

Development of an integrated information and Communications Technology competency framework for prospective Accountancy professionals

O Stumke

 **orcid.org/0000-0001-8240-6298**

Thesis accepted in fulfilment of the requirements for the degree
Doctor of Philosophy in Accountancy at the North West
University

Promoter: Dr JJ Swart

Co-promoter: Prof MJ Swanepoel

Graduation ceremony: June 2021

Student number: 12807958

ACKNOWLEDGEMENTS

I would first and foremost like to thank my amazing husband and kids, TJ and Mia. Thank you for allowing me to miss family outings, bedtime stories, and endless games. Without your gracious sacrifice of my time, I would never have had enough hours in a day to start, continue and finally finish this thesis.

Then I would like to thank my heavenly Father. Without Your continuous internal motivation and those working for you and through you that you sent on my path, I could not have realised my vision that is this dissertation.

A lot of people continuously motivated, encouraged and stood by me throughout this journey. I would specifically like to thank the following people:

- My study leader, acting as my motivator, psychologist and comical relief when I tended to get stressed and demotivated, Dr JJ Swart. Without you, this journey would have been very dull and even more stressful.
- My co-promotor, Prof MJ Swanepoel, who started with me on this journey when we devised my study plan in 2016 with the end goal of 2020. Thank you for pushing me and believing in me.
- My director, Prof H Janse van Vuuren and my colleagues from the School of Accounting Sciences, Vanderbijlpark. A lot of you often just called to check in. Your concern and interest in the process have pushed me to carry on even through the difficult time I had this year. I am not going to mention anyone by name in fear that I miss someone. Just know, I thank you!
- To all my personal friends. Thank you for not giving up on me when I did not phone or check in because I was always busy with my PhD. Your patience means a lot and will never be forgotten.
- Jomoné Müller, thank you for keeping me calm in the final stages of the language editing. Your professionalism and personalised touch are much appreciated.
- Lastly, I dedicate this dissertation to my late mother. Mom, I know that you are proud of me and smiling from above. Thank you for all my life lessons and inspiration throughout the years.

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Keywords: Accountancy curricula, Bloom's, competency framework, core modules, employers, expectations, ICT, integration, model development, SAICA, university

With the rapid change in the workplace due to 4IR technological advancements, literature outlines that the accountancy curriculum is not keeping up with this change. This remains an ongoing debate by academics, employers and SAICA. In order to ensure that well-rounded prospective accountancy professionals enter the workplace with the expected and required basic ICT competencies, the resounding cry from employers and SAICA, as the professional body referred to in particular for this study, is that the accountancy curriculum needs to adapt to take into consideration the changing ICT competencies.

This study concludes that this could be achieved through the integration of specific ICT competencies into the core accountancy modules: Financial Accounting, Audit; Financial Management, Management Accounting and Taxation, linked to the learning outcomes already developed in the curriculum. This is achieved through the development of an integrated communications and technology competency framework (ICTM) for prospective accountancy professionals. The development of the ICTM took place in four steps.

Step 1 was the preparation of the development of the ICTM. This resulted in the development of the research problem and the subsequent objective to answer that question. This entailed the identification of the existing ICT competency gap between what is included in the accountancy curriculum and what is expected from employers and required by SAICA and what specific ICT competencies should be included in the accountancy curriculum. Step 2 entails the collection of information. This took the form of an exploratory mixed research method, including both qualitative and quantitative research. The collection of qualitative data was performed in an unstructured manner. Relevant literature, pertaining to ICT and ICT in the accountancy curricula, the current South African conditions that will affect prospective accountancy graduates, exposure to ICT at school and university level was selected. Also selected and investigated was, employer ICT competency expectations, educational and needs theories that had an impact on this study (Bloom's taxonomy, Maslow's hierarchy of needs and the technology acceptance module (TAM)), and SAICA ICT requirements. These theories propose that knowledge should be linked to learning outcomes and assessed in a scaffolding approach. The starting point being basic, moving to intermediate and ending with advanced knowledge. Applying this to the development of the

ICTM, basic ICT competencies are integrated in the 1st year of study, with intermediate ICT competencies in the 2nd year of study and finally expert ICT competencies in the final year of study. Since the availability of ICT does not necessarily lead to the acceptance of ICT, TAM was also considered to establish and consider the different factors to take into consideration in the development of the ICTM for the successful integration of ICT in the accountancy curriculum by prospective accountancy professionals and lecturers.

SAICA outlines in their competency framework (CF), previous versions and more recently in the CA 2025 proposed CF, the specific technical and other competencies prospective accountancy professionals should possess when they enter the accountancy workplace. The latest proposed CF takes into consideration the 4IR ICT competencies necessary in the accountancy environment. Even with the latest published CF and the proposed CF, the specific ICT competencies to be mastered by prospective accountancy professionals are not outlined in detail. This study will thus assist educators in the preparation of their modules in such a manner to adhere to SAICA's ICT competency requirements but with more guidance on the specific competencies to be included in the accountancy curriculum.

This study focusses on those ICT competencies included in the CF and required by employers. As a result, the inclusion of MS Word, MS Excel, and MS PowerPoint were researched in detail to establish and outline the basic, intermediate and expert competencies that were included in the ICTM. This is in line with the scaffolding approach as outlined by RBT and linked to Maslow's hierarchy of needs adapted to the accountancy education levels. Subsequently, a detailed outline of the specific competencies included under the three competency levels is provided. These specific competencies are linked to the learning outcomes of the four core accountancy levels of the two universities, one traditional and one comprehensive university, who partook in the answering of the self-developed questionnaire. The learning outcomes of the two universities were matched to further streamline the ICT competencies to be integrated into the accountancy curriculum.

The data collected through literature were analysed and summarised in corresponding themes. These themes were instrumental in the development of the quantitative data collection tool, a self-developed questionnaire. Several guidelines were followed in the appropriate development of the questionnaire.

The structured qualitative data were obtained from the analysis and interpretation of responses collected from a self-developed questionnaire. The quantitative data collection followed a non-probability sampling method. The questionnaire was sent to the students and lecturers of two SAICA-accredited universities, one traditional and one conventional university. The responses

were downloaded in MS Excel and coded accordingly. The qualitative statistical data analysis was performed through the identification and analysis of frequencies and correlations between different questions. The qualitative statistical data were performed in a structured method through the use of SPSS. Cronbach's alpha coefficient, Pearson's correlation, and crosstabs were performed to determine the reliability of questions, identify correlations between different variables, and to identify elements with a significant association with one another.

Step 3 of the ICTM development is where the framework was developed. This took into consideration the specific elements as identified through literature and the outcomes of the qualitative and quantitative statistical data analysis. The conclusion is drawn from all of these elements, and as applied in the ICTM is that ICT competencies should be integrated from the first year (1st year) of study at a basic competency level and only for accounting, as it is the only core module presented in the 1st year. At a second-year (2nd year) level, intermediate competencies can be integrated for all four core modules and similarly at an expert level for the third (3rd year) and final year of study. The honours year level was identified as a year of study where no additional ICT competencies should be included in the accountancy curriculum, but rather just the implementation of those competencies acquired from the 1st year to the 3rd and final year of study. The integration of the specific ICT competencies is suggested by means of assignments to the core modules. Also, the integration of ICT should be limited to between 7–10 hours per module per semester. This benchmark was considered appropriate for the ICTM since the findings from the self-developed questionnaire outlined that students spend on average between 7–10 hours on assignments within a semester.

Step 4, and the final step in the development of the ICTM, were the development of ICT module-specific assignment questions. In doing so, TAM 2 was also considered to determine the acceptance of the ICTM by students and lecturers within the accountancy curriculum.

In conclusion, this study addressed the research question through the implementation of the theoretical and empirical objectives. A contribution to the accountancy field is made to identify the specific ICT competencies of MS Word, MS Excel and MS PowerPoint that can be integrated at the different year levels within the accountancy curriculum without adding to the workload. Also, due to the limited research on this topic, this research added to the scholarly outputs.

REMARKS TO THE READER

When reading this thesis, the following details should be taken into consideration that is specific to this thesis:

This study takes into consideration the seminal concepts starting from 1943 to the current conditions in literature in 2020. The reason for the spread of the information is to ensure that a holistic view is presented from the past and present circumstances with regard to the changes over the decades in the accountancy curriculum, required and expected ICT competencies, and the different theories affecting this study.

This study was written according to the NWU Harvard referencing style. Accordingly, references in the text and the reference list are based thereon. The full detail of these guidelines can be located at https://libguides.nwu.ac.za/ld.php?content_id=55809801.

Care was also taken to present this thesis as required by the North-West University postgraduate policy. This policy can be located at: [http://studies.nwu.ac.za/sites/studies.nwu.ac.za/files/files/postgrad/Higher%20Degrees%20Manual Senate 1Sept2020.pdf](http://studies.nwu.ac.za/sites/studies.nwu.ac.za/files/files/postgrad/Higher%20Degrees%20Manual%20Senate%201Sept2020.pdf).

Since this study focusses on accountancy professionals, the concept “accounting and accountancy” is widely used and refers to different qualifications. Thus, where referring to the module accountancy as a curriculum, for this study, it includes BCom CA, BCom Accountancy, and BCom Accounting. Similarly, when referring to CA(SA) it includes, professional accountants, internal auditors, financial managers, tax advisers, etc. to be inclusive of all and any prospective accountancy professionals for this study.

Another inclusive term used throughout this study is where reference is made to information communication technology (ICT). The term ICT is inclusive of any technology components including computer programs, software programs and competencies used to calculate, analyse and research, technological resources such as computers, laptops, the internet, and any other devices, the use of a computer to type. Accordingly, the term information technology (IT) is included in the use of ICT for this study.

The research and research outputs, linked to this thesis are as follow:

- The article on the integration of IT within the accountancy curricula was peer-reviewed and published as part of the conference proceedings of the IIICE 2019- October, Dún Laoghaire, Co. Dublin Ireland, conference. The reference to this article is as follow:

Stumke, O. 2019. Accountancy curricula burden: An investigative study at a South African SAICA-accredited university on the information technology integration opportunities. Ireland International Conference on Education (IICE) (ISBN 978-1-913572-02-0). The author received the best paper award at the Conference.

The published conference proceeding adhered to the conference's guidelines.

- The following book chapter on research on accounting education was co-authored and published as follows:

Stumke, O. & Swart, A. 2020. Information technology in accounting education. *South African Accounting Education Stocktake*, p.205.

The PhD candidate (Stumke, O.) submitted the chapter as the first author and contributed more than 50% to the chapter in accordance with the North-West University guidelines. The remainder of the chapter was contributed by the PhD thesis promotor (Swart, J.J.) by means of a review of the chapter prior to its submission.

- The following article on the integration of ICT into the accountancy curriculum was submitted to the Open Journal of Social Sciences (JSS) as follows:

Stumke, O., Swart, J.J. & M.J. Swanepoel, 2020. Investigating the integration of ICT competencies into the accountancy curriculum using Bloom's taxonomy. Open Journal of Social Sciences (JSS). Unpublished.

Confirmation of the submission is included in Appendix C.

The PhD candidate (Stumke, O.) submitted the article as the first author and contributed more than 50% to the article in accordance with the North-West University guidelines. The remainder of the article were contributed by the PhD thesis promotor (Swart, J.J.) and co-promotor (Swanepoel, M.J.) by means of a review of the article prior to its submission.

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LIST OF ABBREVIATIONS AND ACRONYMS USED

1 st year	: First year
2 nd year	: Second year
3 rd year	: Third year
4IR	: Fourth Industrial Revolution
4th year	: Fourth year
AAA	: American Accounting Association
AAT(SA)	: Associate Accounting Technician
ACC	: Accounting
AECC	: Accounting Education Change Commission
AGA(SA)	: Associate General Accountants
AI	: Artificial intelligence
AICPA	: American Institute of Certified Public Accountants
AUD	: Auditing
CA(SA)	: Chartered Accountant (South African)
CAATs	: Computer Assisted Audit Techniques
CAW	: Chartered Accountants Worldwide
CF	: Competency Framework
CICA	: Canadian Institute of Chartered Accountants
DHET	: Department of Higher Education and Training
DoBE	: Department of Basic Education
DoE	: Department of Education
FEMS	: Faculty of Economic and Management Sciences
FM & MA	: Financial Management and Management Accounting
FPL	: Food poverty line
IAS	: International Accounting Standards

IB	: Personal attributes
IC	: Professional skills
ICAA	: Institute of Chartered Accountants in Australia
ICT	: Information and communication technology
ICTM	: Integrated ICT CF model
IFAC	: International Federation of Accountants
IFRS	: International Financial Reporting Standards
IoT	: Internet of things
IRBA	: Independent Regulatory Board for Auditors
ISA	: International Standards on Auditing
IT	: Information technology
LBPL	: Lower-bound poverty line
LMS	: Learner Management System
MCQ	: Multiple choice questions
MS	: Microsoft
MST	: Maths, Sciences and Technology
n	: Number of respondents
NPA	: National Development Plan
NWU	: North-West University
OBE	: Outcome-based education
OECD	: Organisation for Economic Co-operation and Development
PC	Desktop computer
PC-MoMM	: Practical course using magic of making mistakes
QUAL	: Qualitative
QUAN	: Quantitative
RA	: Registered Auditors

RBT	: Revised Bloom's Taxonomy
SAICA	: The South African Institute of Chartered Accountants
SPSS	: IBM SPSS Statistics
TAM	: Technology acceptance model
TAX	: Taxation
TC-BT	: Educating IT-Engineering theory course
U1	: University 1
U2	: University 2
UBPL	: Upper-bound poverty line

CHAPTER 1

INTRODUCTION AND RATIONALE FOR THE STUDY

1.1 INTRODUCTION

The constant change in information technology and business environment that led to the Fourth Industrial Revolution (4IR), resulted in the ever-expanding expectation disparity between employers and educators. The South African Institute of Chartered Accountants (SAICA) (2017) highlights this expectation disparity between employers and what universities teach accountancy graduates. However, this is not a new phenomenon, Theuri and Gunn (1998:10) already identified the same issue a decade earlier. Historic research in the accountancy field from the 1980s calls for the change in accounting education, to enable accountancy graduates to meet the needs of the employers in a constantly changing business environment.

The change in the business environment is only one of the events creating a gap between what universities are teaching and what employers are expecting of prospective accountancy graduates. SAICA (2018:6) states that a prospective accountant is someone who possesses, at entry point to the profession, the required competencies and skills as set out in their competency framework (CF). The entry point to the profession is the first year of the training contract and after the graduation (SAICA, 2018:6). As such, this study refers to a prospective accountancy graduate as an accountancy graduate entering the profession.

Du Plessis and Gerber (2012:81) supported by Mungal and Cloete (2016:203) propose that the failing school system is also contributing to this. Samans and Davis (2017:5) and Schwab (2017:4) conclude that in South Africa, a country that is still dealing with poverty and inequality, issues such as information communication technology (ICT) may not be at the same level as in other countries. Heeks (1999:17) and Stumke (2014:17) argue that poverty as a daily challenge is placing ICT in the background where schools will rather focus on feeding their children before providing functioning computer centres. Thus, less focus is placed on technical ICT skills and more emphasis is placed on the general well-being of children.

The historic research from the 1980s by global professional institutions, professional bodies, practitioners, educators and other researchers such as the American Accounting Association (AAA) (1986), Accounting Education Change Commission (AECC) (1990), Lau and Rans (1993:24), Williams (1993:76), the International Federation of Accountants (IFAC) (1996), Adler and Milne (1997:191,199) and Theuri and Gunn (1998:101) emphasise that accounting education

should focus less on technical skills and place more emphasis on the skills required by employers. More recently, Lubbe (2017:67) supports the sentiment echoed by prior research that accounting education should deliver graduates that are prepared for the workplace. SAICA (2016) emphasises in their CA 2025 project that ICT is one of the cornerstones for the development of a South African Chartered Accountant (CA(SA)) of the future, which further supports the need for this research.

The AAA (1986:42) supported by the chief executives of the then eight multinational accounting firms (Arthur Andersen, Coopers and Lybrand, Deloitte Haskins and Sells, Ernst and Whinney, Peat Marwick Mitchell, Price Waterhouse, Touché Ross, and Arthur Young), as they were known in 1998, argue that universities did not keep up with the change in the business environment. Kullberg *et al.* (1989:3) further emphasise that employers require from universities to lecture accounting content linked to real-life situations.

Kullberg *et al.* (1989:5) are of the opinion that the accountancy curricula should be structured in such a way as to focus more on employer needs and less on the interest of the faculty. Williams (1993:208) accentuates that professional values of accountancy students can be enhanced through the development of professional skills and knowledge. Albrecht and Sack (2000:2) support this view and argue that the change in accountancy curricula should aim to educate businesspeople and not just accounting graduates. Marcis *et al.* (2005:185) highlight the fact that prior research on the improvement of accountancy curricula is limited in contrast to the vast availability of research on the employability of accounting graduates. Le Grange (2006:189) shares this sentiment in his view that South African higher educational changes discussions have not included considerable talk about the inferences for curricula.

For a curriculum to change, educational theories need to be considered. Maphosa *et al.* (2014:358) identify Bloom's taxonomy, in a revised format, as the educational theory used in higher education in South Africa. Crowe *et al.* (2008:368) explain that this theory allows for the development of learning outcomes, assessment opportunities and teaching activities. Before deciding how a concept should be assessed, Sengupta (2011:103) asserts that the satisfaction of basic needs should first be considered. This is achieved through the considerations as set out in Maslow's hierarchy of physiological needs. Milheim (2012:159) adapted Maslow's hierarchy of needs to various levels of online courses. Subsequently and in line with this, is where Stumke (2014:12) adapted these needs to the accountancy graduate where the needs in terms of ICT will first need to be met at a primary school level and gradually built to the professional career needs. Therefore, if a prospective accountancy professional does not possess the basic needs at a

primary school level the foundation for the other needs is not achieved leading to the gap in the development of professional needs and skills. As a result, textbook skills may be mastered at a theoretical level with limited to no practical application skills.

Siegel *et al.* (2010:44) argue that textbook smart accountancy graduates will not necessarily be able to hit the ground running when employed. Van der Merwe *et al.* (2014:282) highlight that accounting education is unable to meet the expectations of employers due to the accountancy curricula in South Africa being shaped by the professional body, SAICA. This is done through the outlining of prescribed competencies and skills in their CF (SAICA, 2010; 2014; 2018; 2019a).

The Institute of Directors South Africa (2019) and SAICA (2019b) reiterates the fact that SAICA is one of the leading institutes in the world and remains the leading professional accountancy body in South Africa. With several accounting professionals being registered or having the opportunity to be registered with SAICA, SAICA can be seen as a leader in the development and maintenance of skills and competencies of the accounting profession (SAICA, 2019b). This is as a result of SAICA (2019c) accrediting the following accountancy professions, [1] CA(SA); [2] Associate General Accountants (AGA)(SA); and [3] Associate Accounting Technician (AAT)(SA). These designations cover a vast range of the accountancy profession, for example, external auditors, internal auditors, financial accounting and reporting, taxation, payroll accounting, information technology, purchase accounting and costing and budgeting, to name a few (SAICA, 2019c). Given the fact that SAICA includes most, if not all, the professions that an accountancy graduate can qualify for, SAICA is used as a reference when it comes to the required competencies and skills a prospective accountancy professional should possess. This view is supported by De Villiers (2015:1) attesting to the fact that SAICA encompasses a vast majority of accountancy competencies that can be applied in different professional qualifications. With the availability of different competencies across different professional bodies, such as the Institute of Professional Accountants, the Institute of Management Accountants, and the Association of Chartered Certified Accountants, to name a few, not specifically taking into account the ICT requirements from these professional bodies are listed as a limitation to this study in Chapter 7, paragraph 7.9.

SAICA, as the professional body, constantly revises and updates the CF in an effort to address the needs of their members and to ensure that the qualifications remain relevant to the changing business environment SAICA (2018). Van der Merwe *et al.* (2014:282) explain that lecturers and students at SAICA-accredited universities are influenced and constrained by the SAICA CF. Van Romburg and Van der Merwe (2015:142) emphasise that the CF is prescriptive but not

comprehensive enough in what must be taught. Since the introduction of the first CF in 2010 by SAICA (2010) both technical and pervasive skills have been included. However, Van der Merwe *et al.* (2014:282) argue that the accountancy curricula in South Africa can be seen as restricted due to "syllabus overload" affecting the development of "other pervasive skills". This supports the views of the authors mentioned above. The constant technical changes, including updates to International Financial Reporting Standards (IFRS), International Standards on Auditing (ISA), International Accounting Standards (IAS), Code of Professional Conduct etc., in the accountancy curricula, as outlined in the CF and implemented by SAICA, may be the main reason for this.

Wally-Dima (2011:7, 21-22) argues that with this overload the development of pervasive skills by universities is lacking. Ahmed (2019:21) and Lawson *et al.* (2014:298) identify that a persisting problem of accounting education is producing entry-level graduates with limited focus placed on the long-term needs of employers. Lawson *et al.* (2014:298) conclude that the changes made in accounting education up to 2014 will not meet employers' expectations. Pervasive skills consist of soft skills, such as lifelong learning; communication, time management and research, and ICT skills, such as preparing financial statements and reporting, to name a few examples.

Thomson (2017:16) highlights employer concerns regarding the level of basic ICT competencies prospective accountancy professionals enter the workplace with. The inability to perform basic ICT competencies, such as Microsoft (MS) Excel calculations, when prospective accountancy professionals perform their work took up more time than would have been the case if the professionals already mastered these skills at university level. Albrecht and Sack (2000:2); Allen (2000:152); Jones and Sin (2003:141-144) and Webb and Chaffer (2016:349) are in agreement that this disparity between what is imparted and what is expected results in the unpreparedness of prospective accountancy professionals. Lawson *et al.* (2014:301) supported by SAICA (2017:1) argue that basic competencies, including basic ICT competencies, can aid graduates to become valuable employees.

Throughout the business environment, including education and technology changes, the inclusion of ICT into all aspects of a prospective accountancy professionals' work life is emphasised and carried through to the CA 2025 project (SAICA, 2017). The guidance in the latest published CF on the pervasive skills to be taught is limited compared to the detail provided on the technical content. The technical content is divided into six main competencies that are included in four core modules at university level: Accounting, Auditing, Financial Management and Management Accounting, and Taxation (SAICA, 2018). For ICT competencies the user tools under user competency requirements listed are limited to the basics of MS Excel and Word (SAICA,

2019a:7). SAICA's CF gives universities the freedom to implement and design accountancy curricula within the bounds of the CF to fit the needs of the university (SAICA, 2010:7-8, 2014:8, 2018:9). Furthermore, SAICA (2017:21) outlines that prospective accountancy professionals have to display ethical behaviour in every and all tasks performed by them resulting in the inclusion of ethical ICT behaviour. Since ethical behaviour is an integrated part of any competency of SAICA (SAICA, 2017:32), not considering the ethical part of ICT competencies results in a limitation to this study. This fact is outlined as such in Chapter 7, paragraph 7.9.

Albrecht and Sack (2000:2), Jones and Sin (2003:141-144) and Wally-Dima (2011:21-22) conclude that more emphasis is placed on technical knowledge while the rapidly changing business environment requires more "other pervasive skills", including ICT, that should be imparted onto accountancy students, in line with 4IR competencies. Chang and Hwang (2003:445) propose that the integration of ICT into the modules already offered in an accountancy curriculum may be the best option. This will not add additional content and further burden students and the curricula. Phan *et al.* (2020:14) illustrate that employers are concerned that basic ICT skills are not mastered at university level. This conveys the need to investigate the possible integration of ICT into the core modules of the accountancy curricula.

Barac emphasises that "Future CA(SA)'s will need a better balance between pervasive and technical skills to continue to demonstrate their professional competence in serving the public's interest" (SAICA, 2017). In contrast to the fast-changing business world and employer expectations, several South African university's accountancy curricula remained stagnant (Lubbe, 2017:70). Lubbe (2017:61) outlines that generally the only "change" in the South African accountancy curricula happens when so requested by the accounting profession and the business environment. The resounding influence leading to this change is enforced by SAICA through the guidelines provided (SAICA, 2010, 2014, 2018). As evident from the latest published CF (SAICA, 2018:15-18) the main changes, additions, and exclusions, to the content that should be mastered in an accountancy curriculum is due to the changing business and professional environment. Eberhard *et al.* (2017:48) and Lubbe (2017:61) support SAICA's changes as this will keep the accountant relevant for the changing business environment. Some of these changes includes the exclusion of the Closed Corporations Act 69 of 1984 and certain types of engagements being graded down to only basic knowledge and the inclusion of public sector guidance, double tax agreements, ethics (pervasive skills), strategic and risk management, and integrated reporting (SAICA, 2018:15-18).

Although SAICA (2018) provides clear guidance on the knowledge, skills, and attributes a potential CA(SA) should have mastered when entering the workplace, based on the level of importance, accountancy graduates do not always demonstrate competence to protect the public interest. With the clear guidance provided by SAICA, it is thus fair for employers (small, medium and large accounting and auditing firms) to expect that the accredited SAICA universities would have at least instilled said competencies.

With SAICA (2017) acknowledging that change is needed in the accountancy profession the CA 2025 project was launched in 2015. This project aims to investigate the changes necessary within the accountancy profession and how these changes can be effectively implemented by all stakeholders to shape prospective accountancy professionals for the 4IR. The notion echoed by this project is that the accountancy profession's future rests on its ability to meet the changing needs of the business through revising current practices. Current and future research on the competencies to be expected of future CA(SA)'s and Registered Auditors (RA) have been commissioned by SAICA and the Independent Regulatory Board for Auditors (IRBA). The research of the CA 2025 project participants included small to large accounting firms and all stakeholders (universities, trainee accountants, lecturers, professional bodies etc.) in between. Stakeholders at every stage of the development of a prospective accountancy professional formed part of this research to ensure that change can be implemented effectively. In order to achieve this change, a challenge has been extended by SAICA for the revision of the current accountancy curricula by universities (CFO, 2017).

Similarly, this study aims to investigate ICT integration opportunities within the existing accountancy curricula. This is linked to SAICA's goals to revise the current curricula to ensure that the future prospective accountancy professionals can function in the current ICT work environment. Ultimately, it will strive to meet the needs of employers and deliver employable graduates. The needs of employers are addressed in this study in Chapter 3 where literature on the specific ICT competencies considered to be vital by employers for prospective accountancy professionals to possess when they enter the workplace are investigated and summarised.

SAICA (2017) outlines that in their quest to revise the accountancy curricula, the first phase of the CA 2025 project highlights the main themes such as “technical knowledge including strategy, risk and business acumen, interpersonal skills, higher-order of thinking, leadership, and citizenship (including innovation and entrepreneurship), technology and communication (including data analytics), ethics and lifelong learning” as part of the competencies an accountancy professional should master. However, there is limited recent research on how to

integrate these competencies into the accountancy curricula. Prior research from 1980 focusses on accountancy education and needs in general with a clear disparity on how and if ICT can and should be integrated into the accountancy curricula.

Preliminary research was conducted through a document analysis of a traditional university and a comprehensive universities' accountancy degree's published yearbooks for 2020. The preliminary results of the research indicate that universities either offer no ICT modules or only a semester ICT module in their accountancy curricula.

1.2 PROBLEM STATEMENT

With the change in the accountancy work environment, employers are expecting prospective accountancy graduates to possess more ICT competencies when they enter the workplace. This is not a new expectation and SAICA has recently identified that the needs of employers and what universities are teaching should be better balanced between technical and pervasive competencies.

Prior research found that universities focus a lot on technical content as outlined by SAICA with less emphasis being placed on pervasive skills. The specific pervasive skill that is becoming more and more important for a prospective accountancy professional to master is the use of ICT. Employers have identified this competency as one of the gaps in a prospective accountancy professional's list of skills when they enter the workplace. The best way more emphasis can be placed on ICT in the accountancy curricula, as outlined in literature, is through the integration thereof in the already established curriculum.

Research on ICT integration in South Africa into accountancy curricula is limited. Accountancy curricula research mainly emphasises technical content with little to none focus on pervasive skills, which include ICT. Of greater concern, however, is that no recent research could be found on the specific integration opportunities of ICT competencies within the accountancy curricula. These integration opportunities would be ideal to enable the accountancy curricula to not be further overloaded with content.

Even though SAICA provides guidance on what should be taught to prospective accountancy professionals, the CF lacks guidance on how and what ICT competencies, included in the outlined pervasive skills, should be developed. Also, limited guidance is available on how these competencies can be integrated. If the accountancy curricula do not accommodate the outlined basic ICT competencies, there is a risk that the needs and expectations of employers are not met.

Throughout the years, there is an ever-growing disparity between what employers expect of graduates and what universities are teaching them.

This gives rise to the research question: What specific ICT competencies and how these competencies should be integrated into the already established accountancy curricula content of prospective accountancy professionals?

1.3 OBJECTIVES OF THE STUDY

The following objectives have been formulated for the study:

1.3.1 Primary objective

In order to address the problem statement, this study will develop an integrated information and communications technology competency framework model (hereafter referred to as ICTM) for specific ICT competencies in the four core accountancy modules of prospective accountancy professionals.

1.3.2 Secondary objectives

In order to achieve the primary objective firstly, the specific ICT competencies will be identified through the review of literature on ICT competencies and ICT expectations for prospective accountancy professionals. Secondly, a self-developed questionnaire focussing on the four core modules (Accounting, Auditing, Financial Management and Management Accounting and Taxation) of the accountancy curricula for prospective accountancy professionals will be circulated to identify integration opportunities and also to highlight what the current status of ICT integration at two South African universities are. These objectives will be addressed through the following theoretical and empirical objectives.

1.3.2.1 Theoretical objectives:

The aim of the theoretical objective is to review the literature with regard to the accountancy profession within South Africa and globally. This will, in turn, highlight the current ICT struggles, opportunities, and requirements from all stakeholders with regard to the prospective accountancy professional. The following specific theoretical objectives were formulated for this study, which will be achieved by a review of the following:

- Identify the current implementation and use of ICT in South Africa focussing on poverty and inequality, schools, universities and transformation and employer expectations of prospective accountancy professionals, discussed in Chapter 2.
- Investigate the different educational, motivational and technology acceptance theories that had an impact on this study, discussed in Chapter 2.
- Identify the ICT competencies required by prospective accountancy professionals by analysing SAICA's latest published and proposed CF and literature on 4IR, discussed in Chapters 2 and 3.
- Identify the possible ICT integration necessities and opportunities into accountancy curricula, by analysing the views of the different stakeholders, SAICA (professional body), DHET (university requirements) and employers (current markets) discussed in Chapters 2 and 3.
- Identify the most appropriate research design and methodology for this study, discussed in Chapter 4.

The above theoretical objectives will be achieved through the following additional empirical objectives.

1.3.2.2 Empirical objectives:

The aim of the empirical objective is to formulate the data collection tool, from literature and previous studies to enable the collection of data from a target population that will assist in the development of the ICTM. The following specific empirical objectives were formulated for this study:

- Determine the main themes for this study, in order to develop the self-developed questionnaire, discussed in Chapter 4.
- Identify the current status of ICT integration in the accountancy curriculum of two selected universities, discussed in Chapter 3.
- Compare the general learning outcomes of the core accountancy modules of two selected universities with the ICT competencies expected by employers and required from SAICA's CF, discussed in Chapter 3.
- Developed a questionnaire to send out to the students and lecturers of one traditional university and one comprehensive university within the accountancy departments, discussed in Chapter 4.
- Perform qualitative, quantitative and descriptive statistical data analysis methods and analyse the results to identify similarities, anomalies and correlations between different

questions. Also, to verify the reliability of questions included in the self-developed questionnaire where possible, discussed in Chapters 4 and 5.

- Identify and link specific expectations to be included in the ICTM from the two respondent groups by analysing the questionnaire administered to the different respondent groups with the literature review, discussed in Chapter 6.
- Develop an integrated information and communications technology competency framework model for prospective accountancy professionals, as explained in Chapter 6.

In order to achieve the primary objectives, the design and methodology used should be well-planned and documented.

1.4 RESEARCH DESIGN AND METHODOLOGY

This study followed an exploratory mixed-method research approach. This entailed qualitative research followed by quantitative research. The qualitative research, literature review, followed the review of seminal and current research on ICT and ICT integration in the accountancy curriculum. The quantitative research portion, the empirical part of this study, was conducted using a self-developed questionnaire. The self-developed questionnaire underwent specific steps to ensure its validity and reliability prior to, during and after distribution to two selected participating universities.

This study followed a pragmatist research paradigm. Hanson *et al.* (2005:226) and Johnson, Onwuegbuzie (2004:16) and Rahi (2017:1) argue that this paradigm is inclusive of the interpretivist, qualitative research, and positivist, quantitative research paradigms.

The interpretivist paradigm represents qualitative research as outlined by Creswell (2014:8). This is where reliance is placed on previous contributions by individuals in the same field of study. De Vos *et al.* (2018:6) argue that the positivist paradigm is where additional information is obtained from outside parties, representing quantitative research.

1.4.1 Literature review

Creswell *et al.* (2010:26) outline that through a historical and current literature review the gaps or flaws in literature can be identified and serve as relevance of the motivation for the research. Mouton (2011:86-87) argues that a literature review contributes towards research. Welman *et al.* (2005:214) explain that through a literature review themes and patterns, ideas, concepts, behaviours, interactions, incidents, terminology or phrases to make sense of words are the main purpose of qualitative research. Through the literature review for this study, the views and

concepts of various stakeholders on the importance of ICT and the methods of integration were identified. This aided in the development of the ICT integration model.

Cassim (2014:46) supported by Kumar (2014:196) and Struwig and Stead (2001:80) outline that secondary data are those data that are publicly available and where various methods can be applied to obtain this data. Swart (2018:153) points out that this type of data is either copied or transferred from their original source and then scrutinized and communicated on by the researcher. For this study, secondary data sources, published and publicly available were reviewed and included relevant textbooks, journal articles, newspaper articles, the internet, and university materials (previous studies performed, yearbooks and study guides). The literature study was conducted on the integration of ICT into accountancy curricula on a seminal approach since 1970 up to the most recent curricula available. The purpose of the literature study is to address the theoretical objectives, as outlined in Paragraph 1.3.2.1, to identify the views from professional bodies, employers and academics on the importance of ICT in an accountancy curriculum. The possible ICT integration options were identified together with the generic basic ICT competencies to be integrated. Combining the views and importance of ICT integration with the possible options and in line with the empirical research objectives an integrated ICT model is developed.

In addressing the theoretical objectives, the literature review assisted in the identification of common themes with regard to what specific ICT competencies, when they should be taught, and how they can be integrated. This was further supported through the empirical objectives as outlined in Paragraph 1.3.2.2. A broad overview of the empirical objectives, as an empirical research is discussed below.

1.4.2 Empirical research

Robson (1993:88) categorises empirical research design into three categories: fieldwork, survey research and experiments. He outlines fieldwork as the collection of data on people or occurrences in their real life context, also known as a case study. Survey research is where larger groups are used to collect data in a more or less standardised way. Lastly, experimental research follows research based on the manipulation of a particular variable on a dependent variable.

Pöchlacker (2016:67) concludes that out of the three empirical research designs, survey research has become a popular strategy for research on user expectations. This was also the empirical research design followed for this study. The focus was placed on what ICT competencies that are being taught at university level and what should be taught, no experiment was conducted resulting in the non-experimental design being the most suitable for this research.

An empirical review utilises structured methods to categorise and assess relationships and trends between variables (Denzin & Lincoln, 1994:4; McCusker & Gunaydin, 2015:538). This is the main reason for the selection of surveys as the research design for the empirical part of this study. The main elements of the empirical review including the variables and trends for this study are explained further in the next paragraphs:

- 1) Target population
- 2) Sampling frame
- 3) Sample method
- 4) Sample size
- 5) Measuring instrument and data collection method

1.4.2.1 Target population

Welman *et al.* (2005:52) outline that the population of a study includes individuals and groups and is the purpose of the study. Bryman (2016:131) argues that the population is the “universe of units from which the sample is selected”. The following paragraph explains and elaborates on the relevant population that forms part of this study.

The population for this study is the 17 SAICA-accredited universities within South Africa. These 17 universities fall in two university categories, 11 traditional universities and 6 comprehensive universities (Bevan-Dye & Akpojivi, 2016:114). South African Education (2020) describe traditional universities as universities that offer theoretically oriented university degrees. Whereas comprehensive universities provide a combination of both traditional and University of Technology qualifications. Based on the experience of Stumke (2014:67-70) and Swart (2018:213), response rates from universities are often limited. Consequently, the population was limited to 2 South African universities, one traditional university (University A) and one comprehensive university (University B). This is to ensure the representation of the two classifications categories of universities in South Africa.

SAICA (2019b:3-4) included as part of their discussions for the CA2025 project members in business, accounting firms and academia. Based on the importance placed on these stakeholders, the population for this study also included the above-mentioned groups specifically. The qualitative research included all the above-mentioned groups while the quantitative research included students and lecturers only. This is discussed in more detail in Chapter 4.

As it is impractical to test an entire population Welman *et al.* (2005:55) and Creswell *et al.* (2010:146-147) argue that a sample, representative of the population, should be selected.

Bryman (2016:131) explains that a sample will be representative of the population when it accurately replicates the population for it to be a small-scale version of the population.

1.4.2.2 Sampling frame

Since the aim of this study is to develop a competency framework to integrate specific ICT competencies within the accountancy curriculum, the sampling frame within the population focussed only on the students and academics enrolled for an accountancy qualification and teaching an accountancy module within the two SAICA-accredited universities.

The method in collecting the necessary information from the sampling frame was conducted by means of a self-developed questionnaire.

1.4.2.3 Sample method

The two different types of sampling as identified by Welman *et al.* (2005:56) are probability and non-probability sampling. Probability sampling affords the researcher the opportunity to conclude on the probability that the sample will deviate from the entire population. Non-probability sampling includes accidental or incidental, quota, purposive, snowball, self-selection and convenience samples. Creswell (2014:158) argues that the use of non-probability sampling is frequently used for convenience. Uprichard (2013:3) outlines that this method is used to further understand existing knowledge about the selected sample and not always directed to obtain information about the population.

This study applied convenience sampling since previous research conducted at universities outlines the low response rate. With selecting only two universities and focussing on the two different types of universities, traditional and comprehensive universities, the data obtained were able to be extrapolated over the entire population. In order to protect the identity and to ensure the confidentiality of the participants, convenience sampling was found to be the best sampling method for this study.

1.4.2.4 Sample size

The sample size for this study for the self-developed questionnaire consisted of convenience sampling as there are only 11 traditional and 6 comprehensive universities that are SAICA-accredited. From these universities, one traditional and one comprehensive university was selected. Bevan-Dye and Akpojivi (2016:114) similarly also only sampled 2 South African universities, 1 traditional university and 1 university of technology, in their studies. Due to this and the experience of researchers on the limited responses from university participants, as discussed in Chapter 4, the selected sample for this study is considered appropriate.

The self-developed questionnaire was sent to the relevant department heads with the link to the questionnaire to be placed on the LMS systems for registered students and lecturers teaching accountancy. The population for students was 5 222 and lecturers 50. In total 332 students and 15 lecturers completed the questionnaire within the stipulated deadline. In total 314 students and 15 lecturer responses were valid and usable. This resulted in an overall response rate of 6,2%. Pallant (2013:208) reasons that for a normal distribution a sample size of 30+ is enough. Based on this, the response rate was concluded to be acceptable.

1.4.2.5 Measuring instrument and data collection method

The methodological dimensions that were followed for this study are as follows:

Questionnaires are outlined by Mouton (2011:99) and Creswell *et al.* (2010:258) as one of the methods of data collection. Before a data collection method is chosen it should be linked to as many possible previous studies performed on the research topic of related topics (Mouton 2011:174). This is to ensure that if a comparison is to be made between the current study and previous studies, similar data collection methods should be used. The variables included in the questionnaire for statistical analysis include the geography of the firm and university, age of employees, fee size, gender, and number of employees in the firm to list a few examples.

Previous research performed by Wally-Dima (2011:7-8), Theuri and Gunn (1998:106-107), Romney *et al.* (1996:59-60) on the disparity among employers and accounting education and ICT in the accountancy curricula all utilised questionnaires to collect data. Seeing as this is in line with this study, a questionnaire was used as one of the methods to collect data.

The requirements as per SAICA's CF and the views of academics and employers as identified through the literature review were used as a basis for the preparation of the questionnaire for the two selected SAICA-accredited universities. The requirements and the themes identified through the literature review were instrumental in the development of the questionnaire.

A pilot study was conducted on a small locally based group representative of the population before administering the questionnaire to the rest of the population (Swart, 2013:116). The self-developed questionnaire was sent in the same way as the final questionnaire, electronically via email, with an additional section for suggestions and comments that could aid in the improvement of the questionnaire. The main purpose of this was to ensure that the questionnaire is understandable and relevant before circulating it to the desired sample. The pilot study was conducted at a local SAICA-accredited university situated within a close vicinity of the researcher's demographics. The responses of these participants did not form part of the final data. After the pilot study was sent out, the responses were downloaded in a MS Excel format

and the questionnaire was amended based on the suggestions and comments of the participants received via email.

After the successful ethics application from the two selected universities and the amendments evident from the pilot study and after consultation with a statistics expert, the department heads were contacted to obtain permission for the questionnaire to be distributed to the accountancy students and staff at their institutions. Subsequently, the purpose and background to the study for which the questionnaire was distributed and the link to the self-developed questionnaire, on Google Forms, was forwarded to these individuals, requesting them to distribute it to the relevant accountancy lecturers to then place it on their LMS for students and lecturers to complete. No students or lecturers were contacted personally. The relevant ethics numbers obtained from the different institutions were also included. The introduction to the study stipulates that the questionnaire is voluntary, and no one is obligated to complete it. Students can access the questionnaire via the link provided in the email sent to the relevant department heads, subsequently added to the LMS by the relevant lecturers.

After the initial responses, based on the willingness of these participant groups, the sample were further justified and discussed.

The questionnaire consisted of close-ended questions based on a four-point Likert scale. It was divided into different sections, based on the main themes identified, to assist in the data coding for analysis purposes. Stumke (2014:72) supported by Swart (2018:13) argues that a four-point Likert scale is the most appropriate scale for close-ended questions in the accountancy study field. Creswell *et al.* (2010:168) outline that a Likert scale of five produces less reliable data since participants have the option to remain neutral on a point. Therefore, this study applies a four-point Likert scale where the options only range between disagree and agree. Where more options are available, for example: What devices do you own, options in excess of four were available. This is discussed in more detail in Chapter 4.

1.4.3 Statistical analysis

The data gathered from the self-developed questionnaire were downloaded in MS Excel and further analysed using IBM SPSS Statistics (SPSS), V25. The following statistical methods as outlined by Pallant (2013:132, 244) were used on the empirical data sets:

- Descriptive statistics (Cronbach's alpha coefficient analysis)
- Pearson correlations
- Crosstabs

These methods and the qualitative analysis are discussed and analysed in Chapter 5. Table 1-1 summarised which statistical analysis was performed in this study with reference to the specific paragraphs.

Table 1-1: Statistical data analysis for this study

STATISTICAL ANALYSIS METHOD	QUALITATIVE	QUANTITATIVE	MIXED
Type of analysis	Descriptive such as frequencies and correlation	Descriptive statistics, Pearson correlations and crosstabs	Combination of qualitative and quantitative data analysis
How analysed	MS Word and graphs	SPSS	
Chapter reference	Chapter 5, Paragraph 5.3	Chapter 5, Paragraph 5.4	Chapter 5, Paragraph 5.5

The qualitative data collected from literature, questionnaires and document review and the quantitative data collected and analysed from the self-developed questionnaire were combined in the mixed-method research approach and assisted in the development of the ICTM.

1.5 ETHICAL CONSIDERATIONS

According to the North-West University (NWU), the issue of ethical consideration deals with confidential information. Approval from the Scientific Committee of the School of Accounting Sciences, Higher Degrees Committee of the Faculty of Economic and Management Sciences (FEMS), Vanderbijlpark Campus, and the FEMS Ethics committee were granted to conduct the research, including the circulation of a questionnaire (ethics clearance number obtained: NWU- 00118-19-A4). The information gained is reported on in aggregation and not on an individual level. The questionnaire does not infringe on any human rights. All participants participated on a voluntary basis and were not forced to participate nor victimised if they decided not to participate in answering the questionnaire. This fact is clearly indicated in the introduction of the questionnaire to the participant. Important to note is also that no individual will be traceable through their participation in the study. This is achieved through the design of the questionnaire using Google Forms in such a way that no personal information such as email address; student number or telephone number are requested. In order to further ensure that a participant is not traceable the Google Forms settings were adjusted where the “collect email addresses” option is not selected. Permission was also obtained from participants to use the responses as part of this study and possible future studies in the same field from all the said participants, prior to them taking part.

As an additional measure to protect personal information and access to participant information of the respondents, permission was obtained from the NWU Research Data Gatekeeper Committee with the reference number: NWU-GK-2002-020.

1.6 PROJECT PLAN

This study is divided into seven chapters, which are summarised below:

1.6.1 Chapter classification

Chapter 1: Introduction and background to the study

This chapter outlines and emphasises the need for this study. An introduction to the literature, research methodology and data analysis are provided. The ICT competencies required from prospective accountancy professionals by SAICA in their CF and as expected from employers are investigated. The current stance in South Africa on ICT availability and integration are also considered. Subsequently, the research problem and question are outlined, and the relevant theoretical and empirical objectives are formulated to address it.

Chapter 2: Importance of ICT and its integration into the accountancy curricula

This chapter addresses the theoretical objectives as outlined in Paragraph 1.3.2.1 through a literature review of secondary data sources that includes relevant publicly published textbooks, journal articles, newspaper articles and the internet. Specific focus is placed on prior and current literature on ICT in South Africa and the accountancy curriculum. With this study being conducted in South Africa, the “current” challenges South Africa faces were considered to ensure information was gathered that aid in the development of an executable ICTM in the South African context. Here focus was placed on poverty and inequality, schools, universities and transformation and employer expectations.

The different theories that had an impact on this study and assisted in the development of the ICTM, teaching taxonomies, needs theories and technology acceptance are also investigated. These are then linked to the main stakeholders of prospective accountancy professionals, SAICA and employers. Subsequently, an in-depth document analysis and literature review were performed on the requirements from SAICA based on their latest draft CF, a product from SAICA’s CA 2025 project and lastly the impact the 4IR has on accountancy education to ensure that the ICTM is relevant and will fit into the current ICT working environment.

Chapter 3: Curriculum design, learning outcomes and knowledge levels for ICT for integration into the ICTM

Following on Chapter 2, this chapter addresses the theoretical and empirical objectives in Paragraph 1.3.2.1 and 1.3.2.2. A review is performed on prior and current literature and secondary data on the necessity and gap of ICT competencies and the integration thereof in the South African accountancy curriculum. Bloom’s taxonomy as a tool used to design a curriculum

is further investigated and linked to ICT in the accountancy curriculum. The specific ICT competencies as deemed necessary by employers and SAICA's latest published proposed CF is also investigated. Similarities between what is expected from employers and SAICA are compared to find the common and most important ICT competencies for a prospective accountancy professional to possess.

Subsequently, a document review is performed on the published yearbooks of the two selected SAICA-accredited universities who participated in the questionnaire completion. The learning outcomes of the four core accountancy modules from first year (1st year) till fourth year (honours) of study are compared to highlight the different learning opportunities for the integration of ICT. The ICT competency requirements from employers and SAICA are then matched to the available ICT opportunities as deduced from the learning outcomes of the two universities.

This comparison is further linked to the different knowledge levels as outlined by Bloom's taxonomy to ensure the scaffolding of knowledge from the 1st year of study till honours level. This served as the first part of the development of the ICTM.

Chapter 4: Research design and methodology

In this chapter, the research design and methodology used to address the research question and objectives of this study as outlined in Paragraph 1.2 are explained. The difference between research design and research methodology are highlighted. Furthermore, research typology and paradigms are discussed. The different methodological approaches used to classify, select and scrutinise data in this study are also discussed. This includes the development of the questionnaire and sampling methods. The motivation for the questions used in the questionnaire is explained as well as the design method. Reference is also made to the literature study in Chapters 2 and 3. Lastly, the statistical and data analytical methods used to scrutinize data are also discussed.

Chapter 5: Results and findings

In this chapter, the data collected from the self-developed questionnaire are statistically analysed in both a qualitative and quantitative manner. This is achieved through MS Excel for the qualitative analysis of frequencies and correlations between different data sets and through SPSS where Cronbach's alpha coefficient, Pearson's correlation and cross-tabs were performed to determine the reliability of variable, significant correlations between them.

A summary of the quantitative statistical analysis that follows on the qualitative statistical analysis is made to clearly outline the exploratory mixed-method research approach followed.

Chapter 6: Development of the ICTM

This chapter outlines the development of an integrated ICT model into the accountancy curricula. The conclusions based on the data analysis, responses and results of the literature review is also discussed.

The method used to develop the ICTM is discussed in detail. Reference is made to the relevant themes identified in Chapter 2 and 3 and linked to the statistical data analysis performed in Chapter 5, which is instrumental in the development of the ICTM developed in Chapter 6. The rationale used for the development alongside the factual information is also outlined. This is in line with the exploratory mixed research method where qualitative research is performed on previous research, followed by quantitative research on data obtained.

Chapter 7: Conclusions and recommendations

In the final chapter of this study, the conclusions for Chapters 1 to 6, the realisation of the theoretical and empirical objectives, limitations to the study, areas for further research and finally the contributions of this study are discussed.

1.7 CONCLUSION

The conclusion drawn from the introduction and background above is that with employer expectations not being met and universities not meeting the needs of the workplace, changes in the accountancy curricula are essential, which are investigated in the chapters to follow. Change in the sense of balancing out the technical with the pervasive competencies within the accountancy curricula could be the first step towards reducing this gap.

This research will potentially contribute to the literature on ICT integration opportunities, specific ICT competencies, and when ICT competencies could possibly be integrated for prospective accountancy professionals. From a lecturer perspective it may provide relief on the marking workload. It could also aid to reduce the mismatch of what is expected of employers and what universities include in the accountancy curricula to meet the needs of all stakeholders. This will also assist in familiarising students with the ICT environment before they enter the workplace. Subsequently, a further contribution is that the model could aid SAICA's CA 2025 project to provide a proposed outline on how ICT can be integrated into core accountancy modules. Hence, the design of an inclusive accountancy curricula could be developed if the model is followed.

In order to outline and understand why, how and when ICT can be integrated into the accountancy curricula, Chapter 2 from a literature review perspective, discusses the requirements from SAICA in terms of ICT and ICT integration. Then, the national requirements for ICT education, as

stipulated by the DHET are outlined in conjunction with any future plans/visions from the department in terms of ICT. Thirdly, what is expected of employees from an employer perspective, in terms of ICT, is investigated. In an attempt to overcome the competency disparities between industry and education the theories on motivation, technology acceptance and education are considered. Linking the different aspects as previously discussed to a South African context, the reality for South Africa today and the challenges we face are discussed. In conclusion, all discussion points are summarised and linked to the research question as identified in Chapter 1.

CHAPTER 2

IMPORTANCE OF ICT AND ITS INTEGRATION INTO THE ACCOUNTANCY CURRICULA

2.1 INTRODUCTION

In order to address the theoretical objectives in Chapter 1, Paragraph 1.3.2.1. Chapter 2 follows a review of prior and current literature on ICT in South Africa and the accountancy curriculum. This ensures that a holistic view is taken on the importance and necessity of ICT and its integration into the accountancy curricula. As this study is based in South Africa, the “current” challenges South Africa faces were considered first to ensure information was gathered that aided in the development of an executable ICTM in the South African context. This addresses the following theoretical objective: Identifying the current implementation and use of ICT in South Africa focussing on poverty and inequality, schools, universities and transformation and employer expectations of prospective accountancy professionals.

Secondly, the next theoretical objective investigates the different educational, motivational and technology acceptance theories that impact this study. This includes the educational theories for the development of the ICTM, motivational theories for the implementation of the ICTM and the technology acceptance model (TAM) for the successful integration of the ICTM.

The different theories that had an impact on this study and aided in the development of the ICTM, namely Bloom’s taxonomy, Maslow’s hierarchy of needs and the technology acceptance model (TAM) are also investigated. This is linked to the views of the main stakeholders in the development of an accountancy professional, ICT education (Department of Higher Education and Training (DHET) and universities), SAICA (professional body), and employers, to address the theoretical objective: Identify the possible ICT integration necessities and opportunities into accountancy curricula by analysing the views of the different stakeholders. Lastly, to ensure that the development of the ICTM is relevant and will fit into the current ICT work environment, an in-depth document analysis and literature review are also done on the requirements from SAICA based on their latest draft CF, a product from SAICA’s CA 2025 project and lastly the impact the 4IR has on accountancy education to address the theoretical objective: Identify the ICT competencies required by prospective accountancy professionals by analysing SAICA’s latest published and proposed CF and literature on 4IR. This aided the effective integration of the different views and requirements in attainable objectives and competencies for the purpose of developing the ICTM. Figure 2-1 illustrates the different topics that are discussed in Chapter 2.

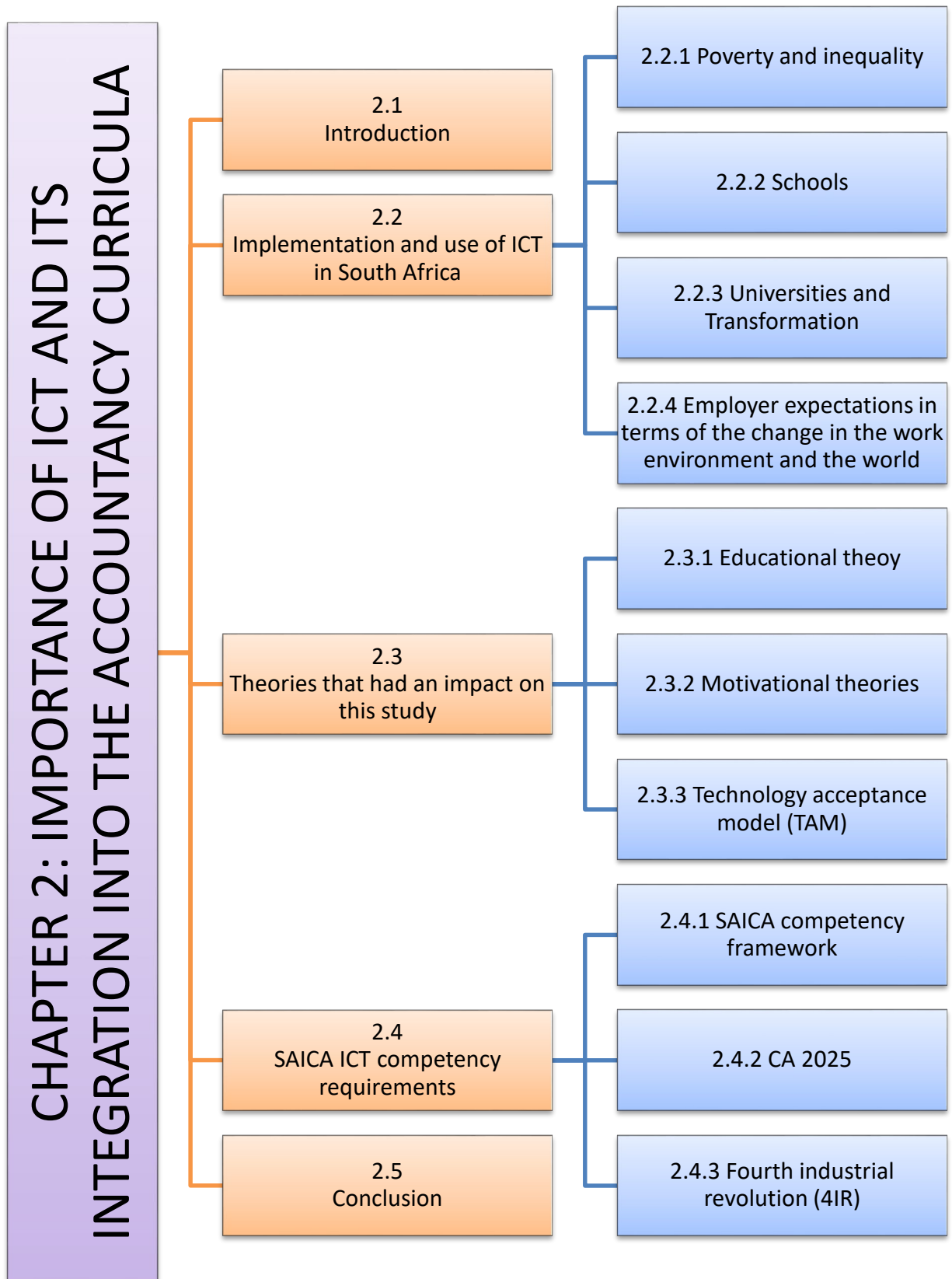


Figure 2-1: Chapter 2 discussion outlay

Source: Summary of paragraphs below

The different sections as illustrated in Figure 2-1 are discussed in more detail below.

2.2 IMPLEMENTATION AND USE OF ICT IN SOUTH AFRICA

Modisane (2019:22) outlines that education forms the cornerstone of an accountancy professional's competencies and skills. Du Plessis and Gerber (2012:81) and Mungal and Cloete (2016:203) emphasise that in South Africa, the students enrolling into higher education have changed not only in respect of their demographics, but also in terms of their level of readiness and basic skill sets. They argue that this is due to the failing school system.

Consequently, before ICT competencies can be assessed, Stumke (2014:14) outlines that the current education levels of students should be considered through the investigation of the state of South Africa's schools to determine what ICT competencies learners are exposed to before they enter university. Only then can it be determined which ICT competencies and when these necessary ICT competencies and skills should be introduced at university level. In order to consider the above, Stumke (2014:17) focussed on the following three aspects within the South African context to better understand the challenges faced by South African learners before they enter university, at primary and secondary school level, in terms of the exposure to ICT competencies and skills:

- Poverty and the effect on the access to personal computers and the internet.
- Computer centres at primary and secondary school level.
- ICT importance at primary and secondary school level.

Samans and Davis (2017:5) and Schwab (2017:4), in line with the above, and as discussed in Paragraph 2.3.1, deduce that some countries have not felt the full extent of the third, not even the Second Industrial Revolution, and yet discussions and preparation are already being made for the 4IR. South Africa can be seen as one of these countries. With several households living in poverty, not having access to basic sanitation and housing, access to technology in the form of private computers, laptops and the internet, the 4IR is a concept that may not even be a familiar term to some.

In order to outline the reality South Africa is faced with when it comes to their daily challenges, which will have a direct impact on their use of ICT, the following factors were examined and elaborated on as initially stated by Stumke (2014:17) in more detail:

- Poverty and inequality
- Access to computer centres at school.

2.2.1 Poverty and inequality

Heeks (1999:9) emphasises that educational skills remain important as it is once again specifically referred to in the inequality and poverty report. Paul Nomba Um, Country Director for South Africa World Bank, explains that the release of this report was done in an attempt to aid South Africa to overcome their triple challenge, namely; poverty, unemployment and inequality, as identified in the National Development Plan (NPA) by 2030 (Hurlbut, 2018:xii).

Hurlbut (2018:1) outlines that the latest evaluation available on the poverty, unemployment and inequality trends of South Africa was published in 2018 where these factors were reported on with 2006 to 2015 used as reference. Twenty-six years after the fight to eradicate poverty and inequality in South Africa, Francis and Webster (2019:798) emphasise that the South African government identifies that these remain notable challenges today. Hurlbut (2018:x) notes that the poverty levels as reported on in 2015 are lower than in 1994, with Hundenborn *et al.* (2016) indicating that there was a reduction in poverty depicting a slowing trend in 2011 due to the economic growth prospects also slowing down. Hurlbut (2018:xi) and StatsSA (2017:30) propose that a greater cause for concern is the increase in poverty between 2011 and 2015, due to the increased unemployment rate among the youth.

Zizzamia *et al.* (2019:8) explain that poverty figures and trends are reported on based on the three national poverty lines. These poverty lines enable a clear distinction between non-poor and poor individuals (StatsSA, 2014:6). The three poverty lines are:

- 1) Food poverty line (FPL);
- 2) Lower-bound poverty line (LBPL); and
- 3) Upper-bound poverty line (UBPL).

The FPL line refers to people unable to purchase the required food for an adequate diet. LBPL is known as the level where food items are sacrificed for the purchase of non-food items. Lastly, UBPL refers to those individuals who can purchase any items they desire, whether food or non-food (StatsSA, 2014:7). Hurlbut (2018:7) identified that overall, the FPL, LBPL and UBPL poverty line ratios decreased holistically from 2006 to 2015. He further asserts that even though this number has gone down, 343,000 more people in South Africa are poor based on the FPL poverty line in 2015 compared to 2006. Hurlbut (2018:10) and Zizzamia *et al.* (2019:14) points out that the main concern is the fact that poverty and the share in the poverty figure increased from 2008 up to 2017.

The 2015 poverty figures paint a dire picture when compared to 2011. The number of South African's living in poverty rose from 53,2% in 2011 to 55,5% in 2015 (StatsSA, 2017:14). Van der

Westhuizen and Swart (2015:734) suggest that this is an indication that even with governments' different interventions, for example, social grants, to alleviate poverty, it has been with little success. StatsSA (2017:19) indicates that the largest portion of this increase in poverty between 2011 and 2015 was made up out of black Africans. In summary this figure increased from 26,0% in 2011 to 29,9% in 2015 (StatsSA, 2017:72). When considering the poverty percentage per age group, StatsSA (2017:73) outlines that for each age category, there was an increase in poverty from 2011 to 2015.

Alvaredo *et al.* (2018:67) point out that linked to poverty, the decline in inequality remains unsatisfactory, leaving South Africa, alongside Brazil and the Middle East, as one of the most unequal countries in the world in 2014. Alvaredo *et al.* (2018:74) even go as far as categorising South Africa as part of the "extreme inequality regimes" observed to have one of the highest inequality levels. Alvaredo *et al.* (2018:145) propose that even though several attempts have been made by South Africa to transform, specifically focussing on the poor race, the key role-players remain in the differences in salaries, quality education, employment and wealth. This inequality was recently exasperated due to the global Covid-19 pandemic.

Sumner *et al.* (2020:6) identify South Africa as one of the countries that will be hit hardest by this pandemic. They argue that this is due to South Africa's "slow progress in reducing poverty over the last years or due to their already high poverty levels". Arndt *et al.* (2020:1) identify that due to the implementations and restrictions imposed by South Africa, the poverty inequalities, including food insecurities, will be further exasperated. Akseer *et al.* (2020:1) concur with the previous authors and outlines that with the Covid-19 pandemic, poverty will be on the rise due to the collapse of several businesses and industries. On the back of this, Loayza and Pennings (2020:2) explain that poverty will increase further due to a direct effect of the Covid-19 pandemic that is seeing a rapid rise in unemployment rates.

Zizzamia *et al.* (2019:9) suggest that by outlining the people living below FPL a sense of how many people will focus more on their immediate survival needs and less on luxuries can be identified. Therefore, it can be argued that with the poverty figures increasing, fewer people will be able and willing to spend their money on anything other than basic survival necessities. This implies that individuals will rather buy food than a computer. As a result, the use and availability of ICT will be limited, or even non-existing, for the portion of the South African population that lives below the FPL. The inference that can be drawn from this is that where households lack the funds to provide ICT resources, the government needs to compensate through the education system as their first priority is essentials such as food. Francis and Webster (2019:293) discuss that inequality in South African is not limited to salaries and income, but it is also evident in the education system.

StatsSA (2017:70) concludes that with the increase in poverty between 2011 and 2015 there has been a corresponding decline in the number of poor individuals who received adequate education. The most prominent declines were noted in the "some secondary", "matric" and "higher" education categories. As with the increase in poverty due to the Covid-19 pandemic, Arndt *et al.* (2020:4) argue that the low education level individuals are affected to a greater degree than those who received secondary or tertiary education. Akseer *et al.* (2020:4) argue that even with education taking up different forms, since the closure of schools and universities, such as online classrooms, self-developed courses, and home-schooling, several children will not have access to this due to, as an example, poverty. In addition, Al-Samarrai *et al.* (2020:2) state that the entities funding education are having to cut back due to the pandemic, which in effect will result in education suffering the brunt of those spending cuts. They also outline that where governments in poorer countries invested in the development of children through the schooling system, these funding commitments will now be more difficult as a result of the Covid-19 pandemic placing additional strain on government funds that need to be applied elsewhere, in response to the pandemic.

Education, alongside market income, gender and race, is one of the important drivers of inequality in South Africa (Hurlbut, 2018:xvii), with education and market income increasing in importance in order to identify how poverty directly affects a learner's education and more specifically the introduction and exposure to ICT, the different types of schools, their daily struggles and the availability of technology are discussed further below. This may potentially shed some light on the ICT competencies learners are exposed to before they enter university. This is important to determine what ICT competencies should be introduced at which year of study at university level.

2.2.2 Schools

Mathumbu *et al.* (2014:1) indicate that ICT was introduced as a subject in South African schools in 1997 to address the technological and higher-cognitive skills shortage. With this being a "new" concept in schools not only to learners, but also teachers, Van Niekerk *et al.* (2010:191) explain that those left to teach ICT were not prepared based on their lack of knowledge on how and what to teach. Thus, with teachers not receiving training to assist them to fulfil the new ICT expectations clear deficiencies in the teaching approaches and methodologies occurred (Van Niekerk *et al.*, 2010:193). Seven years on, this supports the findings of the Department of Education (DoBE) (2013:37) who already identified in 2013 that teachers lack the knowledge and skills to teach ICT at school level. Stumke (2014:22) concludes that in 2011, 66,7% of schools did not possess the necessary resources, including computer centres, to provide learners with ICT exposure. Based on the findings of the latest published NEIMS reports (2011:25; 2009:34) limited to no change has been recorded between 2001 and 2011 with regard to the availability of computer centres

at school. Deduced from this, it can be expected that a similar trend has occurred for the period from 2011 to present with regard to the availability of ICT facilities and resources at schools.

The DoBE (2018:10) explains that their aim through the introduction of ICT in schools is to equip learners with employability skills. However, it is left up to the different schools, through planning and budgeting, to ensure that the necessary resources, in terms of time and resources, are available to deliver the required education. DoBE (2018:11-12) specifies the following as requirements that will be necessary to teach ICT at school level:

- Time allocation
- Resources
 - Computers
- Access to the internet
- Infrastructure, equipment, and finance
- Initial capital to set up a computer centre
 - High-speed printers
 - Data projector
 - Software requirements
 - Budget for annual running costs
 - Sustainability plan
 - Safety standards
 - Anti-theft and fire safety measures

In contrast to the detailed information available in 2014 from the NEIMS reports for 2009 and 2011 reporting on the various infrastructure categories within South African schools, only one, five-page report for 2018 (NEIMS, 2018) is available with updated information. The 2018 report does not contain any information on computer facilities. Due to this, Stumke's (2014:21-32) research illustrated that the latest complete information from 2009 to 2011 NEIMS report can be relied on and is discussed, in short, to be further outlined for the purpose of this study.

The NEIMS report (2009 & 2011) outlined the number of computer centres available per province across South Africa as of 2011. This may serve as an indication of the level of ICT exposure of learners at school level. Stumke (2014:23) concludes that not enough computer centres are available to provide learners with the necessary ICT exposure. In support of this, the Department of Basic Education (DoBE) (2013:15) and the DoBE's NEIMS reports (2011:25; 2009:34) concluded that from 2001 to 2011 the number of schools with computer centres remains virtually unchanged. Mirza (2019:215) explains that with the government's aim to enhance the lives of the

poor through catering to their physiological needs first, technology may be regarded as a privilege more than a necessity. Another reason identified by the DoBE (2013:7-32) is budgetary constraints. This could be viewed as some of the reasons why the full potential of ICT integration into South African schools has not yet been realised (Stumke, 2014:24).

Stumke (2014:25) further compared provinces based on their poverty ratings gathered from StatsSA Poverty Trends in SA (StatsSA, 2014:12) and the availability of computer centres from the NEIMS reports (2011:25; 2009:34) with the available data at that time. The conclusion drawn was that poverty has a direct impact on the availability of ICT at schools. Two outliers were Limpopo, ranked as the province with the highest poverty rate and Eastern Cape, ranked second. Limpopo and the Eastern Cape were identified as the provinces with the highest percentage of schools without computer centres at 89,0% (Stumke, 2014:24). These findings could lead to the conclusion that with poverty comes the lack of "additional" educational tools at schools. Stumke concludes that this may emphasise the lack of exposure learners will have to ICT, on an educational level. When comparing the lack of exposure to ICT at school to the number of learners per province, directly linked to poverty, Stumke (2014:30) found that the majority (70,4%) of schools across South Africa did not have adequate computer facilities.

DoBE (2018:6) outlines that even though ICT is a compulsory subject, it does not count towards a school qualification, but rather necessary lifelong skills. Deduced from this, schools, teachers and even learners may not necessarily comprehend the importance of teaching and learning ICT at school level, which could result in this subject not receiving the required efforts and attention. This is further emphasised by the Department of Basic Education's (DoBE) Maths, Sciences and Technology (MST) strategy developed in 2001 (DoBE, 2013:42) who sought to investigate whether, among others, the important ICT skills are being taught effectively in the classroom.

Regrettably, this is the only available report that could be accessed on the MST initiative. Nevertheless, this report indicates that schools are not effectively implementing the MST strategies with little progress made since 2001 (DoBE, 2013:5-7). Stumke (2014:44) concludes that several obstacles still hamper the implementation of ICT at schools, including, but not limited to teacher skills, electricity supply and budget constraints.

Hurlbut (2018:xii) proposes that for households to achieve economic stability in South Africa, access to higher education is key. Where learners do not receive the necessary and basic ICT skills at primary and secondary school level, the higher education sector will need to take the initiative to develop the basic ICT competencies and skills that prospective accountancy professionals require to be employable. This is further supported by the statistics available. It

stresses that the need for ICT intervention at a university level becomes necessary if not mandatory.

Barnett (2011:31) emphasise that the era for institutions of higher learning to exist for the advantaged few is disappearing and since higher education institutions are public entities subsidised from the public purse, there is the call for them to be dynamic role-players in transforming society. Maurrasse (2002:29) argues that essentially, "knowledge-in-world" or "knowledge-for-the-world" contests the impression of perceived higher education as an ivory tower, "nothing to do with the world miseries", the world over is exposed to bear. In most countries particularly those in the third world, the education sector is anticipated to formulate ground-breaking solutions for socio-economic and political challenges (Maurrasse, 2002:29). Similarly, StatsSA (2014:51) argues that with education it will be possible to decimate poverty and reduce the effect of poverty, unemployment, and inequality.

In order to address the research problem, how and when ICT can and should be integrated into accountancy curricula should be investigated.

2.2.3 Universities and transformation

Even with the challenges listed above, DHET (2014:52) contests that higher education should conform to quality assurance. Moreover, universities should attempt to integrate into their curriculum necessary learning, in this case, ICT, where required. Therefore, ensuring the supply of excellence education.

DZansi *et al.* (2009:39) argue that as a result of the quality of schooling received, by predominantly black empowerment groups, attributes to the high failure rate of first-year accounting students. Du Plessis and Gerber (2012:81) supported by Mungal and Cloete (2016:203) and Van Romburg (2014:3), outline that an inadequate school education system is one of the reasons for expectation gaps between school and university, which leads to a higher expectation gap between the quality of student's universities deliver for the workplace and what employers expect and need to train. Byrne and Flood (2005:118) explain that for students to succeed, accountancy lecturers should consider the factors, such as poverty, availability of resources and prior schooling, that may influence their success. Consequently, universities should consider the prior exposure and availability of ICT to accountancy students to enable them to successfully master and implement the required competencies and skills.

Eberhard *et al.* (2017:48), SAICA (2010:18) and Stumke (2014:1) emphasise that ICT is integrated into every aspect of an accountant's professional duty. This leads to the rationalisation that ICT should be integrated into the professional duties as they are taught at university level, being the four core modules: Accounting, Auditing, Financial Management and Management

Accounting and Taxation. With the integration of ICT, the critique received from AECC (1990), Adler and Milne (1997:191, 199), IFAC (1996), Pan and Seow (2016:171-172) and Van der Merwe *et al.* (2014:285) on the overloaded accountancy curricula due to a greater emphasis on technical skills could be minimised in an attempt to introduce additional ICT competencies and skills. Gathered from this is that the employability skills required by a prospective accountancy professional should be considered in the development of the ICTM for this study.

Livingstone and Lubbe (2017:133-134) report on a study performed by Bunney and Therry that focussed on the extent to which the accountancy curriculum in Australia included employability skills (Bunney & Therry, 2010:32). The conclusion drawn from their study indicated that due to the amorphous of the courses, guidance is needed to [1] identifying employability skills, [2] defining to what extent they are already being taught, [3] designing a "checklist" to ensure all the required skills are included and lastly [4] designing an all-inclusive framework that includes these skills.

Similarly, this study followed the same approach due to the accountancy curricula also being considered not to have a definite structure from university to university. The four different elements as identified by Bunney and Therry (2010:31) provide a framework of the necessary considerations that need to be elaborated on to design an all-inclusive framework with both employability skills and the skills as required by SAICA and employers. Table 2-1 as outlined by Bunney and Therry (2010:35-43) are summarised in terms of the four considerations of the theory and indicate where this is discussed further in this study.

Table 2-1: Guidance elements to design an all-inclusive framework

GUIDANCE ELEMENTS TO DESIGN AN ALL-INCLUSIVE FRAMEWORK (Bunney & Therry, 2010:35-43)	WHERE ADDRESSED IN THIS STUDY
1. Identifying employability skills	Chapter 2, Paragraph 2.2.4 and Paragraph 2.4
2. Defining to what extent they are already being taught	Chapter 2, Paragraph 2.2.3
3. Designing a "checklist" to ensure all the required skills are included	Chapter 3, Paragraph 3.3 and Table 3-4
4. Designing an all-inclusive framework that includes these skills	Chapter 5 and 6

Source: Bunney and Therry (2010:35-43), adopted to this study

Table 2-1 illustrates that in the process to develop an all-inclusive framework, what ICT competencies universities are already implementing and what is expected from SAICA and employers should be combined. The first guidance element, identifying employability skills, is discussed in more detail in Paragraph 2.2.4 and Paragraph 2.4.

Stumke (2019:35) outlines that to determine what universities are already implementing, the second guidance element, a document analysis of secondary data for the four core modules from

the 1st year of study in an accountancy curriculum to honours level can be performed. Consequently, a preliminary study is performed on the latest electronic published yearbooks and study guides of the top ten world ranked South African universities. Masters Portal (2020) ranks the top ten South African universities based on the United States News and World Report Ranking for 2020. The yearbooks and study guides were obtained from the respective official websites of said universities, for data collection and subsequently analysed. It should be noted that due to the confidentiality and to avoid disclosure of sensitive information, the 10 universities were randomly named from university A–J. The 10 universities selected for the preliminary study consisted of 8 traditional universities and 2 comprehensive universities. One university's information could only be obtained if the registration of the course took place. Subsequently, only 9 universities were included in the preliminary study due to the information not being available.

Initially, the yearbooks obtained from the websites of the nine selected universities were scrutinised to identify the core modules presented from the 1st year to honours level. The four core modules as outlined by SAICA (2018:31) and Stumke (2019:36) were used as the basis to which the modules presented, as documented in the published yearbooks, were indicated. These four modules are presented as follows in Table 2-2: [1] ACC – Accounting; [2] AUD – Auditing; [3] FM & MA – Financial Management and Management Accounting; and [4] Tax – Taxation. Where universities included a separate ICT course, this was also included. This is represented as the fifth module [5] ICT – Information and Communications Technology. Table 2-2 is presented by means of either the university include the specific module in their accountancy curriculum (✓) or whether they do not include the module as part of their accountancy curriculum (✗). A summary of the finding on what modules are included in the top nine universities compared to the four core modules and a specific ICT module is summarised in Table 2-2.

Table 2-2: Summary on core modules per year of study for the top ten South African universities (Sources: Due to confidentiality, sources intentionally omitted)

MODULE	UNIVERSITIES									NUMBER OF UNIVERSITIES PRESENTING MODULE	PERCENTAGE OF UNIVERSITIES PRESENTING MODULE
	A	B	C	D	E	F	G	H	I		
1 ST YEAR											
ACC	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
AUD	✗	✗	✗	✗	✗	✗	✗	✗	✗	0	0%
FM & MA	✗	✗	✗	✗	✓	✓	✗	✓	✓	4	44%
TAX	✗	✗	✗	✗	✗	✗	✗	✗	✗	0	0%
ICT	✓	✓	✗	✓	✓	✗	✗	✓	✓	6	67%
Total core modules	1	1	1	1	2	2	1	2	2		
2 nd YEAR											
ACC	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
AUD	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
FM & MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
TAX	✓	✓	✓	✓	✗	✓	✓	✓	✓	8	89%
ICT	✗	✗	✗	✓	✗	✓	✓	✗	✓	4	44%
Total core modules	4	4	4	4	3	4	4	4	4		
3 rd YEAR											
ACC	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
AUD	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
FM & MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
TAX	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
ICT	✗	✓	✗	✗	✗	✗	✗	✗	✗	1	11%
Total core modules	4	4	4	4	4	4	4	4	4		
HONOURS											
ACC	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
AUD	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
FM & MA	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
TAX	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
ICT	✗	✗	✗	✗	✗	✗	✗	✗	✗	0	0%
Total core modules	4	4	4	4	4	4	4	4	4		

Source: Summary of literature above, adapted based on information obtained from yearbooks

Table 2-2 outlines that across the 9 selected universities; the core modules presented across the four years of study towards an accountancy professional are in line. The main discrepancy is that 6 (67%) universities include an ICT module and 4 (44%) universities provide a Financial Management and Management Accountancy module in the 1st year of study. This is illustrated in Figure 2-2 to highlight the consistency between the universities with the exception of university E, F, H and I presenting 2 core modules in the 1st year of study and university E only presenting 3 of the core modules in the 2nd year of study.

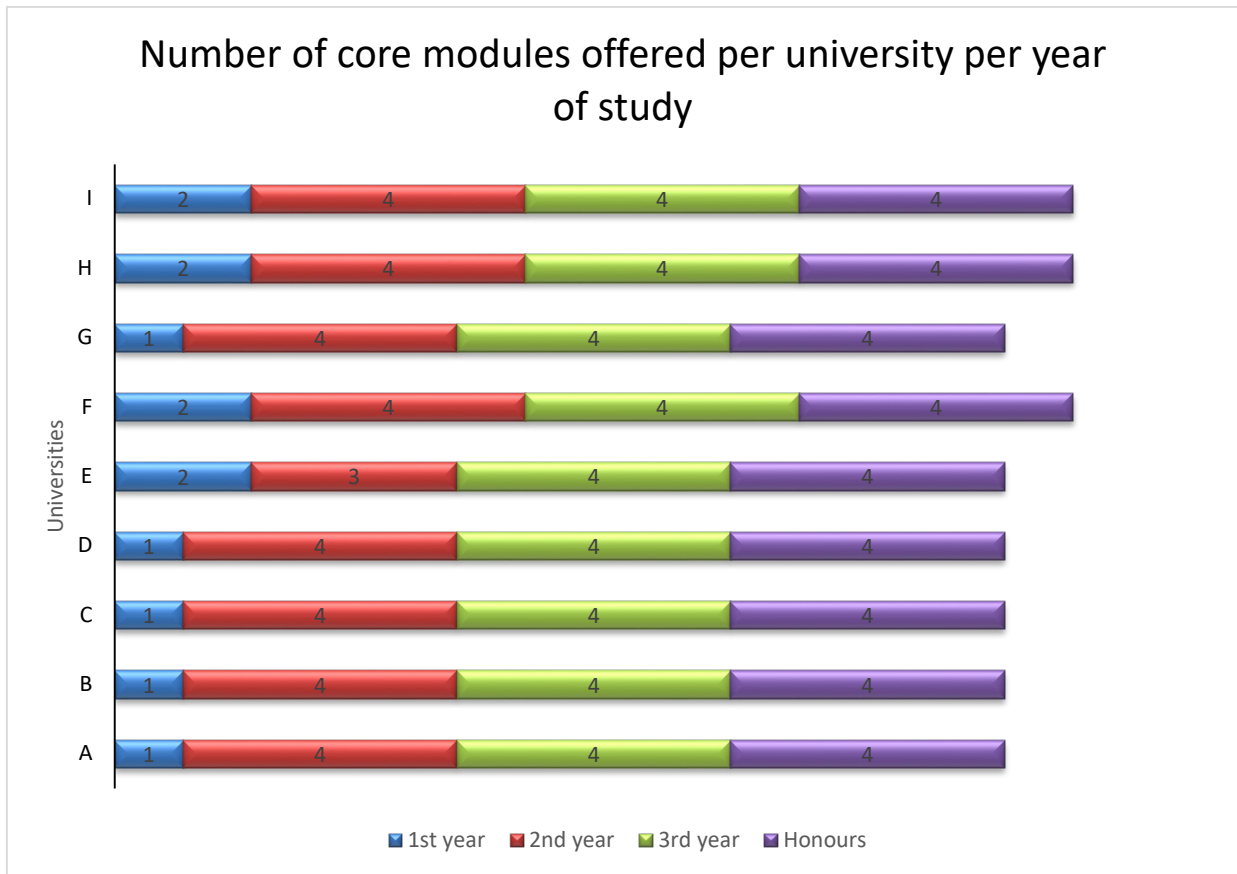


Figure 2-2: Number of core modules offered per university per year of study

Source: Summary of literature above, adapted based on Table 2.2

With Figure 2-2 depicting the similarities between the selected universities in terms of the number of core modules presented over the years of study, a descending pattern is noted with regard to the ICT modules among the universities. Moreover, Table 2-1 outlines that only one university, University C, does not present any ICT module. Based on the information as outlined in Table 2-2, Figure 2-3 illustrates the required ICT modules offered per university by year of study.

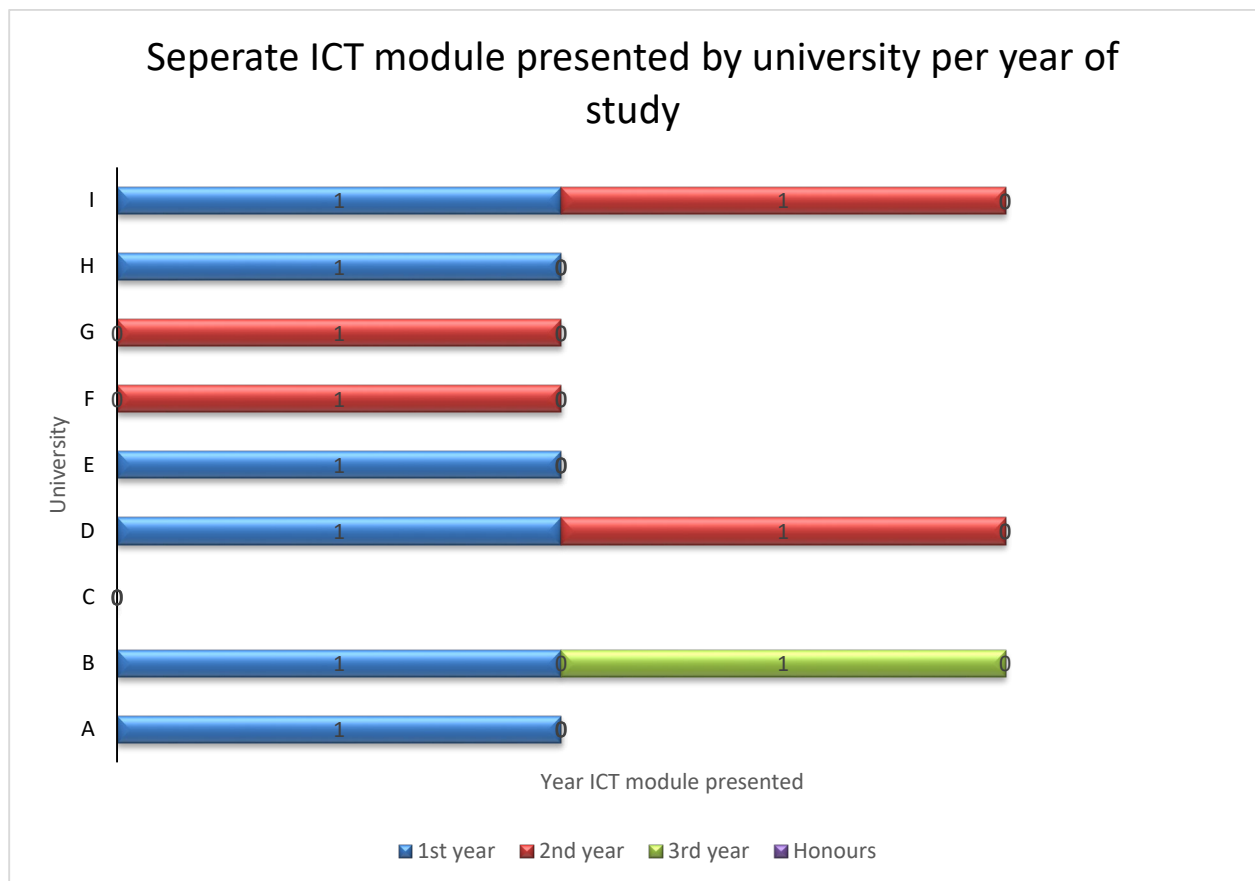


Figure 2-3: Seperate ICT module presented by universities per year of study

Source: Summary of literature above, adapted based on Table 2.2

Figure 2-3 illustrates that from the 1st year of study where 6 out of the 9 universities (67%) present an ICT module, this number declines to 2 universities (44%) in the 2nd year of study and to a mere 1 university (11%) in the 3rd year of study. The lack of ICT education at face value is even more evident in the final year of study, honours level, where none of the universities provide a compulsory ICT module. This observation supports this study to investigate what ICT competencies are being taught at universities. This in turn assisted in the development of the ICTM to ensure that prospective accountancy professionals are provided and taught the necessary and required ICT competencies and skills to ensure that they are employable and to further ensure that the needs of employers and the requirements of SAICA are met.

The second element of the preliminary investigation of the nine selected universities is to identify what specific ICT competencies are required. This information was also obtained from the published yearbooks. Specifically focussing on the universities that include an ICT module in the 1st year of study reference is made to basic MS Excel, MS Word, MS PowerPoint, Outlook, and internet usage. Thus, no ICT integration into the accounting curricula and progressing the fact that some universities provide students with the option to be exempt from the 1st year ICT module.

This is possible by writing a competency test prior to the commencement of the module and on the successful passing thereof, the student can be exempt from attending class for that module. Furthermore, this is an indication of the importance universities place on ICT and ICT integration into the accountancy curricula. Taking into account the fact that a student can be exempt or not being required to complete any ICT modules in the 1st year and in the case of University C not at all in any year of study, the integration and even the exposure to ICT falls on the core modules.

Initially, an additional third element was conducted where the study guides for the core modules are inspected to further identify what ICT competencies are specifically integrated or taught in the core modules. Stumke (2019:37-38) grouped the ICT competencies into three main categories: [1] general; [2] assignment and [3] practical. The general category refers to where a student is only required to make use of ICT to access the learner management system (LMS) to obtain additional information or complete by just clicking on radio buttons, a quiz. Similarly, the assignment category refers to where students are required to electronically submit a written assignment. Thus, no ICT competencies are being integrated. Lastly, and in contrast to the first two categories, the practical category refers to where ICT integration is successfully being applied within the module. Stumke (2019:38) concludes that for one university there was no indication of any ICT integration into their accountancy curricula based on their study guides.

Due to universities only providing study guides once registered for a module, the relevant study guides for all the nine universities could not be obtained. This is a limitation to this study and discussed further in Chapter 7. Consequently, the specific details needed for this study on what each core module integrates for the specific core modules could not be determined. In order to mitigate this limitation, questions were included in the self-developed questionnaire to establish what ICT competencies are integrated in which core modules for the sample selected. This is further explained and elaborated on in Chapter 4 and Chapter 5.

The final element of the preliminary investigation was to identify what ICT competencies are required and to link that to what is expected from SAICA and employers. This was achieved by matching and applying the following components to ultimately derive the ICTM:

- Module outcomes of the four core modules for the top nine South African universities.
- SAICA ICT competency requirements per the latest published and proposed CF (SAICA 2017 & 2019a).
- Self-developed questionnaire responses.
- Module outcomes, SAICA competencies and questionnaire responses applied to practical teaching and learning activities.

This assisted in the development of a functional ICTM and are elaborated on more in Chapter 3.

In conclusion, with SAICA acknowledging that the accountancy education needs to adapt to meet the needs and requirements of the changing industry, the onus rests on educators and employers to empower their workforce to deal with these changes. The challenges associated with the empowerment is that some South African citizens have not yet enjoyed the benefits of the Third or even Second Industrial Revolution (Samans & Davis, 2017:5; Schwab, 2017:4). As a result, universities need to ensure that they consider all the possible challenges that they would encounter in the classroom to ensure the effective and efficient implementation of ICT into their curricula. Consequently, this places a further burden on educators to fill the teaching and exposure gap of ICT competencies. This aligns with the DHET's (DHET, 2017:8) revised strategy which, among others, focus on a review of the curricula of universities. DHET (DHET, 2017:8) argues that the higher education sector needs to continuously progress to be more reactive to the changing labour market, identified by Pincus *et al.* (2017:6) as change in technology. The resounding aim of the DHET's strategic plan (2017:19) supported by Leal Filho *et al.* (2018:287) is that highly skilled individuals are produced and that those individuals "have the skills and knowledge to meet present and future needs of the economy and society". Bhushan (2018:1) is of the opinion that universities should aim to impart a perceived socio-environmental awareness.

Linking to this study, it emphasises the views from employers that prospective accountancy professionals do not possess the required competencies they expect them to have when entering the working environment. One of those competencies is ICT and the integration thereof. With the investigation on what ICT competencies are being taught by universities, it can be concluded that the ICT expectations from employers are not being addressed by universities to prepare prospective accountancy professionals for the changing work environment, which is discussed in the following paragraph.

2.2.4 Employer expectations in terms of the change in the work environment and the world

Bunney *et al.*'s (2015:256) view that graduates are economic assets to business and the economy strengthens the employer's expectation for graduates to possess the necessary competencies. The DHET (2014:64) points out that graduates are finding it difficult to find employment. Moreover, employers feel that they do not possess the skills required. Mathumbu *et al.* (2014:1) state that due to a shortage of high-level skills, South Africa's growth rate is deterred. Hurlbut (2018:xiv) criticises the poor state of the public education system as one of the major reasons why skilled labour is difficult to attain.

With the constant change in business, Bui and Porter (2010:34) and Nearon (2002:28) argue that accounting education does not prepare students for the future accounting profession, and in turn,

employer expectation. Clovey and Oladipo (2008:60) agree that the increasingly high standards set by employers are not being met by accountancy graduates. Van Romburgh (2014:63) concludes that employers find, among others, that graduates do not possess satisfactory ICT skills.

It is reasonable to conclude that employers can expect accountancy graduates to have mastered at least the basic ICT skills as they are outlined by SAICA in their CF (SAICA, 2010:1; 2014:1; 2017:1; 2019a:1). Stumke (2014:64) highlights the fact that in the current South African context, where poverty and previously disadvantaged schools are still a reality, many learners start their accountancy degree journey without the required ICT competency build-up as would be expected by employers.

Studies by Wessels (2005:87-103), Stumke (2014:129-135) and Modisane (2019:162) focussed on the necessary ICT skills required by employers from accountancy graduates. Wessels (2005:87-103) obtained his information from a pure literature study based on publications and research performed by several professional bodies and researchers. Modisane (2019:52-53) lists these research and publications as conducted by SAICA, Chartered Accountants in England and Wales (ICAEW), Institute of Chartered Accountants Australia (ICAA), Canadian Institute of Chartered Accountants (CICA), American Institute of Certified Public Accountants (AICPA), Chartered Institute of Management Accountants (CIMA), International Federation of Accountants (IFAC) and Institute of Management Accountants (IMA), Theuri and Gunn (1998:101-121), Hostrom and Hunton (1998:347-358) and Coenenberg *et al.* (1999:367-387). From the 34 IT skills identified by Wessels (2005:98), they were adapted and reduced to the 6 main ICT competencies as proposed by SAICA in their 2025 CF (SAICA, 2019a:7). This was done to enhance the relevance of the identified ICT skills to current requirements.

The six ICT categories as outlined by SAICA (2019a:7) are [1] data analytics; [2] big data; [3] cognitive and non-cognitive systems; [4] new development and protocols; [5] distributed processing and cybersecurity; [6] user competencies. These categories are elaborated on more in Paragraph 2.4.1). Out of the six SAICA CF categories, Wessels (2005:98) identified that 5 out of the 6 categories are considered critical by employers. The only category lacking was big data.

Stumke (2014:129-135) obtained data from literature and a self-developed questionnaire on the ICT competencies and skills required by employers. Eighty-nine employers with different employment statuses replied. The different statuses of the responses can be categorised as follows: [1] supervisor (17% of responses), [2] manager (10% of responses), [3] partners (27% of responses), [4] directors (13% of responses), [5] training officer (33% of responses) (Stumke, 2014:91). Enough coverage was obtained in this study with regard to different levels of employers within an organisation. Consequently, the highlighted ICT competencies lacking as identified by

the respondents represent all spheres of the accountancy field (Stumke, 2014:129-135). The identified competencies from employers in Stumke's (2014:135) study were also grouped in accordance with SAICA's 2025 CF (SAICA, 2019a:7).

Like Wessels (2005:98), Stumke (2014:135) concluded that five ICT categories are considered important as considered by employers. Big data was not mentioned.

The latest available research on ICT competency and skills requirements was conducted by Modisane (2019:162). He focussed on what ICT skills are necessary for internal auditors in the workplace. As part of his study, he held interviews with potential employers. The data obtained revealed that at least 4 of the 6 ICT categories as categorised by SAICA are deemed important for an accountancy graduate to possess (SAICA, 2019a:16). The two categories not evident from his research are big data and cognitive and non-cognitive systems.

A summary of the literature above with regard to the required critical ICT competencies from recent research are summarised in Table 2-3.

Table 2-3: Required critical ICT competencies (lacking and / or required) highlighted by employers

SAICA ICT competency (SAICA, 2019a:7)	RESEARCHERS		
	Wessels (2005:98)	Stumke (2014:135)	Modisane (2019:162)
1. Data analytics	✓	✓	✓
2. Big data	✗	✗	✗
3. Cognitive and non-cognitive systems	✓	✓	✗
4. New development and protocols	✓	✓	✓
5. Distributed processing and cybersecurity	✓	✓	✓
6. User competencies	✓	✓	✓
TOTAL	5	5	4

Source: Summary of literature above, adapted from authors as indicated above

Table 2-3 highlights the fact that the ICT competency debate has been going on for several years and will probably continue in the future. However, this does not mean that it should be ignored. This emphasise the fact that this study is still current, recent, and relevant. Furthermore, Table 2-3 indicates that most of the competencies as outlined by SAICA (2019a:7) is considered necessary by employers for prospective accountancy professionals to possess. The two competencies that are perhaps debatable as to it being included in the accountancy curriculum at university level is big data, not indicated by either one of the three studies mentioned, and cognitive and non-cognitive systems, not mentioned by the most recent study performed by Modisane (2019:162). The information contained in Table 2-3 is further elaborated on in Chapter 3, Paragraph 3.3.1, and is compared to the views of international studies on which ICT

competencies are perceived to be necessary by employers for prospective accountancy graduates to possess.

Another study performed by Hood (2015) which stemmed from employer concerns with regard to the changes in the work environment due to technology highlighted three main concerns. The one concern that links to this study is that employers are apprehensive about finding employees that possess the appropriate combination of technical and ICT competencies for the changing accounting profession.

Porter and Millar (1985:1) highlighted more than three decades ago that the ICT revolution is changing and continues to change the way business is conducted. Representatives from institutions of Chartered Accountants Worldwide (CAW) (2016:5) explain that it is estimated that approximately every 18 months the capacity of technology doubles and the cost thereof halves. With this comes a greater responsibility as businesses have accepted that ICT is one of the major drivers in their success (Drnevich & Croson, 2013:483). Porter and Millar (1985:6) supported by Drnevich and Croson (2013:483) outline that ICT is now seen as a key driver of firm value and an integrated part of business strategy. Damasiotis *et al.* (2015:537) highlight that equivalent to the importance of ICT in business came to the importance of ICT in the accounting profession. Stumke (2014:1) supported by Eberhard *et al.* (2017:48) explains that with businesses incorporating ICT as part of their daily routines, the performance of accounting and financial tasks is impossible without the use of ICT.

Adetimirin (2012:382), Corbett and Willms (2002:8), Damasiotis *et al.* (2015:537), Lee and Blaszczyński (1999:104) and Stumke (2014:1), to name a few, state that accounting professionals are required to possess, on top of their technical skills, ICT competencies to enable them to successfully perform their tasks. Modisane (2019:5) supports this in his agreement with Wessels (2008:161) that to ensure that graduates adhere to the business environment requirements, ICT skills should be integrated into the preparation of an accountancy professional.

Betts *et al.* (2008:546) and Mills *et al.* (2009:206) are of the opinion that there are numerous factors that influence the success of students that will result in employable graduates. Baard *et al.* (2010:131) identify these success factors, linking it to the use of ICT and taking into account past exposure and experience with ICT, as [1] the role motivation plays in performance (Healy & McCutcheon, 2010:565; Müller *et al.*, 2007:22; Trivellas *et al.* 2013:719), [2] motivation linked to ICT education (Stumke, 2014:13); [3] the intention to use technology (TAM) (Van Schalkwyk & Muller, 2019:1) and [4] how a curriculum is structured (educational theories).

This aligns with the problem statement identified in Chapter 1, Paragraph 1.2, to provide guidelines on what ICT competencies should be taught when. In order to address this, the

different theories that had an impact on this study needs to be investigated. Firstly, the perceived usefulness of ICT needs to be emphasised to students, and in turn, adhering to SAICA's CF and employer expectations. Secondly, when ICT competencies are introduced from 1st year at a basic level and scaffolded through to the final year of study, the perceived ease of use can be addressed. The overall benefit of this approach will ultimately lead to more time available to spend on other tasks, as identified by Davis (1989:335), a necessity for an already overloaded accountancy curriculum (Chang & Hwang, 2003:445; Stumke, 2017:132). Accordingly, the theories that had an impact on this study are discussed in detail below.

2.3 THEORIES THAT HAD AN IMPACT ON THIS STUDY

Modisane (2019:55) argues that when education curricula are based on professional expectations, it will facilitate the transition from student to a professional. Deduced from this, SAICA's (2017) project to incorporate 4IR skills into the training of prospective accountancy professionals will aid with this transition. Lubbe (2017:61) reasons that the changes required to keep accountancy graduates relevant and current to the business environment can start from modifying the accountancy curriculum.

This study underpins the concept of integrating the necessary and required ICT competencies and skills as prescribed by SAICA and emphasised by employers. In effect, a curriculum re-design is not suggested, but rather incorporating ICT into the already applied teaching and learning activities within the accountancy curriculum. Maphosa *et al.* (2014:356) posit that literature does not provide a clear and homogeneous definition of what is included and viewed as a curriculum.

Wojtczak (2002) (cited in Smithson, 2012:3) proposes that the methods that will be used in teaching, learning and evaluation form part of an educational plan, known as a curriculum. Furthermore, the goals and objectives that students will need to master and the topics to be covered also form part of the educational plan. Coles (2003) (cited in Smithson, 2012:3) views a curriculum as the inclusion of all activities, experiences, and learning opportunities a student will have to master. Coles (2003) (cited in Smithson, 2012:3) further argues that these activities are the responsibility of the lecturer, either by default or deliberately. Tanner and Tanner's (2007:12) description of curriculum can be viewed as the one in line with an accountancy professional. He outlines that a curriculum should enable a student to gain knowledge that will enable and instil lifelong learning.

With the different explanations and views on what is included in a curriculum and what is meant by curriculum, the main aspects relevant to this study is that the collective teaching and learning opportunities, being the responsibility of the educator, should be included in the accountancy

curriculum. The different educational outcomes also need to instil and encourage lifelong learning. This is an integral characteristic of prospective accountancy professionals.

Carl (2009: xi) propose that in the development of teaching and learning activities, lecturers have the freedom to design these activities to best fit within their module. Maphosa *et al.* (2014:357) argue that teaching and learning activities should be outcome-based. Watson (2002:208) explains that learning outcomes refer to a student being able to do something now that could not be done previously. Krathwohl *et al.* (1964:4) scribe that educational objectives should strive to give guidance to the learning process and establish the nature of the evidence to be used to evaluate the results of learning experiences. Maphosa *et al.* (2014:357) conclude that the aim of education, directly influencing the curriculum, should be to change students in the sense of equipping them with implementable knowledge. The three main elements present in the South African outcome-based education system: [1] desired outcomes or content, [2] teaching and learning activities, [3] assessment (Maphosa *et al.*, 2014:358).

In order to assist in the development of the ICTM through integrating ICT into the four core accountancy module's teaching and learning activities, the educational theories that influence the design of learning outcomes of the accountancy curriculum are investigated.

Anderson and Sosniak (1994:4-5), Crowe *et al.* (2008:368) and Jideani and Jideani (2012:34) identify Bloom's taxonomy as a broadly accepted tool used by several countries, institutions and educators to assist in the development of curricula. Maphosa *et al.* (2014:358) state that Bloom's taxonomy, in its revised format, is the educational theory used in South African higher education. Crowe *et al.* (2008:368) outline that Bloom's taxonomy is well-defined and used to group types of thinking into different levels. It also assists educators to formulate learning outcomes and assessment practices.

Stumke (2014:10) proposes that to understand why an accountancy student would want and need to acquire certain competencies and skills, Maslow's hierarchy of physiological needs, known as one of the leading motivational theories, should be considered to examine the necessity for human beings needs to be met. Maslow's (1943:370-382) hierarchy of needs are structured in five categories. Sengupta (2011:103) explains that the concept of this hierarchy is that one craves to satisfy your basic needs first, before you can or even will try to satisfy the next. Applying this hierarchy to the education of accountancy trainees, Stumke (2014:12) illustrates their growth needs from primary school level right up to their professional careers. In this illustration, the impact of ICT on an accountancy trainee's needs are clearly projected to have an overall effect on every aspect of their needs.

As ICT impacts every aspect of an accountancy trainee's life, the degree to which they will use or not use it rest on the belief whether it will assist them to perform their jobs better, a seminal concept developed by Davis (1989:320). This variable, perceived usefulness, is one of two considered by Davis (1989:319) to determine if and how technology will be accepted by a user, also known as the technology acceptance model (TAM). Marangunić and Granić (2015:81) agree with the popularity in the use of this model to determine technology acceptance.

With technology now playing a major role in every aspect of an individual's live, the need arises on a personal and professional (educational and employment) level to gain the experience, knowledge and skill necessary to fit into the world as we know it now (CAW, 2016:5). The need may have stemmed from a survival sense, in order to work for a salary, one needs to be able to function in an ICT environment, but it has subsequently trickled down to an educational level (Friedman, 2005:305; Guglielmino, 2013:4). With ICT being the main focus of many educational debates, (Adetimirin, 2012:382; Albrecht & Sack, 2000:2; Corbett & Willms, 2002:8; Damasiotis *et al.*, 2015:537; De Villiers, 2010:1; DHET, 2017:8; Eberhard *et al.*, 2017:48; Guglielmino, 2013:4; Lee & Blaszczyński, 1999:104; Modisane, 2019:267; Navarro, 2008:108; Rubin & Dierdorff, 2009:209; SAICA, 2016:3), Stumke (2014:10-12) emphasise that there is a need for prospective accountancy professionals to master ICT at university level.

In order to develop the ICTM, curriculum design based on Bloom's taxonomy should have been understood. After that, the way in which an accountancy student builds on prior knowledge, stemming from Maslow's hierarchy of needs, as adapted by Stumke (2014:12), had to be considered to ensure that the ICTM is implementable. Another consideration that had an impact on the development of the ICTM is the sense of relevance accountancy graduates will possess with regard to the integration of ICT. This is investigated as part of the TAM. In turn, by understanding when accountancy graduates are more likely to embrace ICT in an integrated format in their accountancy curriculum, the development of the ICTM was more successful when the different considerations of TAM were considered.

Therefore, the educational theory, Bloom's taxonomy, the hierarchy of needs in terms of ICT scaffolding, motivational theories, and when ICT is most likely to be accepted, TAM is discussed in more detail below. As a final discussion point the curriculum development, mainly the integration of ICT in the teaching and learning activities, based on the afore-mentioned elements are outlined.

2.3.1 Educational theory

Preville (2018:20) concludes that Bloom's taxonomy is used for many different reasons. Some use it to design a curriculum, to outline outcomes, to design assessments to clarify expectations or even to inspire. He interprets Bloom's taxonomy as user-friendly and quick to learn.

Bloom *et al.* (1956:28-29, 32-34) and Anderson and Sosnaik (1994:6) define knowledge as remembering or recalling information where the increase in knowledge, one's acquaintance with reality develops and knowledge is the cornerstone of any and all other aspects of education – without knowledge one cannot perform tasks such as problem-solving nor critically evaluate a situation. Bloom's taxonomy has been used for many decades as an effective tool to aid in the development of learning outcomes. Due to this, the ICTM followed Bloom's taxonomy to ensure that emphasis is placed on the necessary and required learning outcomes to result in an executable model. This section discusses Bloom's taxonomy in detail and highlights the different elements that were necessary to consider in the development of the ICTM from an educational perspective.

Woolfolk (1993:485) defines a taxonomy in education as a "classification system". Bloom *et al.* (1956:1) and Krathwohl *et al.* (1964:11) refers to a taxonomy as a constant set of principles or a single principle forming the basis of arranging a set of classifications. Maphosa (2014:355) and Veal and MaKinsterd (1999) argue that Bloom's taxonomy is the single most universal taxonomy in education. Anderson and Sosniak (1994:1) and Forehand (2005:2) conclude that Bloom's taxonomy remains, for over half a century, the real standard, even though other educational taxonomies, and hierarchical systems have been developed. Preville (2018:3), supportive to the authors above, agrees and classifies Bloom's taxonomy as "*the pedagogical model that shook the world*".

The initial intent of Bloom's taxonomy, as outlined by Bloom *et al.* (1956:1), Krathwohl (2002:212) and Paul (1985:39), is to assist "teachers, administrators, professional specialists, and research workers" with their curricular design and evaluation problems and to provide a discussion point for educators. This included classifying educational objectives and experiences, learning processes, and the evaluation of questions and problems referring to several test items as examples (Krathwohl, 2002:212; Paul, 1985:39). Bloom's taxonomy aims to facilitate the meaningful communication among examiners in their professional field of education through the creation of this theoretical framework. Moore (1982:29) argues that Bloom's taxonomy is accepted by the education community due to it having clear symbols, exact and practical definitions and the group that used it at that time agreed on its effectiveness. As Preville (2018:6) identifies, Bloom's taxonomy makes use of straightforward language and common sense. Anderson and

Krathwohl (2002:7) emphasise that the revised Bloom's taxonomy (RBT) still encompasses Bloom's initial intent.

Dontham *et al.* (2016:75) deduce that with the paradigm shift in education to focus on the cognitive ability of students the use of Bloom's taxonomy increased. This was mainly since curriculum is required to outline and specifically focus on the design of curriculum, instruction and evaluation and assessment methods. The notion from the European Commission (2013:32) and Dontham *et al.* (2016:75) is that educators had to move from a pure teacher-centred approach to a more learner-centred approach. This approach is known by different names, for example learning outcomes (Havnes, 2016:206) and "Outcome-based Education (OBE)" (Dontham *et al.*, 2016:75). Some of the reasons for this was to improve the efficiency and effectiveness of higher education (Kennedy *et al.*, 2007:2) and to develop the cognitive ability of students and promote higher-order thinking (Dontham *et al.*, 2016:76).

The ICTM will challenge potential accountancy graduates to apply the competencies and skills as required by SAICA and employers in a practical way. This will be achieved through higher-order thinking where knowledge will need to be acquired and applied from the 1st year of study to possible employment level, honours year. In order to ensure that higher-order thinking will be applied in the ICTM, Bloom's taxonomy was applied and adapted in an ICT integration environment.

Anderson and Sosniak (1994: viii) argue that since the initial introduction in 1956, Bloom's taxonomy is continuously applied in various educational contexts throughout the world. Hill (1984:179) identifies the rational range of the taxonomy as a possible reason. Anderson and Sosniak (1994:5-6) remark that even though several versions have been developed and applied in a wide variety of fields, for example medicine, engineering, teaching, to name a view, (Veal & MaKinsterd, 1999) Bloom's remains the prototype for the development of educational outcomes. Havnes (2016:207) argues that in order to improve the quality of higher education, the relationship between learning theories and concepts of LOs need to be explored.

As mentioned in Paragraph 2.2.3, the DHET has indicated that the quality of higher education needs to adjust to improve the quality of graduates. In order to do this, the curriculum will have to be revised based on Bloom's taxonomy to ensure that the correct amendments are made. For this study, the development of the ICTM was done to facilitate learning that directly links to module outcomes or learning outcomes.

Adams (2015:152) outlines that when formulating and developing learning objectives (outcomes), instructors, or in this case university curricula designers, Bloom's taxonomy should be applied to aid them to ensure the desired skills and abilities are demonstrated and mastered by their

students. LOs has been defined as precise statements by faculties on what they expect students to know and be able to do in a measurable way (Huba & Freed 2000:1) and more specifically what and how students are expected to achieve something (Kennedy *et al.*, 2007:6).

Course improvement has been identified by Dontham *et al.* (2016:75) as a direct benefit when a course is designed based on Bloom's taxonomy. Linking to SAICA's CF (SAICA, 2018:9), the required competencies and skills are outlined, and universities should in turn, through the development of their curriculum, ensure that potential graduates meet the minimum requirements. In turn, the ICTM linked what is required from SAICA and develop integrated teaching and learning activities that meet those requirements and lead to course improvement.

The continuous use of Bloom's taxonomy, even in a revised form, proves that it is and remains the cornerstone of the development of any curricula. In order to address the theoretical objective in Chapter 1, Paragraph 1.3.2.1, the development of Bloom's taxonomy is discussed below. Details on what it entails, how to interpret it and how it can assist in the development of a curricula also are outlined.

2.3.1.1 Development of Bloom's taxonomy

This section covers a brief overview on the development and adjustment to Bloom's taxonomy. Herewith, the main changes are outlined with a brief discussion on the reasons for those changes. Finally, how Bloom's taxonomy was applied in the development of the ICTM is discussed.

It took Benjamin Bloom and his team of educators almost eight years to publish the original version (Preville, 2018:3). Bloom *et al.* (1956:8) explain that their hesitation to publish the cognitive handbook without securing widespread comments and criticism aided in the finalisation of the first version. Forehand (2005:1) adds that due to the rigorous process followed, the development process was lengthy and through.

Forehand (2005:4) and Preville (2018:11-13) reveal that the revision of Bloom's taxonomy took almost six years, signifying the gruelling and meticulous evaluation.

In 1948, after discussions held at the Convention of the American Psychological Association, Bloom and a team of educators embarked on a journey to classify and group educational goals and objectives (Bloom *et al.*; 1956:4; Forehand, 2005:2; Preville, 2018:3). Forehand (2005:2) scribes that the development of the taxonomy started with taking thinking behaviours, important in the process of learning, and classifying them according to their cognitive complexity (Bhaki, 2010:1526).

More than 60 years after its first publication in 1956, the first volume of Bloom's taxonomy, *Taxonomy of Educational Objectives: The Classification of Educational Goals*, continues to be a

paradigm reference for discussions of testing and evaluation, curriculum development, teaching a teacher education (Anderson & Sosniak, 1994:vii; Wilson, 2016). The *Taxonomy of Educational Objectives: The Classification of Educational Goals* handbook was translated into at least 18 languages in 1994 (Anderson & Sosniak, 1994:5), 20 by 2001 (Anderson & Krathwohl, 2001:xxi) and 22 by 2002 (Krathwohl, 2002:213). A search on Google Scholar revealed that the book was cited in excess of 32,000 times.

Anderson and Sosniak (1994:1) state that the use of Bloom's taxonomy educators became aware of how little they required students to think in the higher-order thinking zone. This resulted in the pinnacle substance of the ability of higher mental processes since the introduction of Bloom's taxonomy in 1956.

Since its origin, Bloom's taxonomy has only been revised once. Preville (2018:4) argues that this is proof of the concept's robustness and agelessness. A possible reason for the revision of the original Bloom's taxonomy, as indicated by Anderson and Sosniak (1994:7), is due to the significant changes that have occurred in curriculum, testing, research, and educational psychology over the forty years since the taxonomy was developed.

The revision of Bloom's taxonomy was performed by a former student of Bloom's, Lorin Anderson, together with one of the co-authors of the original taxonomy, Krathwohl, and a supporting team (Anderson & Krathwohl, 2001:xxviii; Wilson, 2016). Forehand (2005:4) proposes that the more formal reason for the revision was with the aim to ensure that the taxonomy is relevant for 21st century students and teachers. The revision also resulted in more emphasis being placed on the comprehensive use of the taxonomy as a tool for curriculum planning and delivery as well as assessment (Preville, 2018:8).

This supports the use of Bloom's taxonomy and the RBT in the development of the ICTM. Through focus being placed on what accountancy students should know cognitively, appropriate teaching and learning activities were developed at the different stages of learning. The testing of these skills will then be clear for students and lecturers to understand and achieve.

Catalano *et al.* (2014:1) and Preville (2018:4) concur in their arguments that the main reason for the development of Bloom's taxonomy was the need to provide educators with a mutual framework to assess learner achievements and assessment tools. They posit that this resulted in a global language that enabled the effective comparison of student results with a substantial and enduring impact. Forehand (2005:4-5) reaffirms this notion in that Bloom's taxonomy provided educators the means to systematically classify the processes of thinking and learning. This is especially important as educators are required to measure their student's abilities. In order to measure those abilities, the levels of intellectual behaviour important in learning needs to be

classified (Bloom *et al.*, 1956:6). Accurately, Bloom's taxonomy provided just such a measurement tool for thinking (Forehand, 2005:4). Preville (2018:4) argues that from the initial intent of Bloom's taxonomy, just to aid in assessment, an "emblem" arose for curriculum design that can be used to set learning objectives and design classroom activities. For this study, the ICTM addressed specific learning outcomes already included in the accountancy curriculum through the design of specific teaching and learning activities that include ICT.

Forehand (2005:2) and Bhaki (2010:1526) outlines the three domains Bloom's taxonomy (Bloom *et al.*, 1956:7; Krathwohl *et al.*, 1964:6-7) is based on, namely: [1] The cognitive – knowledge recall or recognition and the development of intellectual abilities and skills; [2] The affective – *changes* in interest, attitudes, and values, and *development* of appreciations and adequate adjustment; and [3] The Psychomotor – objectives emphasising muscular and motor skills, more relating to handwriting and speech. Bloom *et al.* (1956:7) critique the level of difficulty to classify the affective and psychomotor domains. As it was proven to be a difficult task, the first Bloom's taxonomy only highlighted in detail the cognitive domain. Due to this and the fact that the development of the ICTM directly links to the knowledge of a learner, focus is placed on only the cognitive domain for this study.

The cognitive domain is based on the idea that reason and rational can be ordered in a staggered, increasingly complex level approach (Bhaki, 2010:1526; Bloom *et al.*, 1956:7). The cognitive complexity of the original Bloom's taxonomy and the RBT are illustrated in a triangular format, the bottom starting at a basic level of recall with the top levels of analysis and evaluation of information (Anderson & Krathwohl, 2001:267; Bloom *et al.*, 1956:18; Preville, 2018:3). These categories have been earmarked throughout the years as a stairway (Forehand, 2005:2). Since education is directly linked to how students perform as a direct result of what is taught, Bloom's taxonomy was developed based on the student behaviours.

Bloom's taxonomy was published in a book in 1956 (Bloom *et al.*, 1956) and the RBT in 2001 (Anderson & Krathwohl, 2001:67-68, 268). Through the organisation of the different learning objectives, Bhaki (2010:1526) proposes that a more reliable procedure for assessing students and the outcomes of educational practices arose for educators. A comparison between the original Bloom's taxonomy and the RBT is illustrated in Figure 2-4 below:

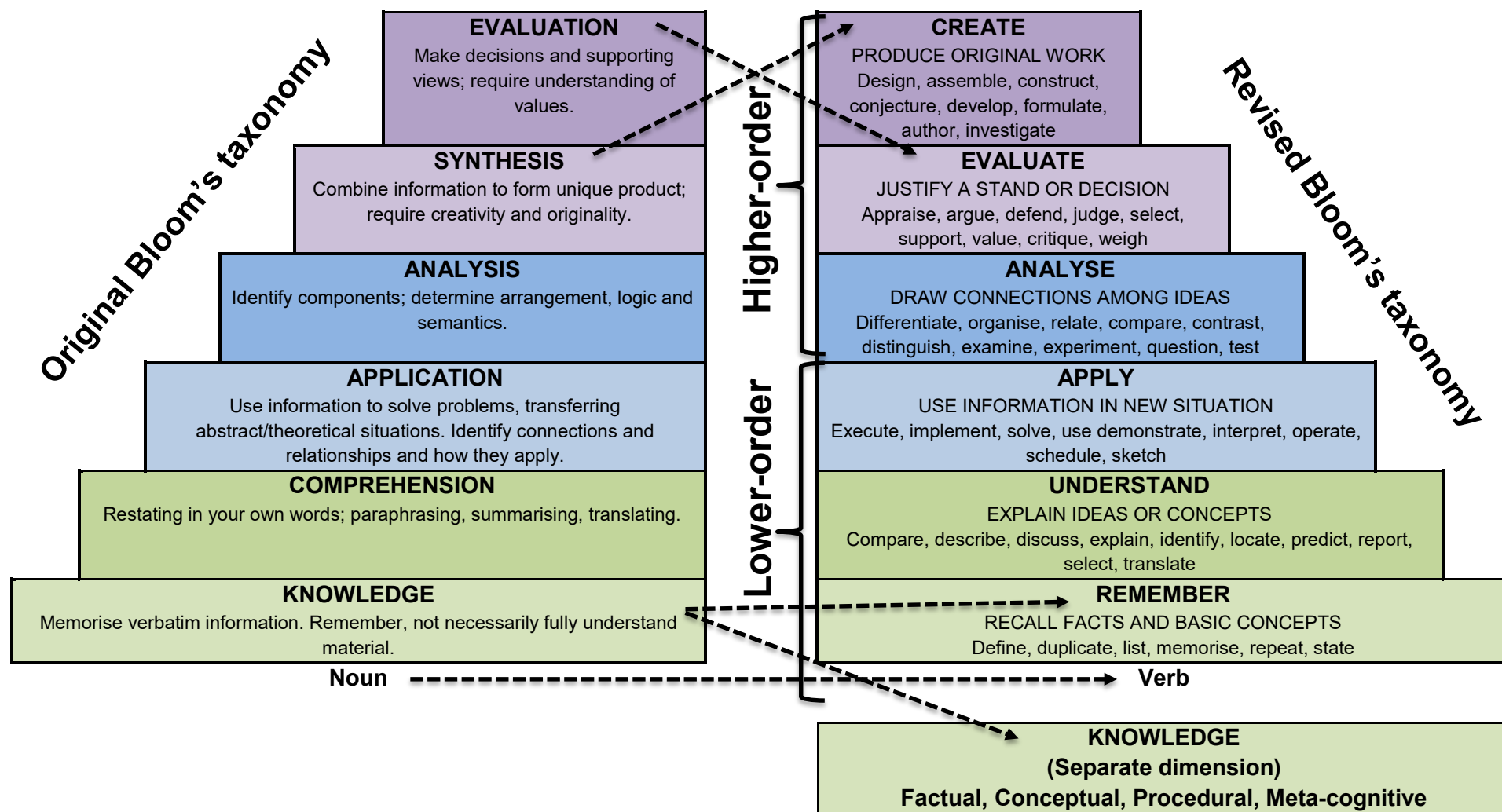


Figure 2-4: Original Bloom's taxonomy vs Revised Bloom's taxonomy

Source: Anderson and Krathwohl (2001:67-68,268); and Bloom *et al.* (1956:203-207), adapted

The original Bloom's taxonomy followed a single level approach that divided the categories of thinking (cognitive levels of complexity). It is divided into six multi-tiered levels represented by nouns: [1] knowledge; [2] comprehension; [3] application; [4] analysis; [5] synthesis and [6] evaluation (Bhaki, 2010:1526; Bloom *et al.*, 1956:18; Bork, 2019:7703; Crowe *et al.*, 2008:369; Dontham *et al.*, 2016:76; Forehand, 2005:2; Moore, 1982:29; Preville, 2018:6).

Subsequently, Anderson and Krathwohl (2001:8) and Preville (2018:6) point out that specific verbs and products are linked to each level of the taxonomy, representing student behaviour (Bloom *et al.*, 1956:18). These verbs aid in the development of questions and facilitation of learners to achieve the objectives for that specific category (Anderson & Krathwohl, 2001:8). The subcategories applied to the six main levels of thinking represents the educational outcomes, or more simply put, the desired or intended behaviour that will be tested and should be mastered by the student (Bloom *et al.*, 1956:18). This aided the development of the ICTM in that the specific ICT skills as outlined by SAICA are matched with the different categories of Bloom's taxonomy. In addition, the different knowledge levels of the RBT were also identified and incorporated.

Anderson and Krathwohl (2001:5); Bork (2019:7703-704) and Forehand (2005:5) identify the six cognitive elements, represented in Phase II of the RBT as [1] Remember, [2] Understand, [3] Apply, [4] Analyse, [5] Evaluate and [6] Create. Anderson and Krathwohl (2001:4-5), Bhakti (2010:1529), Forehand (2005:4), Preville (2018:8) and Wilson (2016) point out that the RBT changed the original nouns categories (describing the knowledge students are expected to acquire) to verbs (describes the intended cognitive process). On the contrary, the categories include both nouns and verbs, with the verbs taking the form of the main classification (Anderson & Krathwohl, 2001:4-5). There are still six categories. The lowest knowledge level was renamed to remember. The top two levels of the original Bloom's, comprehension and evaluate, were inverted to evaluate, and create (Preville, 2018:7). Where the original Bloom's taxonomy required a unique and original model or idea and then evaluate, the RBT outlines that you first need to evaluate an idea before you can design a new one (Anderson & Krathwohl, 2001:84; Krathwohl, 2002:216; Preville, 2018:8).

The four knowledge elements, Phase I of the RBT and the six cognitive process elements are all subdivided (Bork, 2019:7703-704). This subdivision provides a greater explanation and perhaps eliminates any uncertainties with what each division entails and should include. Forehand (2005:5) explain that through the use of the RBT levels, instructors will be able to formulate learning objectives and outcomes, known as the cognitive process elements (the learning process), that will lead to deeper learning and transfer of knowledge and skills. Forehand (2005:5) and Jideani and Jideani (2012:34) argue that this aids teachers, curriculum developers and other

users to write objectives and align standards within their curricula. These two phases of the RBT are illustrated in Figure 2-5.

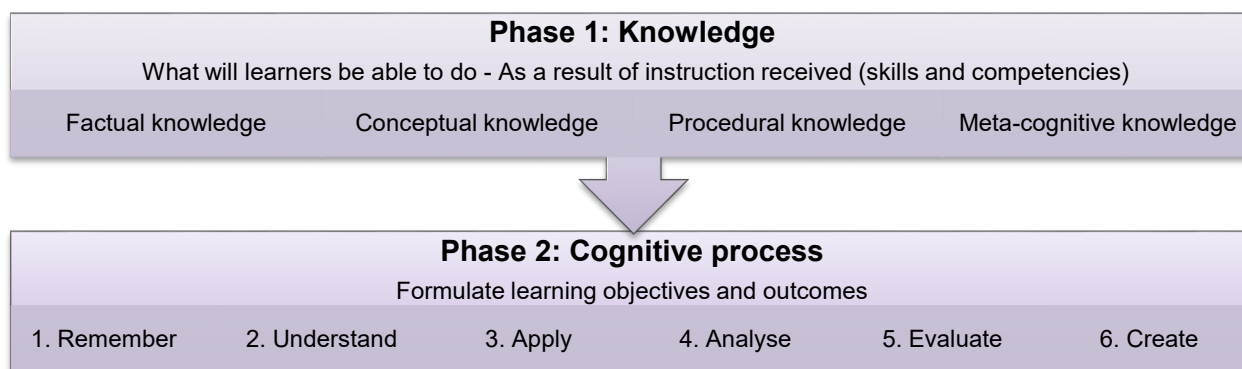


Figure 2-5: RBT twofold approach

Source: Anderson and Krathwohl (2001:5); and Forehand (2005:4), adapted

Figure 2-5 illustrates the two-dimensional approach followed with the RBT to formulate learning outcomes as outlined by Adams (2015:153), Anderson and Krathwohl (2001:5), Bork (2019:7703) and Forehand (2005:4). The rationale behind the two dimensions are that students will now be able to apply their cognitive process to different knowledge levels, a level on its own (Anderson & Krathwohl, 2001:5, 268; Krathwohl, 2002:213).

Krathwohl (2002:213) explains that with the RBT the noun now representative of the type of knowledge with the verb representing the cognitive process dimension. Also, emphasised by Anderson and Krathwohl (2001:267) and Krathwohl (2002:215), is the movement away from the cumulative hierarchy from the original Bloom's taxonomy. They conclude that there is in fact a cumulative hierarchy for the original middle three cognitive levels, comprehension, application, and analysis, with weak support leading to the hierarchical order for the last two levels. This leaves the opportunity for the six categories to overlap.

This two-dimensional approach, knowledge and cognitive process interrelationships, are known as the "taxonomy table" (Anderson & Krathwohl, 2001:5, 27). Anderson and Krathwohl (2001:27) identify two dimensions that the taxonomy table is divided into, knowledge process and cognitive process. Each dimension has several examples and subcategories that allows for better classification of outcomes. Forehand (2005:5-6) explains that with the increased subcategorisation of the RBT, less confusion and more clarity exist as to which verb fits where in the outcomes that needs to be achieved.

Wilson (2016) argues that the first dimension of the RBT is where instructors are encouraged to identify what learners will be able to do, the knowledge element (Anderson & Krathwohl, 2001:5; Forehand, 2005:5) (learning skill/competency) as a direct result of the instruction received. In

effect it is deduced that instruction will lead to knowledge. This study's aim is to integrate ICT to facilitate knowledge creation relevant for the workplace. This is achieved through the development of the ICTM.

These knowledge elements are divided into four categories: [1] factual knowledge, [2] Conceptual knowledge, [3] procedural knowledge and [4] meta-cognitive knowledge. Anderson and Krathwohl (2001:5) explain that knowledge starts from an existing actual level, to the theoretical meta-cognitive level. The middle two levels overlap where some knowledge is more factual and others more theoretical. Wilson (2016) asserts that even though these knowledge levels were included in the original Bloom's taxonomy they were rarely referred to. This led to the limited or even no reference being made to it when Bloom's taxonomy was introduced to the teacher. The meta-cognitive level of knowledge was not included in the original Bloom's taxonomy and only added in the RBT (Wilson, 2016).

This study applies the knowledge levels as outlined by Anderson and Krathwohl (2001:27, 29, 44, 45, 48, 52, 55) and applies them to ICT. These different knowledge levels and its application to ICT can be outlined as follow:

Table 2-4: Knowledge dimension

KNOWLEDGE LEVEL	FACTUAL KNOWLEDGE	CONCEPTUAL KNOWLEDGE	PROCEDURAL KNOWLEDGE	META-COGNITIVE KNOWLEDGE
In simple terms	"Re-call, Must know"	"Group elements based on re-call"	"Systematic decision making based on knowledge"	"Adjusting oneself based on personal experience with the subject matter"
Description	Basics, Isolated content elements, discrete, bits of information	Interrelationship of basics, more complex, organised knowledge forms	How to do something., When to do what.	Thinking about thinking, cognition in general and awareness of and knowledge about one's own cognition.
Knowledge of	Terminology, specific details and elements	Classifications and categories, principles and generalisations, theories, models and structures	Subject specific: skill and algorithms, techniques and methods, criteria for when to use appropriate procedures	Strategic knowledge, cognitive tasks, contextual and conditional knowledge, self-knowledge.
Examples	Definitions of something	Forms of business ownership, Supply and demand law, Structure of congress	Whole-number division algorithm, interviewing techniques, criteria used to judge feasibility of using a specific model to estimate business costs.	Adjust approach to learn something based on a reflection of the knowledge being studied.

Table 2-4: Knowledge dimension (continues)

KNOWLEDGE LEVEL	FACTUAL KNOWLEDGE	CONCEPTUAL KNOWLEDGE	PROCEDURAL KNOWLEDGE	META-COGNITIVE KNOWLEDGE
Examples	Definitions of something	Forms of business ownership Supply and demand law Structure of congress	Whole-number division algorithm, interviewing techniques, criteria used to judge feasibility of using a specific model to estimate business costs.	Adjust approach to learn something based on a reflection of the knowledge being studied.
ICT specific examples	Locate internet browser, MS Excel, MS Word, what is artificial intelligence and big data, etc.	Basic formulas in MS Excel to manipulate data, formatting the font of text within MS Word	CAATs, create templates, professional research	Solve the scenario with little guidance.
Type of knowledge	Subject matter specific knowledge			Knowledge about oneself

Source: Anderson and Krathwohl (2001:31); and Wilson (2016), adapted

Evident from Table 2-4 is that as with the cognitive domains, the knowledge domains also follow a somewhat staggered approach (Anderson & Krathwohl, 2001:44). As with any staggered approach, Bhaki (2010:1526) argues that a learner's ability to perform at a certain level is affected by the preceding level. Bloom *et al.* (1956:18) and Krathwohl *et al.* (1964:4) propose that the decision of which cognitive level starts at the bottom and which one needs to be achieved next was mainly based on the classification of what behaviour is needed to achieve a certain student behaviour. For example, if the basic task required behaviour "A" and a more advanced task required behaviour "AB", all the tasks requiring only "A" behaviours would be classified at the bottom, followed by all the tasks requiring behaviour "AB" combined, and so forth.

Anderson and Sosniak (1994:16) posit that no educator would be satisfied with students only being able to display knowledge of their module content. They emphasise that through the acquisition of knowledge students will need to prove that they can apply the knowledge gained in different situations. Different situations will require the application of generalised techniques as classified in Bloom's taxonomy and the RBT.

Applying these domains to ICT the starting point at the lower-level of knowledge, factual knowledge, is where only basic knowledge is required to be recalled. This is represented by switching on a computer, locating your internet browser and different applications, for example MS Excel and MS Word.

This builds up to conceptual knowledge that requires the interrelationship of basic knowledge where knowledge is grouped based on recall. This is constituted by applying basic formulas in MS Excel to manipulate data, making use of the different tools within an application to make changes, for example formatting the font of text within MS Word.

It then leads to procedural knowledge, where a student will be required to apply the "basic knowledge" from the first two knowledge levels to demonstrate how and when to do something. Here the basic knowledge acquired in the first two levels can be applied to select a sample for testing with the assistance of MS Excel (Computer Assisted Audit Techniques (CAAT's)), the creation of report templates in MS Word and obtaining an understanding of a potential client by performing research on the client through the internet.

The last level, mega-cognitive, has been described as the mental tool used to survive (Fisher, 1998). This entails that a student needs to think about thinking and is self-controlled (Anderson & Krathwohl, 2001:44; Crowe *et al.*, 2008:369; Krathwohl, 2002:214). Taking knowledge and thinking about how to apply it to a certain situation. For a prospective accountancy professional to reach this knowledge level a scenario with little guidance will need to be solved. The tools to be used to solve the scenario will have to be decided on by the student based on the prior knowledge gained.

Preville (2018:14) writes that students tend to think in the lower-order of learning, the factual knowledge category. Anderson and Sosniak (1994:32) and Krathwohl (2002:213) critique that curricula and examinations in their over emphasis on factual knowledge. Anderson and Krathwohl (2001:63) argue that there is an opportunity for instructors to expand their emphasis on the other three knowledge levels. Teachers must constantly remind students by stating learning outcomes (Preville, 2018:14) and in this way promote the other two knowledge levels. They emphasise that when the different knowledge levels are utilised, the type of learning can go from no learning to rote learning and ultimately meaningful learning (Anderson & Krathwohl, 2001:63-64).

No learning is where a student remembers nothing, not even factual knowledge. Rote learning represents a learner who can recall information but not being able to apply that knowledge in a new situation. The ultimate learning level, meaningful learning, represents a learning that can use knowledge gained and apply it to a new situation to solve problems (Anderson & Krathwohl, 2001:63-64).

In conclusion, Bloom's taxonomy represents six categories of student behaviour, representative of the intended outcomes of the education process. Bloom *et al.* (1956:13) emphasises that the taxonomy does not attempt to classify student behaviours or dictate how a curriculum should be designed. It was designed to assist educators in evaluating if a desired or intended behaviour was mastered by a student. These behaviours are only educational and not psychological (Krathwohl *et al.*, 1964:4). Krathwohl *et al.* (1964:4) propose that it also attempts to simplify and tighten the language of educational objectives to ensure conformity among educators.

The main theme of starting with lower-order thinking and gradually building to a higher-level of cognitive skills have remained intact. Teaching and learning processes at different educational levels are till this day still utilising Bloom's taxonomy to shape and outline learning outcomes (Adams, 2015:152). Gagné *et al.* (2005:44) argue that learning objectives shape the learning design and methods used. Biggs (2003:1), in support of this, explains that learning activities should be designed in such a way that set outcomes can be achieved by learners. Gagné *et al.* (2005:44) are also of the opinion that if learning objectives change, so should the learning strategy and instruments. In order to aid in this change, Catalano *et al.* (2014:1) conclude that Bloom's taxonomy assists in identifying what skills should be learnt and in what order.

Correspondingly, this study applied Bloom's taxonomy and the RBT in the development of the ICTM to ensure that the learning objectives, as set out by SAICA in the CF are mastered by prospective accountancy professionals. This in turn will enhance the probability of prospective accountancy professionals possessing the employability competencies and skills as expected by employers. How the RBT is applied in the development of the ICTM is discussed further below.

2.3.1.2 Applying RBT in the development of the ICTM

Deeper learning and transfer of knowledge and skills will be achieved through the inclusion of learning objectives that require a higher-level of cognitive skills. Chadwick (2004:267) and Valsraj and Lygo-Baker (2006:69) argue that an adequate alignment of a curriculum is a result of the educational programme, learning outcomes, teaching, and learning approaches, assessment techniques and course evaluation harmonising with one another.

The original and revised taxonomy both encourages higher-order thinking, where the RBT clearly makes the distinction between the lower-level and higher-level of thinking. This is evident if viewed in the context of the six knowledge levels. The first three, remember, understand, and apply refers to only knowledge that can be recalled separately or in aggregate. This could be interpreted as the lower-level of thinking. The remaining three levels, analyse, evaluate and create requires a learner to use the knowledge gained in the lower-level of thinking and apply that to construct new ideas and elaborate on views. This in turn is a higher-order of thinking (Bhakti, 2010:1529).

Anderson and Krathwohl (2001:4) propose that their taxonomy assist teachers to place outcomes with similar characteristics together when arranging their outcomes in the different taxonomy categories. In turn they feel that this will aid in the preparation of classes and to ensure that the outcomes of a course are what they should be.

For the discussion, with specific reference to the RBT as outlined in Figure 2-4 and Table 2-4, what the different knowledge (Phase 1) and cognitive levels entail (Phase 2), MS Word is used as a practical example to explain how the RBT can be applied, in terms of ICT, in transferring the

knowledge to learners, as proposed by the Omaha Public Schools Teacher's Corner (2005). Forehand (2005:6) explains that even though the example is simple in nature it may ease the understanding of how to apply the RBT.

➤ Level 1: Factual knowledge and remember

The first knowledge and cognitive levels of the RBT's starts with a learner's factual knowledge and only remembering information. Here a learner is only required to recall facts and basic concepts. As previously mentioned, all six cognitive levels are divided in subcategories. These subcategories assist educators in formulating the most appropriate questions to ensure that students can achieve the outcomes for the relevant cognitive level. In the case of remember, the subcategories, or assessment question that can be asked to students include: define, duplicate, list, memorise, repeat, state, name, record, match, etc., to name a few. As a steppingstone to continue with a topic, it forms the basis of developing higher-order thinking skills.

At this instance students would first need to know what MS Word is and what you can use it for. Thus, not applying it at this stage, but just knowing it is there and what you could possibly use it for in your own professional environment.

➤ Level 2: Conceptual knowledge and understand

The second cognitive level requires a learner to understand. Here the second knowledge level, conceptual knowledge, may also be required. This entails that ideas or concepts should be grouped or categorised based on the recall of factual knowledge and in turn explained. The subcategories or assessment questions that can be asked to students for this level include: compare, describe, discuss, explain, identify, locate, predict, report, select translate, observe, review etc., to name a few. This also forms part of the lower order thinking category.

In a MS Word context, a learner could be taught at this stage to change fonts, change text colour, what a page break is, how to insert images and save the document in MS Word.

➤ Level 3: Procedural knowledge and apply

The third level, applying, requires a learner to use the knowledge gained from the first two levels, using information already gained or procedural knowledge and implementing it in another familiar situation. The subcategories, or assessment questions that can be asked to students for this level include: implement, solve, use, demonstrate, interpret, sketch, illustrate, manipulate etc., to name a few.

At this stage the learner has the basic knowledge of the tools in MS Word and should be able to demonstrate that the knowledge can be applied. Once MS Word is open and text can be changed,

different paragraphs can be moved, page breaks can be inserted, and images could possibly be added to the document.

➤ Level 4: Procedural knowledge and analyse

The fourth level, being the first level that deals with a higher-order of thinking, is analysing. This level requires learners to break information down into different parts and to draw connections among ideas. The procedural knowledge level will also be applicable here. The subcategories or assessment questions that can be asked to students for this level include: differentiate, organise, relate, compare, contrast, examine, distinguish, interpret, plan etc., to name a few.

When a document in MS Word has been prepared, at this stage it can now be structured in such a way that only valid information is extracted to prepare a management report with significant financial outliers. This report should be structured in such a way that it is visually and technically correct and presented in a professional manner.

➤ Level 5: Meta-cognitive knowledge and evaluate

The fifth level, evaluate, requires a learner to justify a stand or decision. The meta-cognitive knowledge level is a possible knowledge category that could be applied here. Albrecht and Krathwohl (2001:61) scribe that the fact that the measurement of this knowledge level yields several individual differences. As it is based on a person's own reflection and personality, the paper-and-pencil measures are difficult to assess (Pintrich *et al.*, 2000:45). Consequently, the assessment of this knowledge level is best done in a classroom environment with discussions and activities (Anderson & Krathwohl, 2001:61). The subcategories, or assessment questions that can be asked to students for this level include: appraise, argue, defend, judge, select, support, critique, revise, assess etc., to name a few.

After a report has been prepared in MS Word, the learner could be required to decide on said information and to present the decision in an electronic format. Here it can be clearly seen that the preparation of the document is not the focus as it was in the applying (third) stage, but analysing the information is. Also, important to note is that if the third stage were not mastered, presenting the information electronically would not have been possible.

➤ Level 6: Meta-cognitive knowledge and create

This final stage, create, entails that a learner should produce new work. The knowledge levels that could be applied here is both procedural and meta-cognitive. The reason for this is mainly since the skills obtained will follow a certain sequence, procedural, and that the student will have to apply their own personal thought process to create something new. The subcategories or

assessment questions that can be asked to students for this level include: design, assemble, construct, develop, formulate, create etc., to name a few.

A student should be able to utilise the information from all the other stages (1 to 6) to design, construct, plan, produce and invent new ideas or thoughts. At this stage the MS Word document prepared with the analysis of the information could be applied in creating a new plan.

An overview of each question that can be asked for every knowledge cognitive level based on MS Word is summarised below in Table 2-5.

Table 2-5: Phase 2: Cognitive process applied to MS Word

POSSIBLE MS WORD ACTIVITIES	KNOWLEDGE LEVEL	COGNITIVE LEVEL	PROCESS VERB
Lower order of thinking			
Know what MS Word is and what it can be used for.	Factual	Remember	List
Change fonts, change text colour, what a page break is, how to insert images and save the document in MS Word.	Conceptual	Understand	Explain
Demonstrate that the basic knowledge of the tools in MS Word can be applied.	Procedural	Apply	Demonstrate
Higher-order of thinking			
Differentiate between valid information. Structure MS Word reports to be visually and technically correct and presented in a professional manner.	Procedural	Analyse	Differentiate
Critique a report prepared in MS Word, to formulate a decision on the information and present the decision in an electronic format.	Meta-cognitive	Evaluate	Critique
Develop a new plan based on the analysis of the MS Word document.	Procedural and meta-cognitive	Create	Develop

Source: Summary of literature above, adapted

Table 2-5 starts at the lower-order of thinking with students only having to list and explain information that they heard or read in the story.

Jideani and Jideani (2012:34) argue that to memorise and recall only requires a minimum level of understanding. No complex reasoning or interpretation occurs at this initial level. The third level, even though not requiring students to just answer knowledge already outlined in the story, no higher-order of thinking takes place. Students here apply the information to a possible new situation. With the differentiate, critique, and development levels, students are required to apply their minds.

Crowe *et al.* (2008:368) and Zoller (1993:195) outlines that the application of knowledge gained, and critical thinking falls in the higher-order thinking category. It should be emphasised that if students do not know what the elements of the concept or skill are, remember (Level 1), they will not be able to create. Bransford *et al.* (2000:8-9) and Bailin (2002:370) conclude that most

students struggle to perform at the higher-order of thinking. This is a crucial concept that is echoed by Bloom and all the other researchers in favour of Bloom's taxonomy, and that is that if you want to create, you first need to start at the bottom of the stairs and build your way up to the top floor, create. No steps can be skipped to reach the top and without certain steps, you will not be able to reach the top, or it may take you longer.

Similarly, when prospective accountancy professionals are required to possess ICT competencies, they need to go through the different levels of teaching, starting at a lower order of thinking to ultimately reach the higher-order of thinking. The latter will ensure that SAICA's CF requirements are met and in turn that they possess employability skills as required by employers.

In conclusion, the original Bloom's taxonomy and the RBT both have six cognitive levels. The original being classified by means of noun's and the RBT by verbs. Both have subcategories to provide guidance on how educators, teachers and professionals can structure their outcomes to assess their students, with the RBT's subcategories being broader and more understandable. A detailed comparison between the original Bloom's taxonomy and the RBT cognitive domains including all these elements are summarised in Table 2-6. This summary was used as a guideline in the development of the ICTM to outline the different teaching and learning activities for the different years of study of prospective accountancy professionals. This is discussed in detail in Chapter 3.

Table 2-6: Comparison between the original Bloom's taxonomy and the RBT cognitive domains

BLOOM'S TAXONOMY NOUNS & RBT VERBS	KNOWLEDGE ↓ REMEMBER	COMPREHENSION ↓ UNDERSTAND	APPLICATION ↓ APPLY	ANALYSIS ↓ ANALYSE	SYNTHESIS ↓ EVALUATE	EVALUATION ↓ CREATE
Definition	Retrieve knowledge from long-term memory	Construct meaning from instructional messages, including oral, written and graphic communication.	Carry out or use a procedure in a given situation.	Breaking information down into its constituent elements.	Putting together constituent elements or parts to form a whole requiring original, creative thinking.	Judging the values of the idea, material, and methods by developing and applying standards and criteria.
Cognitive process	Recognise and recall	Interpreting, exemplifying, classifying, Summarising, inferring, comparing, explaining	Executing and Implementing	Differentiating (discriminating, distinguishing, focussing, selecting), Organizing (finding coherence, outlining, parsing, structuring) & Attributing (deconstructing)	Generating (hypothesis), Planning (designing), & Producing (constructing)	Checking (coordinating, detecting, monitoring, testing) & Critiquing (judging)
Teachers' role	Direct, tell, show, examine, question, evaluate	Demonstrate, listen, compare, contrast, examine	Show, facilitate, observe to evaluate, organise, question	To probe, to guide, to observe, to evaluate, to act as a, to resource, to question, to organize, to dissect	To reflect, to extend, to analyse, to evaluate	To clarify, to accept, to harmonize, to guide
Students' role	Respond, absorb, remember, recognise, memorise	Explain, translate, demonstrate, interpret	Solve problems, demonstrate, use knowledge, construct, participate	To discuss, to uncover, to list, to active, to participant	To discuss, to generalise, to relate, to compare, to contrast, to abstract, to active, to participant	To judge, to dispute, to develop, to active, to participate

Table 2-6: Comparison between the original Bloom's taxonomy and the RBT cognitive domains (continues)

BLOOM'S TAXONOMY NOUNS & RBT VERBS	KNOWLEDGE ↓ REMEMBER	COMPREHENSION ↓ UNDERSTAND	APPLICATION ↓ APPLY	ANALYSIS ↓ ANALYSE	SYNTHESIS ↓ EVALUATE	EVALUATION ↓ CREATE
Process verbs	Define, name, record, match, select, underline, cite, sort, know, recall, listen, choose, quote, memorise, show, distinguish, reproduce	Relate, identify, discuss, locate, retell, research, convert, annotate, translate, give describe, report, recognise, review, observe	Translate, manipulate, exhibit, illustrate, calculate, sketch, interpret, prepare, make, experiment, list, practise, apply, relate	To distinguish, to interpret, to inspect, to compare, to examine, to inventory, to probe, to scrutinize, to separate, to discover, to inquire, to survey, to arrange, to detect	To compose, to assemble, to manage, to pretend, to arrange, to organize, to invent, to generalise, to systematize, to show, to compile, to forecast, to modify, to devise, to derive, to purpose, to construct, to plan, to revise, to collect, to prepare	To judge, to rate, to validate, to predict, to assess, to score, to evaluate, to compare, to defend, to select, to measure, to appraise, to value, to probe, to argue, to decide, to estimate
Products	Quiz, definition, fact, worksheet, reproduction, label, list, test, workbook	Recitation, summary, collection, explanation, story, problems quiz, definition, test, label, debate, outline	Predict, puzzle, scrapbook, relate, product, diary, photograph, report, illustrate, diorama, simulation, poster, sculpture, diagram, experiment, lesson, interview, model	Diagram, chart, investigation, outline, graph, conclusion, plan, list, categorize, summary, questionnaire, survey, illustration, database, inventory, mobile, spreadsheet	Film, story, project, blueprint, plan, solution, new game, song, pantomime, video, newspaper, painting, HyperCard stack, media product, advertisement, poem, formula, machine, goal, play, cartoon, invention, product, radio, event, collage, design	Investigation, judgement, opinion, report, survey, editorial, debate, scale, evaluation, verdict, conclusion, recommendation, panel
Skill demonstrated	Observe and recall information, master the subject matter, know major ideas	Understand the meaning, translate knowledge into new context	Use information, method, concept, theories in new situation and solve problems using required skills or knowledge	See the patterns, organize some parts, recognise the hidden meanings, and identify the components	Use old ideas to create new ones and generalise from given facts	Compare and discriminate between the ideas, assess value of theories, and make choice based on reasoned argument

Table 2-6: Comparison between the original Bloom's taxonomy and the RBT cognitive domains (continues)

BLOOM'S TAXONOMY NOUNS & RBT VERBS	KNOWLEDGE ↓ REMEMBER	COMPREHENSION ↓ UNDERSTAND	APPLICATION ↓ APPLY	ANALYSIS ↓ ANALYSE	SYNTHESIS ↓ EVALUATE	EVALUATION ↓ CREATE
Possible activities	Make a list of the main events, make a fact chart, recite a poem	Draw/paint pictures to explain what an event is about, illustrate the main idea, write a summary report	Construct a model to show how it will work, edit films / photograph/recording s to demonstrate a point, make a puzzle game using ideas from event	Design a questionnaire to gather further information, write a commercial to sell a new product, and write a biography	Invent a machine for a specific task, create a new product, and write about your feelings in relation to...	Prepare a list of criteria to judge a show and include priorities and ratings
Possible question	"How many...?", "Can you tell...?", "Which is true or false...?"	"Can you write in your own words...?", "Can you write a brief outline of...?", "Who do you think...?"	"How can you use...?", "What examples can you find to...?", "What factors would you change if...?"	"Which events could have happened?", "How was this similar to?", "What do you see as other possible outcomes?"	"Can you design a ...to...?", "Can you see a possible to?", "Can you develop a proposal which would...?"	"Is there a better solution to ...?", "Judge the value of...?", "Can you defend your position about...?"
Application to ICT	General knowledge on how ICT works, components, database	General knowledge on ICT security, what ICT can be used for within the accountancy environment, different ICT applications applicable to the accountancy field	Apply ICT in preparing basic: workpapers, budgets, financial statements, reports	Apply ICT in designing basic: workpapers, budgets, financial statements, reports	Apply ICT in designing advanced: workpapers, budgets, financial statements, reports	

Source: Anderson and Krathwohl (2001:67-68); and Bloom *et al.* (1956:207-208), adapted

Table 2-6 echoes the consensus, in that to reach the highest level of knowledge, the starting point will be the lower order of thinking, which refers to remember. Through climbing the knowledge “steps” and building on the lower order thinking, the higher-order of thinking, which refers to create, can be achieved. In addition to Bransford *et al.* (2000:8-9), Bailin (2002:370) made the conclusion that several students find it difficult to perform at the higher-order thinking, what will motivate them to want to perform at that level should be considered.

“Before a student’s cognitive needs can be met, they must first fulfil their basic physiological needs” (Maslow, 1943:373), roughly translated, Maslow is of the opinion that through the fulfilment of basic survival needs, educational and cognitive needs will follow (Stumke, 2014:17). Prospective accountancy professionals are a diverse group. As discussed in Paragraph 2.2, they come from different backgrounds with different resources at their disposal to further their education.

With several prospective accountancy professionals arriving from penury households and sub-standard schooling environments, not only their educational needs should be considered, but their physiological, safety, social, esteem and self-actualisation needs as well. Accordingly, motivational theories are discussed and outlined. The most appropriate motivational theory was adapted to ICT and aided in the development of the ICTM to ensure that above and beyond the different knowledge levels are addressed. Why ICT is considered to be important to prospective accountancy professionals is also addressed.

2.3.2 Motivational theories

Various research is conducted on what motivation entails, with no common consensus being reached. In order to highlight the extensive difference in opinions and the lack of common consensus available in literature on what is meant by motivation, Table 2-7 summarises some of the different views of different researchers.

Table 2-7: Literature of the meaning of motivation

AUTHOR	VIEW ON MOTIVATION
Carmen and Elena (2011:487) and Manzoor (2012:37)	The purpose of motivation is to “stimulate, influence, trigger or push”
Gorn and Kanungo (1980:265); Moch (1980:16); and Mol (1992:19)	Total participation
Franco <i>et al.</i> (2002:1257); Pouchová (2011:154); Smithers and Walker (2000:833)	Having enthusiasm
Likert (1961:30) and Quijano and Navarro (1998:194);	Making an effort
Kanfer <i>et al.</i> (1994:826); Locke and Letham (2004:388); and Mitchell (1982:86)	A psychological impact or progression

Table 2-7: Literature of the meaning of motivation (continues)

AUTHOR	VIEW ON MOTIVATION
Akbas and Kan (2007:18) and Martin and Bartol (1998:224)	Control
Hill (1984:1) and Ruthankoon and Ogunlana (2003:340)	Ambition
Fisher (2009:365)	Through triggering productivity, motivation can be viewed as the most significant factor in accomplishing work successfully.
Sandhya and Kumar (2011:1780)	When needs are met, enhanced motivation will result

Source: Summary of authors mentioned in table

The meaning of motivation for this study is the one as used by Fallatah and Syed (2018:19). They state that success of individuals is driven by motivation as the most important factor. By outlining the importance of motivation, they identify that Maslow's hierarchy of needs is often presented. The needs hierarchy is divided into five categories, starting at the foundation of, physiological, safety, social, esteem and self-actualisation (Bagozzi *et al.*, 2003:916; Fallatah & Syed, 2018:19; Maslow, 1943:382-383; Stumke, 2014:8-9). Fallatah and Syed (2018:22) state that the needs fostered by an individual will lead them to be motivated to fulfil those needs.

With many motivations and needs theories being developed over the years, the ones that are used more often, listed from recent to oldest, are:

- 1987: the Motivation-Hygiene theory by Frederick Herzberg (Moore 1992:1)
- 1984: three basic needs theory by David McClelland (Smits *et al.*, 1993:104)
- 1977: the ERG (existence, relatedness and growth) theory of motivation by Clayton Alderfer (Alderfer & Guzzo, 1979:347)
- 1960: Theory X and Theory Y by Douglas McGregor (Carson, 2005:450; McGregor, 1960:1)
- 1954: Maslow's hierarchy of needs (Maslow, 1954:2; Stumke, 2014:8)

Chiu and Lin (2004:200-201) and Steel and König (2006:889) propose that the above theories are all varying universal theories or models of needs, which share and are allied in many ways to the hierarchy of needs theory. This is due to the fact that these theories were reaffirmed, adopted, progressed or amended from Maslow's model (Brown & Cullen, 2006:100).

In order to support the use of Maslow's hierarchy of needs in the development of the ICTM, the influence it had on the development of other needs theories is briefly explained as identified and critiqued by seminal and current research.

2.3.2.1 Influence of Maslow's hierarchy of needs on other theories

Sahoo *et al.* (2011:25-26) argue that the first part of Herzberg's model is similar to Maslow's lower needs categories of physiological, safety and belonging. The second part of Herzberg's theory refers mainly to motivation and this in turn relates to Maslow's higher needs categories of self-esteem and self-actualisation (Sahoo *et al.*, 2011:22). Even though these needs are split into only two categories, Hunter (2012:32) and Marques (2011:20) conclude that Herzberg's model is Maslow's horizontal model represented vertically. Carrigan (2010:100) supported by Sandhya and Kumar (2011:1780) and Vránová (2011:525) identifies that due to these similarities and connections between the two models, it is a strong indication of Maslow's influence over Herzberg's theory.

Hunter (2012:32) and Taormina and Lao (2007:202) argue that another model influenced by Maslow is McClelland's theory. This theory categorises needs into three main categories: power, affiliation, and achievement. Affiliation can be directly linked to Maslow's need for belonging and love (Jindal-Snape & Snape, 2006:1339; Mobbs & McFarland, 2010:3; Yang, 2011:276). Achievement in turn can be linked to the self-esteem or self-actualisation need of Maslow (Van Raaij & Wandwossen, 1978:592).

Alderfer and Guzzo (1979:353) took the five needs of Maslow and integrated them into only three main needs categories (Gopalakrishnan, 2012:56) namely existence, relatedness and growth (Jindal-Snape & Snape, 2006:1326). Existence represents Maslow's *physiological* and *safety* needs (Category 1 and 2 of Maslow's hierarchy of needs). Relatedness bears similarities to Maslow's *belonging* and *self-esteem* needs (Category 3 and 4 of Maslow's hierarchy of needs) (Pettijohn *et al.*, 2012:2; Sahoo *et al.*, 2011:26). Growth represents the *self-actualisation* need of Maslow (Category 5 of Maslow's hierarchy of needs) (Anyim *et al.*, 2012:33; Sahoo *et al.*, 2011:26). Ajang (2001:15), Anyim *et al.* (2012:33) and Sahoo *et al.* (2011:26) identified that Alderfer's theory only regrouped Maslow's need theories.

McGregor's theory sets out management tools for employees with X-attributes (lazy, disloyal, avoiders, etc.) and employees with Y-attributes (self-driven, loyal, go-getters, etc.). Put differently, the X theory is management styles for people who are motivated by lower-level needs (Barbača & Zekan, 2011:338) and the Y theory is management styles for people who are motivated by higher-level needs (Hofstede, 1994:12). Linking directly to Maslow's needs hierarchy, Harell and Daim (2010:29) and Hunter (2012:33) argue that McGregor's theory shows great similarities to Maslow's hierarchy of needs.

Based on the use of Maslow's hierarchy of needs in different theories and throughout different spheres of life it is viewed as a sound base to deduce the needs hierarchy from. Fallatah and

Syed (2018:36), supported by Chew *et al.* (2008:3), Puttick (1997:136) and Saeednia (2011:3084), conclude that the popularity of Maslow's model has been applied throughout numerous social topics including education. Maslow's hierarchy of needs is the starting point to determine which ICT skills should be taught to prospective accountancy professionals during the different levels of their personal and educational journey. This assisted in the development of the ICTM that addresses the appropriate level of ICT needs at the different educational year level.

An overview of Maslow's hierarchy linked to the educational levels are discussed in more detail below. Subsequently, the ICT needs are linked to the educational levels that assisted in the development of the ICTM.

2.3.2.2 Maslow's hierarchy of needs

Fisher and Royster (2016:994) explain that Maslow's ideas that due to human nature, human needs arrange themselves into hierarchies of dominance; and as one's needs are satisfied the next will appear, resulted in the evolution of his hierarchy of needs.

Bagozzi *et al.* (2003:363) explain that the hierarchy of needs, as developed by Maslow, is divided into five categories; [1] physiological, [2] safety, [3] love, [4] esteem and [5] self-actualisation. Stumke (2014:10) adapted Maslow's hierarchy of needs (Maslow, 1943:370-382) to the educational environment for a prospective accountancy professional. This adapted hierarchy represents the development of a prospective accountancy professional from a scholarly level, to university student and ultimately professional career. Stumke (2014:10) identified these different levels as the different stages at which an accountancy professional is shaped. The five stages are [1] primary and secondary school, [2] university, [3] honours, [4] traineeship, and [5] professional career. This in turn relates back to the different needs as outlined by Maslow's hierarchy of needs where the lower level, primary and secondary school level, will first need to be fulfilled before the next, university, can be attempted successfully.

Adapting Maslow's and Stumke's categories to ICT within the university environment, basic ICT skills will have to be met first, in this case, primary and secondary school, that will form the basis for the additional ICT skills that will be expected and taught in the university context. Stumke (2014:13) argues that learners should be exposed to ICT from as early on as primary and secondary school level. This is important to expose learners to what is out there and to trigger a sense of inquisitiveness in this regard.

In the development of the ICTM, the different stages a learner, students and trainee find themselves in determine what level of ICT they should be exposed to. These specific skills linked to the five educational stages can be outlined as [1] Introduction of basic ICT skills and competencies (availability of ICT at school level may differ based on the type of school attended),

[2] Perform basic ICT tasks underpinned by skills and competencies acquired at primary and secondary school level, Utilise ICT skills for communication and social needs as well., [3] Master more advanced ICT skills, Utilise ICT skills for communication and social needs as well., [4] Apply ICT skills in a work environment and adhere to employer requirements in terms of foundational ICT skills and knowledge, and [5] Apply in a work environment, expand and keep up to date on ICT knowledge.

These three versions of Maslow's hierarchy of needs, the original version, Stumke's (2014:10) adaptation to a prospective accountancy professional's development phases and the development of ICT skills at a university level are illustrated in Figure 2-6.

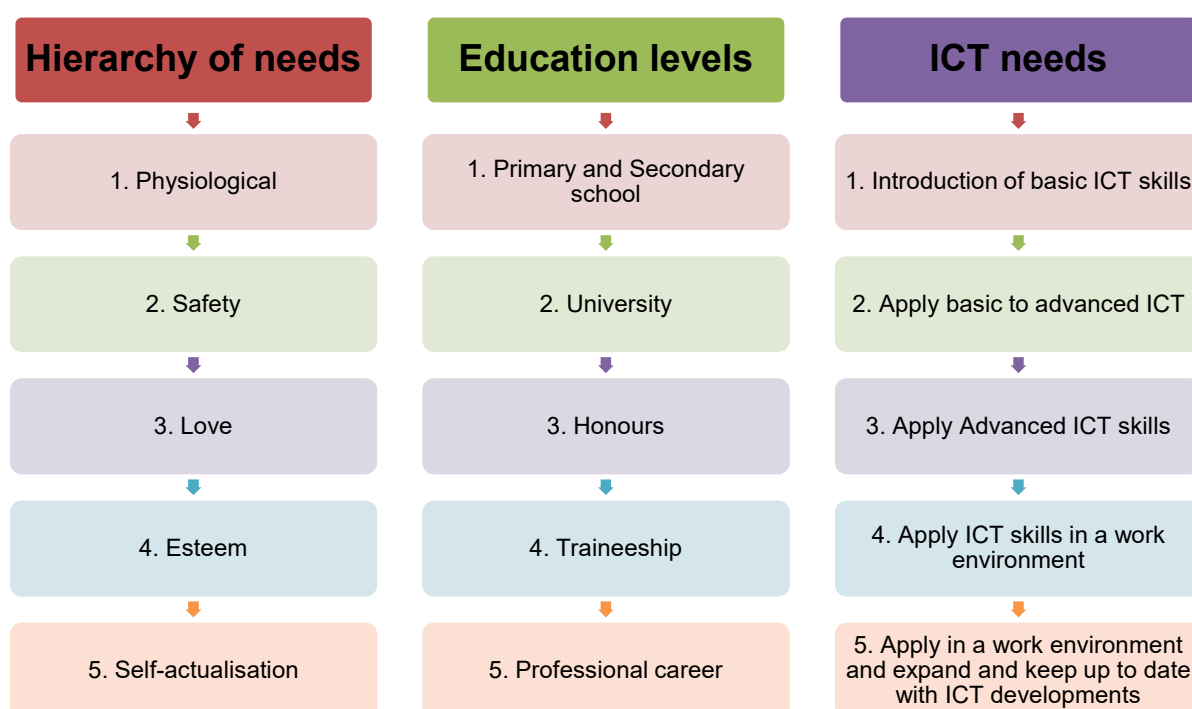


Figure 2-6: Maslow adapted to Stumke adapted to ICT

Source: Maslow (1943:370-382); and Stumke (2014:11), adapted

Figure 2-6 illustrates Maslow's (1970:240; 1943:373) and Sengupta's (2011:103) suggestion that in order to move to the next needs, the first needs should be fully satisfied or met so that it no longer dominates the motivation of that person. It is fair to say that according to Maslow's hierarchy, the physiological need is the most important one to be met and will determine the motivation to fulfil any other needs.

Similarly, Stumke (2014:12) suggests that before the next educational need can be considered or fulfilled, the lowest need should be satisfied first. In the educational context, a learner should first master all the competencies at the primary and secondary school level, and then only would

they be able to move on to university and honours level to then start their traineeship that will ultimately enable them to embark on their professional careers.

Also deduced from Figure 2-6 is that ICT skills start from the basic level, the knowledge gained from primary and secondary school. This will form the cornerstone for any and all ICT skills that are required to be mastered at university level. The five need levels as outlined in Figure 2-6 from all three perspectives are discussed in more detail below.

➤ Level 1

The first basic need that a person strives to meet is oxygen, food, shelter, water, rest, etc., categorised as physiological needs (Netotea-Suciu *et al.*, 2012:1017). Fallatah and Syed (2018:27) propose that physiological needs are those needs that a person will seek to satisfy and that is necessary for them to be motivated to achieve other needs. Khan *et al.* (2011:281) argue that Maslow is of the opinion that a person will not be motivated or satisfied if these basic needs are not met. Maslow (1943:373) outlines that the physiological needs are a channel or basis for the other needs to stem from. This argument stems from Maslow's (1954:82) view that "if a person who is lacking food, safety, love, and esteem would probably hunger for food more strongly than for anything else" (Stoll & Ha-Brookshire, 2012:152). Pulasinghage (2010:198) and Sadri and Bowen (2011:44) suggest that the environment in which a person functions, outside of the home environment, should be in such a condition that it enables a person to meet their physiological needs. Therefore, the physiological need is the most important need that should be fulfilled to foster the need and want for the other needs to be met and fulfilled.

Stumke (2014:11) proposes that the basic needs of a prospective accountancy professional start at a scholarly level in primary and secondary school. When learners at school level are not fed and do not have the necessary shelter, Maslow (1970:23) supported by McLeod (2014) explains that it becomes difficult to focus on learning. This is underpinned by the notion that only once a learner feels emotionally and physically safe will they be able to reach their full potential (Stumke, 2014:11).

Linking to ICT, if adequate skills are not mastered at school level, entering university with inadequate knowledge of what ICT entails and what will be expected in terms of ICT may result in the ever-crucial motivational foundational element not being met. This will hinder the further development of ICT for prospective accountancy professionals.

➤ Level2

The second need is safety or security where the fear of job insecurity, failure or even physical safety and security drives a person to perform (Aworemi *et al.*, 2011:229; Khan *et al.*, 2011:283). Stumke (2014:9) explains that "safety is underpinned by security and shelter in the form of money,

homes or even fear from everyday threats”. As soon as the safety category is entered, physiological needs are already satisfied, and all other needs become less important. Fallatah and Syed (2018:29) argue that as soon as safety is no longer a direct need due to it being fully satisfied the belonging becomes the next priority.

As the basic needs are fulfilled, successfully completing primary and secondary school, and a learner becomes a university student, the importance of the lower two needs will lessen. Certain ICT skills will be expected when university is entered. At this point, basic ICT skills and concepts should be introduced to new entrants. Once this is achieved further development in ICT will be possible. The first two levels are still considered to be lower needs as per Maslow’s model.

➤ Level 3

Belonging is categorised to include the support of friends, family and the community through love and affection to ultimately satisfy the sense of belonging (Pulasinghage, 2010:198). Maslow (1943:381) emphasises that once a person’s need for quality relationships is satisfied, it opens the path for the next need to be satisfied.

Once an undergraduate level is completed, a trainee moves into the middle needs level, which could be seen as the start of a higher needs category. Although the dependency on the lower two levels may decrease, they will still play a role in the needs hierarchy of a student. Consequently, the ICT skills mastered in Level 2 will be applied to enable the acquisition of advanced ICT skills.

➤ Level 4

The self-esteem need refers to the need to achieve a personal goal (Stumke, 2014:9). Anyim *et al.* (2012:34) and Stoll and Ha-Brookshire (2012:149) argue that this needs level denotes a need to acknowledge and grasp one’s rights, ability and capacity. This can only be achieved once the first three needs levels have been achieved. Mujah *et al.* (2011:20) and Saefullah (2012:1563) assert that this category drives a person through their need for recognition, appreciation, attention and even the need to feel important. As with the other needs categories, only when the need is satisfied will the next need, self-actualisation, emerge.

With the first three, lower needs levels, being fulfilled in the undergraduate journey of an accountancy trainee, the need to find themselves and having confidence will now emerge. With graduating from a post-graduate degree, a certain level of self-esteem will have been achieved. At this stage, advanced ICT skills are mastered. The next step would be to apply these ICT skills in a professional work environment. At this stage, if a stage was skipped or not practically applied, the prospective accountancy professionals will not be able to effectively apply ICT within the work environment. Once traineeship is started, self-esteem will enjoy a higher-level of importance. As

the professional journey is started, accountancy trainees will have to fulfil a greater level of independence. In turn, this implies that the application will have to be placed above theory.

➤ Level 5

Fallatah and Syed (2018:31) imply that the self-actualisation need is a more personal need. This is where a person strives for individual fulfilment of their personal potential by reaching their personal goals. George and Sabapathy (2011:91) and Netotea-Suciu *et al.* (2012:2012) explain that here a person can achieve a sense of professional sensibleness and career progression. Maslow (1943:382-383) argues that only one in a hundred people will achieve this need level. This is mainly due to the fact that society places more emphasis on self-esteem, belonging and other social needs (Stumke, 2014:9). Maslow (1943:382-383) supported by Kenrick *et al.* (2010:294) also explains that this needs category means different things to different people. Ultimately, to achieve self-actualisation, Maslow (1943:382) argues that a person will strive to be the best that person can be.

As with any professional career, accountancy trainees will need to take charge of their own development and promotion. Here the notion of Maslow that only one in a hundred people will fulfil their self-actualisation need becomes the responsibility of the individual. The onus for further development of ICT skills relevant to the work environment now rests on the prospective accountancy professional.

In conclusion, all needs, personal, educational, or ICT related, starts from a lower foundation level. Only once this lower level is satisfied or achieved, the impulse to move on to the next, will emerge. In the development of the ICTM caution had been given to ensure that the lower ICT skills are taught first to enable prospective accountancy professionals to move on to the next level.

With the integration of ICT into an accountancy curriculum, the success thereof will rest mainly on the acceptance of technology by the students (users). Marangunić and Granić (2015:81) stress the fact that with the increased development of technology and its continuous incorporation into almost every aspect of a person's life, the acceptance of technology remains an open question. Lee *et al.* (2003:768) highlight that since the development of the TAM by Davis (1989:320) it became the foremost model to determine a user's acceptance of technology.

2.3.3 Technology acceptance model (TAM)

This section addresses the theoretical objective as outlined in Paragraph 1.3.2.1, to investigate how ICT can be integrated successfully through the consideration of TAM.

Marangunić and Granić (2015:89) report that in the last few years the educational field has been receiving a lot of interest with regard to TAM. This research has, however, been limited to the use of e-learning by Cheung and Vogel (2013:160), Gong *et al.* (2004:365), Jin (2014:471), Van Schalkwyk and Müller (2019:1-9) and Zhang *et al.* (2008:312). Marangunić and Granić (2015:89) discuss that even though several researchers have modified TAM over the years for different fields, the basic concepts, perceived usefulness and perceived ease of use, have remained intact.

Davis (1989:320) underscores that to predict the actual use of any specific technology, the development of a reliable model is required. Davis (1989:320) and Sharp (2007:4) argue that the original TAM is based on the beliefs that a user's motivation to use that system leads to the actual use thereof. Linking the motivation of a user to use ICT in this study, Maslow's hierarchy of needs is considered. The psychological needs of prospective accountancy professionals will influence their acceptance of the ICTM. The satisfaction of the lower needs will have to be met first before the next need level will even be considered. In turn, the acceptance of prospective accountancy professionals of ICT is considered through investigating TAM and what it entails and applying these considerations in the ICTM.

Davis (1989:320), Sharp (2007:4) and Taylor and Todd (1995:145) identify two important variables that should be considered when determining how technology will be accepted. They are [1] perceived usefulness and [2] perceived ease of use. These two variables are defined as follows:

- Perceived usefulness: "the degree to which a person believes that using a particular system would enhance his or her job performance." (Dwivedi *et al.*, 2019:729; Taylor & Todd, 1995:148; Venkatesh & Davis, 2000:187)
- Perceived ease of use: "the degree to which a person believes that using a particular system would be free of effort." (Dwivedi *et al.*, 2019:729; Moore & Benbasat, 1991:197; Radner & Rothschild, 1975:360; Venkatesh & Davis, 2000:187)

Out of the two variables mentioned above, Davis (1989:333), supported by Jin (2014:473), King and He (2006:746), Marangunić and Granić (2015:81), Van der Velde and Ernst (2009:582) and Van Schalkwyk and Müller (2019:9) conclude that the perceived usefulness of technology plays the most significant role in the acceptance of technology. This notion supports the seminal concept argued by Davis (1989:334) in that the difficulty or ease of any application will never outweigh the usefulness thereof. Deduced from this is that even though an application may be perceived as being difficult if it is required or seen as useful, it will be accepted.

This study adopts this notion in the sense that if ICT is integrated in the accountancy curriculum from the 1st year of study, the importance and usefulness thereof will be emphasised. This will

lead to the acceptance of prospective accountancy professionals of the ICTM as their study years progress irrespective if ICT is perceived to be easy or difficult.

Jin (2014:472) identifies that TAM is divided into three factors: [1] perceived ease of use, [2] perceived usefulness and [3] attitude towards using. Sharp (2007:5) states that with motivation being the main factor in the use of a system, it is shaped by the two beliefs, perceived usefulness and perceived ease of use. TAM is illustrated in Figure 2-7.

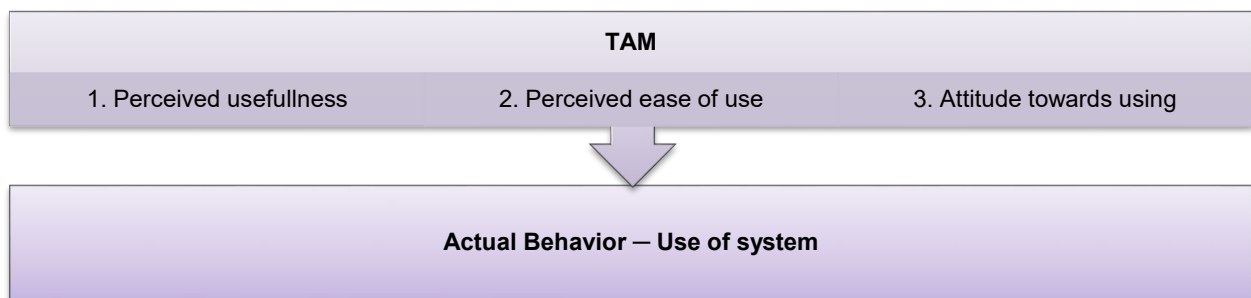


Figure 2-7: TAM layout

Source: Davis (1989:320)

Figure 2-7 outlines that the ease of use still plays a vital role in technology acceptance (Davis, 1989:335). Davis (1989:335) proposes that the easier a system is to use; the less effort it will take to master. This leads to more time available to spend on other activities. This study investigates, among other things, what ICT is already being applied at the university level. Relevant questions were included in the self-developed questionnaire, as outlined in Chapter 4, Paragraph 4.6.3. If an application is used continuously the perceived ease of use will enhance. This is also the aim of this study to introduce the ICTM from the 1st year of study to the final year of honours.

Subsequent to the original TAM, Davis *et al.* (1989:984) made several changes. Marangunić and Granić (2015:85) indicate that this included the removal of "attitude" as it did not facilitate perceived usefulness and perceived ease of use; the addition of a new variable, behavioural intention, directly influencing perceived usefulness; and considering external variables, possibly influencing beliefs (Venkatesh & Davis, 1996:186).

Venkatesh and Davis (2000:187) explain that with the removal of attitude and the addition of behavioural intent, the direct influence of perceived usefulness on the use of the system could now be explained. They outline that the consideration of the external variables refers to those factors that may influence a person's beliefs. These variables usually include "system characteristics, user training, user participation design, and the nature of the implementation process". Lee *et al.* (2003:767) accentuate that with every theory, TAM underwent constant change. Venkatesh and Davis (2000:187) proposed an updated TAM, TAM 2. This was done

due to the resounding findings that perceived usefulness was the foremost constituent of the intention of use (Davis, 1989:319; Davis *et al.*, 1989:984). Marangunić and Granić (2015:86) organise the variables that influence the perceived usefulness, as identified by Davis (1989:319) and Davis *et al.* (1989:983-984) as follows:

- Subjective norm: influence others have on a user's decision on the use of technology, underpinned by experience and voluntariness.
- Image: the desire of a user to maintain a certain image among others.
- Job relevance: the appropriateness of the technology to the job.
- Output quality: satisfactory execution of the task with the technology.
- Result demonstrability: the production of noticeable outcomes.

The revised TAM, TAM 2, is illustrated in Figure 2-8.

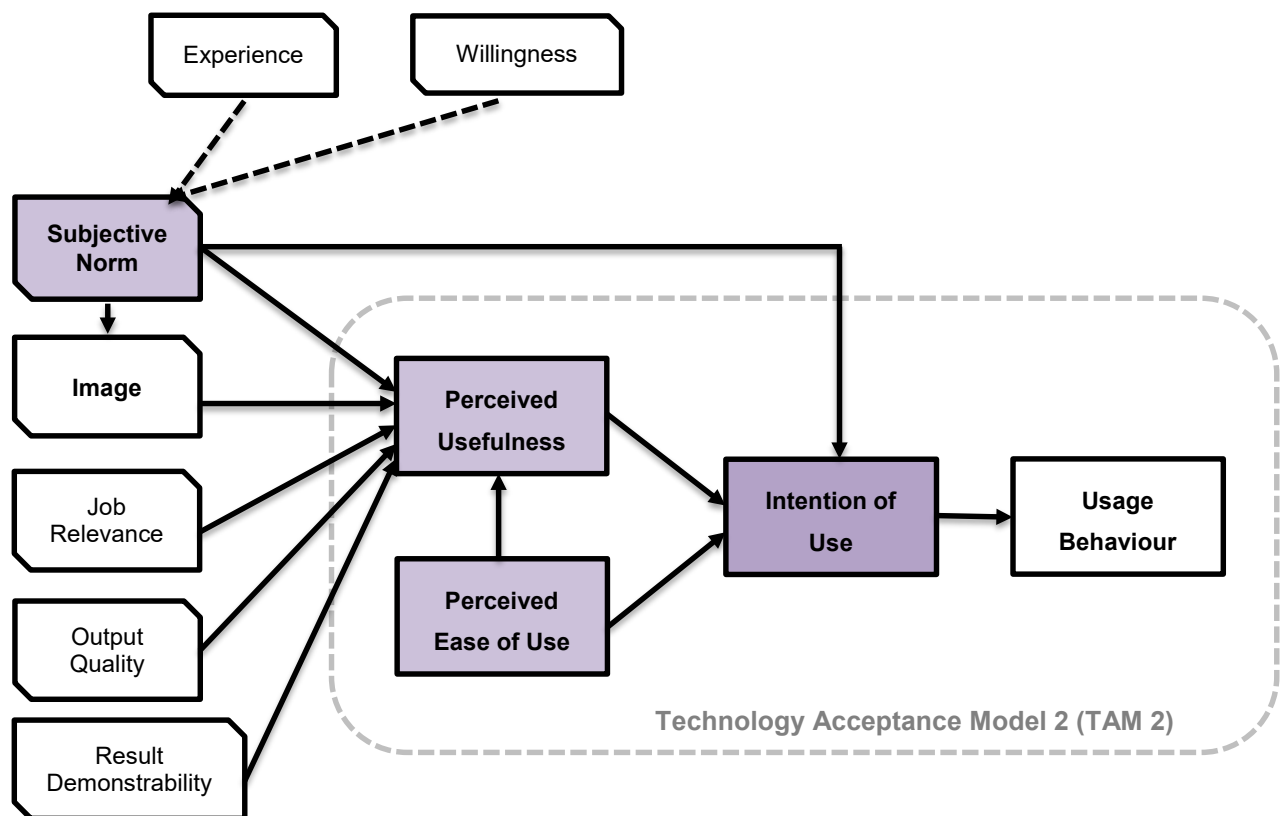


Figure 2-8: TAM 2

Source: Legris *et al.* (2003:192-193)

Figure 2-8 outlines that to determine the successful implementation or adaption of ICT the various external variables will play a role. A clear outlier is that perceived usefulness remains the variable that is impacted the most by the different external variables.

The variables, as identified by Venkatesh and Davis (2000:188), linked to this study point out the perceived usefulness of ICT still remain important. Linked to the perceived usefulness is firstly

the factors that will influence the beliefs. Linking to Maslow's hierarchy of needs, as outlined in Paragraph 2.3.2.2, basic needs need to be fulfilled first, before the subsequent need will even be considered. Directly influencing the integration of ICT, consideration was given to how, what and when ICT should be taught in the accountancy curriculum. This was achieved through considering Maslow's hierarchy of needs, as adapted by Stumke (2014:11) to the educational levels of prospective accountancy professionals, and subsequently for ICT needs, as illustrated in Figure 2-6. The external variables that affect students in all these spheres, basic needs, education and ICT were taken into consideration in the development of the ICTM, after considering the variables from TAM 2. This is further elaborated on in Chapter 6, Paragraph 6.6.

Thus, considering TAM 2, the external variables that influenced the ICTM are teaching basic and advanced competencies, students entering university with different ICT skillsets and universities sufficiently implementing ICT in their curriculum, the integration of or separate teaching of ICT, and lastly how ICT will be taught in the core accountancy modules with different teaching and learning activities. A summary of the TAM 2 variables linked to the ICTM is depicted in Table 2-8.

Table 2-8: External variables of TAM 2 adapted to the ICTM

TAM 2 EXTERNAL VARIABLES	APPLIED TO THE ICTM
User training	Different ICT skillsets from school to university and implementation of ICT in university curriculum.
User participation design	Integration of or separate teaching of ICT
System characteristics	Basic and advanced competencies
Nature of the implementation process	Teaching and learning activities including ICT

Source: Venkatesh and Davis (2000:197), adapted

Table 2-8 posit that before the ICTM can be implemented, several external factors should be considered in the development thereof. These factors will assist in the acceptance of ICT by prospective accountancy professionals. Subsequently, included in the self-developed questionnaire, as outlined in Chapter 4, Paragraph 4.6.3 questions pertaining to the ICTM elements are included as based on the information of Table 2-8 and further explained and summarised in Table 2-10. If the ICTM was developed considering all the external factors that can influence the acceptance of ICT, the implementation thereof will be duly supported.

Venkatesh and Davis (2000:188) separate subjective norm, perceived usefulness, and perceived ease of use as the direct determinants of the intention to use technology. They identify the other variables, image, job relevance, and result demonstrability as significant determinants of perceived usefulness with one two-way relationship, output quality and job relevance, being outlined as the only relationship of significance.

The resounding issue that will affect the acceptance of technology, as outlined by TAM 2, is that with poverty looming and affecting many South Africans, as stated in Paragraph 2.2.1, and where South African schools not possessing the necessary ICT equipment for several previously disadvantaged schools, as outlined in Paragraph 2.2.2, the assumption that learners enter university with basic or the same level of ICT skills and competencies cannot be made. Taking this into account, one cannot assume that said students will automatically accept the ICTM due to their different backgrounds and daily challenges. The success of the proposed ICTM will mostly rely on the external variables that affect perceived usefulness, as identified by Davis (1989:320) and Davis *et al.* (1989:984-985) and explained by Marangunić and Granić (2015:86).

These variables can be classified as the most influential in the lives of a student to determine if they will do or will not do something. Stumke (2014:13) argues that when students are at university level they are motivated by physiological, safety and belonging needs. These are the needs that directly impacts the image a student portrays to their peers. In turn, it is this image that they would work on tirelessly to uphold to satisfy their basic needs that will allow them to move to the next need Maslow (1954:82). This links to the external variables as outlined by Davis (1989:321) and Davis *et al.* (1989:984-985).

Adapting TAM 2 to an accountancy student's educational path will have to start at the external variables. These variables could be viewed in the same manner as illustrated in Figure 2-6, in terms of Maslow's first three levels of motivation, physiological, safety and belonging. This is also similar to Stumke's (2014:13) interpretation in terms of the educational levels, primary and secondary school, university and honours level. These three levels outline that basic ICT skills and competencies should be introduced from an early age, with more competencies added and developed at university level. Maslow's hierarchy of needs, Stumke's educational levels, TAM 2 and the application of all these theories are illustrated in Figure 2-9. The aim of this is to illustrate how the personal needs, as outlined by Maslow, influence the educational level of prospective accountancy professionals. Similarly, the acceptance of ICT in the accountancy curriculum was adapted to what ICT competencies and skills should be taught within the different educational levels. This was formulated after considering the external variables that could affect the perceived usefulness of ICT, as outlined by TAM 2.

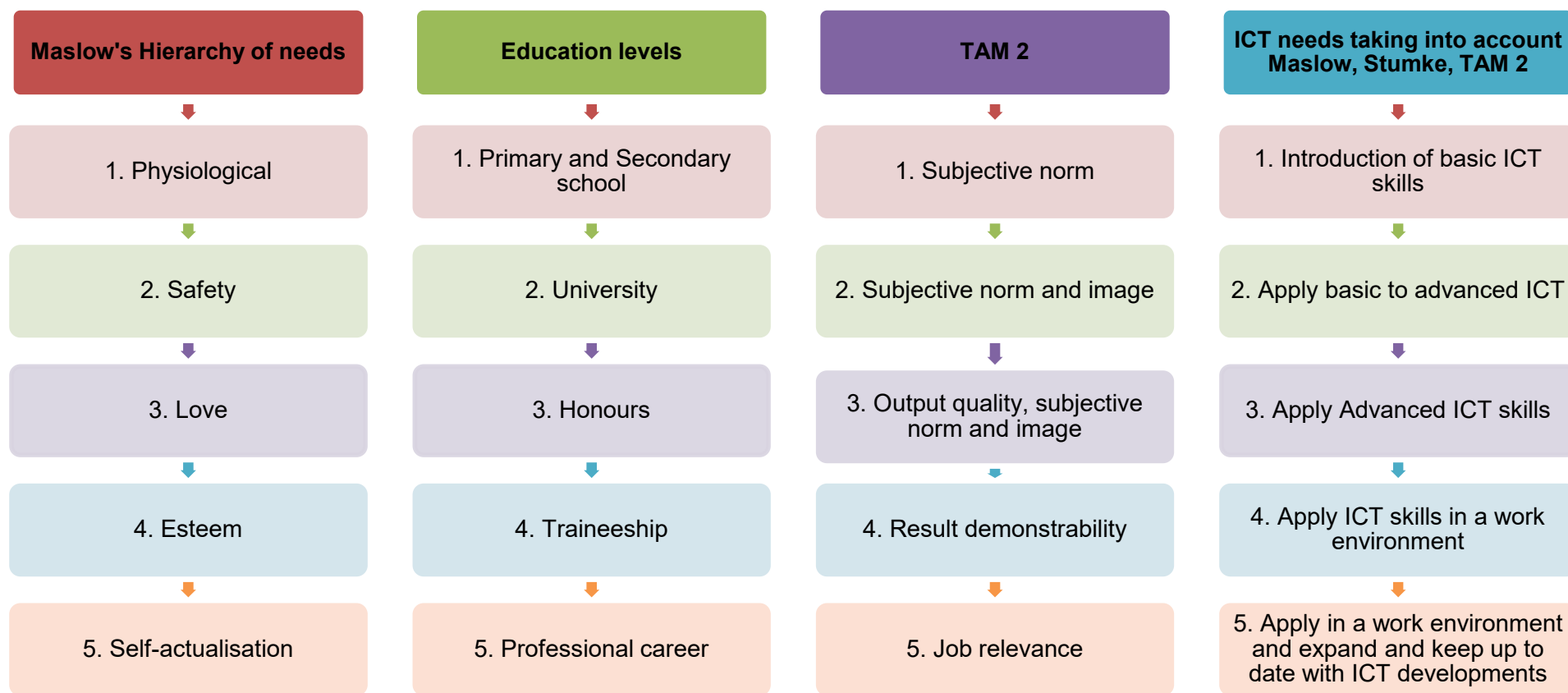


Figure 2-9: Motivational theory adapted to the educational phases of a prospective accountancy professional, adapted to the TAM, adapted to ICT needs of prospective accountancy professionals

Source: Marangunić and Granić (2015:86); Maslow (1943:370-382); and Stumke (2014:11), adapted

In applying TAM 2 to the different educational aspects affecting prospective accountancy professionals, the development of an executable ICTM was the outcome. In order to assist in the development of the ICTM, TAM 2 was linked to a student's external variables. It considers firstly the external factors that should be considered that will affect the acceptance of ICT through the view of perceived usefulness. The main external factors considered for this study are poverty, ICT in schools and universities, employer expectations and finally the expected competencies and skills as outlined by SAICA.

In conclusion, Van Schalkwyk and Müller (2019:1) argue that if these variables can be approached with the correct direction, perceived usefulness and perceived ease of use can lead to the acceptance of ICT within the accountancy curricula by students. If TAM 2 is adapted to prospective accountancy professionals' career path, starting at university level, their willingness to embrace the ICTM will depend on how important they think the ICT competencies being taught at university level will be for their professional careers. Care should be taken to align both motivation (Maslow) and perceived usefulness (TAM 2) in such a way that the product, being employment, is clear from the start. This will ensure that the importance of the competencies is emphasised and continuously practised.

Similarly, the importance of ICT in the future career of a prospective accountancy professional is emphasised by SAICA. For a prospective accountancy professional to obtain their professional qualification, they need to comply with the basic competencies and skills as outlined by SAICA. Through their various initiatives, the CF (SAICA, 2019a:7) and the CA 2025 project, the need for ICT in the development of prospective accountancy professionals are stressed. The next section addresses the theoretical objective as outlined in Paragraph 1.3.2.1. SAICA's ICT requirements in terms of their CF, the CA 2025 project linking to SAICA's end goal for 2025 and the changing business environment in the context of the 4IR are discussed in more detail below. This is important to ensure that the development of the ICTM addressed the required competencies as outlined by the professional body and is flexible enough to adapt to constant change due to 4IR.

2.4 SAICA ICT COMPETENCY REQUIREMENTS

Steenkamp (2012:2), Van der Merwe *et al.* (2014:279) and Van Romburgh (2014:5) state that all competencies and skills a prospective accountancy professional should possess when they enter the workplace are outlined in SAICA's CF. Since the first introduction of the CF in 2009, due to demands from local and international stakeholders, as outlined by Wessels and Steenkamp (2009:118), the Institute of Chartered Accountants in Australia (ICAA); the Canadian Institute of Chartered Accountants (CICA) and the American Institute of Certified Public Accountants (AICPA) and as discussed in Paragraph 2.1, AAA (1986), Adler and Milne (1997:191,199), AECC

(1990), Albrecht and Sack's (2000:2), IFAC (1996), Kullberg *et al.* (1989:5), Lau and Rans (1993:24), Theuri and Gunn (1998:101) and Williams (1993:76), who appealed for the improvement of accounting education. The importance of the integration of ICT has been echoed in all the revised versions in 2014, 2017 and 2019 (still in a draft format) (SAICA, 2010:18; 2014:16; 2018:20; 2019a:2). Bunney, *et al.* (2015:259) argue that through the integration of non-technical skills, such as ICT, the concept of lifelong learning could be enhanced. They furthermore outline that this skill is becoming more and more important due to the fact of ever-changing work environments as a result of innovation and workplace demands.

Bunney *et al.* (2015:257) state that employers and professional bodies are instrumental in the drive to integrate non-technical skills in accounting curricula. SAICA (2018:32) divides non-technical skills into three main categories, namely: [1] ethical behaviour and professionalism, [2] personal attributes and [3] professional skills. Included in professional skills is the use of ICT. Wessels (2008:161) argues that the integration of ICT is necessary to ensure accountancy graduates meet the needs of the working environment. Hesketh (2011:4) suggests that the CF provided a significant steering tactic on how ICT skills should be taught to graduates. Applying this notion, the development of a curriculum and teaching and learning activities should be based on the RBT, as mentioned in Paragraph 2.3.1.1. This assisted in the development of the ICTM, in that through the considerations of the RBT clear outcomes are designed that will lead students to know exactly what and how they will be assessed. The starting point would be to determine what students should know at the end of a course or curriculum.

As a result of this SAICA's CF was used as the main point of reference in the development of the ICTM. What ICT skills should be taught at university level are clearly outlined and the relevant teaching and learning activities could then be designed. The specific competencies required by SAICA for prospective accountancy professionals to possess when they enter the workplace are discussed in more detail below.

2.4.1 SAICA competency framework

Through their continuous development, updating and revision of the competencies that prospective accountancy professionals should master, SAICA is one of the instrumental and key professional bodies involved in shaping the accountancy profession (SAICA, 2019a:1). Modisane (2019:50) refers to SAICA's CF in his research in the establishment of ICT competencies for internal auditors. This indicates that SAICA's CF has an impact on all accountancy fields and further emphasises that the reliance and reference to it covers a vast majority of the profession.

In order to understand the development and the continuous importance of ICT in a prospective accountancy professionals' professional qualification as underwritten by SAICA, the development

of SAICA's CF, from initial implementation in 2009 to the current 2019 published CF, specifically focussing on ICT, are discussed in more detail below. In order to support this discussion, the following needs to be kept in mind that SAICA (2018:6), supporting the definition of Dubois (1998:v) and Teodorescu (2006:29), explains that the competencies in the CF refers to the knowledge, skills and attributes a prospective accountancy professional should display when they enter the professional work environment. Competency is defined by Moghabghab *et al.* (2018:54) as the vital skill that is required to do a job. Deduced from these definitions, competencies are encumbering knowledge, skills and attributes. Subsequently, where this study specifically mentions competence or competency, reference is also made to knowledge, skills and attributes.

SAICA (2019c) identifies that due to continuous change of the world as we know it, accountants should stay relevant and up-to-date in the role they need to perform. Steenkamp and Smit (2015:669) posit that due to several competencies not being addressed to a satisfactory level previously, SAICA introduced the CF. Alongside the many different changes, SAICA (2019b) outlines that the continuous improvement of technology creates both challenges and opportunities for accountants in today's professional environment. This statement supports SAICA's revised CF (SAICA, 2019a:7) where ICT competencies have been clearly identified and categorised, which is different from the three previous versions where ICT was limited to the mastering of MS Word, MS Excel, PowerPoint and professional research tools (Stumke, 2019:36).

SAICA (2009:9) initially divided their CF into three main categories, namely compulsory skills, elective skills and residual skills. Compulsory skills include technical subject-specific accounting and external reporting that a prospective accountancy professional has no choice but to master pervasive skills (SAICA, 2009:10). Included in pervasive skills as identified by SAICA (2009:10) are those non-technical skills required to be applied in carrying out a specific task. SAICA (2010:11-12) categorises pervasive skills further into three categories, namely ethical behaviour and professionalism (IA), personal attributes (IB) and professional skills (IC). The three categories include the following competencies as outlined by SAICA (2010:20, 23, 26):

- Ethical behaviour and professionalism (For example: professional conduct, honesty, integrity, trustworthy, etc.)
- Personal attributes (For example: Maintain awareness of new developments, add value, exercise initiative, lifelong learning, etc.)
- Professional skills (For example: effective use of ICT in the creation, analysis, evaluation and synthesis of information, communication skills, etc.)

From the above, the importance of ICT in the task to be performed by an accountancy professional was already evident in the required competency, professional skills. Ever since the

initial development and implementation of SAICA's CF (SAICA, 2010:1) the importance to include and integrate ICT in the accountancy curricula have only increased.

SAICA (2010:12) clearly states that some of these pervasive skills, including ICT, may be better addressed during the training programme, but that all universities should strive to equip their graduates with said skills where possible.

SAICA (2010:13) emphasises that due to the rapid changes in the business, ICT, social and political environment, will lead to a continuous revision of the CF on a continuous basis. Consequently, the first revision of the CF was published in 2010 (SAICA, 2010:1). The main changes from the 2010 version to the 2013 version (SAICA, 2010:14) were mainly linked to the integration of integrated reporting, competencies now linking to the public sector and the strategy and risk management section being rewritten to provide clarity on some sections. The inclusion of the pervasive skills remained a focal point with the integration of ICT still featuring, with no adjustments (SAICA, 2010:5, 16). It is still only mentioned that a prospective accountancy professional should be able to use ICT in the creation, analysis, evaluation and synthesis of information, communication skills through the use of MS Word, MS Excel, MS PowerPoint and internet research tools (SAICA, 2010:16).

SAICA (2016:16) published their next revised CF in 2016 with the most notable changes being the inclusion and removal of some knowledge areas to be in line with their examinable pronouncements. In this version, SAICA (2016:16,) also reviewed and updated their pervasive skills section relating to ethics. Although the CF was updated from its initial introduction in 2010 to 2018, the inclusion of ICT remained. Stumke (2019:36) remarks that it is notable throughout all the different versions that there is the limited guidance available on what and how ICT should be taught and integrated into accountancy curricula. Again, the only mention of ICT specifically is that a prospective accountancy professional should be able to use ICT in the creation, analysis, evaluation and synthesis of information, communication skills through the use of MS Word, MS Excel, MS PowerPoint and internet research tools (SAICA, 2010:16).

The latest revision of the CF (SAICA, 2019a:1) started from as early as 2015 when SAICA launched its CA 2025 initiative. SAICA's CA 2025 project (2016:3) heeds the historic views of required change by AAA (1986), Adler and Milne (1997:191,199), AECC (1990), Albrecht and Sack's (2000:2), IFAC (1996), Kullberg *et al.* (1989:5), Lau and Rans (1993:24), Theuri and Gunn (1998:101) and Williams (1993:76) in that more focus should be placed on employer required skills and needs. It furthermore endeavours to prepare prospective accountancy professionals with more employer-based competencies. The elaboration of ICT is included to further emphasise the importance thereof in the changing workplace environment.

Therefore, since the CA 2025 project will replace the existing CF when finalised, a specific focus was placed on the ICT competencies outlined to ensure that the ICTM is relevant and adheres to SAICA's vision. The CA 2025 project, with specific reference to ICT competencies, is discussed in more detail below.

2.4.2 CA 2025

Communicate Recruitment (2018) outlines that the CA 2025 project is underway to identify the skills required by the future CA(SA). In line with the DHET's (2014:10) proposal that universities need to conduct research to cater for the needs of the economy and society, research is currently being conducted by the University of Pretoria which is challenging other universities to change their accountancy curriculum. Communicate Recruitment (2018) asserts that with the evolution of technology the jobs of accounting professionals will not disappear, but rather the way that accountancy tasks are performed will change. Barnes (2017) correspondingly asserts that the most important characteristic that a prospective accountancy professional could possess may be the ability to change.

Likewise, the 2010 CF has undergone a complete overhaul in how prospective accountancy professionals will perform and prove their "new" competencies. The revised CF's components are now defined as [1] professional values and attitudes, [2] enabling competencies (acumens) and [3] technical competencies (SAICA, 2019a:2). Professional values and attitudes and technical competencies directly link to the compulsory component of the previous CF's (SAICA, 2019a:6). Professional values and attitudes now include the original ethical behaviour and professionalism and personal attributes. This entails personal business and professional ethics, self-development and adaption to name a view (SAICA, 2019a:3). SAICA (2019a:5-6) further updates the enabling competencies to take on the form of the original personal attributes and professional skills, as outlined in Paragraph 2.4.1.

This component is divided into four acumens namely: [1] Business; [2] Decision-making, [3] Relational and [4] Digital. The Collins dictionary (2008) and adopted as such by SAICA (2019a:5), defines acumen as "the ability to judge well; keen discernment, and insight". By dividing this component into acumens, SAICA places more responsibility on prospective accountancy professionals. This is due to the change from a prospective accountancy professional merely having to possess certain skills as set out in the CF (SAICA, 2018:30) to being an individual with the skills as set out in the CF that will facilitate the ability to judge appropriately, have profound discernment and apply judgement with insight.

The first three competencies relate more to the original personal attributes that include innovation and creativity, problem-solving, professional scepticism, communication, leadership and people

skills, to name a view. The acumen relevant to this study is the fourth one, digital. This is in line with Barac's (SAICA, 2017) comment that the future CA(SA) will need to demonstrate a great level of ICT competence. In addition, the disparity to all the previous versions of the CF the proposed CA 2025 version provides more guidelines on ICT and the type of ICT that a prospective accountancy professional should possess. Five additional ICT components have been added (SAICA, 2019a:7). SAICA (2010; 2014; 2016; 2018) only referred to the now user competencies acumen in its previous CF's. Table 2-9 outlines the specific ICT competencies that will be required of a prospective accountancy professional in terms of the proposed CA 2025 CF (SAICA, 2019a:7).

Table 2-9: SAICA's Digital acumen

ELEMENTS	DIMENSIONS
1. Data analytics	➤ The nature of data (e.g. underlying characteristics and storage) ➤ Perform data analysis
2. Big data	➤ Impact on business models
3. Cognitive & non-cognitive systems	➤ Including, but not limited to machine learning, robotic process automation and artificial intelligence.
4. New developments & protocols	➤ Including, but not limited to cloud computing, blockchain, and mobile apps
5. Distributed processing and cybersecurity	➤ Distributed processing (Internet of Things) ➤ Risks and attacks ➤ Mitigating steps
6. User competencies	➤ User tools (word processing, presentation software, spreadsheet software) ➤ Basic ICT coding ➤ Securing and safeguarding

Source: SAICA (2019a:7)

The last category, user competencies, refers to the ICT competencies as outlined in the first three versions of SAICA's CF, namely word processing, presentation software, spreadsheet software, securing and safeguarding and basic ICT coding. Understood from this is that even though the CF has been immensely updated with regard to ICT, the basic competencies and skills are still important. The digital acumen will be further discussed in Chapter 3, Paragraph 3.3.1 and Tables 3-2 to 3-4. This will aid in identifying the specific ICT competencies of required computer programs, and is further discussed in Chapter 3, Paragraph 3.3.3 and outlined in Tables 3-5 and 3-6. Through this, the ICT competencies that will aid in the development of the ICTM is identified and discussed further in Chapter 3, Paragraph 3.4.1 and outlined Table 3-8.

Focussing on the added user competency from the latest published CF (SAICA, 2018:49) to the proposed CF (SAICA, 2019a:7), Kirkham (2020), Meyer (2015) and Shikati (2017) state that basic ICT coding will enhance prospective accountancy professional's marketability and usefulness within their firms. Meyer (2015) and Shikati (2017) emphasise that ICT coding produces better logical thinking, necessary in the accountancy profession. Meyer (2015) argues that this is due to the rigour in which ICT coding takes place, from step A–Z, without missing any steps. Shikati

(2017) points out that when ICT coding is applied, the computer program will be able to process information quicker and with precision. Furthermore, Zahid (2018) indicates that technology, specifically ICT coding, can increase the functioning of teams. Kirkham (2020) outlines that with the many benefits ICT coding offers, for example, the processing and cleaning of data to be left with statistical and interactive methods, innovation should be taken to empower prospective accountancy professionals with this ICT competency.

Meyer (2015) concludes that where basic ICT coding is to be integrated into the accountancy curriculum, a separate programming class should be taken. Based on this, this study concludes that the integration of basic ICT coding into the four core modules of the accountancy curriculum will be less favourable due to the detailed and specialised knowledge that it entails. As a result of this, basic ICT coding was included in the ICTM. However, a recommendation is made in Chapter 7 that ICT coding be included as a separate module, part of the accountancy curriculum in the future.

Table 2-9 proposes that if future accountancy graduates want to stay relevant to the profession, in terms of ICT competencies, universities will need to revise their current teaching of ICT. This speaks to the developments in business based on the 4IR, discussed in more detail in paragraph 2.4.3. Since the initial development of the CF in 2009, Steenkamp and Smit (2015:667) argue that in order for universities to comply with SAICA's guidance, they had between 2009 (first year introduced) and 2013 (first year tested in the professional examination) to evaluate their own curricula. Nevertheless, universities will have to revise their current curricula once more based on the proposed CF changes (SAICA, 2019a:1). This supports the views of Bunney *et al.* (2015:257) that the need to integrate non-technical competencies, such as ICT, into the accountancy curricula is now more important than ever.

For this study, if the six ICT elements are firstly linked to the external factors that cannot be changed, but that can affect the acceptance of ICT in the university context, TAM 2 (Table 2-8), and a prospective accountant's needs, as outlined by Maslow and adapted to the educational levels and to ICT (Figure 2-6 & Figure 2-9), the six ICT elements can be staggered from lower knowledge level to higher-order thinking. In turn, applying it to the RBT as outlined in Table 2-7. The rationale behind this links to Maslow's hierarchy of needs and the RBT knowledge levels where if a lower-level need or competency is not met or mastered, the need or ability to move to the next level will not present itself. Thus, it is done to ensure that prospective accountancy professionals successfully master the basic ICT competencies before attempting or moving on to the next.

Subsequently, the self-developed questionnaire, as outlined in Paragraph 4.6.3, includes questions relating to the ICT competencies possessed by prospective accountancy professionals.

It also includes questions on the new ICT competency categories, big data and blockchain. This is to identify the awareness of these competencies, but also to aid in ranking when and where these competencies should be taught to prospective accountancy professionals. This aided in the development of the ICTM with outcomes appropriate for the different year levels of study. The six ICT competency categories as prescribed by SAICA linked to Maslow's hierarchy of needs, adapted to the educational levels, TAM 2 and ICT competencies for this study are summarised in Figure 2-10.

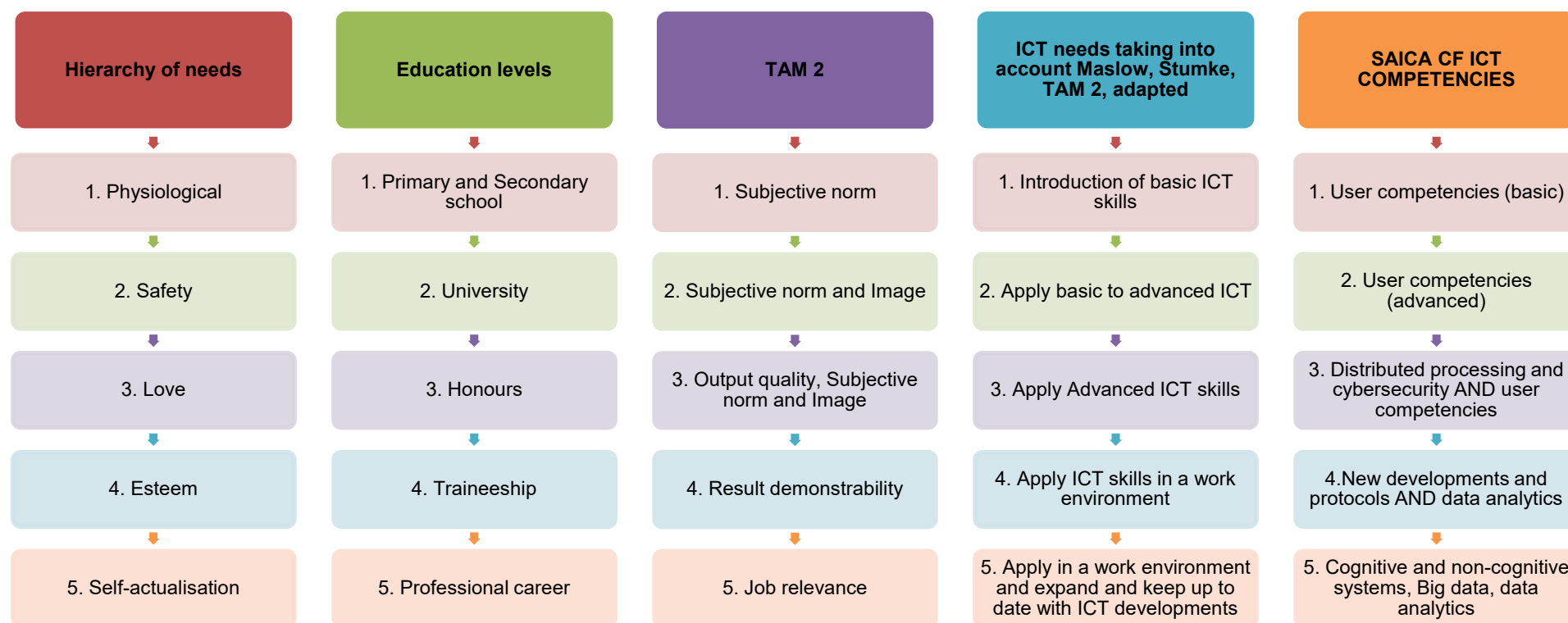


Figure 2-10: Motivational theory adapted to the educational phases of a prospective accountancy professional, adapted to the TAM, adapted to ICT needs of prospective accountancy professionals

Source: Marangunić and Granić (2015:86); Maslow (1943:370-382); SAICA (2019a:7); and Stumke (2014:11), adapted

Figure 2-10 outlines all the different theories and documents that were necessary in the development of the ICTM. The different elements as outlined in Figure 2-10 were also incorporated into the ICTM. This is discussed in more detail in Chapter 6. When all the different variables are considered, together with the data obtained from the questionnaire, the development of the ICTM addresses the needs of both prospective accountancy professionals, universities, SAICA and employers. The progress made on identifying relevant ICT competencies of prospective accountancy professionals should also be investigated to ensure that the latter is achieved. The CA 2025 project headed by SAICA is discussed in more detail below to outline the progress made.

In conclusion, the development of SAICA's CF was initially aimed to address the lack of focus on non-technical competencies. But as it was revised over the years, the focus has always been to adapt to and stay relevant to the changing profession and working environment. The latest amendment leads to the integration of ICT and the request for graduates to possess more digital competencies, such as data analytics, big data, cognitive and non-cognitive systems, new developments and protocols, distributed processing and cybersecurity and lastly user competencies. This just emphasises the importance of ICT integration into the accountancy curricula.

Barnes (2017) points out that the aim of SAICA's revised CF is to educate CA(SA) graduates that can easily adjust to the changing business environment. Garitte (2000:3) argues that ICT has been the leading developer, and in effect, the changer of all technologies over the past 150 years. Accordingly, Samans and Davis (2017:3) identify that in 2017 more than 4.5 billion people (Statistica, 2017) and in 2019 more than 4.68 billion people (Statistica, 2019) are estimated to make use of mobile phones on a regular basis. China has even shifted to the digital retail commerce continent with the smartphone being a loyal companion to an excess of 60% of adults in Organisation for Economic Co-operation and Development (OECD) countries (CNBC, 2016).

The historic prospect of Albert Einstein that "It has become appallingly obvious that our technology has exceeded our humanity", echoes the current difficulties faced by the accounting profession resulting from the vast and rapid change being experienced in the profession due to technology (SAICA, 2016:2). Samans and Davis (2017:3) assert that a 4IR is being implied by the mixture of heightened connectivity and declining costs of digital processing and storage, resulting in the rise of new systems and capabilities of significant potential. In the development of the ICTM, the learning activities and outcomes are able to adapt to the fast-changing digital environment. The changes in terms of ICT and the effects thereof, 4IR, are discussed in more detail below.

2.4.3 Fourth industrial revolution (4IR)

Over and above the need to improve the quality of learning, Eberhard *et al.* (2017:47) validate the vision of the DHET (2017:8) and the DoBE (2018:14) that to meet the needs of the changing labour markets, higher education should progress, as a direct effect of the 4IR. Guglielmino (2013:3-4) posits that at the rate of technology change, the 4IR far outreaches the school preparation that learners and students receive today. This study identified in Paragraph 2.2.1 and Paragraph 2.2.2 that due to poverty and an ineffective schooling system, with regard to ICT, learners entering university do not possess the necessary and adequate ICT competencies. Malloy and Gambrell (2006:482-483) identifies that teachers should prepare students and learners for what is still to come due to the rapid change in and as a result of technology. Subsequently, as identified in Paragraph 2.2.3 the onus rests on universities to prepare prospective accountancy professionals with the basic ICT competencies as required by SAICA and employers.

Sox *et al.* (2014:247) and Weidauer (2012) supported by Van Schalkwyk and Müller (2019:2) argue that Generation Y (born early 1980s–mid 1990s), being the first generation to be raised in a technology-driven, digitally connected world, expects more from technology. Taking this into account, it is fair to assume that employers will therefore expect more from this generation when it comes to ICT. This is even more important due to the fact that Morgan (2014) estimates that by 2020 Generation Y will make up more than 50% of the workforce. Eberhard *et al.* (2017:48) argue that with the 4IR rapidly changing the labour market, professionals, and depicted from above, Generation Y, will be expected to possess new competencies. Telang (2019:265) highlights that with the 4IR comes the automation of several professions, including accounting. Discussed in Paragraph 2.4.2, SAICA has answered the call for change with their CA 2025 project. Included in the revised CF are new competencies, never included in the competency's requirements of prospective accountancy professionals.

In order to assess where South Africa lies within the industrial revolutions that have occurred throughout the years, what a revolution is, and the four industrial revolutions experienced are discussed in more detail below.

Samans and Davis (2017:5) and Schwab (2017:6) define revolution as abrupt, radical, major and disruptive change. Three historical revolutions have occurred where technologies and novel ways of perceiving the world have led to a great change in economic systems, social structures, and the way we produce, communicate, make use of transport, produce food and interact socially. As these changes may take years to unfold and are not known at the point in time they occur, some parts of the world are still to enjoy or undergo the first three industrial revolutions. In some

developing countries, 2,4 billion people still lacking water and basic sanitation, 1,2 billion people still do not have access to electricity and 4,2 billion people have no access to the internet (Schwab, 2017:4; Samans & Davis, 2017:5). Similarly, Tamrat (2020) indicates that only 24% of the population has access to the internet. With regard to higher education, Adotey (2020) highlights that due to the current struggles evident in South Africa, universities had to provide their students with data packages and laptops to enable them to access online learning materials. This decision was made, supported by this study, based on the challenges faced by South Africa, due to students not having access to a computer at home or the internet (Tamrat, 2020). Considering the lack of access to the internet and data packages students will not be able to comfortably and effectively access education that now had to move to an online mode. All these problems are present even when the world has moved on to the 4IR, dominated by technology and computers. The four industrial revolutions are briefly discussed below.

The First Industrial Revolution occurred when railroads were constructed and steam engines were built. The Second Industrial Revolution was when machines replaced muscle power. The Third Industrial Revolution was earmarked by the development of computers and forming the basis for and leading us into the 4IR (McGinnis, 2018; Samans & Davis, 2017:4). Schwab (2017:6) argues that this revolution can be characterised by a “much more ubiquitous and mobile internet, by smaller and more powerful sensors that have become cheaper, and by AI and machine learning”.

Benioff, Chairman and CEO of Salesforce and a member of the World Economic Forum Board of Trustees, relates to Schwab’s (2017:vii-viii) explanation that in contrast to the previous three industrial revolutions, the latest one, the 4IR, is unique due to the speed at which new technologies and ideas are spreading worldwide. Digital technologies which are more sophisticated and integrated are now becoming the new norm (Schwab, 2017:7). This revolution in a way forces every company across every industry to change their traditional way of doing business and thinking in order to stay relevant to the ever-changing business environment and to adhere to user anticipations (McGinnis, 2018). Benioff concludes that the 4IR earmarks the trends that will be shaping our world in future.

Ndung’u and Signé (2020) explain that the 4IR is a revolution shaped by new technologies. This revolution will change how we “live, work and relate to one another” (Schwab, 2017:1). McGinnis (2018) stresses that with this revolution a lot is still unknown. These unknowns include AI, robotics, the Internet of Things (IoT), autonomous vehicles, 3D printing, to name a few. With some of these only in their infancy stage, the rapid development and fusion of technologies will soon see them reach new heights (McGinnis, 2018; Ndung’u & Signé, 2020; Schwab, 2017:1). With the rapid change due to technologies, institutions are also joining the communication paradigm

and governments in reforming, among other things, their educational approaches (Schwab, 2017:2).

It is Schwab's (2017:2) opinion that although there is a resounding uncertainty as to the development and adoption of all these new technologies and systems, all global stakeholders- governments, businesses, academia, and civil society – should take responsibility to collaborate in order to understand the emerging trends better. This emphasises the importance of the ICTM to include SAICA's revised CF ICT competencies. In doing this, change within the curriculum will already address some of the changes resulting from the 4IR.

Schwab's (2017:8) deduces that the lesson from the First Industrial Revolution is still valid today. Progress can be determined to a large extent on society's willingness to embrace technological innovation (Samans & Davis, 2017:4). Schwab (2017:8) posits that as much as government and public institutions need to do their part to prepare for the 4IR, the long-term benefits should also be acknowledged and embraced by citizens. This links to TAM 2, Paragraph 2.3.1.2, where the perceived usefulness of ICT influences the acceptance thereof.

Penprase (2018:217) argues that time should not be wasted when it comes to the 4IR. This amidst the public concern about inequality, insecurity and the prospects of younger and future generations. One should always take the good with the bad and Samans and Davis (2017:6) argue that with the 4IR comes bigger opportunities to increase productivity for businesses and the quality of life. In line with this study, as outlined in Figure 2-10, in assessing the ICT competencies of learners when they enter university, acknowledging their different competency levels, developing the ICTM to take into account their needs, educational level, their acceptance of technology, based on the perception of usefulness, SAICA's ICT competencies, will aid in moving forward and taking the good with the bad.

The challenge now for policymakers in the 21st century is not just to capitalise on the opportunities of the 4IR but also to mitigate the risks associated with it. One of the G20's aims is not to "mistake a means for ends". Explained in basic terms, one cannot insist and enforce the long-term benefits of globalisation without empowering the community with the necessary investments and changes (Penprase, 2018:219; Samans & Davis, 2017:7). This study aims to do just that, empower prospective accountancy professionals with ICT competencies necessary in the business world today, irrespective of their social or schooling background. This will be achieved through the implementation of the ICTM.

The world economic forums' four key principles in drafting their policy regarding emerging technologies were considered in the development of the ICTM. These four principles as summarised by Samans and Davis (2017:7) are:

- a. “Focus on the impact on systems, rather than simply the capability of technologies.
- b. Find ways to empower citizens and stakeholders, rather than controlling them.
- c. Be conscious of design principles at the heart of evolving systems, and shift these to being more human-centred.
- d. Make positive values a feature of technological systems, rather than viewing ethical issues as matters of compliance, cost or mere “unintended consequences””.

Principle b. and d. are of importance to this study. With regard to principle b. it can be deduced that through the ICTM, citizens, in this case, students, will be empowered to make use of basic IT, thus enabling them to further develop 4IR competencies. Principle d. speaks to the current position South Africa faces where some students still have no access, in their personal capacity and at school level, to the internet and basic computer technologies, resulting in them not yet receiving the benefits of the Third Industrial Revolution. Penprase (2018:219) argues that the revolutions build on one another and without students having experienced and mastered the Third Industrial Revolution, the attainment of the current technological revolution, the 4IR, may not be possible or even viable.

A direct benefit of introducing/integrating ICT in core modules is that it can provide students with immediate feedback (Dontham *et al.*, 2016:75). It has a dual purpose to improve ICT competencies and identifying theoretical areas students will have to focus on more and where the greater reward will be placed on such curriculums (Penprase, 2018:218). Dontham *et al.* (2016:76) outline that due to the multiple changes continuously taking place in how students learn, and educators teach, the 4IR educators should be more sensitive to the needs of students. This speaks to the need for students to acquire basic ICT competencies. With the flexibility of ICT and the shift in teaching pedagogy to student-centeredness, educators should strive to effectively integrate ICT in their expert fields to extend learning beyond the classroom. If this can be achieved, educators will be able to promote higher-order thinking. This can be achieved by designing teaching and learning activities based on Bloom’s taxonomy. How Bloom’s taxonomy is applied in the development of the ICTM is discussed in more detail in Chapter 3.

2.5 CONCLUSION

In the development of the ICTM different theories, competency requirements and stakeholder views are considered. These considerations address the problem statement, primary objective and theoretical objectives as outlined in Chapter 1, Paragraph 1.2, 1.3.1 and 1.3.2.1. This entails a research focus area not yet investigated with regard to the integration of ICT into the accountancy curricula in a South African context. Furthermore, it addresses the primary objective

to develop the ICTM for the four core modules, Accounting, Auditing, Financial Management and Management Accounting and Taxation, within the accountancy curriculum.

The primary objective mentioned above is achieved through the in-depth literature review of prior and current literature on firstly the implementation and use of ICT in South Africa. Specific focus is placed on poverty and inequality, schools, universities and transformation and employer expectations. It is attained that poverty in South Africa remains a driving factor behind the expanding inequality divide. With poverty levels on the rise going hand in hand with unemployment, the basic needs of South Africans are of grave concern. This rising trend is further exasperated with the consequences of Covid-19. Taking this into account, the number of people that need to fight for their daily needs will far exceed the need to buy other non-essential goods and services, such as computers and internet.

As a result, government will need to compensate for this shortcoming of non-essential goods and services through the education system. The situation prior to the Covid-19 pandemic in schools with regard to ICT resources was in a dire state. More than 65% of schools did not possess the necessary computer centres and other resources to provide learners with ICT competencies. This was even after the introduction of programmes specifically focussing on ICT within schools. With this gap in exposure to ICT at schools, due to a lack of resources, universities are left with the task to expose students and teach them the necessary ICT competencies that will be required once they enter the workplace. The Covid-19 pandemic further highlighted and grew the ICT gap due to schools and universities having to close down. This resulted in the offering of online classes. But, with poverty increasing and unemployment on the rise, the number of students with access to the equipment to enable them to partake in online classes is limited. This will further enhance the ICT and even educational gap.

Where universities need to teach prospective accountancy professionals the required ICT competencies as expected from SAICA and employers, literature is clear that there is an ever-expanding gap. This is mainly due to the overloaded accountancy curriculum, focussing more on technical competencies and less on non-technical competencies, including ICT. In an effort to reduce this expectation gap, the literature suggests that the accountancy curriculum needs to be adjusted, not re-created. One way in doing this would be by integrating ICT into the accountancy curriculum within the already existing core accountancy modules.

Before the ICTM can be developed, what ICT competencies are already being implemented at universities was considered. It was found that from nine selected SAICA-accredited universities, 5 out of 9 provide a separate ICT module in either the 2nd year or 3rd year of study. Thus, ICT exposure is currently evident at the majority of universities, but still, the integration thereof in the four core accountancy modules is not clear. This is discussed in more detail in Chapter 3.

The ICT expectations from employers revealed that they are more or less in line with the exception of big data, not considered as necessary for prospective accountancy professionals to possess. The clear consensus from employers is that ICT is and remains an important competency to possess when entering the workplace. This serves as support in performing this study.

The different theories that had an impact on this study are also reviewed to identify the considerations and structure that should be considered in developing the ICTM. Linking learning outcomes with assessment methods based on action verbs that can be implemented through the design of learning activities are outlined in RBT.

With the integration of ICT into the core accountancy models, care should be taken as to how it is done. With Bloom's taxonomy in its revised form, RBT, being used for many years and across several different disciplines, it is a good starting point. In using the RBT the assessment needs can be identified and can then be taken back to the different learning objectives. This will enable students to start with the lower-order of thinking to systematically move up to the higher-order of thinking. With the accountancy curriculum already being overloaded with technical content, RBT can assist educators in adjusting course material and not to re-write the entire curriculum.

Furthermore, the needs of prospective accountancy professionals and how these needs will affect their educational levels are outlined in Maslow's hierarchy of needs and adapted to the educational levels from a previous study. With Maslow's hierarchy of needs applied to the educational levels of prospective accountancy professionals, the basic level of needs and competencies should first be met before additional or more in-depth needs, and competencies can be acquired. This links to the type of ICT competencies universities need to teach graduates in the different years of study, allowing for a staggered approach in acquiring basic ICT competencies to advanced ICT competencies. Subsequently, the needs and educational levels are adapted to the ICT elements within the accountancy curriculum. This is done considering the staggering achievement of any competency.

Nevertheless, universities will need to comply with SAICA's CF with regard to the different types of ICT competencies. Moreover, to teach advanced ICT competencies, the basics will still need to be taught first. Even though universities may aim to teach students ICT competencies, their perception of usefulness will play a significant role in them accepting and adapting it. Hence, the emphasis on why ICT is taught and integrated into the core accountancy modules should be highlighted to ensure that students understand and accept it.

In order to effectively integrate ICT into the accountancy curriculum the acceptance of technology is considered based on the external variables as outlined in TAM 2. This implies that before the

ICTM can be developed, close consideration should be given to the factors outside of the control of the university that will influence prospective accountancy professionals to view ICT as useful.

In addition, the importance of ICT and moreover, ICT integration, has been emphasised over the years by SAICA. The latest ICT competency requirements, additional to the previously required basic competencies including more digital skills, are outlined by SAICA through their CA 2025 project. This ensures that the ICTM addressed all the required competencies as expected by the professional body are taught to prospective accountancy professionals.

This shift is mainly due to the 4IR that is changing the business world as we know it. The 4IR goes hand in hand with SAICA's CA 2025 project in that prospective accountancy professionals should be prepared with the changing ICT competencies to enable them to adapt and change with change. With these changes, the onus rests on universities to prepare graduates in some way for this changing business environment, guided by the revised CF.

In conclusion, to address the empirical objective, outlined in Chapter 1, Paragraph 1.3.2.2, the main themes identified through the literature review throughout Chapter 2 are identified. These themes are included in the development of the self-developed questionnaire (Annexure A) and assists in the development of the ICTM, as outlined in Chapter 4, Paragraph 4.6.3, can be summarised as follows:

Table 2-10: Themes identified through the in-depth literature review instrumental in the development of the self-developed questionnaire and the ICTM

THEME	EXPLANATION / RELEVANCE	CHAPTER 2 REFERENCE	WHERE APPLIED (Annexure A)	
			Student questionnaire	Lecturer questionnaire
Type of schooling	➤ Public: Fee-free school ➤ Public: Private school ➤ Private: Independent school	➤ Paragraphs 2.2.1; ➤ 2.2.2	Question 10-11	N/A
ICT exposure at school level	➤ Available ICT subjects at school, ➤ ICT competency when matriculated	➤ Paragraph 2.2.2	Question 12, 16,	Question 42
ICT being integrated in the four core accountancy modules	➤ Core modules incorporating ICT required competencies	➤ Paragraphs 2.2.3; ➤ Table 2-1 ➤ Figure 2-3	Question 9, 24, 27 - 30	Question 39, 50 - 51, 53 - 58
ICT Gap: Employer expectations vs ICT being integrated into the accountancy curriculum	➤ Competencies in various ICT applications	➤ Paragraphs 2.2.3; ➤ 2.2.4; ➤ Table 2-1 ➤ Figure 2-3	Question 17, 22	Question 42, 48
Bloom's taxonomy (RBT) / Curriculum development	➤ At what level is what being accessed in terms of ICT	➤ Paragraph 2.3.1 ➤ Table 2-4	Question 25 – 26, 31	Question 52,59

Table 2-10: Themes identified through the in-depth literature review instrumental in the development of the self-developed questionnaire and the ICTM (continues)

THEME	EXPLANATION / RELEVANCE	CHAPTER 2 REFERENCE	WHERE APPLIED (Annexure A)	
			Student questionnaire	Lecturer questionnaire
Maslow's hierarchy of needs adapted to accountancy educational levels	➤ In which year of study is what being integrated or used in terms of ICT	➤ Paragraph 2.3.2.2; ➤ Figure 2-6	Question 18 - 20	Question 44 - 46
External factors that will influence the acceptance of the ICTM, TAM 2	➤ Type of schooling, ICT exposure at school level, ICT being integrated at university, employer expectations and SAICA's CF	➤ Paragraph 2.3.3; ➤ Table 2-8	Question 9-13, 16, 24, 27-30	Question 39, 42, 50-51, 53-58
SAICA's ICT requirements: revised CF	➤ Basic to advanced competencies	➤ Paragraphs 2.4.1; ➤ 2.4.2; ➤ Table 2-9	Question 21-22	Question 47
4IR	➤ Impact of ICT on the lives of prospective accountancy professionals, ➤ Availability of ICT resources, private and at university	➤ Paragraph 2.4.3	Question 14-15, 23, 32-33	Question 40-41, 43, 49, 60-61

Source: Summary of literature above, adapted.

Table 2-10 summarises the main themes identified through the literature review. These themes are instrumental in designing the self-developed questionnaire, discussed in Chapter 4, Paragraph 4.6.3. These themes are further combined with the themes identified in Chapter 3 in designing an implementable ICTM, discussed in Chapter 6. This will enable prospective accountancy professionals to possess the necessary ICT competencies to effectively execute the ICT competencies as required by SAICA and as expected by employers.

CHAPTER 3

CURRICULUM DESIGN, LEARNING OUTCOMES AND KNOWLEDGE LEVELS FOR ICT FOR INTEGRATION INTO THE ICTM

3.1 INTRODUCTION

In order to address the theoretical and empirical objectives in Chapter 1, Section 1.3.2.1 and 1.3.2.2, Chapter 3 follows a further review of prior and current literature and secondary data on the necessity and gap of ICT competencies and the integration thereof in the South African accountancy curriculum of universities.

In order to develop the ICTM, RBT's taxonomy table is considered the most appropriate framework to follow and to assist in the mapping of the different ICT integration opportunities with the learning outcomes within the different core modules. RBT suggests that knowledge should start at the lower order thinking and gradually, in a scaffolding approach, move to higher-order thinking. In order to ensure that this approach is followed, what ICT competencies prospective accountancy professionals are required to possess are identified first. For this study, it is achieved by first identifying the required ICT competencies a prospective accountancy professional should possess in terms of employer expectations and SAICA's CF.

Furthermore, what ICT competencies that are required and deemed necessary by employers in the accountancy curricula are identified. Since the literature available on what ICT competencies and how these ICT competencies should be taught at university level is limited, both internationally and locally, the literature review in Chapter 3 is limited to prior studies specifically performed on ICT in the accountancy curriculum.

The ICT competencies required by employers are summarised and listed alphabetically. The main or most important competencies are considered to ensure an ICTM that can be applied to various institutions and not being unique to one specific one. The employer ICT competencies are matched with SAICA's latest CF (SAICA, 2019a:7) with regard to ICT competencies. The aim is to highlight more or less important ICT competencies required of prospective accountancy professionals. In turn, it identifies which ICT competencies should be taught at a lower-order knowledge level at university and which one should receive extensive attention at a higher-order thinking level.

After this comparison, the main ICT competencies were identified that were used in the development of the ICTM.

Secondly, curriculum mapping of the learning outcomes for the four core modules: Accounting; Auditing; Financial Management and Management Accounting and Taxation (SAICA, 2018) for each year of study (1st year to honours level), of the two respondent groups to the questionnaire, as outlined in Chapter 4, Paragraph 4.6.2.1, is performed. This outlines the integration opportunities available within the core modules. The 2020 published yearbooks are scrutinised for this purpose. This gives an indication of shortcomings and similarities in how the accountancy curriculum is currently designed between a comprehensive and a traditional university. This serves as an indication of where South African universities can apply and are already integrating ICT within their accountancy curriculum in line with their learning outcomes. A further comparison is made in Chapter 5, where the data collected from these universities are analysed and interpreted.

The ICT competencies previously identified are mapped and applied to the module outcomes of the four core modules. This serves as an indication of what type of ICT integration may fit best in the specific year of study and in turn the specific core module. The type of ICT integration is deduced from the literature review as identified in Chapter 2 and from the prior research mentioned above.

The final product, the different ICT competencies integration opportunities within the different years of study, will in turn be applied to the teaching and learning outcomes to provide a practical example of possible integration of ICT. Caution is taken in this application by applying RBT in scaffolding the competencies to start from the lower-order of thinking and moving to the higher-order of thinking as the year of study progresses. Brown and Pike (2010:28) assert that the challenge is to ensure that students with limited exposure to ICT competencies are not overwhelmed and those familiar with ICT remain engaged.

As a final step, the learning outcomes as identified in Chapter 3 were utilised and adjusted where necessary in the development of the ICTM development in Chapter 5 according to the results obtained from the self-developed questionnaire. The result is an implementable ICTM, after considering all relevant aspects from literature and data obtained. Figure 3-1 illustrates the different topics that are discussed in Chapter 3.

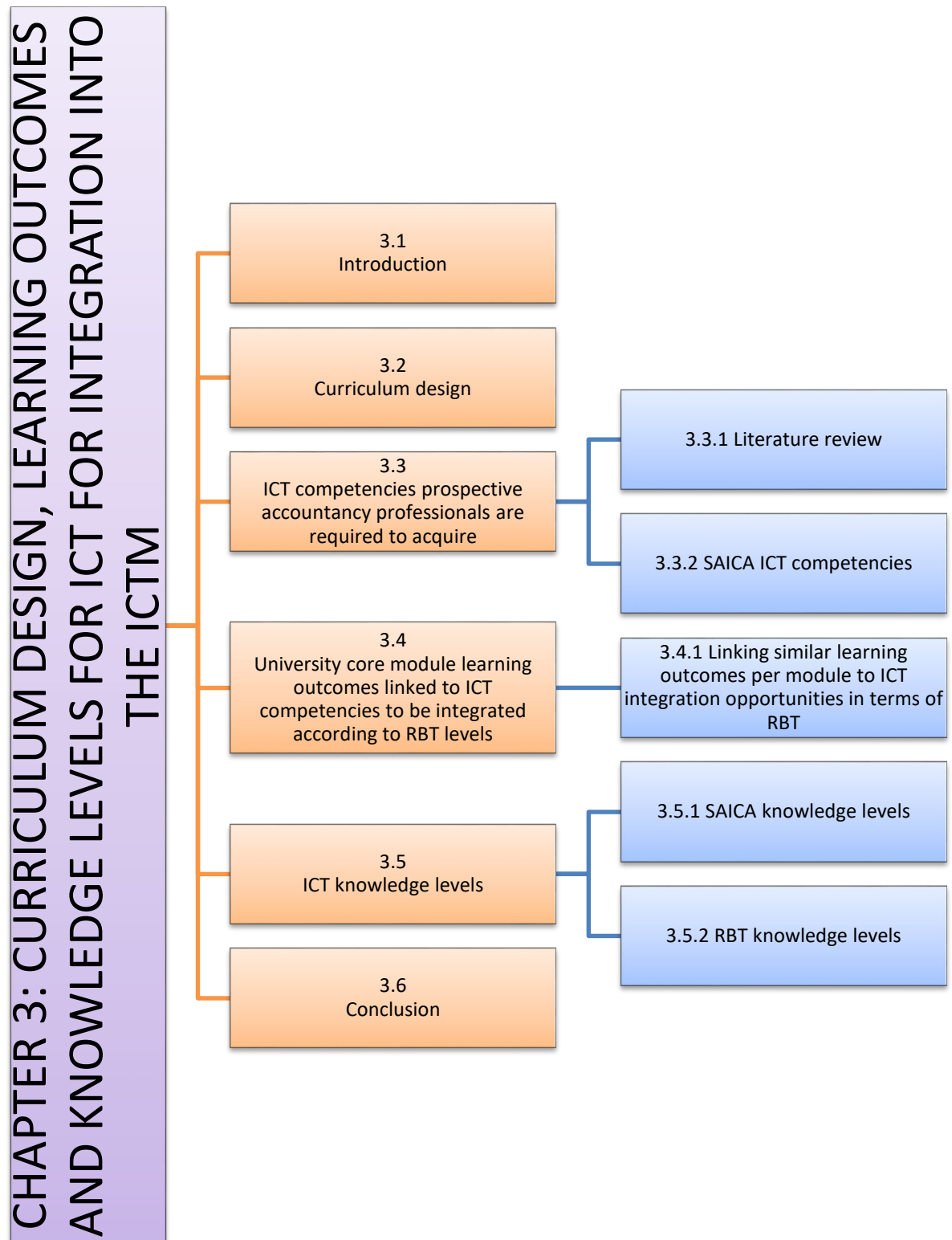


Figure 3-1: Chapter 3 discussion layout

Source: Summary of paragraphs below

3.2 CURRICULUM DESIGN

The DHET (2017:3,5) argues that the educators of accountancy professionals strive to develop prospective accountancy professionals with higher-level thinking skills. This entails deeper cognitive processing, including critical thinking. The DHET's (2017:8) plan to review the curricula of universities is supported by Lee *et al.* (2018:45), Lubbe (2017:60) and Van Romburgh (2014:19). The shared notion is that to keep up with the constant change in business environments, as a result of changing technology, curricula should be revised.

Toffler's (1974:3) seminal belief that "All education springs from some image of the future" is still relevant in the 21st-century educational context. If we keep on teaching for the here and now, we will not shape employees for the future. Curriculum change is driven by teaching taxonomies and Anderson and Sosniak (1994:28-38) point out that in the higher education context, several teaching taxonomies are available to assist policymakers, program developers, educators, and institutions with the design and implementation of course knowledge. However, over the years the use of Bloom's taxonomy has increased due to the university administrators demanding a clear outline of the learning objective for each course (Preville, 2018:5). This study is based on the integration of ICT into the four core accountancy modules. This will only be possible if it is linked to the existing learning objectives as set out in the four core accountancy modules.

Krathwohl (2002:213) suggests that the RBT better fits the needs of the 4IR teachers. A clearer, more concise visual representation of the alignment between standards and educational goals, objective, products and activities are provided. Forehand (2005:5) concurs and makes the comparison to pieces of a puzzle. Due to teachers having to carefully plan what and how they are going to use their classroom time, the alignment with local, state, and national standards are a necessity and must fit together like the pieces of a puzzle.

The DHET (2014:73) states that the curriculum design remains, and should remain, the responsibility of the individual institutions. Likewise, Forehand (2005:5) submits that the RBT provides educators with a clear, documented guideline, or even blueprint, of each lesson plan's essential question that can be easily defined. With clearer guidelines, Dontham *et al.* (2016:76) identify that educators can adjust/plan their teaching methods (pedagogies) to encourage and necessitate students higher-order thinking. This study follows this approach by suggesting different ICT integration opportunities through the identification of ICT learning objectives that can be adjusted to guide lesson plans in the four core accountancy modules.

Preville (2018:5) explains that RBT can be used in higher education by lecturers to set clear learning objectives and to develop classroom activities. In turn, this allows learners to set expectations for themselves. Sandra McGuire, Professor Emerita of Chemistry and Director

Emerita of the Centre for Academic Success at Louisiana State University, the author of two books based partly on Bloom's taxonomy, "Teach Your Students How to Learn and Teach Yourself How to Learn", argue that the use of RBT does not mean that a curriculum needs to be rewritten. Forehand (2005:5) states that it will assist lecturers to identify the order of learning students need to demonstrate and adjust the course material and lectures accordingly. The order of learning is identified and applied to the accountancy context based on RBT and Maslow's hierarchy of needs in Chapter 2, Paragraph 2.3 and Figure 2-9. Similarly, this study does not suggest the change of the accountancy curriculum, but rather the adjustment of learning activities already utilised on a paper format to an ICT format.

Preville (2018:15) supports this view in that RBT can be used to move from a lower-order of thinking to a higher-order of thinking, resulting in a scaffolding tool for course design. This scaffolding approach is outlined and discussed in terms of the accountancy context based on RBT and Maslow's hierarchy of needs in Chapter 2, Paragraph 2.3. Napoleon *et al.* (2006:19) emphasise that in order to assist students to function in a higher-order thinking level, more innovative curriculum integration will have to be adopted. In turn, this study aims to develop integrated ICT learning activities into the four core modules in the accountancy curriculum, linked to SAICA's CF learning outcomes, which will ensure that both technical and ICT competencies of prospective accountancy professionals are developed.

Ferguson (2002:239) explains that the overall consensus from numerous researchers and users of RBT is that it provides educators with a common language to ensure that learning outcomes can easily be translated over different subject areas. Preville (2018:16) adds that when using RBT an educator can set their learning outcomes by identifying what cognitive activity is happening in the brain. Then, by linking it to the action verbs the teaching methods can be aligned to assist students to meet those outcomes in a scaffolding approach.

In order to assist in the development and placement of objectives of any module, the RBT makes use of the taxonomy table (Anderson & Krathwohl, 2001:7; Krathwohl, 2002:215). The taxonomy table distinguishes between the type of knowledge and the cognitive level a student needs to achieve. The knowledge dimension forms the vertical axis of the table with the cognitive process dimension being the horizontal axis (Table 3-2). Krathwohl (2002:215) indicates that objectives can be classified into one or more cells when using the taxonomy table. Dontham *et al.* (2016:77) and Preville (2018:18) further support this and state that this is another factor that should be considered to ensure student success and to promote higher-order thinking, for example, meta-cognitive knowledge. Here the different orders of thinking can be explained and illustrated to give students a visual picture of what (knowledge) they should be able to do and how (verb) they will be able to demonstrate/be tested on the specific topic.

The literature above was applied in the development of the ICTM in such a way that the different integrated ICT activities, within the different core modules of the accountancy curriculum, clearly outlines what should be mastered and how this can be done across both the lower-order and higher-order of thinking spheres. In turn, this will provide clear guidance to both students and educators on what should be developed at the end of a specific course in terms of ICT.

When using the RBT, in categorising the verb(s) the intersection of the column(s) should be referred to. In categorising the noun(s) or noun phrase(s) the rows should be referred to. In order to illustrate the placement of objectives in the different cells, an example is used and summarised in Table 3-1. The example provided is the one that the design of the ICTM was based partially on. It is the method followed by Dontham *et al.* (2016:77) for their Educating IT-Engineering theory course (TC-BT) and Practical course using the magic of making mistakes (PC-MoMM). The steps followed and the designing of these ICT courses and how it links to the RBT are discussed in more detail below.

The course is divided into two sections: theory course (TC-BT) and practical course (PC-MoMM). The theory course was designed in such a way to enable students to obtain the knowledge necessary to move into the higher-order or learning. TC-BT was divided into six sections, namely: [1] Course plan; [2] Multiple choice questions (MCQ); [3] Definitions; [4] Assignments; [5] Case studies; and [6] Collaborative activities. Similarly, the ICTM is designed to first establish the foundational ICT concepts and theories that will assist prospective accountancy professionals to move on to the successful application thereof in the four core accountancy modules. Here the basic concepts of ICT, for example, the different computer programs available, what they can be used for, how it will impact the work of a prospective accountancy professional, cybersecurity, big data, artificial intelligence, to name a few, is introduced to students. This will serve two purposes, firstly to ensure that all students, irrespective of their different schooling and social background are exposed to the basics of ICT before integration thereof is started, and secondly, to keep students up to date with any new developments, for example, big data, that may affect their professional and higher educational environments.

The approach followed by RBT is providing students with learning outcomes at the beginning of a course to enable them to study towards a predetermined outcome, in this case, an ICT competency. In knowing what you will need to possess at the end of a course, specific focus can be placed on learning activities that will enable the successful acquisition of those competencies. This is supported by the notion of Preville (2018:18) that the outcomes should be given to students from the very start. Dontham *et al.* (2016:77) apply this approach in Section 1 course plan. It provided students with all the necessary information needed to deduce what they should know and how they will be assessed. Included were course details, description, pre-requisites,

outcomes and evaluation plan and ground rules. For this study, the course plan already available for the individual core modules will need to be adjusted to include the ICT integration. Students will have to be made aware that they will need a computer to complete certain tasks in order to successfully complete the course that will now include an ICT element.

The first section linking to the RBT is [2] MCQ tests. It is designed for every study unit to assess the previous knowledge learned. This links directly to the lower-level of thinking where factual and conceptual knowledge will have to be recalled. This relates to remember and understand the cognitive element from the RBT (Table 2-4 & Figure 2-6). Dontham *et al.* (2016:77) found that when students were paired to answer the questions in groups, after discussions with their peers, the knowledge gained from others was a clear favourite as opposed to doing the MCQ on their own. For this study, students completed their basic knowledge question on the universities' LMS by only clicking radio buttons, thus not integrating ICT at this stage.

Section 3, definitions, overlaps with that of the MCQ, where students had to complete a peer-evaluated assessment on their comprehension of those definitions. This also links to remember and understand cognitive elements from the RBT (Table 2-4 & Figure 2-6). Like MCQ, the definitions section of the ICTM can also be completed on the LMS system by means of a quiz. Since remembering and understanding are based on theory and not on integration, it is more beneficial to assess this on a theoretical method on the LMS system.

In order to evaluate the application of knowledge of students, Section 4, assignments, provide students with summative assessment opportunities where knowledge can be applied to actual situations. Dontham *et al.* (2016:78-79) argues that through these assignments students gain other cognitive skills, for example, presentation, thinking, logical and auditory skills. This is demonstrated by the preparation of PowerPoint presentations, charts, mats, demonstrations, etc. This links to apply a cognitive element from the RBT (Table 2-4 & Figure 2-6). Even though this section falls within the apply section of RBT, it is still considered lower-order thinking. For this study, students were required to use their basic knowledge of ICT, for example, MS Word, to write a report with the correct font size, colours and spacing.

In order to enhance the lower order thinking of students, Section 5, case studies, are introduced to improve their analytical skills. These skills are still on a lower-order thinking to enable students to learn step by step. This links to apply cognitive element from the RBT (Table 2-4 & Figure 2-6), but to a lesser degree. Perhaps to further the student-centred learner, as the last section, a few collaborative activities are introduced. This links to an overlap starting at remember to apply cognitive elements from the RBT (Table 2-4 & Figure 2-6). After the establishment of the factual and conceptual knowledge necessary for the application of ICT, the course moves into the practical part. For this study, before a student will be able to move to the integrated part of ICT

they have to master certain basic ICT competencies, for example, and as mentioned above, how to write a report on MS Word, with the correct settings and formats, without the assistance of anyone. Once that is mastered, students will better understand what the integration will entail and will be able to focus more on how ICT can be used in the accountancy field and less on what ICT is.

PC-MoMM is designed with the intent to practically apply the knowledge gained from TC-BT. This is promoting higher-order thinking. Here analysing, evaluating and creating new ideas are the focus point. As a starting point, pre-requisites for the course are stipulated. This ensures that when a student starts with the module, some basics have already been mastered. After this, the course outcomes are provided. The course outcomes start with a verb and lead into the specifics that should be identified (understand), explained (understand), demonstrated (apply), used knowledge and provide a service (analyse and evaluate), and illustrated (create) (RBT, Table 2-4 & Figure 2-6). In this part of the course, students are required to apply the knowledge gained from the first course, TC-BT. Without that basis, the application part will not be possible (Dontham *et al.*, 2016:81). Applied to this study, students will need to utilise their basic knowledge in a scaffolding approach and build on what they have mastered at a lower-order thinking and apply that to the subject matter in an integrated way to achieve higher-order thinking. This concept stems from Figure 2-9 where RBT, Maslow's hierarchy of needs, adapted to the educational levels and the ICT needs as outlined by SAICA are considered.

The approach followed is for students to complete two informal assessment tasks in class. Students were provided with the instructions on what they had to do in the first five minutes of the class. They were then given 45 minutes to complete the task. At the end of the 45 minutes, those who successfully completed the task must get up and assist those who are struggling or have not yet completed the task. This results in no student just remaining seated until everyone has successfully completed the task, but rather peers helping one another until everyone is done. As an ongoing requirement, students had to document, on Google Forms why they could not finish, and the mistakes made. After the first two tasks, students are then given a formal assessment that should be completed individually and that will be graded. This process is repeated for all the concepts to be mastered. For this study, the approach followed above will enable the development of not only ICT competencies but also other soft skills, in the way of mentoring and assisting students that may take longer to grasp or apply a concept.

Applying the above-mentioned course design as an example of how to use the taxonomy table, the starting point would be to identify the knowledge dimension (rows/nouns). Since the TC-BT course is predominantly the theory part of the course, the [2] MCQ, [3] definitions, [4] assignments, [5] case studies and [6] collaborative activities fall within the factual (A) and

conceptual knowledge category (B) – group elements based on the recall cognitive element of RBT. For the PC-MoMM course the knowledge gained from the theoretical course is applied in class assignments through informal assignments and formal assignments. The analysing, evaluating, and creating of new ideas fall within the procedural and meta-cognitive knowledge fields (C-D).

Next, the cognitive processing dimension (verbs/columns) needs to be identified. In this scenario there are three verbs that should be considered for the TC-BT, remember, understand and apply (1-3). With the PC-MoMM course focussing less on remember, understand and apply and more on analyse, evaluate and create (4-6). This grouping is illustrated in Table 3-1.

Table 3-1: Taxonomy table explained

KNOWLEDGE DIMENSION		VERBS					
		1. Remember	2. Understand	3. Apply	4. Analyse	5. Evaluate	6. Create
		Lower-order thinking			Higher-order thinking		
NOUNS	A. Factual knowledge	[2] MCQ, [3] Definitions, [6] Collaborative activities	[2] MCQ, [4] Assignments	[4] Assignments [5] Case studies [6] Collaborative activities			
	B. Conceptual knowledge	[2] MCQ, [3] Definitions, [6] Collaborative activities	[2] MCQ, [4] Assignments	[4] Assignments [5] Case studies [6] Collaborative activities			
	C. Procedural knowledge				PC-MoMM	PC-MoMM	PC-MoMM
	D. Meta-cognitive knowledge				PC-MoMM	PC-MoMM	PC-MoMM

Source: Anderson and Krathwohl (2001:7); and Krathwohl (2002:215), adapted

Table 3-1 is an overview of how the taxonomy table can be used to group module outcomes. In doing this the inclusion or exclusion of certain cognitive domains can be clearly identified by educators (Krathwohl, 2002:216). In turn, this can aid in designing module outcomes that do not over-emphasise the remember cognitive domain and enabling educators to appropriately spread the different outcomes between lower-order thinking and higher-order thinking. These further enable educators to follow a scaffolding approach whereby basic knowledge is first instilled in prospective accountancy professionals followed by higher-order thinking skills. Evident from Table 3-1 is that basic ICT knowledge falls within the first three levels of RBT, with the application of ICT falling in the last three levels. This is elaborated on further in Chapter 6, during the development of the model.

In conclusion, Preville (2018:9) remarks that using RBT, a top-down approach should be followed, starting at what needs to be acquired back to what should be a course's learning objectives. He is of the opinion, supported by Anderson and Sosniak (1994:110), Crowe *et al.* (2008:373), Krathwohl (2002:212), Jideani and Jideani (2003:34) and Lubbe (2017:128), to name a few, that RBT allows for the refinement of courses that will assist students to follow a scaffolding approach of the orders of learning from lower-order thinking to the higher-level thinking platform. Anderson and Krathwohl (2001:3) conclude that irrespective of what teacher objectives were or are classed today, teachers want students to learn as a result of their objectives.

In the design of the ICTM, the top-down approach as suggested above was followed. Firstly, which ICT competencies a prospective accountancy professional should acquire are outlined (Paragraph 3.3). The ICT competencies as required by employers are summarised from the latest international and local studies based on ICT requirements within the accountancy field. Since the required competencies of prospective accountancy professionals are prescribed by the professional body, SAICA, the latest available CF is summarised to highlight the ICT specific competencies that should be mastered. In order to align with SAICA's CA 2025 project, the latest published ICT competencies are aligned with the suggested future ICT competencies.

Secondly, to enable executable ICT integration opportunities, the different required ICT SAICA competencies are linked, in a scaffolding approach, to the different learning outcomes per year level for the different core accountancy modules within the accountancy curriculum. The reason for this is to approach the accountancy curriculum in a different manner as not to add to the content, but rather just to integrate ICT within the relevant core modules. These learning outcomes are obtained from the two universities that partook in the completion of the questionnaire. They represent one comprehensive and one traditional university. Secondary data obtained from the published yearbooks are utilised to obtain the learning outcomes of the different universities, per year of study, per core module offered.

The year levels and subsequently knowledge levels per core module are further broken down into lower-order and higher-order level thinking, in terms of RBT, to ensure that basic knowledge is obtained first before more complex applications are expected of students. The process mentioned above is discussed in more detail below.

3.3 ICT COMPETENCIES PROSPECTIVE ACCOUNTANCY PROFESSIONALS ARE REQUIRED TO ACQUIRE

3.3.1 Literature review

Bunyi (1995:95) states that an important aspect with regard to the course and module development is reflecting on and making decisions about teaching before it commences. Maphosa, *et al.* (2014:355) explain that before teaching starts, “broad-based thinking on teaching, learning and intended learning outcomes” should be considered. This study includes and analyses the research performed by Ahmed (1999:14); Lee *et al.* (2018:44); Medeiros (2019:5) and Modisane (2019:164). These studies specifically focus on ICT within the accountancy field. Through a literature and document review, this study identifies the gap between what ICT competencies are expected of prospective accountancy professionals by employers and what is being taught at university level. Mitrić *et al.* (2012:41) propose that even though academia and accounting professionals are aware of the shortcoming between what is being taught and what is expected of accountancy professionals, this has not yet been addressed. Ahmed (1999:8) states that to adhere to the requirements of the work environment, ICT needs to be integrated into the accountancy curriculum.

SAICA’s (CFO, 2017) recognition that in order for change to occur, the accountancy curricula at universities should be revised to lessen the competency and expectation gap. This aligns with the critique in the White paper for post-school education and training (White paper) from the DHET (2014:10) that the South African post-school education and training system does not produce individuals and graduates that meet the needs of society. Medeiros (2019:6) supports the fact that the accountancy curricula need to change to prepare graduates for the workplace. Ahmed (1999:179) also argues that currently there is a gap between what is being taught at university level and what is expected from employers. This is in support of this study where literature indicated that the employer expectation gap is increasing rather than contracting. Through the development of the ICTM, the accountancy curriculum will be changed in a way that could ensure that ICT competencies, as expected by employers, are taught to prospective accountancy professionals.

Le Grange (2006:190) identifies that discussions in South Africa around curriculum change has not been one of the main focus points of higher education. Tshishonga (2019:1) argues that the roles of universities have shifted from the traditional “knowledge-for-itself” to the “knowledge-of-the-world” as outlined by Barnett (2011:31). Moreover, the main factor that could see higher education deliver well-equipped and motivated graduates can be achieved through their curriculum.

Even with several research performed on the necessity of ICT in the accountancy curricula, both internationally and locally over the past two to three decades, curricula do not keep trend with developments. Ahmed (1999:128) further supports the opinion that accountancy curricula are either out of date, or technology changes faster than changes can be implemented. Uyar and Gungormus (2011:33) argue that the teaching methods are not enough to meet the current demands of employers.

The employer and education gap have been identified in the last century. Ahmed (1999:9) investigated the gap between what employers expect of and what universities are teaching prospective accountancy professionals. This achieved identifying the required ICT competencies required of a prospective accountancy professional. With the different outliers of what employers expect of prospective accountancy professionals, Ahmed (1999:124) conclude that the difficulties, for example, limited computer facilities, under-skilled staff, overloaded curriculum, to name a few, that exist in the implementation of these ICT competencies could be a contributing factor to the slow change in the accountancy curriculum. Ahmed (1999:51) reasons that with the implementation of ICT into the accountancy curriculum, active learning is facilitated resulting in a prospective accountancy professional that will be able to transition from university to the professional environment. This is further emphasised in recent studies performed in 2018 and 2019, which still highlights the technological development gap between employers and educators.

Lee *et al.* (2018:44) argue that specifically focussing on the ICT competencies, a prospective accountancy professional should possess when entering the workplace, limited literature is available on the specific software and tools are available. They conducted a study to outline the specific ICT competencies required from employers by prospective accountancy professionals. In their study, Lee *et al.* (2018:46) summarised different studies on the importance of and which ICT competencies are necessary to be included in an accountancy curriculum. Their overall conclusion was that the inclusion of MS Excel remains a focal point and important as considered by both employers and universities. This finding is in line with the findings of this study and is discussed in more detail in this chapter. The specific ICT competencies that should be included in an accountancy curriculum as identified by Lee *et al.* (2018:51) are also outlined in more detail in the next paragraph. These ICT competencies are taken into account to ensure the development of the ICTM adheres to the requirements of employers and SAICA where practical and possible.

Medeiros (2019:1) investigates what competencies are required and what are being taught at university level for forensic accountants. He states that the design of the current curriculum focusses on how to perform basic accounting competencies, with little to no room for other competencies, such as ICT, to be taught. Lawson *et al.* (2014:295) argue that universities focus on existing rules, regulations, audit procedures, and standards in the accountancy curriculum.

This results in book smart graduates lacking the necessary competencies to effectively integrate into the work environment. A clear gap was identified by Medeiros (2019:61) because of this.

Deduced from the literature above from 1999 till 2019 employers have voiced their concerns and unhappiness with regard to the ICT competencies prospective accountancy professionals possess when they enter university. Furthermore, not much has been done from an educational perspective to narrow this ICT competency expectation gap. Also evident from past to present literature as explained by Lee *et al.* (2018:51) and Medeiros (2019:61), for example, is the existence of the gap that spans over several years. It can consequently be inferred that universities are not keeping up with the fast-changing pace of ICT within the accountancy profession.

A general summary from the international literature above of the different ICT competencies required from a prospective accountancy professional by employers, in alphabetical order, are summarised in Table 3-2 below.

Table 3-2: ICT competencies required from international employers

COMPETENCY REQUIRED	DESCRIPTION	REQUIREMENTS (Basics / Advanced)	REFERENCE
Accounting software packages	Software packages developed to perform accounting functions within the accounting practice.	Basic	Ahmed (1999:107); Medeiros (2019:55)
Adobe Acrobat	Editing saved documents	Basic	Lee <i>et al.</i> (2018:51)
Artificial intelligence	Expert systems used to plan external audits, assess risk, evaluate loan loss reserves, determine disclosure compliance, recommend audit sample size, etc.	Basic	Ahmed (1999:113)
Communication	Connecting people through the use of networks, for example, email, internet, electronic funds transfer systems.	Basic	Ahmed (1999:62, 174); Medeiros (2019:63)
Data analysis	Data mining Analysis of data to: ➤ Provide insights on the data ➤ Detect errors ➤ Present data indigestible manner ➤ Summarise data	Basic	Ahmed (1999:14) and Medeiros (2019:56)
General ICT competencies	Functioning of a computer and basic programs.	Basic	Ahmed (1999:174)
MS Excel (Technical competencies)	Basic functionalities, formulas, formatting, create electronic work papers.	Basic	Ahmed (1999:109, 174); Lee <i>et al.</i> , (2018:51); Medeiros (2019:51)
PowerPoint	Prepare presentations in a professional format.	Basic	Lee <i>et al.</i> (2018:51)

Source: Ahmed (1999:14, 62, 107, 109, 113, 174); Lee *et al.* (2018:51); and Medeiros (2019:55, 56, 63)

From the list above, the ICT competencies that features the most often are MS Excel and MS PowerPoint. A comparison between what is being experienced and expected globally serves as a starting point of what can be expected and subsequently implemented in a local environment. Consequently, the most recent and most relevant local research performed in the accountancy field with regard to ICT and ICT competencies is discussed in more detail below.

Modisane (2019:5), in support of Wessels (2008:161), argue that to ensure that prospective accountancy professionals meet the employer requirements, ICT competencies should be integrated. Furthermore, SAICA's (2019a:5) emphasis that ICT is integrated into every aspect of a prospective accountancy professional daily task necessitates this integration. Hesketh (2011:4) states that with the publication of the CF, the necessity and focus of ICT competencies are highlighted. Deduced from this, it could be expected that most of the prospective accountancy professionals would possess the necessary basic competencies as outlined by the CF.

However, this is not the case, as identified by Modisane (2019:192), where employers are of the opinion that prospective accountancy professionals lack the basic ICT competencies they expect.

Stumke (2017:123) supports the views of Albrecht and Sack (2000:2); Richard (1993:24) and Williams (1993:76, 208) that the integration of ICT into the accountancy curricula could lead to a value-added curriculum. Stumke (2014:146) identifies that employers expect different ICT competencies of prospective accountancy professionals when they enter the workplace. Possible reasons for the expectation gap are because universities are left to apply the competencies outlined in the CF that best suit their needs (Stumke, 2014:164). Another contributing factor is the lack of specific guidance on what is meant by the different ICT competencies in the CF and how these competencies should be taught. Finally, the overloaded accountancy curriculum focusses more on the technical accounting aspect and less on the other pervasive skills. Gathered from this is that it results in book smart graduates that are not always able to transition from university to the work environment.

A general summary from the local literature above of the different ICT competencies required from a prospective accountancy professional by employers, in alphabetical order, are summarised in Table 3-3 below.

Table 3-3: ICT Competencies required from South African employers

COMPETENCY REQUIRED	DESCRIPTION	REQUIREMENTS (Basics / Advanced)	REFERENCE
Database software	Databases such as Access.	Basics	Stumke (2014:145)
Documenting and report writing	Audit reports, performance reports	Basics	Modisane (2019:164); Stumke, 2014:145
Email communication	Connecting people by means of email, using it as a daily planner, storing information	Basics	Stumke (2014:145)
Information technology environment	Types of ICT used within a client environment.	Basics	Modisane (2019:164)
Information technology competencies	MS Excel, Data analytics and CAAT's	Basics	Modisane (2019:162 – 163)
General ICT knowledge	Functioning of a computer and basic programs.	Basics	Modisane (2019:163)
Professional research	Utilising research tools for accountancy related research, such as EBSCOhost, Google Scholar, etc.	Basics	Stumke (2014:145)

Source: Modisane (2019:162–164); and Stumke (2014:145)

The ICT competencies required from employers internationally and locally are compared to identify the similarities and differences in the expectation gap and required ICT competencies. The different competencies are categorised according to SAICA's CA 2025 proposed digital acumen (SAICA, 2019a:7), as explained in Chapter 2, Paragraph 2.2.4, Table 2-3. The content of these six elements is outlined in Chapter 2, Paragraph 2.4.2, Table 2-9. The comparison is outlined in Table 3-4. Where an element is expected by employers necessary for prospective accountancy professionals to possess, required, it is indicated as a "✓", and where it is not considered necessary, lacking, it is indicated by a "✗".

Table 3-4: International and local required critical ICT competencies (lacking and/or required) highlighted by employers, adapted from Table 2-9

SAICA ICT COMPETENCY ELEMENTS	LOCAL STUDIES	INTERNATIONAL STUDIES
Data analytics	✓	✓
Big data	✗	✗
Cognitive & non-cognitive systems	✓	✓
New development & Protocols	✓	✓
Distributed processing and cybersecurity	✓	✗
User competencies	✓	✓

Source: Ahmed (1999:14, 109, 113, 174); Modisane (2019:162-164); O'Brian (2017:112); SAICA (2019a:7); and Stumke (2014:145), adapted

Table 3-4 clearly outlines that with the information available, big data is either not investigated or not considered necessary to be taught at a higher-order thinking level at university. As a result of

the limited literature on which ICT competencies should be taught and to what extent, at university level, the necessity of big data at university level remains uncertain. An anomaly visible from Table 3-4 is that where distributed processing and cybersecurity are considered an expectation gap exists locally, but it is not the case internationally. This could be again since limited research on the specific ICT competencies to be taught to and expected from prospective accountancy professionals are available.

Overall, all the ICT competencies as outlined by SAICA (2019a:7), apart from those mentioned above, are considered necessary for prospective accountancy professionals to possess. This is deduced from the fact that employers perceive these competencies as not being mastered at university level. SAICA's latest published CF (SAICA, 2017:49) outlines that certain user appropriate IT software tools should be mastered by prospective accountancy professionals. These competencies are discussed in more detail below.

3.3.2 SAICA ICT COMPETENCIES

SAICA (2018:42) requires that as part of the professional competencies a prospective accountancy professional should have mastered at the end of their studies the understanding and use of appropriate ICT systems and tools. The understanding of computerised business systems and the use of appropriate ICT software tools are included under the understanding and use of ICT systems and tools.

The conclusion can be drawn from the SAICA 2017 CF that it does not specifically require the application of ICT competencies and that only basic knowledge should be obtained. Thus, the understanding of computerised business systems will be ranked as a lower-order of thinking in terms of RBT. However, SAICA (2018:4) highlights the use of appropriate ICT software that needs to be achieved in the relevant and business context, which is divided into the use of, and clearly indicated at a basic level, the following tools:

- Spreadsheets – MS Excel
- Word process – MS Word
- Databases
- Internet
- Relevant research

The information is limited to the items as listed above with no further specific detail. SAICA does not provide any specific instructions or guidance on how these tools should be applied and taught at university level. Specifically mentioned though (SAICA, 2017:49), is that for the second professional exam of prospective accountancy professionals, the use of MS Excel and MS Word will be utilised. Concluded from that, it can be argued that MS Excel and MS Word should enjoy

a higher-level of importance in the accountancy curriculum to enable graduates to a basis to build on when they enter the workplace.

With the changing workplace due to the impact of ICT and 4IR, SAICA (2019a:1) is adapting their CF to deliver prospective accountancy professionals that are responsible leaders and will create value. In their endeavour, SAICA (2019a:7) developed the digital acumen in the proposed 2025 CF, which is still part of a prospective accountancy professional values and attitudes. SAICA (2019a:6) states that these competencies are only qualities a prospective accountancy professional should possess to assist in the performance of work and to assist in the value creation process. The different components, as discussed in Chapter 2, Paragraph 2.4.2, Table 2-9, clearly distinguishes between six elements: [1] data analytics, [2] big data, [3] cognitive and non-cognitive systems, [4] new developments and protocols, [5] distributed processing and cybersecurity and [6] user competencies.

Based on the results from literature, internationally and locally, and the specific reference made to MS Excel and MS Word in the latest published CF (SAICA, 2017:49), certain ICT competencies will only be presented at an introductory level with regard to where those specific ICT components fit into the accountancy profession, with others being integrated extensively, as SAICA (2019a:3) intends, to assist in performing daily activities and to create value. The ICT competencies as outlined by SAICA (2018:49; 2019a:7) were used as a basis to determine which ICT competencies and at which level they were to be included in the ICTM.

Where an element can only be studied theoretically, for example, the characteristics of data, securing and safeguarding information, risks and attacks over the internet etc., it is included at a basic knowledge level. The one specific outlier is the integration of basic ICT coding. As discussed in Chapter 2, Paragraph 2.4.2, due to the complexity of ICT coding, this study recommends, as discussed in Chapter 7, that due to the importance and many benefits of ICT coding, it should be included in the accountancy curriculum as a separate module. Other elements also being included at a basic knowledge level, but which could possibly be integrated or applied, for example, the impact of big data on business models, artificial intelligence, blockchain, etc., are done to introduce the topic to students. Since these are more advanced aspects of ICT and due to the fact that it is not yet published by SAICA as a requirement of prospective accountancy professionals, the practical side of topics like these will be developed when a prospective accountancy professional enters the workplace. With this approach, the prospective accountancy professional will have a basic understanding of what it entails and can build on this knowledge in the workplace. For big data and blockchain specifically, two questions were included in the self-developed questionnaire to evaluate what students and lecturers know and understand regarding

these topics. This further aided in the level of inclusion in the ICTM. This is discussed in more detail in Chapter 5.

Where possible, the suggested ICT competencies, as proposed by SAICA (2019a:7) are integrated, if not only a theoretical approach can be followed or if it is not too complex for the teaching environment at university level. The ICT competencies expected by international and local employers, as outlined in Paragraph 3.3.1 and the ICT competencies set out by SAICA in the latest published CF and the proposed CF, as outlined in Paragraph 3.3.2 were matched to find the similarities in the importance of inclusion. These competencies were again matched based on the proposed CF's six elements of the digital acumen. The inclusion of these ICT competencies at which knowledge level as identified in Paragraphs 3.3.1 and 3.3.2 is also included to outline the possible inclusion thereof at which year of study. Where the elements are required it is indicated as a "✓". Through this process, the proposed inclusion of specific ICT competencies in the ICTM is outlined in Table 3-5.

Table 3-5: Proposed ICT competencies to be included in the ICTM

ELEMENTS	SAICA CF	SAICA 2025	Literature	Included at which level
1. Data analytics				
The nature of data (e.g. underlying characteristics and storage)	✓	✓	✓	Basic knowledge
Perform data analysis		✓	✓	Integrate
2. Bid data				
Impact on business models		✓		Basic knowledge
3. Cognitive & non-cognitive systems				
Machine learning		✓	✓	Basic theoretical knowledge
Robotic process automation		✓	✓	Basic theoretical knowledge
Artificial intelligence		✓	✓	Basic theoretical knowledge
4. New developments and protocols				
Cloud computing		✓	✓	Basic knowledge
Blockchain		✓	✓	Basic knowledge
Mobile apps		✓	✓	Basic knowledge
5. Distributed processing and cybersecurity				
Distributed processing (Internet of Things)	✓	✓		Basic knowledge
Risks and attacks		✓		Basic knowledge
Mitigating steps		✓		Basic knowledge
6. User competencies				
Word processing	✓	✓	✓	Integrate
Presentation software	✓	✓	✓	Integrate
Spreadsheet software	✓	✓	✓	Integrate
Basic ICT coding		✓	✓	Basic knowledge, and consider separate module
Securing and safeguarding		✓	✓	Basic knowledge

Source: Ahmed (1999:14, 109, 113, 174); Modisane (2019:162-164); O'Brian (2017:112); SAICA (2018:49; 2019a:7); and Stumke (2014:145), adapted

Table 3-5 served as a guideline with regard to what ICT competencies could be integrated into the accountancy curriculum in the development of the ICTM. The specific ICT competencies decided on, as outlined by Table 3-5, that are included in the ICTM includes the following ICT elements only: data analysis, word processing (MS Word), presentation software (MS PowerPoint) and spreadsheet software (MS Excel). This is as a direct result of international and local literature pointing to the importance of these ICT competencies.

Marediya (2017) states that with data analysis raw data can be collected and interpreted in meaningful ways. Rouse (2017) stipulates that data analysis is where mathematical approaches are used to interpret data. Marediya (2017) indicates that data analytics is also referred to as the refinement process of data. Rouse (2017) argues that advanced data analysis focusses on the forecasting of future events and behaviour. Rouse (2017) explains that with advanced data analytics, and due to its complexity, a professional with extensive mathematical and computer ICT coding training is required. Inferred from the different arguments above, data analysis will require extensive focus on the manipulation and interpretation of data. Since SAICA requires prospective accountancy professionals to only master basic competencies, and with the ICTM focussing on the integration of ICT competencies in the four core accountancy modules, without adding to the content of the accountancy curriculum, only basic data analytics were included. This only requires the use of MS Excel and its basic functions.

Marediya (2017) suggests that for basic analysis descriptive analytics can be used. This is where data is presented in the form of charts to describe what happened or what is. An example is providing insights into the sales cycle of a company. Rackliffe and Ragland (2016:116) suggest that for the accountancy profession, data analysis can be performed using MS Excel. For this study, basic MS Excel formulas and MS Word charts and graphs will be integrated into the core modules and represent data analysis to ensure compliance with this ICT competency. The basic MS Excel formulas are discussed in more detail below.

Limited to no information is available in literature on which specific MS Word competencies should be mastered by prospective accountancy professionals. Uyar and Gungormus (2011:40) identify MS Word as a necessary competency in the presentation and preparation of audit reports. In turn, Otoghile (2015) argues that when MS Word is used, the use of MS Excel will be easier, and vice versa, as the functionalities are very similar. Therefore, the MS Excel and MS Word functionalities will receive the same level of integration at similar knowledge levels.

With regard to PowerPoint, Lee *et al.* (2018:44) identify it as a frequently used software in the work environment. Like MS Word, limited to no information is available on the specific competencies that should be mastered by prospective accountancy professionals.

However, there is a constant emphasis in literature, including but not limited to the studies performed by Brown and Pike (2010:), Collins (2017), Lenning (2014), Rackliffe and Ragland (2016:113), Ragland and Ramachandran (2014:139) and Willis (2016:87), that illustrate that there are the many benefits students will gain through the introduction and integration of MS Excel. Brown and Bradley (2005:50) state that students will be able to apply workplace competencies with Rackliffe and Ragland (2016:113) proposing MS Excel enables prospective accountancy professionals to develop analytical and critical thinking skills. Similarly, Brown and Pike (2010:25) argue that through the introduction of basic MS Excel competencies, working towards the integration of more advanced competencies, integrated into the core modules can enhance the accountancy curricula.

Brown and Pike (2010:26) and Lee *et al.* (2018:44) insinuate that with the popularity in the use of MS Excel above other accountancy programs, the integration thereof into the accountancy curriculum is beneficial to both prospective accountancy professionals and prospective employers and should enjoy a greater emphasis in the accountancy curriculum. This is achieved by teaching a competency required in the accountancy field and equipping prospective accountancy professionals with the necessary competencies to minimise errors in the workplace. Willis (2016:90) identifies that the pressing issue is not if MS Excel should be included in the accountancy curricula, but what specific competencies pertaining to MS Excel should be included.

Otoghile (2015) outlines the levels of MS Excel competencies in four levels: [1] basic; [2] intermediate; [3] expert; and [4] advanced. He further explains what specific competencies can be expected under each of these levels. Otoghile (2015) states that basic MS Excel competencies can be grouped according to the first three ribbons within a document. These three are the home tab, page layout tab and the view tab. Brown and Pike (2010:29) identify basic MS Excel competencies as the ability to create and edit a workbook, formatting cells and ranges, worksheet formatting, managing worksheets and working with data. Additional to this, Otoghile (2015) and Rackliffe and Ragland (2016:113) propose that the basic functions locatable on the drop-down button of the AutoSum icon on the home tab including sum, average, count numbers, max and min, sort and filter of data, are a must for first time users. Linking to this, Otoghile (2015) argues that the ability to navigate within MS Excel with the added formulas of multiplications, subtractions and divisions is an integral part of a basic user competencies.

Building on these basic competencies, similar to the scaffolding approach of RBT, intermediate competencies are inclusive of the basic competencies and include the use of the formula tab. Brown and Pike (2010:29) argues that the use of basic functions should be mastered at this stage. Otoghile (2015) explains that a student will master the function wizard to enter function inputs and arguments. Otoghile (2015) and Rackliffe and Ragland (2016:113) further explain that by

understanding the function wizard a student comprehends more challenging arguments and inputs together with the specific order in which they need to be arranged. Some of these functions include the TEXT functions, DATE functions, LOOKUP functions and MATH functions. Rackliffe and Ragland (2016:115) suggest that at this level the verification of calculations and error identification can be taught. Otoghile (2015) argues that with the use and familiarising with the function wizard confidence will be build that will allow a student to apply certain functions without the function wizard and to even further enable the understanding of how MS Excel thinks and behaves with certain functionalities. This leads to an expert MS Excel user.

Like the intermediate competencies, the expert user of MS Excel builds on the knowledge obtained in the basic and intermediate levels. Otoghile (2015) states that at this level a student will delve deeper into the functionalities of MS Excel and will add the DATA tab and the INSERT tab. Brown and Pike (2010:29) and Otoghile (2015) propose that here a student will be able to report on data by means of chart, formatting charts, connect external data sources to already acquired information, use PivotTables and subtotals in an expert manner, apply compound and complex formulas to report meaningful information, add pictures and shapes to a worksheet and finally securing and sharing documents. At this level a student will be able to create templates that could be used at lower levels by users of MS Excel. Furthermore, Rackliffe and Ragland (2016:115) propose that the extraction and analysis of data can be applied here. Together with this, MS Excel can be used to extract audit samples in the form of CAATs. In conclusion, MS Excel is a powerful tool that can equip prospective accountancy professionals with one of the most valuable ICT competencies as identified through literature and as expected from employers.

By contrast, the advanced level of MS Excel is outlined by Otoghile (2015) as the developer level. Here the developer tab should be utilised by the user to write codes. Based on the discussion in Chapter 2, Paragraph 2.4.2, due to the complexity of ICT coding, the advanced level of MS Excel is not dealt with in the study as a competency that can be integrated into the core modules and should rather be taught as part of ICT coding in a separate module.

In conclusion, the specific ICT competencies that were included in the ICTM as outlined in literature and based on the different ICT competencies as identified in Table 3-3 focus more on MS Excel as it is considered to be the most important ICT competency. However, if MS Word and MS PowerPoint are linked to MS Excel, due to the similarities in their functionalities, the specific basic and intermediate competencies of MS Excel, as identified through literature, can be applied to both competencies. As a matter of clarity, this study includes data analysis in the integration of MS Excel, since only basic data analysis will be included through the use of MS Excel, as mentioned previously. The continuous inclusion of this ICT competency ensures constant exposure to its different functionalities to lead to improved competencies.

Table 3-3 outlines the ICT competencies considered necessary by employers, internationally and locally and SAICA for prospective accountancy professionals to possess. This study concluded on the inclusion of MS Excel, MS Word and MS PowerPoint computer programs based on the continuous emphasis on their importance in literature. This is in line with SAICA's user competency digital acumen as discussed in Chapter 2, paragraph 2.4.2 and outlined in Table 2-9. Subsequently, the specific competencies per computer program are specified and outlined in the paragraphs above. In addition, the level under which each specific competency per computer program falls are outlined in three categories namely: [1] basic competencies, [2] intermediate competencies, [3] expert competencies and [4] advanced competencies. The specific competencies per computer program included in the ICTM is outlined in Table 3-6.

Table 3-6: Specific ICT competencies per ICT element included in the ICTM

ICT COMPETENCY INCLUDED IN THE ICTM		
MS EXCEL, including data analytics	MS WORD	MS POWERPOINT
Basic competencies		
➤ Home tab ➤ Page layout tab ➤ View tab ➤ Creating and editing a Workbook ➤ Formatting cells and ranges ➤ Worksheet formatting ➤ Managing worksheets ➤ Working with data ➤ Sort and filter of data ➤ Basic formulas (sum, average, count numbers, max, min, multiplications, subtractions, divisions)	➤ Home tab ➤ Page layout tab ➤ View tab ➤ Creating and Editing a document ➤ Formatting text ➤ Document formatting ➤ Managing document	➤ Home tab ➤ Design tab ➤ View tab ➤ Creating and editing a presentation ➤ Formatting text ➤ Presentation formatting ➤ Managing presentation
Intermediate competencies		
➤ Using basic formulas and functions ➤ Function Wizard (text, date, lookup, match) ➤ MATH ➤ Verification of calculations (e.g. analytical reviews and compliance testing), error identification	➤ Template usage	➤ Template usage
Expert competencies		
➤ Creating charts from Your Data ➤ Adding Pictures and Shapes to a Worksheet ➤ Securing and sharing documents ➤ Data tab ➤ Insert tab ➤ PivotTables ➤ Subtotal ➤ Complex formulas ➤ Create templates ➤ Create charts ➤ Format charts ➤ Connect external data sources ➤ Data extraction and analysis ➤ Computer assisted audit tool (CAAT) that helps with sampling, (e.g. testing details of transactions and balances)	➤ Creating charts from your data ➤ Adding Pictures and Shapes to a document ➤ Securing and sharing documents ➤ Design tab ➤ Insert tab ➤ Mailing ➤ References ➤ Create templates ➤ Create charts ➤ Format charts ➤ Connect external data sources	➤ Animations tab ➤ Adding Pictures and shapes to a document ➤ Securing and sharing documents ➤ Design tab ➤ Insert tab ➤ Slide show
Advanced competencies		
➤ ICT coding - Not part of this study		

Source: Summary of literature above, adapted

Brown and Pike (2010:29) explain that the emphasis of the broader sense of ICT need to be shifted to an accountancy specific audience with real world accountancy issues. In order to integrate these ICT competencies into the accountancy curriculum, what specifically and how it

should be taught should be considered. Like all the previous published CF's, SAICA's proposed 2025 CF provides limited guidance on how the outlined ICT competencies should be taught. Also, the level at which these competencies should be mastered is not clear. The ICTM considered the level of inclusion as outlined in Table 3-4 together with the different learning outcomes per year, per core modules, as outlined in the yearbooks of the two participating universities. The inclusion of the specific ICT competencies in the ICTM, as outlined in Table 3-6, is explained in Chapter 6, Paragraph 6.4.

It should be taken into account that since all SAICA-accredited universities should adhere to the CF to remain accredited, the learning outcomes between the different universities are expected to have a significant amount of similarities. This is due to the set competencies that needs to be taught as outlined by SAICA. Due to this, the learning outcomes can be projected across almost all the SAICA-accredited universities, due to the standard learning outcomes as set out by the CF of SAICA and university accreditation visits and results. In order to facilitate in the development of the ICTM, the learning outcomes per core accountancy module were identified to highlight the different ICT integration opportunities. The learning outcomes of the two participating universities in the self-developed questionnaire linked to the ICT competencies as identified in Table 3.4 are discussed in more detail below.

3.4 UNIVERSITY CORE MODULE LEARNING OUTCOMES LINKED TO ICT COMPETENCIES TO BE INTEGRATED ACCORDING TO RBT LEVELS

Willis (2016:88) argues that even though the accountancy curriculum across different institutions are similar, the content varies in the delivery and coverage of content. As a result, a comparison is made in this study between firstly the coverage of content within the four core modules. This is done to identify what is expected of prospective accountancy professionals, as outlined in the yearbook for the accountancy curriculum. Consequently, the yearbooks, focussing specifically on the four core modules: Accounting, Auditing, Financial Management and Management Accounting and Taxation (SAICA, 2018) for each year of study (1st year to honours level), of the two universities (one traditional and one comprehensive university) involved in the collection of data were reviewed. Due to the confidential nature of the information, as mentioned in Chapter 2, Paragraph 2.2.3, the names of the universities are intentionally omitted. The universities are referred to as University 1 (U1), traditional university, and University 2 (U2), comprehensive university.

The participation of these two universities are twofold, firstly, to identify the similarities and differences between the required outcomes per year and module level between a traditional and a comprehensive university in order to allow for the projection of the suggestions of ICT integration

over all the accountancy curricula. The similar learning outcomes between U1 and U2 are linked to specific ICT competencies that can be integrated. In turn, these ICT competencies are linked to the RBT knowledge levels to strengthen the scaffolding approach of how knowledge should be mastered, from a lower-order level of thinking to the higher-order of thinking. This is discussed in detail in Chapter 6. Secondly, to further compare the learning outcomes to the data collected through the distribution on the self-developed questionnaire in Chapter 5 of this study. This comparison assisted in the development of the ICTM, also discussed in Chapter 6.

The learning outcomes per module, per year of study, were summarised and grouped, according to their similarities. This enables a clear distinction between the norm and perhaps enable identification of outliers. The 2020 published yearbooks were obtained from the respective university's websites.

Several similarities were expected between U1 and U2's learning outcomes as the outcomes of the different modules are based on SAICA's CF (2018:6) and university accreditation status. The expected differences are mainly due to universities being able to design their curriculum to best suit their needs (SAICA, 2010:7-8; 2014:8; 2018:9). This results in different universities focussing on different competencies at different levels in different years of study. But ultimately all universities should meet the CF requirements as set out by SAICA (2018:6). As a result, even though some differences may appear from year to year, at the end of a prospective accountancy professional's four years of study the same or at least similar competencies, as outlined by SAICA in their CF, should be mastered.

The learning outcomes per year of study, per core module is scrutinised and summarised per university. Both universities structure their accountancy curriculum as follows:

- 1st year of study: Accounting
- 2nd year of study: Accounting, Auditing, Financial Management and Management Accounting and Taxation
- 3rd year of study: Accounting, Auditing, Financial Management and Management Accounting and Taxation
- Honours year of study: Accounting, Auditing, Financial Management and Management Accounting and Taxation

The review of four yearbooks of the two universities, one each for undergraduate studies (academic year 1 to 3) and one each for postgraduate studies (4th academic year (honours)) present the four core modules in the same years of study. As explained in Chapter 2, Paragraph 2.2.3, this study refers to the core modules as follows: [1] ACC – Accounting; [2] AUD – Auditing; [3] FM & MA – Financial Management and Management Accounting and [4] TAX – Taxation. Both

universities present an ICT module with the difference being in which year it is presented and the learning outcomes of the ICT modules for the two universities. In order to highlight the differences noted, the ICT modules were also included with the reference ICT.

Additional to the abbreviations used for the different core modules, the year in which it is presented, 1st year, 2nd year, 3rd year or 4th year (honours) is added to clearly distinguish the scaffolding level of knowledge at which it is being taught in terms of RBT. Table 3-7 summarises the modules included in the ICTM.

Table 3-7: Module codes included in the ICTM

YEAR OF STUDY	CORE MODULES: U1 & U2				ICT MODULE
	ACCOUNTING	AUDITING	FINANCIAL MANAGEMENT AND MANAGEMENT ACCOUNTING	TAXATION	
1 st year	ACC1				
2 nd year	ACC2	AUD2	FM & MA 2	TAX2	ICT2 (U2)
3 rd year	ACC3	AUD3	FM & MA 3	TAX3	ICT3 (U1)
4 th year (honours)	ACC4	AUD4	FM & MA 4	TAX4	

Source: Yearbooks 2020, U1 and U2

The module outcomes as outlined in the respective yearbooks per module code, as outlined in Table 3-7, are summarised, and grouped according to topic and action verb in terms of RBT of how the competency can be achieved. This in turn is linked to the ICT competencies that is identified in Table 3.6, MS Excel (including data analysis), MS Word and MS PowerPoint, considered necessary for prospective accountancy professionals to possess. The rationale behind linking RBT and the learning outcomes per module per year of study is to ensure that the appropriate scaffolding takes place from lower-order thinking to higher-order thinking.

Linking RBT to the different competency levels of ICT, reference is made to the four ICT competency levels, [1] basic, [2] intermediate, [3] expert and [4] advanced, as outlined by Otoghile (2015) and Table 3-4. Where RBT has six knowledge levels, the verbs or main elements within the levels are linked to the main elements of the four ICT competency levels as outlined by Otoghile (2015) within the three ICT competencies, MS Excel, MS Word and MS PowerPoint. In order to achieve this, Table 3-6 is linked to the RBT knowledge levels in Chapter 2, Table 2-6.

For this study, when reference is made to the basic ICT competencies it links to RBT's Level 1 and 2 as it deals more with the remembering and understanding of information pertaining to the program. The next ICT competency level is the intermediate level. This is where basic knowledge can be applied to analyse data. The best fit here in terms of RBT is Level 3 and 4, apply and analyse. Moving to the expert ICT competency level, and with this being the highest ICT competency level of the ICTM, as discussed in Table 3-6, Level 5 and 6 of RBT, evaluate and create apply. At this level, a prospective accountancy graduate needs to apply all the ICT

competencies, from a basic level and including the intermediate competencies as well, evaluate information to create reports, templates, calculations and present this information in a professional manner.

The different ICT competency levels are included in the self-developed questionnaire, as discussed in Chapter 4, Paragraph 4.6.3. Participants had to indicate which ICT competencies per computer program they believe should be included in which year of study and in with modules. This assisted in the development of the ICTM and is discussed in more detail in Chapter 5.

In order to identify the different ICT integration opportunities within the core modules, the specific learning outcomes, as per the yearbooks of U1 and U2, linked to the different ICT competencies, identified in the literature and concluded on in Table 3-4, and the relevant RBT levels, discussed in Chapter 2, Paragraph 2.3.1.2 and Table 2-6 are discussed in more detail below.

3.4.1 Linking similar learning outcomes per module to ICT integration opportunities in terms of RBT

In order to design an executable ICTM, the ICT competencies identified in Table 3-6 are mapped to the different RBT knowledge and cognitive levels as identified in Chapter 2, Paragraph, 2.3.1.2 and Table 2-6 per the similar learning outcomes per core module, as identified in Table 3-7. This ensures that the different ICT competencies are introduced in the appropriate year level based on the similar learning outcomes and the RBT knowledge and cognitive levels.

The different learning outcomes as outlined in the yearbooks are grouped according to the subject codes as indicated in Table 3-7. Since the two universities have different numbers of learning outcomes per module they were linked in terms of a specific topic or competency as outlined by SAICA's CF to provide a clear image of either similarities or anomalies between them. The reason for this was to ensure that the ICTM can be applied to different accountancy curricula over different universities. The learning outcomes similarities and differences of the different modules, per year of study, are discussed in more detail below.

3.4.1.1 1st year of study

For ACC1 the similar main topics identified for the two universities were a general understanding of accounting and its history. The application of basic and routine accounting calculations and the preparation of a basic set of financial statements were also identified. No anomalies were identified. As the learning outcomes mainly deal with remember and understand it is presented at a lower-order thinking level.

For this study, the understanding of accounting cannot be applied within an ICT environment due to its theoretical basis and is included as part of the ICTM. The application of basic accounting

transactions and preparation of financial statements are incorporated at a basic level of ICT (RBT Level 1 and 2) by means of MS Excel. In order to ensure that the ICTM is executable and that it is perceived as easy to use, it is suggested that a basic introductory course be presented in the first semester of a student's 1st year to bridge any ICT competency gap that may exist from secondary school level.

3.4.1.2 2nd year of study

ACC2 did not present any anomalies either. The main topics identified for the two universities are the application of routine events and transactions within the accountancy environment together with the preparation of an intermediate set of financial statements, inclusive of notes. These learning outcomes fall within the lower-order thinking as it deals with the understanding and application of accounting concepts.

For this study, the application and preparation of intermediate financial statements are like that of an intermediate level and is consequently also integrated at an intermediate level of ICT (RBT 2 and 3) by means of MS Excel. The additional use of MS Word will be introduced at this stage to incorporate the inclusion of notes to the financial statements that could be best presented in a "Word" format.

AUD2 presents a more theoretical layout. Here the understanding and recommendations of principles in terms of ethical principles and corporate governance are required. The audit process, pre-engagement activities, risk and assertions are required to be described and understood. Also required is an understanding of the effect of ICT on the audit of a company and detailed knowledge of selected ISA's. Similar to ACC1, as the learning outcomes mainly deal with remember and understand it is presented at a lower-order thinking level.

For this study, the latter is basic knowledge with no room for the integration of ICT at this year level. Even so, the discussion with regard to ethics, corporate governance, pre-engagement activities, risk and assertions can be applied in terms of MS Word. A report can be prepared with the intermediate functionalities of MS Excel, with even the integration of PowerPoint to present the proposed audit approach to management (RBT 2 and 3).

FM & MA 2 contains the verbs understand, evaluate, analyse and present. This leads to some concepts requiring a basic knowledge while others should be applied to evaluate and present information. Inferred from this is that data analysis will feature here in a strong sense. Due to the focus being placed on understanding in this module, it only requires lower-order thinking.

For the development of the ICTM the basic knowledge will not be able to be integrated in terms of ICT. The evaluation and analysis of information will fall within the ICTM integration where data analysis can be applied within MS Excel at a basic to intermediate level (RBT 2 and 3).

Furthermore, the presentation of the analysis is possible using MS Word or MS PowerPoint in the form of a report or a presentation at an intermediate level (RBT 2 and 3).

The requirements of TAX2 is similar to that of ACC2 in the sense of the number of calculations that can be performed. By contrast, this is the first introduction to taxation prospective accountancy professionals receive. Consequently, several basic knowledge and understandings are laid down with only basic calculations based on these understandings. This leads to the conclusion that this module is also presented at a lower-order of thinking.

The ICTM integrates ICT for TAX2 in a similar fashion as with ACC2 where MS Excel is used at a basic to intermediate level (RBT 2 and 3) to sum, auto sum, subtract or deduct, lookup functions, match certain criteria and even apply date formulas. The formatting of a worksheet can also be applied to ensure the calculations are presented in a professional and structured manner.

Overall, all the 2nd year core accountancy modules are the same. However, there is an outlier in terms of the availability of an ICT module at U2. This module focusses on computer programs with limited guidance on what specific programs are referred to. Based on the learning outcomes specified, it points to a higher-order of thinking. Since there is no evidence of other ICT modules preceding this one, the risk is that prospective accountancy professionals with limited to no exposure prior to their university career will not include the required basics to perform basic ICT competencies, let alone use ICT at an expert level. The risk associated with this is that the necessary scaffolding from lower-order to higher-order thinking is not sufficiently achieved.

Subsequently, to overcome this possible obstacle, as outlined in Paragraph 3.2 and Table 3-1, the ICTM suggests that a basic introductory course be introduced in the accountancy curriculum focussing specifically on the basic ICT competencies that will aid in bridging the gap between what universities expect of prospective accountancy professionals when they first enter university and what they were exposed to prior to such a time. Here the appropriate scaffolding from lower-order (RBT 1 to 3) to higher-order thinking (RBT 4 to 6) can be established. This course is suggested to cover at least MS Excel, MS Word, MS PowerPoint and a basic level of data analysis within MS Excel. This will aid in the introduction of what ICT entails in the accountancy context and what the different functionalities could be used for.

3.4.1.3 3rd year of study

Building on the competencies and knowledge obtained in ACC2, ACC3 requires the integration of different accounting concepts, the analysis of information and the preparation of financial statements in compliance with the accounting standards and the aspects of group companies. At this stage, less focus is placed on basic knowledge and understanding with the movement towards a higher-order of thinking.

The integration of the different accounting concepts is integrated at an expert level (RBT 4 to 6) of MS Excel. Here more complex formulas can be applied to aid in the analysis and evaluation of information and the consolidation of group companies. Additional features can also be applied to create reports to present information in the form of charts and graphs, pivot tables, etc. As with ACC2, the preparation of financial statements can be performed professionally and accurately using MS Word at an expert level and MS Excel at an intermediate level.

Contrary to the pre-conceived notion that audit is more theoretical and less application based, AUD3 requires the identification, analysis, reflection, evaluation, explanation and development of ideas, risks, problems within the business context and ethical behaviour. Even though still theoretical, the presentation of the mentioned requirements can be done using ICT. Communication remains an integral part of an audit and should be done in a professional and clear manner. Additional to the analysis and presentation of information, analysis of data is also required. This is in the form of selecting the relevant items to perform audit procedures on. This leads to the move to a higher-order of thinking.

The ICTM integrated the learning outcomes of AUD3 through mainly the use of MS Word and MS PowerPoint. MS Word at an expert level (RBT 4 to 6) can ensure that professional communication is created and prepared from the auditor's perspective that can in turn be distributed to the client after analysing and evaluating information. Similarly, when an auditor identifies an issue or makes a recommendation based on an idea, MS PowerPoint can be used to professionally present it. Additional to this, auditors are required to select samples to perform audit procedures on, and in turn, analyse data. This can be achieved through the use of different MS Excel formulas at an expert level (RBT 4 to 6).

As with FM & MA 2, FM & MA 3 requires the integration, analysis, evaluation, development, decision-making and more theoretically, the understanding, reflection on and understanding of complex theories and principles. Again, data analysis will feature strongly here with the added reporting and reflection on the analysis made. With these learning outcomes a higher-order thinking is required to be able to successfully achieve them.

The ICTM again makes use of data analytics within MS Excel at an expert level (RBT 4 to 6). In order to aid in the development and decision-making, data can be manipulated and analysed to be presented in a logical and usable format. Similarly, the presentation of the information can be captured in a report prepared in MS Word or even MS PowerPoint.

Continuing the trend followed by TAX2, being similar to ACC2, TAX3 falls within the same integration and application category as ACC3. Complex calculation is to be prepared and detailed tax knowledge is to be applied at this level. Similar to all the 3rd year modules, TAX3 is required

to present the information. The ICTM integrated ICT for TAX3 by utilising MS Excel for the preparation of complex calculations at an expert level. The presentation of information will also be applied using MS Word to ensure professional and accurate information.

Like the outlier identified in terms of ICT2, U1 presents an ICT module in the 3rd year of study. This module focusses on the integration of ICT into the accountancy context. However, with also no information available on the presentation of other ICT modules preceding this one, there is again a risk that prospective accountancy professionals with limited to no exposure prior to their university career will not possess the required basics to perform basic ICT competencies, let alone use ICT at an expert level. Based on the learning outcomes specified, a level of higher-order thinking needs to be applied. In turn, with no evidence of prior structured ICT exposure there is a lack of scaffolding from a lower-order of thinking where the basic knowledge of ICT requirements is established. The suggestion to introduce a separate ICT module in the 1st year of study to overcome this obstacle still applies in this case.

3.4.1.4 4th year of study – Honours

ACC4, AUD4, FM & MA 4 and TAX4 for U1 and U2 focusses extensively of the integration and the application of complex calculations and the adherence to professional standards and ethics. This implies that a full integration will be applied at this stage at an expert level for all the modules. Subsequently, a higher-order of thinking is required at this stage.

The ICTM integrates all the required ICT competencies into a single assignment that will cover accounting calculations and considerations, data analysis and interpretation, auditing considerations and the preparation of taxation calculations at an expert level (RBT 4 to 6). The presentation of all of these will also be executed by means of a professional document and presented by means of a formal presentation. The rationale behind this approach is to enable prospective accountancy professionals to focus on their preparation for their first professional exam with some exposure to ICT, as to not to overwhelm the amount of content needed to be covered, but still keeping them abreast with the different functionalities within the different ICT programs. The questions included in the self-developed questionnaire on the availability of ICT equipment. The evidence is satisfactory in that no student highlighted that they do not have access or own a device necessary to implement ICT. This further supports the successful integration of the ICTM from a practical participation perspective.

The similar learning outcomes per core module, per year of study of U1 and U 2 are mapped in Table 3-8. Only those learning outcomes that allow for the integration of ICT are included. The other basic knowledge and understanding learning outcomes as discussed above is left out intentionally to standardise the development of the ICTM. In addition, the different ICT integration

opportunities are linked to RBT's knowledge levels. In doing this, the learning outcomes for the ICTM follows the suggested scaffolding learning approach as outlined by RBT. This is discussed in more detail in Chapter 6 linked to the results of the self-developed questionnaire on the integration of ICT competencies in the different years of study and core modules, as discussed in Chapter 5. Similarly, the wording of the learning outcomes is phrased accordingly to enable prospective accountancy professionals to identify exactly what will be expected of them and how they will be able to achieve the different ICT learning outcomes.

Table 3-8: Mapping of ICT competencies to similar learning outcomes per year of study and core module of U1 and U2

MODULE	SIMILAR LEARNING OUTCOMES PER MODULE PER YEAR FOR U1 AND U2	ICT INTEGRATION OPTION (Qualitative data analysis – Chapter 3)			RBT KNOWLEDGE LEVELS
		MS EXCEL, including DATA ANALYSIS	MS WORD	MS PowerPoint	
ACC1	Basic routine accounting transactions, individually and within different entity forms.	✓			1 - 2
	Prepare basic set of financial statements, including notes to financial statements.	✓			
ACC2	Practical application at an intermediate level of routine events and transactions within the accounting environment.	✓			2 - 3
	Prepare intermediate set of financial statements, including notes to financial statements.	✓	✓		
AUD2	Describe and discuss audit process, pre-engagement and planning, risk, assertions.		✓		2 – 3
FM & MA 2	Evaluate, select, and apply the appropriate techniques or methods in the field of Financial Management and Management Accounting.	✓			2 – 3
	Analyse and evaluate complex information, including financial statements.	✓			
	Reliably and logically present and communicate information or decisions.		✓	✓	
TAX2	Reliably, accurately, and coherently prepare basic tax calculations.	✓			2 – 3
	Identify and calculate the tax implications in respect of farming.	✓			
ICT2	Solve programming problems using a computer.	#	#	#	#
	Analyse, design, program and use algorithms.				
	Use computer programs and demonstrate them				
ACC3	Understanding and apply a range of complex consolidation procedures in terms of IFRS.	✓			4 – 6
	Prepare a set of financial statements that fully comply with a selection of IFRS.	✓	✓		
	Identify, analyse, critically reflect on, and address selected complex accounting problems.	✓			
AUD3	Identify, analyse, critically reflect on, and address complex problems within business contexts, in terms of selected International Standards on Auditing (ISA).	✓	✓		4 – 6
	Develop and communicate ideas and opinions in the correct context considering corporate governance, professional ethics and International Standards on Auditing (ISA) principles.		✓	✓	

Table 3-8: Mapping of ICT competencies to similar learning outcomes per year of study and core module of U1 and U2 (continues)

MODULE	SIMILAR LEARNING OUTCOMES PER MODULE PER YEAR FOR U1 AND U2	ICT INTEGRATION OPTION (Qualitative data analysis - Chapter 3)			RBT KNOWLEDGE LEVELS
		MS EXCEL, including DATA ANALYSIS	MS WORD	MS PowerPoint	
FM & MA 3	Identify, analyse, evaluate, critically reflect on, and solve complex, integrated problems.	✓			4 – 6
	Develop ideas and opinions and communicate these ideas and opinions in a well-formed argument in a professional manner.		✓		
	Make decisions with an understanding of how decisions in one area of an organisation have an impact on other areas.		✓		
TAX3	Identify, analyse, critically reflect on, and address selected complex taxation problems.	✓	✓		4 – 6
	Prepare complex tax calculations in compliance with tax law.	✓	✓		
ICT3	Integrated ICT in the accounting environment.				#
	Use ICT to identify and analyse business and accountancy problems.	#	#	#	
	Manage information processes, recognising that problem-solving in an IT environment is context and system bound, and does not occur in isolation.				
ACC4	Compile and criticise advanced external financial reports, including consolidated financial reports.	✓			4 – 6
	Analyse and address complex, abstract and/or integrated external financial reporting problems.	✓			
	Present contextualised external financial reporting opinions and arguments on unfamiliar, complex, and uncertain problems by selecting and applying methods, standards, and techniques appropriate to external financial reporting practice.	✓	✓	✓	
AUD4	Perform assurance engagements and evaluate and criticise manual and computerised internal control and governance systems.	✓	✓		4–6
	Identify, analyse, and address complex, abstract and/or integrated assurance.	✓	✓		
	Present contextualised assurance reports, opinions, and arguments on unfamiliar, complex, and uncertain problems by selecting and applying methods, standards, and techniques appropriate to external financial reporting practice.	✓	✓		

Table 3-8: Mapping of ICT competencies to similar learning outcomes per year of study and core module of U1 and U2 (continues)

MODULE	SIMILAR LEARNING OUTCOMES PER MODULE PER YEAR FOR U1 AND U2	ICT INTEGRATION OPTION (Qualitative data analysis – Chapter 3)			RBT KNOWLEDGE LEVELS
		MS EXCEL, including DATA ANALYSIS	MS WORD	MS PowerPoint	
FM & MA 4	Demonstrate integrated knowledge and understanding of the underlying theories, methods, and techniques available in the field of Financial Management and Management Accounting.	✓			4–6
	Demonstrate the ability to critically interrogate multiple sources of knowledge, such as financial and non-financial information of businesses as well as the general economic environment and review that information as well as the manner in which it was produced.	✓			
	Demonstrate the ability to present contextualised management accounting and finance opinions, arguments, and recommendations on unfamiliar, complex and uncertain problems by selecting and applying methods, standards, and techniques appropriate to external financial reporting practice.		✓		
	Demonstrate the ability to apply knowledge, theories, methods and techniques in the field of Financial Management and Management Accounting to solve complex investment, financing, and dividend decisions, within the context of the company as well as the context of the environment.	✓			
	Demonstrate the ability to develop creative responses with regard to the responsible financial management of a company and its assets by critically reviewing the information, evaluating the processes and effectively using the financial aids within the boundaries of the strategic aim of the company.	✓	✓		
TAX4	Perform and criticise advanced tax calculations based on an extensive and deep knowledge of the relevant authority, methods and techniques relevant to tax practice.	✓	✓		4 – 6
	Identify, analyse, and address complex, abstract and/or integrated tax problems.	✓	✓		
	Present contextualised tax opinions and arguments on unfamiliar, complex and uncertain problems.	✓	✓		

This key refers to the suggestion made in the ICTM that a basic ICT module be introduced in the 1st year of study to cover basic competencies of MS Excel (including data analysis), MS Word, and MS PowerPoint.

Source: Ahmed (1999:14, 109, 113, 174); Anderson and Krathwohl (2001:67-68); Bloom *et al.* (1956:207-208); Chapter 5 data analysis, Krathwohl (2002:215); Modisane (2019:162-164); O'Brian (2017:112); SAICA (2018:499; 2019a:7); Stumke (2014:145); U1 and U2 yearbooks; Table 2-4; and Table 3-5, adapted

Table 3-8 outlines where ICT can be integrated within the already established learning outcomes of the core modules. Additionally, it links those integration opportunities to the relevant RBT knowledge levels to ensure a scaffolding approach. The start being with basic knowledge as suggested in a separate ICT module in the 1st year of study as an overall introduction to ICT, the effect on the accountancy field and the possible integration thereof in future. Here integration will not take place and can possibly start from 2nd semester in the 1st year of study after a basic ICT knowledge foundation at a lower-order thinking level is established. From there, the 2nd year of study will integrate ICT in the accountancy field at still a lower-order thinking level, but with less basic knowledge and some application. From the 3rd year of study, however, prospective accountancy professionals need to apply a higher-order of thinking in the use and integration of ICT. This enables the analysis, evaluation and creation of ICT related concepts, information and presentations relevant to the accountancy working environment. Finally, the 4th year of study serves as an extension of the 3rd year where prospective accountancy professionals integrate all ICT competencies from 1st year to 3rd year to effectively and professionally analyse data, prepare financial statements and reports and present information to management within the accountancy context.

In order to ensure that the ICT competencies are integrated at the required knowledge levels, from a professional and educational perspective the different ICT knowledge levels that have an impact on accountancy learning outcomes are considered. A brief comparison is made between SAICA's CF knowledge levels and the already developed accountancy curriculum of the four core modules as outlined in Table 3-7 in terms of RBT. This assists the development of specific ICT competencies from 1st year of study to honours from an educational perspective while still adhering to the professional body, SAICA's, knowledge requirements.

3.5 ICT KNOWLEDGE LEVELS

3.5.1 SAICA knowledge levels

Van der Merwe *et al.* (2014:282) state that SAICA is the driving force in shaping the accountancy curriculum in South Africa. Van Romburgh (2014:5) assesses that with the CF SAICA (2010; 2014; 2016; 2018) ensures that universities teach prospective accountancy professionals the necessary workplace competencies that they would need after graduation. Thus, accountancy curriculums should adhere to specifications as set out in the CF.

SAICA (2018:12) divides the required technical skills to be mastered by prospective accountancy professionals into four core modules, namely, [1] Accounting, [2] Auditing, [3] Financial Management and Management Accounting, and [4] Taxation. These modules are further divided

into topics that should be mastered. These topics are assigned knowledge levels from 1–3 and proficiency levels A, I and X (SAICA, 2018:24-26). The knowledge levels are assigned to outline the foundation for the attainment of a competency, based on the proficiency levels (SAICA, 2018:25). The proficiency levels refer to the level at which a prospective accountancy professional should be able to demonstrate the different knowledge areas at the time of writing their initial test of competence, after the successful completion of the honours degree SAICA, 2018:24). Thus, no formal training would have been received in the workplace. SAICA explains their knowledge and proficiency levels as follows:

Knowledge levels

- Level 1 – Basic knowledge
 - A basic understanding, at a broad conceptual level, of the subject matter, that it exists, the significance and relevance thereof and its different definitions.
 - No procedural or numerical aspects are required at this level.
 - The level of knowledge at this level should encourage the student to want to know more.
- Level 2 – Intermediate knowledge
 - Detailed knowledge and understanding of the main ideas and issues of the subject matter.
 - Procedural and numerical aspects, specific to the subject matter is required, excluding complex and unusual aspects.
 - This level builds on Level 1, and the knowledge at this level should encourage the student to want to explore and understand this topic more.
- Level 3 – Advanced knowledge
 - In-depth knowledge and complete understanding of the subject matter.
 - Complex and unusual aspects should be mastered.
 - This level builds on Level 1 and 2.

Proficiency levels

- Level A (Awareness)
 - Only required to be aware of the main ideas and principles of this area. Demonstration of technical expertise or detailed knowledge is NOT required.
 - Should be able to identify and explain the competency and types of circumstances.
- Level I (Initiates the Task)
 - Intermediate understanding of the requirements of the area, no complex calculations, limited complexity, builds on Level A and includes these competencies.

- Identifies and applies the required professional skills.
- Level X (Completes the Task)
 - Advanced understanding of the topic, complex calculation, builds on Level A and I and includes these competencies.
 - Analyse and recommend the best course of action.

The two different categories, knowledge and proficiency as listed above, are summarised and graphically presented in Figure 3-2 below:

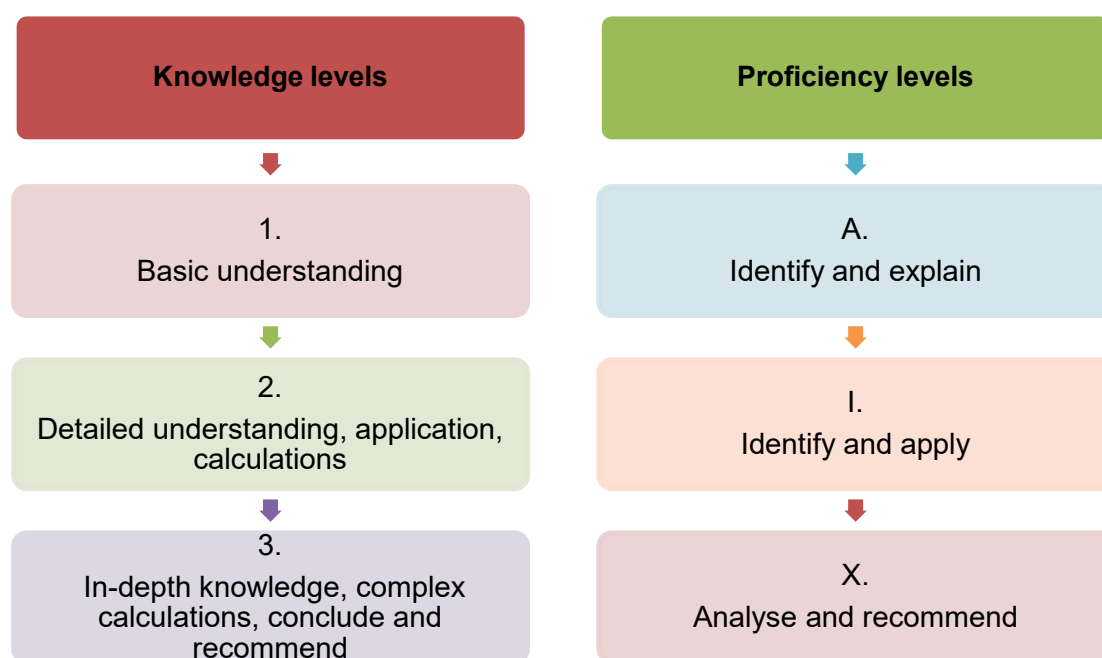


Figure 3-2: SAICA's knowledge and proficiency levels

Source: SAICA (2018:24-26)

Figure 3-2 provides an illustration on the connection between the knowledge and proficiency levels. In order to obtain a basic understanding (Knowledge Level 1), only identification and explanation will be required (Proficiency level A). Furthermore, to gain a more detailed understanding and to apply knowledge and perform calculations (Knowledge Level 2), identifying concepts based on basic knowledge and applying that to a scenario is necessary (Proficiency Level I). Lastly, to have in-depth knowledge on certain concepts and to be able to perform complex calculations, conclude on scenarios and to make the appropriate recommendations (Knowledge Level 3), the analysis of the information is required (Proficiency Level X).

Identifying the professional knowledge levels that a prospective accountancy professional is required to adhere to, the educational knowledge and competency levels should be included in such a way that the learning outcomes adheres to both educational and professional requirements. Therefore, the different RBT levels are linked to the SAICA knowledge and

proficiency levels to enable the development of ICT integration opportunities in an educational context that will adhere to the professional requirements. This is discussed in more detail below.

3.5.2 RBT knowledge levels

As with Bloom's, SAICA's knowledge levels and proficiency levels stagger and build on one another. In contrast, SAICA has three levels, knowledge, and proficiency, and RBT has six knowledge levels. In order to ensure adherence to SAICA the three SAICA knowledge levels are aligned with RBT's six levels of knowledge. This is done through the matching of the verbs contained in the three SAICA knowledge levels with the verbs as per RBT. As discussed in Chapter 2, Paragraph 2.3.1 and Table 2.6 the six knowledge categories of RBT are [1] remember, [2] understand, [3] apply, [4] analyse, [5] evaluate and [6] create.

Linking this to SAICA's knowledge levels, Level 1 refers to obtaining a basic understanding through identifying and explaining concepts. This links directly to RBT's [1] remember and [2] understand. Similar verbs used in RBT's first two levels contain name, identify, explain and distinguish and define, to name a few, which directly links to SAICA's Knowledge Level 1. Level 2 refers to the identification and application of basic knowledge. RBT's [3] apply and [4] analyse best fits here. The verbs used in RBT's third and fourth levels includes similar verbs as used by SAICA, for example, interpret, prepare, detect, examine, scrutinize, and illustrate, to name a few. The third and last knowledge level of SAICA refers to having an in-depth knowledge of a concept or topic, performing calculations, and making conclusions on information. RBT's [5] evaluate and [6] create links to SAICA's Level 3 in the verbs used, for example arrange, assemble, forecast, modify, argue, decide, estimate, measure, and validate, to name a few.

For this study it is clear that in utilising or referring to RBT's knowledge levels and applying the verbs as outlined in the different levels, the ICT integration learning outcomes will not only follow a scaffolding approach from lower-order to higher-order thinking, but it will also comply with SAICA's required knowledge levels. The application hereof is discussed in Chapter 6.

3.6 CONCLUSION

Chapter 3 focusses on the curriculum design, learning outcomes per year of study per core module and the knowledge levels for ICT for the integration into the ICTM. This is done to outline the required ICT competencies required by employers and SAICA to ensure that the included ICT competencies in the ICTM will prepare prospective accountancy professionals for the changing work environment due to the rapid change in technology, underpinned by the 4IR.

The curriculum design as outlined by RBT is considered and applied through identifying the different ICT competencies that can be assessed. This is obtained firstly through the review of

both international and local literature that focus specifically on the inclusion of ICT in the accountancy curriculum and secondly, what is specifically required by SAICA.

RBT divides the learning outcomes in lower-order and higher-order knowledge levels. For a competency to be applied successfully, basic knowledge (lower-order) needs to be obtained first and then in a scaffolding approach, move to a more advanced (higher-order) level. RBT applies the taxonomy table where the different learning outcomes from Level 1 to 6 are divided based on specific action verbs. ICT is applied to this table and concludes that basic knowledge of ICT falls within the first three RBT knowledge levels. Where more advanced levels of ICT competencies are required, Levels 4 to 6 apply. After considering the different knowledge levels of RBT linked to ICT, the next step is to identify what specifically should be taught at university level. This is obtained through the literature review of employer expectations and SAICA's CF requirements.

With the limited literature available on what specific ICT competencies should be taught at university level, both locally and internationally, the latest available research on the inclusion of ICT within the accountancy curriculum is reviewed. The top three ICT competencies expected by local and international employers are user competencies (MS Excel, including data analysis, MS Word, MS PowerPoint). Limited research is available on other ICT competencies, such as big data.

Linked to SAICA's ICT competencies the latest published CF was considered and compared to the proposed CA 2025 CF. This revealed that user competencies remain important in the development of a prospective accountancy professional with added. However, this study concludes that due to the fact that the CA 2025 not being published as of yet and based on the requirements from employers, the ICT competencies that were included in the ICTM, outlined in Chapter 6, focus on MS Excel (including data analysis), MS Word and MS PowerPoint. Also suggested is that the other CA 2025 ICT competencies should be introduced at a basic knowledge level to at least introduce prospective accountancy graduates to what it entails and how it could possibly affect them in the accountancy context.

The review of literature, only focussing on MS Excel, MS Word, MS PowerPoint and Data analysis outlined the specific ICT competencies contained in the three computer programs included in this study. Literature revealed that the importance of MS Excel, which included data analysis, supersedes any of the other ICT competencies identified. Also identified is due to the similar functionalities between MS Excel and MS Word, the competency in one will lead to the ease of use in the other.

After the identification of the specific ICT competencies, the learning outcomes of the four core modules of U1 and U2 are summarised. The similar competencies, per year of study per core

module, are grouped together to obtain a holistic view of any similarities and anomalies between the two universities. Additionally, the learning outcomes for the ICT modules presented by U1, in the 3rd year of study and U2, in the 2nd year of study is also included. The learning outcomes of these modules differ extensively and leads to the support of this study in that what and how ICT should be taught needs to be outlined to ensure that all prospective accountancy professionals receive the required instruction at university level.

Linking the learning outcomes to the ICT competencies, based on the three different ICT competency categories, the ICT competencies were outlined based on the RBT's suggested scaffolding approach. Starting with basic knowledge in the 1st year of study, in some instances the 2nd year of study due to that module being presented for the first time in the 2nd year, gradually moving to intermediate and expert knowledge levels. In doing this, ICT integration starts with a lower-order knowledge level moving to a higher-order thinking level.

A recommendation is made that a general ICT module is introduced in the 1st year of study that covers the basic knowledge. This is to overcome any knowledge level disparities between prospective accountancy professionals. This module can ensure that all prospective accountancy professionals start with a similar ICT knowledge level when full integration at a higher-order thinking level is required.

In order to ensure that the educational knowledge complies with SAICA's knowledge requirements, the SAICA CF knowledge levels are compared to that of RBT. Consequently, SAICA's three knowledge levels are successfully linked to RBT's six knowledge and cognitive levels based on the type of knowledge required from SAICA in each of their three knowledge levels.

All the information obtained, and the conclusions made in Chapter 3 were used to further aid the development of the self-developed questionnaire, outlined in Chapter 4, Paragraph 4.6.3 and the ICTM as outlined in Chapter 5 and 6. The research methodology applied in this study together with the data collection and data analysis methods are further outlined in Chapter 4.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The purpose of this chapter is to explain the research design and methodology used to answer the research question and the methods used to implement the research design of this study as outlined in Chapter 1, Paragraphs 1.2. Also, the theoretical and empirical objectives as outlined in Chapter 1, Paragraphs 1.3.2.1, identifying the most appropriate research design and methodology for this study, and 1.3.2.2, determining the main themes for this study that assisted in the development of a questionnaire, and subsequently distributing this questionnaire and statistically analysing the data collected, are addressed. In this chapter the difference between research design and research methodology is highlighted. Furthermore, research typology and paradigms are discussed. The different methodological approaches used to classify, select and scrutinize data in this study are also discussed. Lastly, the statistical and data analytical methods used to scrutinize data are also discussed.

The themes, also referred to as constructs, as discussed in Chapter 2 and 3 are established in a structured method with the aim of answering the primary research question as identified in Chapter 1, Paragraph 1.4 on whether the SAICA guidelines with regard to ICT competencies are adhered to by universities. In order to answer this question, the primary and secondary objectives of this study are achieved by following a mixed-method research approach, consisting of both qualitative (Chapter 2 and 3) and quantitative (Chapter 5) research methods. The data gathered from the qualitative and quantitative research methods aid in the design of the ICTM for prospective accountants in order to ensure compliance with SAICA's CF.

This study is conducted in three phases. In Phase 1, Chapter 2 followed a qualitative research approach and investigated the need for ICT in the accountancy curricula, the expectation gaps that exist between employers and what universities are delivering, the needs of SAICA for the implementation and integration of ICT and the curricula design theories. Chapter 3 outlines the comparison between offerings of the two selected South African universities to accountancy students, in terms of ICT and ICT integrations, SAICA expectations and implementation. The themes identified in Chapter 2 and 3 are used to explain the development of a questionnaire.

Cameron (2011:96) points out that mixed-method research can be viewed as the third methodological movement with a swift rise in acceptance among researchers. Creswell (2014:12) supports the use of these three methods (qualitative, quantitative and mixed) as valid research

methodologies. Swart (2018:187) further illustrates that these procedures provide unambiguous guidance to the research process.

The research design and methodology for this study drew inspiration, guidance and relevance from recent studies in the accountancy field from South African Researchers De Villiers (2015), Mentz (2014), Modisane (2019), Swart (2018) and Swanepoel (2017). Even though these studies did not specifically focus on ICT and the use of ICT in the accountancy field, they outline the most appropriate research methods and theories available and relevant in the accountancy field. Subsequently, the different aspects in terms of the research design from these researchers are extensively referenced to throughout the study and are summarised Table 4-6.

Figure 4-1 displays the layout of Chapter 4. It represents the research process followed in the literature review in Chapter 2 and 3, the data analysis in Chapter 5 and the design of the ICTM in Chapter 6 to address the problem statement, research question and objectives set out in Chapter 1.

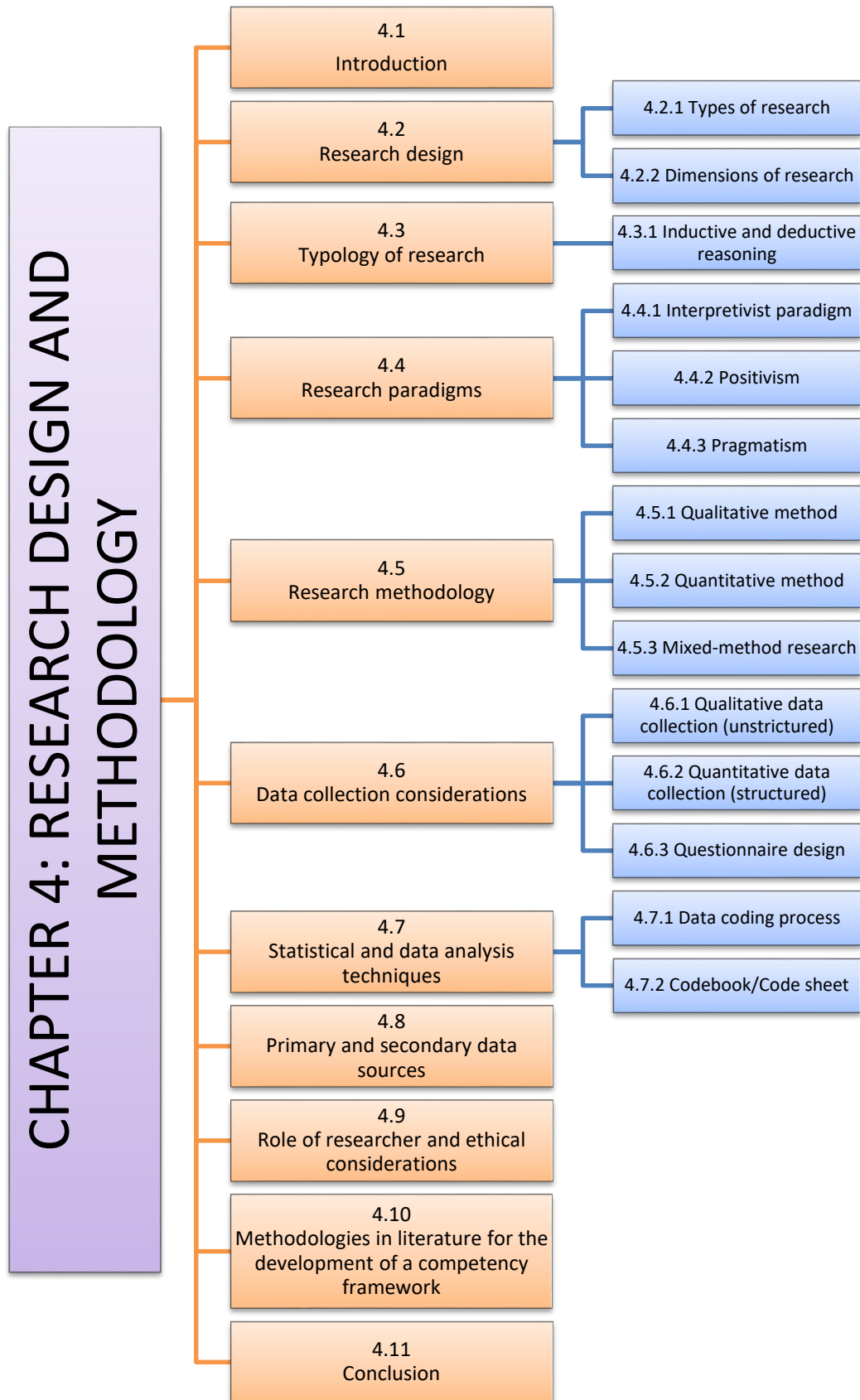


Figure 4-1: Chapter 4 discussion layout

Source: Summary of paragraphs below

4.2 RESEARCH DESIGN

Mouton (2011:56) and Swart (2013:8) argue that research design precedes research methodology. This is since research design refers to the logic of the study, whereas research methodology refers to the data collection process. Heppner *et al.* (1992:80) and Welman *et al.* (2005:5) assert that research, or a method of inquiry, is to gain new knowledge, discover more and to obtain facts. Van Zyl (2014:2-3) indicates that research starts from the word of others from which new ideas are developed. Similarly, Mofokeng (2018:8) and Williams (2007:65) support the view that research in itself is comprehending an event through the collection, measuring and inferring of data. In turn this is in line with the historic views of Davis (2005:134), Denzin and Lincoln (2008:15), Punch (2006:47) and Zikmund *et al.* (2013:65) that research design provides a researcher with a clear map of the methods to be used in solving the research question. This study aims to research, discover, and identify weaknesses in the current ICT integration in South African universities' accountancy curricula and based on literature and responses from questionnaires to develop an implementable ICTM.

De Vos *et al.* (2018:61) reason that when seeking to discover anything, certain steps and processes, encapsulating research design, should be followed to enhance understanding. Equally so, Hancock *et al.* (2009:6), Mouton (1996:63) and Williams (2007:65) argue that the research process followed should be disciplined and the most appropriate and applicable one to address the research question. In support of Creswell (2014:2), Durrheim (2004:29), Leedy and Ormrod (2010:3), MacMillan and Schumacher (2001:166) and Welman *et al.* (2005:52), explain that research design encompasses the different research methodological processes; qualitative, quantitative and mixed; used to describe data collection methods, how data are classified, selected and scrutinized, to understand or even solve a research problem.

Indicative to research design it needs to be performed in a structured manner, which is supported by De Vos *et al.* (2018:61). This consists of three main phases within the process, namely [1] origin; which pertains to the research problem, [2] the research process; relating to the design which is underpinned by the research methodology, and [3] the conclusion and findings. This is similar to Brynard *et al.*'s (2014:4) ProDEC approach. ProDEC can be broken down into the following parts: [1] "Pro" represents the problem, [2] "D" refers to the research design, [3] "E" represents the empirical evidence, referring to the methodology, and [4] "C" relating to the conclusion and findings. In principle, Leedy and Ormrod (2014:6) support both of these structures. The information in the literature above from the researcher's classification of research structure is summarised and compared in Table 4-1.

Table 4-1: Research structure of De Vos *et al.* and Brynard *et al.* compared

De Vos <i>et al.</i> (2018:61)	Brynard <i>et al.</i> (2014:4)
Start	
Research question (Aim of the study)	Pro – Problem
Process to collect information	
Research design and methodology ➤ Based on facts ➤ Logic ➤ Orderly ➤ Guided by a general idea. ➤ Facts depict the acceptance or rejections of the general idea. ➤ Only the data available adds to the conclusion reached.	D – Design E – Empirical Evidence – Methodology
End	
Conclusion where the question is answered, or problem is solved.	C – Conclusion – Findings

Source: Brynard *et al.* (2014:4); and De Vos *et al.* (2018:61), adapted and compared

Table 4-1 outlines that even though different researchers describe the research process by using different words and terms, the process remains the same. Research starts from the problem identified, moves to the process to collect the necessary information to solve that problem and ends with the report on the findings and evidence through a conclusion. This study followed the same process, described as the three phases, to ensure research is conducted in a structured manner. The starting point, Phase I, is the problem statements and research question identified in Chapter 1, Paragraph 1.2. Phase II is where information was collected through literature review in Chapter 2 and 3 and quantitative data collection as outlined in Chapter 4 and 5 to address the primary and secondary objectives as formulated in Chapter 1, Paragraph 1.3. Taking into account all previous information gathered in Chapter 2 and 3, together with the data collected through the quantitative research, Phase III addressed the development of the ICTM in Chapter 6, with a final conclusion on all the processes and procedures performed and the analysis of data in Chapter 7. The research design for this study is outlined in Table 4-2 per phase linking the different research aspects discussed in previous chapters and further discussions in this study.

Table 4-2: Research process steps applied to this study

RESEARCH PROCESS STEPS De Vos <i>et al.</i> (2018:61)	RELEVANT DISCUSSION IN THIS STUDY
Phase I: Start	
Research question (Aim of the study)	Ch 1, Paragraph 1.2
Phase II: Process to collect information	
Research design and methodology: ➤ Based on facts ➤ Logic ➤ Orderly ➤ Facts depict the acceptance or rejections of the general idea. ➤ Only the data available adds to the conclusion reached.	Ch 2 and Ch3 Ch 4 and Ch 5 Ch 4 Ch 5 Ch 5
Phase II: End	
Conclusion where the research question is answered, or the problem is solved.	Ch 6 and Ch 7

Source: De Vos *et al.* (2018:61), adopted to this study

Table 4-2 suggests that research could be seen as having a clear start and end, almost like a full circle. This relates to the process followed as outlined in research design. Similarly, this study also had a clear starting point, research question, that is investigated in an orderly and structured manner to end up with the design of the ICTM being the answer to the research question. Leedy and Ormrod (2010:6), however, caution that this full circle view could be misleading as research starts with one problem, but as it progresses, several other problems emerge resulting in the restart of the process (new problem, new process) at several stages during the research process. Taking this into consideration and being cautious to the fact that as and when a new problem arises it should be addressed in terms of Phase I – III (Table 4-1 & 4-2) there needs to be certain elements present, at a minimum. Babbie and Mouton (2001:72), support De Vos *et al.* (2018:61) and Leedy and Ormrod (2014:6) who argue that each research project needs to have at least four elements: [1] a research problem (Paragraph 1.2), [2] research design (Paragraph 4.2), [3] empirical evidence (also known as research methodology) (Paragraph 4.5) and conclusions (Chapter 7), which remain the same for all research projects.

Swanepoel (2017:99) argues that the philosophical assumptions influence research design, which includes personal experience, enquiring strategy used, research method used, research problem and requirements of the audience. This is indicative that before the research methodology, being qualitative, quantitative and/or mixed methods, can be selected, the type of research needs to be identified first. Cavana *et al.* (2001) explain that there are two types of research, known as basic research and applied research. Once the type of research is identified, the dimensions of research are considered to establish the researchers' world view, also known as the philosophical assumptions. Grix (2010:59) identifies three categories of research dimensions, identified as ontology, epistemology and methodology. Figure 4-2 summarises these aspects as they are further discussed in this study.

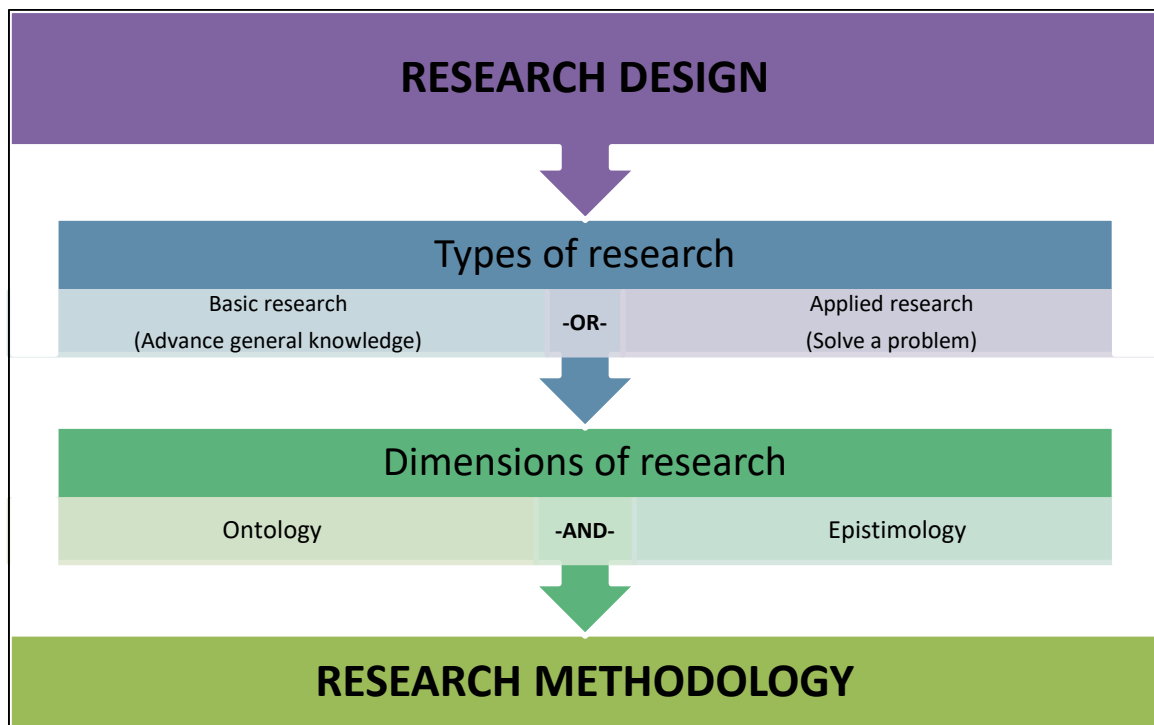


Figure 4-2: Summary of the different research design elements for this study

Source: Cavana *et al.* (2001); Grix (2010:59); and Swanepoel (2017:99), adapted

Figure 4-2 represents a synopsis of literature above on research design and further outlines the different aspects for this study. The different categories and terms are discussed in more detail below.

4.2.1 Types of research

In addition to following a clear research process, Tuvadaratragool (2013:61) asserts that research is conducted in one of the two research dimensions, basic or applied research, as outlined in Figure 4-2. De Villiers (2015:323) supports the views of Cavana *et al.* (2001:3), Davis (2005:8), Mentz (2014:144-145) and Neuman (2006:24) in that there are two categories of researchers. The first category is those who apply research to advance their general knowledge, known as basic research. The second category are those who apply research in order to solve a particular problem, known as applied research. De Villiers (2015:24) and Swanepoel (2017:276) concur that applied research is employed when striving to answer the research or even further research questions.

As outlined in the Chapter 1,2 and 3, this study is aimed at solving the identified research problem of what specific ICT competencies and how these competencies should be integrated into the already established accountancy curriculum content. For this study the research problem aims to solve a problem, what specific ICT competencies should be integrated into the accountancy

curriculum. Also, how these ICT competencies should be integrated is also part of the research problem. Since the main focus falls on solving a problem and not advancing of already acquired knowledge, applied research is the more suitable type of research for this study.

As outlined in Figure 4-2, after deciding on the type of research followed in a study, the dimension in which the researcher will conduct the research should be considered next. The dimension of research as explained in literature and applied to this study is discussed below.

4.2.2 Dimensions of research

After concluding that this study followed an applied research dimension and based on the suggestion of Grix (2010:59) that data in its primary form are not be able to describe itself, research should be conducted after considering the three different research dimensions (also known as philosophies). These dimensions are ontology, epistemology and methodology as illustrated in Figure 4.2. Moon and Blackman (2014:1168) argue that before the philosophical principles can be applied in a meaningful manner, a clear understanding should first be established.

Burrell and Morgan (2005:2), Grix (2010:75) and Kivunja and Kuyini (2017:26) indicate that these three dimensions are the building blocks of research from which investigations should commence. Harrits (2011:151), supported by Kivunja and Kuyini (2017:26) states that these building blocks provide information on the researchers' perceptions, which in turn have an impact on the sensed relative prominence of reality aspects that steer the investigation process. The three categories of research dimension as identified by Grix (2010:59), ontology, epistemology and methodology are discussed below.

4.2.2.1 Ontology

Mack (2010:5) proposes that the main purpose of ontology is to establish how individuals perceive reality. Bless *et al.* (2013:1), and the recent research performed by South African researchers in the accountancy field, De Villiers (2015:28), Mentz (2014:145), Modisane (2019:92) and Swanepoel (2017:99), outline that ontology refers to what knowledge can be acquired in the world as we know it. Similarly, this supports Blaikie (2007:13) and Merriam's (2009:8) argument that ontology relates to social reality, the world as we know it. For this study, ontology implies that through the study of literature, how and what individuals perceive as reality in the world as we know it. More specifically for this study, what ICT competencies an accountancy professional needs to possess and should be taught to enter the workplace. The literature investigated in Chapter 2 and 3 was to understand the topics for further applying the research in the development of the questionnaire and the model building development in Chapter 6.

Following the first research dimension on how individuals observe reality, how this knowledge can be obtained, epistemology, needs to be considered.

4.2.2.2 Epistemology

De Villiers (2015:29), Mentz (2014:146), Modisane (2019:92) and Swanepoel (2017:99), support Blaikie (2007:19) and Merriam (2009:8) that epistemology refers to how knowledge is attained and to what extent it can be acquired. Blaikie, (2007:19) Eriksson and Kovalainen (2008:15) and Mack (2010:5) further posit that epistemology refers to the principles to attain information, the methods used to retrieve the knowledge, the process used to evaluate the relevance of the information acquired, and the practices applied to measure the shortcoming and particulars of the knowledge. Hirschheim *et al.* (1995:20) argue that there are different types of investigations and methods to attain information. For this study, epistemology took on the form of a self-developed questionnaire as a research tool to gain further knowledge on what ICT competencies are already implemented at universities and which ones should and should not be taught at university level.

Mack (2010:5) outlines that ontology and epistemology are integrated paradigms and share an inter-reliant connection. Similarly, this study followed both philosophies at different stages of the study. The last dimension of research refers to methodology. Durrheim (2006:6) states that while ontology and epistemology are the holistic view of the world, research methodology is the approach used to uncover it.

Research methodology is defined by Dudovskiy (2018) as the underpinning of the direction and methods that are used in a study. Hancock *et al.* (2009:6) argue that if a disciplined approach is used in research, evidence will be uncovered. The three research methods that form part of this disciplined approach as outlined by Creswell and Plano Clark (2007:5) Mouton (1996:63), Stumke (2014:67-70) and Williams (2007:65) are [1] the qualitative method, [2] the quantitative method and [3] the mixed-method. Research methodology is discussed in more detail in Paragraph 4.5.

In order to assist in the selection of the most appropriate research methodology, Tuvadaratragool (2013:62) explains that the different types of research, also referred to as the typology of research, should be considered. This is discussed in more detail below.

4.3 TYPOLOGY OF RESEARCH

Dudovskiy (2018) and Tuvadaratragool (2013:60) explain that “selecting the appropriate method for the research lies within the research question”. They further argue that with a more objective research question in nature the researcher uses a quantitative method and collects numerical data, therefore with a more subjective question in nature the qualitative method is chosen, and the researcher uses textual data.

When deciding on the research method to use, Gravetter *et al.*'s (2016:18) opinion is that gaining knowledge rests on the intent of the researcher. De Vos *et al.* (2018:49) point out that consideration should be given to the different reasoning approaches, inductive or/and deductive reasoning, which are discussed in the following paragraph.

4.3.1 Inductive and deductive reasoning

Babbie (2007:49) supported by De Villiers (2015:32) and Schwester (2015:164-165) explain that inductive reasoning starts from a particular point or concrete observation, not a predetermined truth or assumption, and moves to a general view or explanation. De Vos *et al.* (2018:49) and Neuman (2006:60) argue that inductive reasoning starts with an ambiguous general topic, which is then refined into a more specific theoretical view. Gravetter *et al.* (2016:18) further clarify that inductive reasoning is where a general statement is produced with the use of a specific example. Accordingly, De Vos *et al.* (2018:49) conclude that inductive reasoning is a creative reasoning method where the conclusion is not entirely clear or assured, but only speculative or likely. Therefore, inductive reasoning can be seen as a search for a specific answer until it is found. Conversely, this method of reasoning is different to deductive reasoning.

Babbie (2007:46), Mentz (2014:147) and Neuman (2006:59) describe deductive reasoning as the inverse of inductive reasoning where general concepts are started with and through testing the connections between them, a concrete conclusion is drawn. Simply stated it supports the view of Schwester (2015:164-165) in that it starts from a theoretical point and moves to confirmation. De Vos *et al.* (2018:48) suggest that with deduction all possibilities should be evident for which a conclusion is drawn with no new concepts being added throughout the process. Therefore, deductive reasoning can be seen as a recipe for which the evidence just needs to be proven.

Consequently, inductive reasoning applies to qualitative research where text is read and scrutinized from a general topic into a more theoretical view. Deductive reasoning applies to quantitative research where predefined concepts are tested to arrive at a concrete conclusion, without adding any new concepts. Swanepoel (2017:7) proposes that when grounded theory is used as a research method, the combination of inductive and deductive reasoning can be used successfully. Furthermore, Swart (2018:205) suggests that the first step is to apply the inductive reasoning to the literature that assists in the development and collection of data through the quantitative method. Figure 4-3 illustrates these two methods in a simplistic manner.

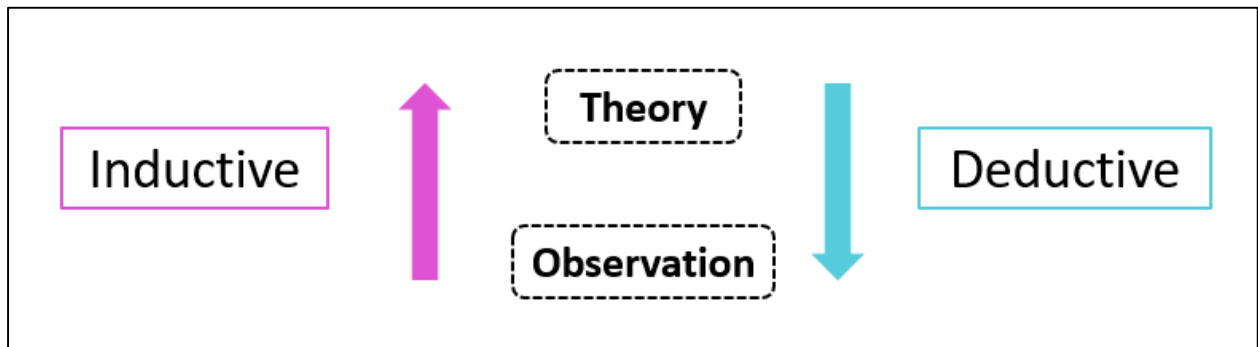


Figure 4-3: Inductive and Deductive reasoning directions

Source: Babbie (2007:46,49); De Villiers (2015:32); Mentz (2014:147); Neuman (2006:59); and Schwester (2015:164-165), adapted

Based on Figure 4-3 and the literature above it can be concluded that this study followed an inductive reasoning approach as a starting point in the literature review, also explained under the qualitative research method. The research question on the compliance of universities to SAICA's CF in terms of ICT was investigated. This was done to consider the need of ICT in accountancy education from a world view, professional body view (SAICA) and a university view. The conclusion drawn was on the general perceptions of these stakeholders.

Furthermore, this study also followed a deductive reasoning approach succeeding the inductive approach followed in the literature review. The deductive approach was followed in the quantitative research method, as the compiled research question was attempted to be resolved through the detail evident from the literature review, which assisted in the development of a questionnaire through which data were collected. The predefined possibilities, as outlined in the questionnaire, were confirmed based on the responses from the participants. Thus, the theory, from the literature review and as outlined in the questionnaire, were confirmed by the responses. This was analysed as statistical data to draw the necessary conclusions. This is discussed in more detail in Chapter 5.

Cronje (2014:1) and De Vos *et al.* (2018:40) indicate that in order for the study not to continue on a technical level, research needs to be conducted in one of the different research paradigms. Durrheim (2006:4) proposes that after considering the first two aspects of the world view on research, ontology and epistemology, conclusions need to be drawn based on empirical testing. This represents the final world view on research element, methodology, which is referred to by Rallis and Rossman (2012:40-49) as research paradigms. Similarly, De Villiers (2015:28-29), Modisane (2019:8) and Schwandt (2001:183) suggest that a paradigm is the views and ideals in a discipline that directs how problems are solved, known as a shared worldview. In order to study humans, researchers should consider one of the many paradigms available.

De Vos *et al.* (2018:5) state that human studies are categorised or defined as social sciences. Moreover, this view supports the view of Barker (2003:406) and Neuman (2006:6) that social sciences involves the studying of views, actions, collaboration and organisations of humans. Consequently, investigating whether universities comply with SAICA's CF and the perceptions of the workplace, professional bodies and universities (humans) on the inclusion of what ICT competencies and when can be considered as social sciences.

De Vos *et al.* (2018:5) highlight that due to the difficulty of measuring human behaviour and actions, a variety of approaches as a measuring instrument emerged. Barker (2003:312) explains that "a model or pattern containing a set of legitimated assumptions and a design for collecting and interpreting data" can be defined as a paradigm. Lather's (1986:259) seminal view of research paradigms is that it naturally mirrors our views about the world we live in and want to live in. Olsen *et al.* (1992:16) define a paradigm as "a pattern, structure and framework or system of scientific and academic ideas, values and assumptions".

Rahi (2017:2) explains that the selection of a paradigm in which research is conducted is vital to ensure that the researcher is able to select sounder positions based on other options without dwelling in his/her own philosophical beliefs. De Vos *et al.* indicate that a paradigm is the way a researcher view's the research material. Denzin and Lincoln (2008:22) and Mertens (2005:7) define paradigms as the way to look at the world. The research paradigm adopted in this research, before the selection of the most appropriate research method, was considered below based on literature and the aim of this study.

4.4 RESEARCH PARADIGMS

Kuhn (1970: vii-viii) proposes that with the different number of paradigms available, an array of contesting paradigms, need to be accommodated within a specified discipline. In addition, De Vos *et al.* (2018:41) argue that in order to ensure clear communication and unambiguous research, a researcher must decide within what paradigm they are working, clearly understand the nature of that paradigm and document the details of the selected paradigm clearly. Based on these arguments and due to several different research paradigms available, only the following three research paradigms, the interpretivist paradigm, positivism and pragmatism are discussed further in more detail.

Burrell and Morgan (2005:22) identify four main paradigms of social research as radical structuralism, humanist, functionalist, and interpretivism. Rallis and Rossman (2011:40-49) suggest that the two main paradigms used in research are interpretivist and positivism. Rahi (2017:1) states that the four paradigms most often used in ICT research is interpretive, positivism, advocacy and pragmatism. Rallis and Rossman (2012:40-49) point out that the two

main research paradigms are interpretivist and positivist. Moreover, De Vos *et al.* (2018:5) suggest that the most common research paradigm approaches used are interpretive, positivist, post-positivist, constructivism and critical. Rahi (2017:1) further identifies a combined research paradigm, known as pragmatism, used when both qualitative and quantitative research methods are used. Smith (2011:1) argues that due to the accountancy field having underdeveloped research theories, they are dependent on other disciplines. Swanepoel (2017:98) argues that the most appropriate paradigms relevant to accountancy is interpretivism and positivism as the field forms part of the social sciences. Deduced from the previous researchers are that there are two dominant paradigms in the social sciences, interpretivism and positivism, with the addition of a combined research paradigm, pragmatism, which is discussed in the following paragraphs.

4.4.1 Interpretivist paradigm

Cohen *et al.* (2003:19) states that interpretivist's aim, through the use of inductive reasoning, is to uncover and understand a phenomenon. Furthermore, they posit that interpretivist researchers are of the view that only those involved in the topic under investigation are able to understand it. Therefore, when research is conducted in this paradigm, the perceptions of the individuals actively involved in the relevant research world are investigated.

Creswell (2014:8) contest that interpretivist researchers rely on the previous contributions made by individuals in the same field of study. In addition, he points out that such researchers do not usually start with a model, but instead develop a model or array of connotations as the research commences. Accordingly, De Vos *et al.* (2018:8) state that interpretive research follows the detailed reading of text. This points to the view of Creswell (2014:66), in that through the reading of text the researcher develops a model or array of connotations.

Therefore, this paradigm starts from an observation to form a theory, an inductive approach is followed. As previously mentioned, the inductive reasoning approach, relevant to the qualitative research method was followed to answer the research question for this study. Detailed information was obtained in the literature review, the qualitative research method, in Chapter 2, on the necessity of ICT in accountancy education from a world view, professional body view (SAICA) and a university view. Literature on the different theories applicable to this study, Bloom's taxonomy, Maslow's hierarchy of needs and TAM were studied to identify the necessary and most important aspects to consider in the integration of ICT into the accountancy curriculum. The information gathered through this research method assisted to identify main themes to aid in the development of the questionnaire for further data collection. All these aspects in the end assisted and advanced the development of the ICTM.

4.4.2 Positivism

The second relevant research paradigm, positivism as explained by Rallis and Rossman (2012:40-49) is where future events are predicted to further obtain an understanding on. De Vos *et al.* (2018:6) define positivism as a researcher is open minded in the research conducted and interprets the information obtained as an outside party.

De Vos *et al.* (2018:6) discuss positivism in six parts. Firstly, they support the views of Babbie and Mouton (2001:23), Morris (2006:3) and Neuman (2003:75) in the belief that a reality exists outside societal and personal beliefs. Druckman (2005:5) states that in following this approach a researcher strives to analyse and observe data from an external perspective. Secondly, Bryman (2000:15) suggests that positivists believe that only studied occurrences, whether directly through experience, or indirectly through the support of instruments, can be merited as knowledge. De Vos *et al.* (2018:6) point out that with positivism it is argued that with the gathering of confirmed fact comes scientific information. Furthermore, De Vos *et al.* (2018:6) stress that with positivism explicit arguments are extracted from the broad-spectrum of reality and are considered deductive. Finally, they point out that when following a positivist approach the researcher needs to remain unbiased to ensure that the legitimacy of the knowledge is not undermined. Furthermore, De Vos *et al.* (2018:7) elaborate on the fact that where positivism follows the belief that there is a reality to be examined, depicted and comprehended, post-positivism relies on various means to depict as much of reality as possible.

Glicken (2003:28) describes post-positivism as a more relaxed paradigm that permits the development of different research strategies that could lead to the identification of data in less formal ways. Creswell and Plano Clark (2007:20) state that this paradigm follows the beliefs of numerous perspectives of participants rather than one reality. De Vos *et al.* (2018:7) indicate that this can be achieved through smaller sample sizes with self-created measuring instruments. Glicken (2003:29) cautions that this paradigm, if not applied correctly, may make data useless. However, if the research methodology can be sufficiently explained and defended in such a way that the study can be replicated, creative methodologies on a small scale could be used.

As this research followed a self-developed questionnaire based on secondary data without the continuous involvement of participants, positivism, combined with post-positivism, is the most appropriate research paradigm and was followed for the quantitative part of this study.

In Paragraph 4.1, it was identified that this study followed a mixed-method research approach. Similarly, the research paradigm, applicable to the combination of the qualitative and quantitative research approaches, the mixed-method research approach, also known as pragmatism, were applied in this study and are elaborated further in the following paragraph.

4.4.3 Pragmatism

Creswell and Plano Clark (2007:15), Hanson *et al.* (2005:226), Johnson and Onwuegbuzie (2004:16), Rahi (2017:1) and Teddlie and Tashakkori (2011:291) posit that the combination of interpretivism and positivism known as pragmatism, is applied in the mixed-method research methodology. Teddlie and Tashakkori (2009:7) define pragmatism as the paradigm where the research question is the primary focus. They suggest that this paradigm lays focus on what works in solving the research question, with the values of the researcher playing a major role. Cameron (2011:101) and Swart (2018:206) illustrate that the paradigm relevant to the mixed-method research approach is pragmatism. Figure 4-4 illustrates the three main paradigms outlined and discussed in the paragraphs above.

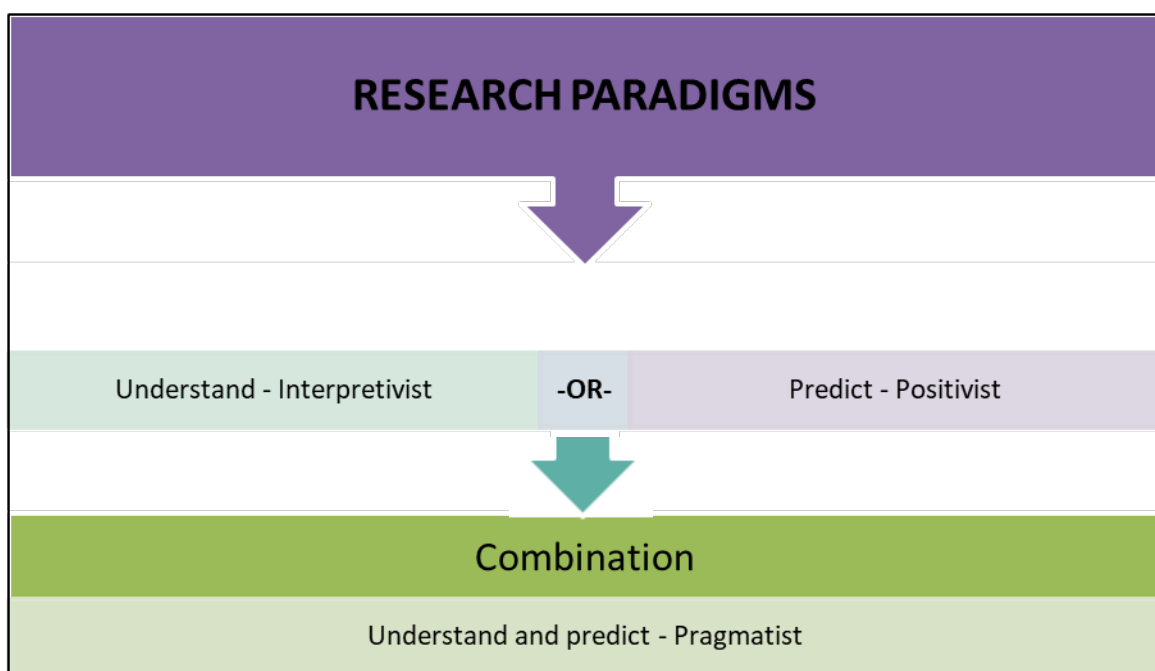


Figure 4-4: Summary of the three main research paradigms

Source: Cameron (2011:101); Creswell and Plano Clark (2007:15); Hanson *et al.* (2005:226); Johnson and Onwuegbuzie (2004:16); Rahi (2017:1); Swart (2018:206); and Teddlie and Tashakkori (2011:291), adapted

It can be derived from Figure 4-4 that as with the mixed-method research methodology resulting from both qualitative and quantitative research methodologies, pragmatism results in the mixture of their paradigms.

Since this study followed the basis on obtaining knowledge from text and using that to obtain additional data through a self-developed questionnaire, the pragmatism paradigm was considered to be the most appropriate paradigm for this study. As part of the research design the most

appropriate research method has been selected for the study. As previously outlined in Paragraph 4.2, a mixed-method research approach was applied for this study.

4.5 RESEARCH METHODOLOGY

As indicated in the previous paragraph the mixed-method research approach entails that the research is conducted through qualitative means (text) and quantitative means (numbers). Cameron (2011:106) contests that in selecting the mixed-method research approach, proficiency and competence in both quantitative and qualitative methods should be present. Creswell and Plano Clark (2007:67,75), De Vos *et al.* (2018:441), Ivankova *et al.* (2007:266), Mentz (2014:145) and Modisane (2019:92) identify four mixed-method research approaches: [1] exploratory, [2] explanatory, [3] triangulation and [4] embedded research. The three research methods as outlined in the literature above, are illustrated in Figure 4-5.

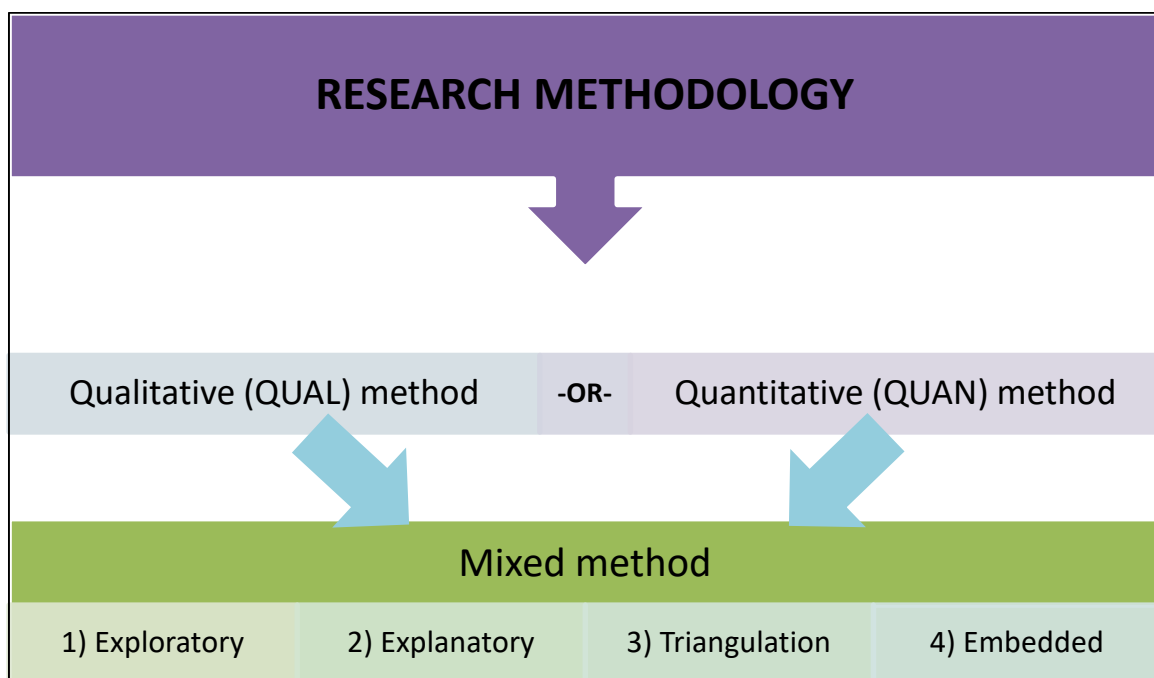


Figure 4-5: Research methods relevant to the study

Source: Cameron (2011:106); Creswell and Plano Clark (2007:67, 75); De Vos *et al.* (2018:441); Ivankova *et al.* (2007:266); Mentz (2014:145); and Modisane (2019:92), adapted

Figure 4-5 outlines that there are three research methods available in social sciences research. It also emphasises that even if the mixed-method research approach is selected as the research method of choice, both qualitative and quantitative research methods are applied. These three methods, qualitative, quantitative and mixed methods, including the different approaches, are discussed in more detail below.

4.5.1 Qualitative method – Interpretivist

Leedy and Ormrod (2010:94-97) and Swanepoel (2017:103) indicate that a qualitative researcher aims to better understand a complex situation. In addition, they argue that this is research that is followed with an open mind. Mentz (2014:149) states that this method also follows an inductive approach. In line with this, Kumar (2005:12) perceives qualitative research as an unstructured approach due to its flexibility. This allows for exploration of a problem. He also argues that qualitative methods are used if a problem is to be described. Since this research aims to answer the research problem on what specific ICT competencies and how these competencies should be integrated into the accountancy curriculum, as outlined in Chapter 1, Paragraph 1.2, the open mindedness and flexibility explanation fits this research study as it allows for the investigation of different views from different stakeholders, world view, employers and SAICA, of what specific ICT competencies should be included in the accountancy curriculum and how they should be taught.

Similarly, Creswell and Plano Clark (2007:37-39) indicate that qualitative research is the collection of data through the examination of text through multiple forms. Even so, Babbie and Mouton (2001:53) and Creswell and Plano Clark (2007:37-39) argue that qualitative research is less focussed on the meaning the researcher brings to the study, but rather focusses on forming an opinion about different sources around the research problem. Babbie and Mouton (2001:53) also believe that qualitative research is concerned with non-statistical methods and small samples. Patton (2002:129) argues that a definite strength of qualitative research method is the “inductive, naturalistic inquiry strategy of approaching a setting without predetermined hypotheses”. Qualitative research allows this study to focus on many different viewpoints of different stakeholders to ultimately summarise the most important and practically applicable ICT competencies to be incorporated into the accountancy curriculum.

De Vos *et al.* (2018:312-313) explains that the most relevant research type for social sciences is grounded theory. De Villiers (2015:35) suggests that grounded theory is where data are collected and compared to new data sets in order to create a new or adjusted theory. Strauss and Corbin (1990:23) explain that the data collected pertains to the phenomenon under investigation which is in line with this. De Vos *et al.* (2018:5) suggests that in order to approach research impartiality, grounded theory can be used. This involves research to start with an unambiguous theoretical viewpoint. As outlined in Paragraph 4.1 due to their recency and pertinence to the accountancy field, De Villiers (2015), Mentz (2014), Modisane (2019), Swanepoel (2017) and Swart (2018) are used as guidance and point of reference for this study in terms of research design.

Out of all the available qualitative research designs available, grounded theory was selected as the most appropriate method for this study, as it is the method of choice of research performed

within the accountancy field and is supported by recent studies performed in this field, specifically referring to De Villiers (2015:40-41), Mentz (2014:156-159), Modisane (2019:94), Swanepoel (2017:111) and Swart (2018:197-198) (refer to Table 4-6). In addition, grounded theory is applicable to this study due to the selected research only pertaining to ICT, the impact of local and international influences, being the specific phenomenon under investigation.

Neuman (2000:76) contests that this research method follows the in-depth reading of text. The reading is intended to ascertain the meaning rooted within the text. Furthermore, he points out that only through the detailed investigation of the text, outlining the different messages and meanings of said text and finally establishing the link between these different parts, can true meaning be achieved. Rahi (2017:1) asserts that the theory will then establish the conceptual framework that guides the fieldwork and the interpretation of findings. Mentz (2014:156) and Strauss and Corbin (1998:12) argue that grounded theory is considered an instrument to expand the perception of data, give acumen and guide the action to be taken.

This study applied grounded theory where the data collected in Chapter 2 and 3 by means of secondary data were compared to the data collected from the self-developed questionnaire, as discussed in Chapter 4 and 5. This is performed through firstly, the collection of data through the in-depth reading of text in the form of content analysis and document review. This is to better understand the current implementation and use of ICT in South Africa based on statistics and prior research, the different theories that had an impact on this study. It is also to identify what ICT competencies are expected of prospective accountancy professions by the employer, those already implemented by universities in the accountancy curriculum based on the available information in the published yearbooks and what should be implemented based on SAICA's CF. Secondly, data were collected by means of a self-developed questionnaire, influenced by the themes identified in literature in Chapter 2 and 3, the analysis of the data in Chapter 5 and compared to the initial data collected in Chapter 2 and 3 to create the ICTM.

By applying grounded theory, the data collected were compared to identify similarities and ultimately form constructs. (For the purpose of this study, going forward constructs are referred to as themes for consistency purposes.) Kerlinger and Lee (2000:40) and Mitchell and Jolley (2001:21) reason that a construct is made up out of several concepts. Hence, Powers *et al.*'s (1985:133) seminal view that concepts need to be formed and grouped by similarities into higher-order concepts, still applies. De Vos *et al.* (2018:47) propose that in devising consistent scientific descriptions of relevant practice occurrences as they arise in daily practice lead to the formulation of original theoretical knowledge. As a result, practice generalisations develop. The themes identified through grounded theory for this study are the impact of ICT in South Africa, the different theories that impacted this study and the specific ICT competencies required by employers,

together with what is already being implemented at university level linked to the prescribed ICT competencies of SAICA. It further assisted to determine the main themes to be included in the questionnaire development that assisted in the development of the ICTM.

Sherman and Reid (1994:269) suggest that when similar concepts are linked as having similarities, generalisation occurs. These similar concepts fall within the term themes. De Vos *et al.* (2018:30) point out that themes are viewed as being intentionally and mindfully invented from ordinary text for a specific scientific purpose.

De Vos *et al.* (2018:47) and Modisane (2019:96) state that through the use of one or more of the available data analytical methods the practised generalisations or concepts are then further grouped in the most practical means relevant to the study. Maree (1997:99) indicates that the grouping of concepts is known as data coding. There are three types of data coding under grounded theory namely [1] open, [2] axial, and [3] selective coding. They explain that open coding refers to the examination of data to analyse and to discover repetitions and exclusion that may result in altered findings. Similarly, axial coding also makes use of open coding, but analyses and merges the results in different methods to identify and report on any correlations between them. Selective coding refers to the process where different categories are examined to determine the relationship between them (Corner *et al.*, 2019:3; Maree, 1997:100). This study applied selective coding by reviewing literature through the qualitative research approach and identified what specific ICT competencies are deemed necessary by employers for prospective accountancy professionals to possess. The similar concepts, in this case ICT competencies, as described in Chapter 3, Paragraph 3.3.1, were grouped according to SAICA's prescribed ICT competencies to ensure that the development of the ICTM adheres to the necessary requirements.

In conclusion, grounded theory is applied to this study through the viewpoint that there is currently a gap between what ICT competencies are expected of accountancy graduates and what are being taught at university level. This viewpoint led to the investigation of literature to support this notion and to further investigate possible reasons for this. It also took on the root of identifying which ICT competencies are expected of accountancy graduates and what ICT competencies are currently being taught at university level.

Through content analysis and document review in Chapter 2 and 3 similarities between different concepts were identified by applying selective coding. Qualitative research and selective coding were the starting point for the development of different themes that assisted in the integration of the data coding and development of a self-administered questionnaire, as outlined and discussed in more detail in Paragraph 4.6.3. This questionnaire was used as part of the quantitative research method.

The quantitative research method is defined by Kumar (2005:12) and Ivankova *et al.* (2007:255) as the more structured research approach. This is discussed in more detail below.

4.5.2 Quantitative method – Positivism

Kumar (2005:12) and Leedy and Ormrod (2010:94-97) submit that quantitative research follows structured guidelines. Leedy and Ormrod (2010:94-97) argue that the methods chosen to apply within quantitative research were identified before the start of the study and remained constant throughout. These methods were then used to isolate the relevant variables for the study and standardised procedures were then used to collect numerical data. Ivankova *et al.* (2007:255) state that this method is used where exact, narrow research questions are devised that can be measured. Statistical procedures will then be used to further draw conclusions on the collected data. Leedy and Ormrod (2010:94-97) conclude that the result of quantitative research is either confirm or disconfirm the intended research objective. As previously mentioned, they are also in agreement that quantitative research follows a deductive reasoning approach.

This study applied the quantitative method after the qualitative method's themes were formalised, as outlined in Chapter 2, Paragraph 2.5, Table 2-9 and Chapter 3, Paragraph 3.4.1, Table 3-6. These themes assisted in the development of the questionnaire, discussed in more detail in Paragraph 4.6.3 (Annexure A), used in the quantitative method to collect the relevant numerical data. Specific and focussed questions were grouped by construct in the questionnaire to focus on what ICT competencies are currently being taught at universities and the perceptions of students and lecturers on what and when certain ICT competencies should be taught and integrated into the accountancy curricula. The statistical analysis procedures followed to analyse the data collected are discussed in detail in Paragraph 4.7. Similarly, the proof or disproof of the data collected on what specific ICT competencies and when these ICT competencies should be implemented at university level as perceived by students and lecturers are discussed in more detail in Chapter 5.

De Vos *et al.* (2018:66) supported by Alasuutari *et al.* (2008:15), Bergman (2008:1), Ivankova *et al.* (2007:260), Kumar (2005:13), Leedy and Ormrod (2010:97) and Monette *et al.* (2002:92) argue that even though qualitative and quantitative research methods are mainly used throughout many research areas, they are not mutually exclusive. They propose that in many social sciences these two approaches need to be combined for a better understanding of the research topic. This combination is known as the mixed-method research and is explained in the following paragraph.

4.5.3 Mixed-method research – Pragmatism

Alasuutari *et al.* (2008:15) in support of Creswell and Plano Clark (2007:5) indicate that a mixed-method research approach is followed where a combination of both qualitative and quantitative

data provides a better understanding of the research question that the two methods would be able to provide individually. The shared view of Creswell and Plano Clark (2007:12), Johnson and Onwuegbuzie (2004:17), Swanepoel (2017:102), Swart (2018:197) and Tashakkori and Teddlie (2003:711) is that mixed-method research is a separate research method where both qualitative and quantitative research methods are used and combined to reach a more holistic view of the problem. Similarly, De Vos *et al.* (2018:436) states that the mixed-method research approach allows the researcher to use all the methods possibly available to investigate and solve the research question. By contrast, Ivankova *et al.* (2007:261) propose that the mixed-method research approach is where data are collected, both from text and numerical, within a single study to answer the research question. Moreover, they scribe that the data or findings of these two approaches are linked or combined at a single or several stages of the study. Creswell and Plano Clark (2007:6-9) support the views of Kumar (2005: Preface) and Teddlie and Tashakkori (2009:238) in that a fundamental principle of the mixed-method research approach is that the mixing of qualitative and quantitative data should be performed in such a way that it has complimentary powers and no coinciding flaws.

Based on the literature above and most recent studies performed by De Villiers (2015:258), Modisane (2019:92) and Swart (2018:194-197,201) in the accountancy field (Table 4-6), the mixed-method research approach was deemed the most appropriate method to be followed for this study. This is as a result of both qualitative (Chapters 2 & 3) and quantitative data (Chapters 4 & 5) that were collected to provide a more holistic view of what ICT competencies prospective accountancy professionals are required to possess based on the world view of ICT and the current South African circumstances. Also, the different theories that had an impact on this study, teaching knowledge levels, hierarchy of needs and technology acceptance, with their requirements were considered. Also considered were the employer expectations, current ICT implementation in the accountancy curriculum of one traditional university and one comprehensive university and the ICT competency expectations from SAICA.

The quantitative data were collected through the distribution of a self-developed questionnaire, where the development took into account the information collected from the literature review in Chapters 2 and 3. The development of the questionnaire is discussed in detail in Paragraph 4.6.3. The data were then analysed in Chapter 5 to conclude on the types of ICT competencies and the stages of when ICT should be integrated into the accountancy curricula. This all aided in the development of the development of an ICTM for prospective accountancy professionals.

Onwuegbuzie and Collins (2007:290) state that mixed-method research has different classifications based on their different degrees of intricacy. Furthermore, most mixed-method research makes use of time orientation dimension as their starting point. De Vos *et al.* (2018:439)

assert that the qualitative and quantitative phases in a mixed-method research approach can either occur at exactly the same time (concurrently), or the one occurs after the other, with one being dependent, to some degree, on the other. They further point out that these two methods within the mixed-method research methodology can be classified as either, [1] data collected in a parallel or synchronised way or [2] data building or expanding on one another in a successive way. This study followed the second approach, where themes were identified through qualitative research method (Chapters 2 & 3) and subsequently collecting data (Chapters 4 & 5), based on the themes identified in the qualitative method, through means of a questionnaire.

Teddlie and Tashakkori (2009:142) argue that the basic notational system designed by Morse (1991:2003), that is still in use today, identifies three main considerations when it comes to deciding which mixed-method research approach to be used. These three considerations as outlined by Teddlie and Tashakkori (2009:142) are, [1] is the study qualitative (QUAL) or quantitative (QUAN) orientated, [2] which aspect is dominant, QUAL or QUAN, and [3] are the project conducted simultaneously or sequentially? Based on these considerations, Creswell and Plano Clark (2007:60-62) identified four major types of mixed-method research designs. They are known as [1] exploratory design, [2] explanatory design, [3] triangulation design and [4] the embedded design. These four designs are summarised in Table 4-3 and discussed in the paragraphs below.

4.5.3.1 Exploratory design

Creswell and Plano Clark (2007:75) classify the exploratory design as the method used when the results of the qualitative research aid in the development of the quantitative research. They outline that this method is particularly relevant where a researcher wants to explore a phenomenon in-depth first before testing its frequency. McMurray (2007:21) explains that exploratory research is followed when little is known about a specific topic. Similarly, Cavana *et al.* (2001:108) indicate that this method is applied to investigate a topic on which little research has been done. Tuvadaratragool (2013:62) predicts that through exploratory research, further areas or opportunities can be identified to be studied. Cavana *et al.* (2001:108) and Punch and Oancea (2014:263) argue that descriptive research refers to the method applied to provide factual information of a problem through numerical data. As identified by Creswell and Plano Clark (2007:60-62) and based on the considerations of Morse (1991:2003), this design refers to where research is conducted by means of both QUAL and QUAN research methods, but with QUAL being dominant. It is also applied sequentially, with the one research method following on the other, thus a two-phased approach.

Due to limited research available on which specific ICT competencies should be taught to prospective accountancy professionals, when it should be taught, and how it should be taught at

university level, this study first embarked on a qualitative approach (QUAL) to identify themes to address the limited research (Chapters 2 & 3). Subsequent to this, data were collected through the circulation of a questionnaire, quantitative research (QUAN), (Chapters 4 & 5), based on the themes identified in the qualitative method. Consequently, a two-phased approach was followed where first QUAL was conducted followed by QUAN in a sequential manner.

4.5.3.2 Explanatory design

De Vos *et al.* (2018:441) and Mentz (2014:145) point out that by contrast the explanatory design follows an inverse approach to the exploratory design. Kumar (2005:31) explains that this design endeavours to provide clarity on “why and how there is a relationship between two aspects of a situation of a phenomenon”. As identified by Creswell and Plano Clark (2007:60-62) and based on the considerations of Morse (1991:2003), this design refers to where research is conducted by means of both QUAL and QUAN research methods, but with QUAN being dominant. It is also applied sequentially, with the one research methods following on the other, thus a two-phased approach.

This study did not follow a dominant quantitative (QUAN) research method approach. Also, this study did not attempt to investigate why ICT is not integrated into the accountancy curriculum, but rather what ICT competencies, and how and when they should be taught at university level, this design is not deemed relevant for this study.

4.5.3.3 Triangulation design

Ivankova *et al.* (2007:266) and Modisane (2019:92) explain that the triangulation design involves the collection of data simultaneously in order to compare it per method to identify to what extent they agree or do not. Kumar (2005:30) defines triangulation as a correlation study to compare two or more aspects to one another. As identified by Creswell and Plano Clark (2007:60-62) and based on the considerations of Morse (1991:2003), this design refers to where research is conducted by means of both QUAL and QUAN research methods, with both QUAL and QUAN being dominant. It is also applied simultaneously in a one-phased approach.

Because the aim of this study is to identify the specific ICT competencies required by employers, what is currently being implemented and the requirements from SAICA, supplemented by the data collected from quantitative research, questionnaire, the data collected rather supplements every phase, qualitative and quantitative, and follows on one another, instead of identifying in a single phase how the data collected from the two methods agree or disagree with one another. Thus, this design is not viewed as relevant for this study.

4.5.3.4 Embedded design

Creswell and Plano Clark (2007:67) indicate that the embedded design refers to a study where one set of data only provides a supportive role to another. In addition, this design implies that several questions need to be answered and can only be achieved through the use of different data sets from different research methods, QUAL and QUAN. As identified by Creswell and Plano, Clark (2007:60-62) and based on the considerations of Morse (1991:2003), this design refers to where research is conducted by means of both QUAL and QUAN research methods, with either QUAL or QUAN being dominant. It is also applied simultaneously in a one-phased approach.

Similar to triangulation, this study was conducted through both qualitative and quantitative research, with the one following on the other, instead of identifying, in a single phase. Therefore, this design is not viewed as relevant for this study.

These four mixed-method research designs, as explained and summarised by Creswell and Plano Clark (2007:73) are outlined in Table 4-3.

Table 4-3: Four mixed-method research designs

MIXED-METHOD RESEARCH DESIGNS	CONSIDERATIONS			
	QUAL / QUAN	Dominant	Simultaneously / Sequentially	Phases
Exploratory design	QUAL and QUAN	QUAL	Sequentially	2-phased
Explanatory design	QUAL and QUAN	QUAN	Sequentially	2-phased
Triangulation design	QUAL and QUAN	QUAL and QUAN	Simultaneously	1-phase
Embedded design	QUAL and QUAN	QUAL or QUAN	Simultaneously	1-phase

Source: Creswell and Plano Clark (2007:73), adapted

Table 4-3 indicates that the research aim should be considered to select the most appropriate mixed-method research design for your study. Creswell and Plano Clark (2007:79-48) argue that the decision on the most relevant research design applicable to a researcher's study depends on the three considerations as outlined by Teddlie and Tashakkori (2009:142) in Table 4-3.

In conclusion, this study followed the exploratory design. This is supported by the research aim to identify the specific ICT, when and how they should be taught at university level. This is achieved through the qualitative research approach as a starting point to address the problem statement and research question as identified in Chapter 1, Paragraph 1.2. An in-depth analysis of text with regard to the need of ICT in accounting education from a world view, professional body view (SAICA) and a university view. Conclusions were drawn on the general perceptions of these stakeholders, as outlined in Chapter 2 and 3, and this in turn aided in the development of the questionnaire, discussed in Paragraph 4.6.3, to collect primary data. The predefined possibilities, as outlined in the questionnaire that stemmed from the qualitative method, were confirmed based on the responses from the participants. Therefore, this research followed an

exploratory research approach based on prior research that supports this decision. Besides the reasons mentioned for selecting the relevant mixed-method research design for this study, the recent research conducted in the accountancy field in South Africa by De Villiers (2015:258), Swart (2018:194-197) and Swanepoel (2017:7) (Table 4-6), who all applied the exploratory mixed-method research approach were also considered.

Whether using qualitative, quantitative or mixed-method research approaches, and whether applying a grounded theory or exploratory research approach, a data collection method should be selected to ensure the effective collection of data that is meaningful for the study.

4.6 DATA COLLECTION CONSIDERATIONS

Babbie (2007:223) and Kumar (2005:131) distinguished between unstructured and structured data collection instruments. De Vos *et al.* (2018:181) indicate that the unstructured instruments, which includes for example interviews, are considered qualitative. Furthermore, structured instruments are referred to by Kumar (2005:133) as primary sources, which includes questionnaires, indexed and scales, are considered quantitative. Since this study followed a mixed-method research approach, data collection for qualitative and quantitative methods as illustrated in Figure 4-6 are discussed further. With any research project a sample should be selected from a wider population. For qualitative and quantitative methods different sampling methods apply. The ones relevant for this study under qualitative and quantitative methods are also discussed.

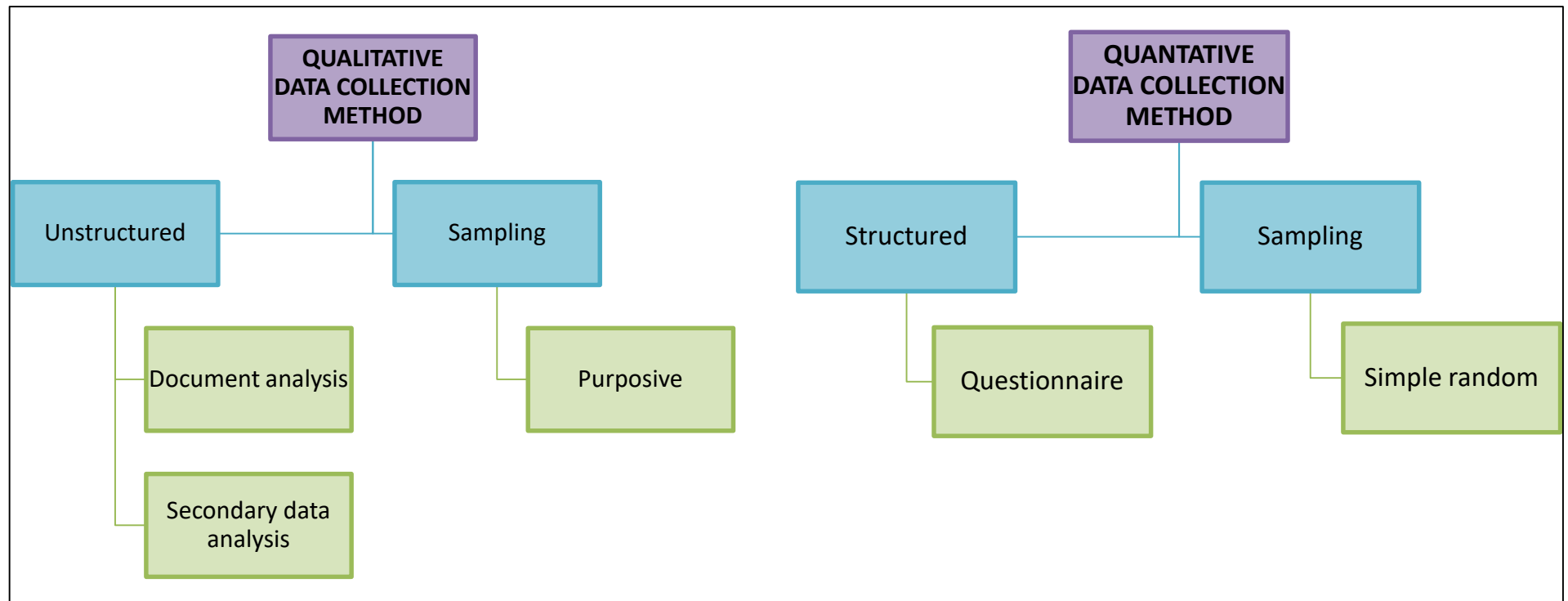


Figure 4-6: Qualitative and Quantitative data collection methods

Source: Babbie (2007:223); De Vos *et al.* (2018:181); and Kumar (2005:131), adapted

Figure 4-6 only covers some of the data collection and sampling methods available in literature. With the wide variety of data collection methods available, it is however, important to only consider the most appropriate methods for the study that will assist in answering the research question. Consequently, only the methods, as identified in Figure 4-6 are discussed further. The rationale behind the use of these methods and the relevance to this study are also covered.

4.6.1 Qualitative data collection (Unstructured)

De Vos *et al.* (2018:376) explains that there are four data collection methods within the qualitative research method, namely [1] observation, [2] interviewing, [3] document analysis and [4] secondary data analysis. They suggest that the document and secondary data analysis are used when written material is being researched. Due to this research focussing on the identification of themes from literature and existing data first, the qualitative methods relevant to this study is document and secondary data analysis.

Taking into consideration De Vos *et al.* (2018:384) and Modisane's (2019:9) research, the main difference, and to an extent similarity, between document and secondary data analysis is the fact that document analysis creates data from the investigation of selected text, where secondary data refers to published data from publicly available sources, including textbooks, journal articles, academic research and the internet. Similarly, Kumar (2005:154) argues that both methods analyse data, the data is just collected either through self-collection, text, or from already collected data. Swart (2018:143) defines secondary data as those data that are not confidential and publicly available. This leads to them concluding that both of these data collection methods can be viewed as secondary analysis.

4.6.1.1 Document analysis

Swart (2018:211) argues that document analysis is less prone to bias based on the fact that published data are analysed, eliminating responses. Equally so, Swanepoel (2017) emphasises in his abstract that through the use of document analysis the legitimacy, dependability and credibleness of data are enhanced. Ellinger *et al.* (2003:204) explain that document analysis ensures that a coherent study is developed and planned through available data.

Swart (2018:211) and Modisane (2019:96) successfully applied document analysis as part of their qualitative and quantitative research methods to analyse and interpret literature and secondary data in the accountancy field. A similar approach was applied in this research where literature and published documents were scrutinized to obtain information to analyse and so to identify the ICT competencies necessary and already being implemented in the accountancy profession, by SAICA and universities.

Cooper and Schindler (2008:405) and Richards (2005) reason that document analysis data, in this case words, needs to be separated/classified or grouped, "coded", into smaller elements (phrases, sentences or paragraphs) and assigned a name or distinct label. Similarly, De Villiers (2015:308) explains that through the investigation of text, common themes can be identified. Creswell and Plano Clark (2007:153) state that the data coding assigned can be created by the researcher or directly from the text. The main themes, or codes, as identified in the literature are reported on in Chapters 2 and 3. These themes and codes as identified in Chapter 2, Paragraph 2.5, Table 2-9 and Chapter 3, Paragraph 3.4.2, Table 3-6 led to the development of a questionnaire to collect primary data under the quantitative research method. The inclusion of this is further discussed in Paragraph 4.6.1.2, questionnaire design.

4.6.1.2 Secondary data analysis

Alston and Bowles (2003:186), Babbie (2007:277), Hakim (2000:24), Neuman (2003:37), Royse (2004:211), Rubin and Babbie (2005:283) and Walliman (2006:52) identify the analysis of secondary data as the fourth data collection method when using the qualitative research method. Secondary data analysis is referred to by these authors as the modification of data obtained that have already been analysed. Gravetter and Forzano (2003:38), Marlow (1993:81), Neuman (2000:305) and Thomas and Smith (2003:225) describe secondary analysis as the follow-up on the primary analysis of data. This study reviewed literature on the ICT expectations for prospective accountancy professionals set in the accountancy field from a world view, employers, SAICA and universities. Reliance was placed on these stakeholders through various secondary data sources available publicly to identify the specific ICT competencies required from prospective accountancy professionals.

Babbie (2007:277), Bailey (1994:299), Bless and Higson-smith (2000:156), Marlow (2005:182) Ritchie and Lewis (2003:76) and Welman *et al.* (2005:149) argue that the aim of secondary data should be to provide new meaning to already collected data. The research conducted by De Villiers (2015:19), Mentz (2014:152), Swanepoel (2017:8) and Swart (2018:211) in the accountancy field extensively relied on secondary data. Salkind (2000:190) and Walliman (2006:53) argue that although the analysis is conducted on data already collected, that the quality of the primary source should be evaluated to ensure the data are reliable. This study focussed primarily, where possible and available, on published data, whether dissertations, SAICA articles, published peer-reviewed articles, textbooks and conference proceedings, to name a few. This ensured the reliability and quality of the data the study was based on.

Modisane (2019:9) made use of secondary data to identify what ICT competencies are expected to be mastered by students through the scrutiny of frameworks, articles, textbooks and academic research. This research also applied additional secondary data analysis where data collected by

Stumke (2014:5, 71) through a questionnaire were further analysed to aid in the development of a new questionnaire to fit the aim of this research. Stumke's (2014:71) questionnaire was scrutinized to identify the general ICT competencies deemed to be important from the perspective of SAICA, university lecturers, students and prospective employers. It also aided further in designing questions on when these competencies should be taught at university level and at what level. Furthermore, this assisted in the development of the ICTM, the main objective of this study.

The collection of data for analysis, irrespective if document or secondary analysis was used to focus on specific data. Royse (2004:189-190) remarks that sampling is used to collect data from a smaller set of interpretations that can give an indication of what the total population of the study could represent. The sampling method used for this study and its relevance is discussed in more detail below.

4.6.1.3 Qualitative method: Sampling

De Vaus (2002:240) and Sarantakos (2000:154) state that sampling for qualitative research is less structured. Patton (2002:244) posits that no rules apply for sample size for qualitative research. According to De Vaus (2002:240) and Sarantakos (2000:156) this is due to the fact that sampling applied in qualitative research is based on satiety, not representation, with the size not being determined statistically with lower costs and less time. Where the selection of a particular individual is unknown due to the researcher not knowing the population size nor its members.

Gravetter and Forzano (2003:118) and Salkind (2000:87) describe this sampling process as non-probability sampling. Likewise, Unrau *et al.* (2007:370) also suggest that not all individuals within the sampling frame will have an equal chance of being selected. This supports the notion of Denzin and Lincoln (2000:370) in that samples are selected based on the fact that the process being studied will occur, thus not randomly selecting participants. As a result, De Vos *et al.* (2018:391) conclude that non-probability sampling is used without compromise.

De Vos *et al.* (2018:392-393) and Welman *et al.* (2005:56) outlines the different non-probability sampling methods relevant to qualitative research as: purposive or judgemental, theoretical, deviant case, sequential, snowball, key informant, and volunteer samples. These sampling methods are discussed in detail below.

Silverman (2000:104) describes purposive sampling as the selection of a case that contains some features that are relevant to the study. Creswell and Plano Clark (2007:125) add that this form of sampling purposefully adds to the understanding of the problem relevant to the study. Equally so, Marlow (2005:144) calls it "case sampling" due to the cases that are selected. In addition, Rubin and Babbie (2005:247) describe it as judgemental sampling. Grinnell and Unrau (2008:153) and Monette *et al.* (2005:125) agree with this description in that this type of sampling is based on the

judgement of the researcher, where the sample is made up of features that contain the most qualities, symbolic or representative traits of the population that assist the aim of the study best. De Vos *et al.* (2018:392) emphasise that the selection of the population should follow the critical consideration of the bounds of the population. This is in support of Maree's (2007:79) argument that it is of fundamental significance to distinctly identify and formulate the preselected criteria for the choice of respondents.

Modisane (2019:94), Swanepoel (2017:16) and Swart (2018:14) applied this method in their respective research projects. With recent research performed in the accountancy field and due to only purposefully selecting literature on ICT competencies required based on a world view, employer expectations and SAICA requirements, and the effect of ICT on prospective accountancy professionals, purposive sampling was deemed the most appropriate sampling method for this study.

Alston and Bowles (2003:81) describe theoretical sampling as the method used to develop a theoretical argument. Neuman (2003:81) argues that this sampling method is chosen to gain an understanding of the circumstances being studied and to ultimately highlight the researcher's developing theory. De Vos *et al.* (2018:392) posit that where gaps are identified as qualitative research progresses, theoretical sampling can be used to select only those matters that provide more specific information to further cast light on the emerging theory. Thus, in the selection of only specific information, ideas are refined and not enlarged. Denzin and Lincoln (2000:519) identify that theoretical sampling enables the researcher to "define categories, identify the contexts in which they are relevant, specify the conditions under which they come up or are maintained, and discover their consequences". Bryman (2000:117) argues that with the data-gathering phase, and due to the specific selection of material, the researcher seizes to discover new categories. Babbie and Mouton (2001:288) calls this "theoretical saturation". De Villiers (2015:53) and Mentz (2014:154) applied this method in their respective research projects. Since this study focused on identifying the specific ICT competencies required of prospective accountancy professionals, based on the continuous outcry from employers, there is no emerging theory to be highlighted. This sampling method was therefore not applied for this study.

Morris (2006:91) explains that deviant case sampling is where cases are selected for a study due to the fact that they vary from the main pattern or characteristics. Neuman (2003:215) argues that the main purpose of deviant case sampling is to identify the distinct, rare, unlike or abnormal circumstances that are not typical of the population as a whole. This method ultimately examines the negatives or areas of concern in a particular field of study. Because this study followed on previous studies that identified the gap of ICT competencies of prospective accountancy

professionals, it is not an abnormal or rare occurrence. Subsequently, this sampling method was not applicable for this study.

De Vos *et al.* (2018:393) explain sequential sampling as the method that is used where information is gathered only until a saturation point. Neuman (2003:215) posits that sequential sampling is similar to purposive sampling with the exception of when to stop selecting data. With purposive sampling as many data as possible on a specific topic are gathered and not just until a certain saturation point is reached, as is the case with sequential sampling. Similar to purposive sampling, this sampling method is applicable to this study in the sense that literature is purposively selected to investigate ICT competencies in the accountancy field. However, a saturation point is not reached in this study, this sampling method was not applicable for this study.

Alston and Bowles (2003:215) describe snowball sampling as the method used when limited to no information is available on the sampling frame. They further argue that this method is used when the available participants are limited. Babbie (2007:184-185) describes that this method involves the location of a participant, who then suggests other participants, and so forth. Hence, the snowball effect. Grinnell and Unrau (2008:153) and Royse (2004:197-198) conclude that this referral and identification method makes up the sampling frame to be used in a study. Due to the availability of literature on expectation gaps experienced by employers of prospective accountancy professionals, even though specific emphasis is not placed on ICT, this sampling method was not applicable for this study.

Marlow (2005:145) indicates that when experts in a field of study are identified and systematically interviewed, it is known as key informant sampling. He cautions against the risk that non-probability may be relevant as the selected experts may not be a total representation of the population. Taken into consideration this limitation, and the available literature in the accountancy field, this sampling method was not viewed as relevant for this study.

Silverman (2000:159) states that volunteer sampling is where participants know one another and voluntarily participates in a study. Mark (1996:138) proposes that when volunteer sampling is used the researchers should clearly identify the motives of the volunteers to eliminate any possible ulterior motives. Seen as the participants to the study are derived from publicly available literature, the researcher now knows them all as they hail from all over the world. Thus, this sampling method was not used in this study.

Based on all the different views on the qualitative research sampling methods, a summary of those methods, how data are selected, and the specific considerations linked to these methods are summarised in Table 4-4.

Table 4-4: Non-probability sampling methods

SAMPLING METHOD	SELECTION METHOD	CONSIDERATIONS	APPLIED IN STUDY FOR QUALITATIVE RESEARCH
Purposive sampling / Case sampling / Judgemental sampling	Predefined criteria Only those that will be relevant to the topic being studied.	Bounds of the population	Yes, predefined criteria (ICT, ICT integration, expectation gap, etc.) was used to gather data from text and secondary data sourced (only those relevant to the study) within the bounds of the population.
Theoretical sampling	Select to support researcher's theory	Theory being researched theoretical saturation	No, research follows the design of a model and not a theory to be proved.
Deviant case sampling/Extreme case sampling	Selection of distinct, rare, unlike or abnormal circumstances.	Focus being placed on the negative or problematic areas being researched.	No, theme of this study, ICT competencies, is not rare, unlike or abnormal.
Sequential sampling	Predefined criteria Only those that will be relevant to the topic being studied.	Select data until saturation point is reached.	Yes, predefined criteria (ICT, ICT integration, expectation gap, etc.) were used to gather data from text and secondary data sourced (only those relevant to the study) within the bounds of the population.
Snowball sampling	Identify relevant participant and select/gain access to data from referral of this participant.	Limited participants	No, information gained through review of relevant literature published and available.
Key informant sampling	Identify experts in the field. Obtain information from them.	Not clear if experts represent the entire population.	No, all information available was considered from different sources and researchers and not just experts.
Volunteer sampling	Participants know one another, voluntary participates in a study.	Researchers should clearly identify the motives of the volunteers to eliminate any possible ulterior motives.	No, literature publicly available and published used, thus no consent or prior motives required to be identified or communicated.

Source: Summarised for this study

Table 4-4 depicts a clear link between purposive and sequential sampling, with the only difference being the saturation levels that either are (sequential) or are not reached (purposive). For this study, the purposive sampling method was used to identify and select the views from employers, being those firms employing prospective accountancy graduates, SAICA, universities and the ICT world on the importance of ICT integration for prospective accountancy professionals. Therefore, predefined criteria (ICT, ICT integration, expectation gap, etc.) were used to gather data from text and secondary data sourced (only those relevant to the study) within the bounds of the population (employers, SAICA, universities and the ICT environment). As a result, and, due to the fact that no saturation level was reached, only relevance was considered, purposive sampling was determined to be the best fit for this study.

The data collection for the quantitative method is discussed further to complete the mixed-method research approach.

4.6.2 Quantitative data collection (Structured)

Mentz (2014:149) argues that the main purpose of quantitative research is to create data that can be quantified, which is clarified as being able to count, assess and weigh information. De Vos *et al.* (2018:144) identify two types of quantitative research, [1] experimental and [2] non-experimental designs. Experimental designs refer to where the responses or lack thereof of two groups are compared to one another as to report on these similarities or differences. Maree and Pietersen (2007:152) argue that non-experimental design is where the selected participants to the study are measured on predefined variables with no manipulation of the variables. They also point out that there is no experiment or comparison between different groups. With both these designs there exist several different data collection methods. In conclusion, since this research study focused on what ICT competencies are being taught at university level and what should be taught, no experiment was conducted resulting in the non-experimental design being the most suitable for this research study. Through collecting data from those involved in the accountancy curriculum either by studying towards an accountancy degree or teaching an accountancy degree, the data collected are relevant and up to date with the views and the current implementation of ICT within the accountancy curriculum. This further aided in the development of the ICTM and are discussed in Chapters 5 and 6.

De Vos *et al.* (2018:171) indicate that the data collection methods associated with quantitative research refer to "measuring instruments". These "measuring instruments" are known as: structured observation schedules, structured interviewing schedules, questionnaires, checklists, indexes and scales.

Grinnell and Unrau (2008:106) and Salkind (2006:99) describe measurement as the assigning of numbers to objects to symbolise quantities or attributes numerically. Furthermore, Monette *et al.* (2002:103-104) surmise that the assigning of numbers should be done according to specific rules. De Vos *et al.* (2018:172) point out that the adequacy of the results obtained from the numbers assigned to the data depends on the sufficiency of the rules according to which these numbers are assigned.

The four main structured data collection methods, as mentioned above, relevant to quantitative research are discussed further.

Grinnell and Unrau (2008) refer to the first method, structured observation schedules, as the method used to observe the behaviour of people in their natural environment. The second method structured interview schedule, as suggested by De Vos *et al.* (2018:186), is where a questionnaire

is read to a group of respondents and the responses are then recorded. Babbie (2007:246) indicates that the third method, questionnaires, is mainly used to obtain facts and opinions about the phenomenon being studied. Creswell *et al.* (2010:155) and Mouton (2011:103) argue that this instrument is the one mostly used. Recent research in the accountancy field by De Villiers (2015:34), Modisane (2019:97-98) and Swart (2018:211) also used questionnaires for quantitative data collection and emphasises the popularity of this method. De Vos *et al.* (2018:202) point out that the last method, checklists, are questionnaires that only require a participant to answer by means of a check box.

This study made use of a questionnaire to collect the necessary data to assist in the development of the ICTM. This method was selected as a follow-up to the secondary data collected from Stumke's (2014:67-70) questionnaire. The questionnaire design is discussed in more detail in Paragraph 4.6.3.

Yates (2004:25) states that it will seldom be possible to test an entire population. Additionally, Denscombe (2008:141), DePoy and Gilson (2008:234-235), Kerlinger and Lee (2000:164), Royse (2004:189-190) and Thomas and Smith (2003:225) argue that a sample is selected with the notion that this smaller set will be able to provide information on what can be expected of the entire population. De Vos *et al.* (2018:223) highlight that this does not mean that the sample is representative, but rather believed to be a representation of the population. The different sampling methods under the quantitative research method are discussed below.

4.6.2.1 Quantitative method: Population and sampling

➤ Target population

Creswell *et al.* (2010:146-147) and Welman *et al.* (2005:55) state that not all members of a population will be included in a research project. Consequently, McBurney (2001:248) refers to the population as the framework within which the sample is selected. Barker (2003:380) and Unrau *et al.* (2007:279) argue that a sample is the selected individuals from the totality of individuals, the population, that will actually be included in the study.

In the 1980s Arkava and Lane (1983:27) state that a population is a restricted set of individuals who own a certain set of characteristics that the researcher intends to study. Welman *et al.* (2005:55) point out that if the sample selected is representative of the population meaningful results will be achieved.

The population for this study, within the quantitative research method, is the SAICA-accredited universities within South Africa. In totality, there are 11 traditional and 6 comprehensive SAICA-accredited universities. South African Education (2020) describes traditional universities as universities that offer theoretically-orientated university degrees. Whereas comprehensive

universities provide a combination of both traditional and university of technology qualifications. Bevan-Dye and Akpojivi (2016:114) sampled individuals limited to 2 South African universities, 1 traditional university and 1 university of technology. Furthermore, based on the experience of Stumke (2014:67-70) and Swart (2018:213), response rates from universities are often limited. Consequently, the population is limited to two South African universities, one traditional university (U1) and one comprehensive university (U2). This is to ensure representation of the two classifications categories of universities in South Africa.

The logic surrounding this limitation is due to the fact that each of these institutions represent different spectrums of the student environment throughout South Africa.

➤ Sampling frame

Out of the two selected universities, focus was placed on the registered accountancy students and employed accountancy lecturers. This sampling frame represents the institutions that teach and that are responsible for transferring the required knowledge, as outlined by the SAICA CF, to prospective accountancy professionals and the prospective accountancy professionals that will enter the workforce. The questionnaire was distributed to the department heads of the accountancy departments of the two universities, after the necessary ethical clearance was obtained from both universities' ethical committees. They were requested to distribute the introduction of the study together with the relevant questionnaire link with their academics to complete themselves and to request their students, 1st year, 2nd year, 3rd year, and 4th year (honours students) to complete. It was ensured that at least one lecturer actively distributed the required information to their students and also completed the questionnaire themselves. Therefore, a 100% response rate was observed in terms of the two different categories of the universities.

➤ Sample method

Alston and Bowles (2003:66) note that for quantitative research focus is placed on data that are considered random, general or representative within both probability and non-probability sampling techniques. Grinnell and Unraue (2005:155) explain that random sampling is more applicable to probability sampling and ultimately quantitative research methods. Gravetter and Forzano (2003:118) indicate that random sampling is used where the population is known. Munteanu *et al.* (2008:125) state that probability sampling falls within the definition of statistical sampling. De Vos *et al.* (2018:228) and Welman *et al.* (2005:56) identify the forms of probability sampling most often used as simple random sampling, systematic sampling, stratified random sampling and cluster sampling. Since the population of this study is known, probability sampling is considered as the most appropriate sampling method and thus statistical and can be extrapolated over the

full population (ISA 530). The different forms of probability sampling are discussed in more detail below.

Jackson (2003:15) and Marlow (2005:139) argue that simple random sampling is the easiest sampling method used. Welman *et al.* (2005:59) point out that with this sampling method, each person in the population will have an equal chance of being included in the sample. Rubin and Babbie (2005:266-267) explain that systematic sampling is similar to simple random sampling with the only difference being the first person is selected randomly with the following person being selected based on a certain interval, for example every fifth person. Creswell (2003:156-157) identifies stratified random sampling as the method where a population with similar characteristics is divided into different segments or strata to ensure an equal representation from different groups within the population. An example is where the population is divided into gender, age and home language. This ensures that all groups have an equal representation in the sample. Jackson (2003:60) points out that cluster sampling is used in situations where random sampling cannot be applied due to a population being too large. De Vos *et al.* (2018:230-231) explain that this method is different to stratified random sampling in that it only reports on the cluster sample selected to be studied and not the population as a whole.

This study followed a simple random sampling frame since each person in the population, registered students and employed lecturers in accountancy from the two selected universities had the same chance of being included in the sample. This was ensured through the distribution of the questionnaire to all the department heads at the two selected universities. Even with the intention of giving the entire population an equal chance to be included in the sample, it does not ensure that a large sample size will complete the questionnaire.

➤ Sample size

Neuman (2003:232) asserts that where a study is performed with a large population, the sample size percentage can be smaller, and vice versa. In addition, De Vos *et al.* (2018:224) argue that as a sample increases in size the difference in effect will decrease with the increase of the sample until no effect is reached. Grinnell and Unraue (2005:168) and Welman *et al.* (2005:70, 74) state that if the sample error is considered to be large, the sample size should consequently be increased.

Pallant (2013:208) reasons that for a normal distribution a sample size of 30+ is sufficient. In a study by Swart (2018:215) in the accountancy field, a response rate for 44% was achieved. Electronic questionnaires were distributed by email to 112 participants with 49 responses received back through voluntary participation. Modisane's (2019:102-103) study, also in the accountancy field and specifically relating to ICT competencies, also involved electronic

questionnaires that were distributed to a population size of 10 016 participants. A response rate of 0,53% was achieved (53 usable responses). A similar study by Fourie (2014:135) achieved a 1,79% response rate (148 responses out of a population of 8 268). Stumke's (2014:88) response rate totalled 13,8% when electronic questionnaires were also distributed to universities to be completed by students and lecturers. This was achieved through 89 responses received out of a population of 645 registered students and employed lecturers at the selected university. In conclusion, different sample sizes and response rates are achieved across the different studies performed in the accountancy field. It is observed that where the population size is fairly large, as with the case of Modisane (2019:102-103) where 10 016 participants formed part of the population, smaller response rates can be expected.

Similarly, for this study where the population was represented in totality for the two universities as 4 724 recorded registered students and 50 employed lecturers in the accountancy programme over the four years of study, a low response rate was to be expected. This is in line with Neuman (2003:232) who cites that heterogeneity of the population, the desired degree of accuracy, the type of sample, the available resources, and the number of variables in which the data are grouped should all be considered in selecting the sample size.

As mentioned in Paragraph 4.1, with the different data collection options and sampling methods available, research relevant to the field of this study, accountancy and accountancy education, was reviewed and scrutinized to identify the most relevant and common method(s) used. Research conducted by and referenced to in the research of De Villiers (2015), Mentz (2014), Modisane (2019), Swanepoel (2017) and Swart (2018), were used as a basis and summarised. These authors were chosen due to their research being recently conducted in the accountancy field. The main research methodology components as identified in Chapter 4 are summarised per author in Table 4-5.

Table 4-5: Summary of different research design and methodologies from studies in South Africa relating to accountancy

RESEARCH METHODOLOGY COMPONENT	AUTHOR				
	Modisane	Swart	Swanepoel	De Villiers	Mentz
	RESEARCH TITLE				
	Establishing a competency framework for the integration of workplace information technology competencies within an Internal Audit education programme and training.	Audit methodologies: Developing an integrated planning model incorporating audit materiality, risk and sampling.	The development of an integrated financial decision-making model using lean accounting.	Evaluating the effectiveness of a newly developed simulation in improving the competence of audit students.	An integrated audit evidence planning model to quantify the extent of audit evidence.
DIMENSIONS OF RESEARCH					
Basic research	N/A	N/A	N/A	N/A	N/A
Applied research	*	*	*(2017:276)	(2015:323)	(2014:145)
Ontology, epistemology, methodology	(2019:92-93)	*	(2017:99-93)	(2015:28-30)	(2014:145)
TYPOLOGY OF RESEARCH: ACQUIRING KNOWLEDGE					
Inductive/deductive research	*	(2018:201)	(2017:100-112)	(2015:32)	Mainly Inductive - (2014:146-149)
RESEARCH PARADIGMS					
Philosophical paradigms	Combination of: Positivist (QUAL) and interpretivist (QUAN) (2019:90-91)	Pragmatism – Combination of positivist (QUAL) and interpretivist (QUAN) (2018:194-209)	Pragmatism – Combination of positivist (QUAL) and interpretivist (QUAN) (2017:109)	(2015:31-33)	*

Table 4-5: Summary of different research design and methodologies from studies in South Africa relating to accountancy (continues)

RESEARCH METHODOLOGY COMPONENT	AUTHOR				
	Modisane	Swart	Swanepoel	De Villiers	Mentz
RESEARCH METHODS					
QUALITATIVE RESEARCH <u>Exclusively</u>	N/A	N/A	(2017:107)	N/A	(2014:156)
QUANTITATIVE RESEARCH <u>Exclusively</u>	N/A	N/A	N/A	N/A	N/A
Mixed-method research (QUAL and QUAN) – Exploratory – Explanatory – Triangulation – Embedded	(2019:92)	(2018:194-197, 201)	N/A	(2015:258)	N/A
QUALITATIVE DATA COLLECTION METHODS					
Content/Document analysis	(2019:96)	(2018:199)	(2017:264)	(2015:48-50)	(2014:154-156)
Interviews	Semi-structured, open-ended questions (2019:92, 99, 112-113)	Semi-structured, open-ended questions (2018:200)	N/A	(2015:43)	N/A
Secondary data	(2019:8-9)	(2018)	(2017:264)		
Grounded theory	(2019:94)	(2018:197-198)	(2017:111)	(2015:40-41)	(2014:156-159)
Multiple case study	N/A	N/A	(2017:98)	N/A	N/A
QUANTITATIVE DATA COLLECTION METHODS					
Structured observation schedules	N/A	N/A	N/A – Only qualitative research method	N/A	N/A
Structured interview schedule	N/A	N/A	N/A	N/A	N/A
Questionnaire	Non-probability judgemental: Self-administered online (2019:92, 97, 106)	Judgemental: Self- administered email (2018:199-201)	N/A	(2015:35-39)	N/A
Checklist	N/A	N/A	N/A	N/A	N/A

Table 4-5: Summary of different research design and methodologies from studies in South Africa relating to accountancy (continues)

RESEARCH METHODOLOGY COMPONENT	AUTHOR				
	Modisane	Swart	Swanepoel	De Villiers	Mentz
QUALITATIVE SAMPLING METHOD(S) – NON-PROBABILITY					
Purposive sampling	(2019:94)	(2018:14)	(2017:116)	N/A	N/A
Theoretical sampling	N/A	N/A	N/A	(2015:53)	(2015:154)
Deviant case, sequential, and snowball sampling	**	**	**	**	**
QUANTITATIVE SAMPLING METHOD(S) – PROBABILITY					
Sampling method	N/A	Judgemental (2018:10)	N/A	N/A	N/A
Sample size	0,53% (2019:102-103)	43,75% (2018:215)	N/A – Only qualitative research method	Pre-test 73% Post-test 68% (2015:252)	N/A – Only qualitative research method
Pilot test	Yes (2019:104-105)	Yes (2018:213)	N/A – Only qualitative research method	N/A	N/A
Analysis tool(s)	Statistical Package for Social Sciences, V24.0 (SPSS) and MS Excel 2010	Statistical Package for Social Sciences, V25.0 (SPSS)	N/A – Only qualitative research method	Statistical Package for Social Sciences, version 2011 (SPSS) and MS Excel 2010	N/A
Analysis method(s)	➤ SPSS: mean, mode, median and standard deviation (2019:105) ➤ Cronbach's alpha measures reliability of a sample (2019:105) ➤ Two-way analysis of variance (ANOVA) (2019:106)	➤ Correlation descriptive statistics, alpha ➤ Cronbach's alpha correlation.	N/A	➤ SPSS: Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) Factor analysis (2015:258); ➤ Bartlett's test of sphericity (BTS) significance (2015:258)	N/A

* Although the specific term(s) was not used in the research, the study followed this approach as deduced by this research.

** None of the researchers applied these sampling methods and was therefore not considered in this study. This is contrary to the expectation that at least one researcher would have applied one of these methods in their studies.

Source: Authors listed above

Table 4-5 emphasises that mixed-method research is a popular research method used in the field of accounting, 3 out of 5 used mixed-method research. The data collection methods used in this study have been used in the accountancy field before. Thus, it is concluded that the research methodology for this study was relevant and appropriate to address the research question as identified in Chapter 1, Paragraph 1.2.

As part of addressing the research question, a questionnaire was developed based on previous research and from data collected in Chapters 2 and 3. This is discussed in more detail below.

4.6.3 Questionnaire design

Rattray and Jones (2007:235) emphasise that to enable collected data to be reported on effectively, the process followed to develop and design the questionnaire should be outlined in as much detail as possible. De Vos *et al.* (2018:190) explain that before a questionnaire can be developed the information needed should be clear. Grinnell and Unrau (2008:110) argue that through studying the literature the principal concepts that information will be needed on will be identified. Accordingly, the most important and influential documents reviewed in the literature that were used to assist in the development of the questionnaire comprise the following:

- Questionnaire developed and adapted by Stumke (2014:158-176).
- U1 and U2 yearbooks
- SAICA's CF (2019a:7), summarised and depicted in Chapter 3.
- Themes identified in the literature study in Chapter 2 and 3.

All of the above-mentioned documents in literature served their own purpose. Firstly, the questionnaire developed by Stumke (2014:158-176) in 2014 specifically focusses on ICT in the accountancy curriculum. It is broad in the sense that general perceptions of respondents were tested. This gives an indication of the general areas that can be elaborated on. Furthermore, the 2014 questionnaire was already subject to ethical procedures, a pilot study and analysable results could be obtained. Above and beyond these positive elements, the 2014 questionnaire of Stumke (2014:158-176) highlights the ICT gap evident from prospective accountancy graduates and supports this study.

Building on the existing questions and themes from Stumke's (2004:158-176) questionnaire are the yearbooks from U1 and U2. From these yearbooks, the current ICT integration and ICT opportunities within the accountancy curriculum were identified. Further evidence was obtained from the participants on the extent to which specific ICT competencies are being integrated and educated. These specific ICT competencies, as evident from U1 and U2's yearbooks are discussed in detail in Chapter 3, Paragraph 3.4.

The ICT competencies and integration evident from the yearbooks of U1 and U2 are linked to that required from SAICA. The latest published CF (SAICA, 2018:15) and proposed CF (SAICA, 2019a:7) to identify at which level the required ICT competencies are currently being taught and/or integrated. All of these requirements are discussed in Chapter 3, Paragraph 3.3.2.

Lastly, the main themes identified through the in-depth literature review of Chapter 2 and 3 were also considered as necessary questions. This was to act as a supplement to what literature depicts through the collection of quantitative data. Taking all of these elements into account was subsequent to the guidelines available in literature on how to develop a questionnaire.

The questionnaire developed took into consideration the guidelines as set out by De Vos *et al.* (2018:190-202) and Swart (2018:212). This included the following five areas of consideration: [1] simple and brief instructions and response scale limited to maximum of five points, [2] user-friendly and neat appearance, [3] length of the questionnaire should be limited to gain the most information in the least amount of time, [4] logic question sequence, and [5] non-threatening and neutral questions with similar question types grouped together. Rattray and Jones (2007:235) explain that if the questionnaire design is well-defined and outlined, it supports the reliability and validity thereof.

De Vos *et al.* (2018:193) stress that the format of a questionnaire is directly influenced by the method of administration thereof. Depending on whether it will be mailed, personally administered or emailed will impact where and by whom it will be completed and ultimately have an impact on its appearance. With various methods available to administer a questionnaire, mailed questionnaires, telephonic questionnaires, questionnaires delivered by hand, self-administered questionnaires, group-administered questionnaires and electronic questionnaires, in today's technologically advanced and fast paced world, electronic questionnaires remain the most popular. Grinnell and Unrau (2008:298) propose that the three main types of electronic questionnaires are emailed, self-developed and computerised interactive voice response systems.

The first one refers to where an email is sent to the respondents as an attachment. The second one is where a respondent will complete the questionnaire through a website. The last one is where automated telephone calls are made. This study followed a self-developed approach. The questionnaire was developed to be completed on Google Forms. The link was sent to the relevant institutions to distribute to their staff and students associated with the accountancy curricula. Respondents were required to copy the questionnaire link or follow the link, through their internet browser and complete the questionnaire online.

Before a questionnaire can be used as an effective data collection tool, Brace (2004:106-111), Creswell *et al.* (2010:155), De Vos *et al.* (2018:195) and Welman *et al.* (2005:148) emphasise that an essential component is to first perform a pilot study before the final questionnaire is distributed to participants. Swart (2018:213) concludes that the importance of a pilot study is to consider the necessary adjustments to ensure that all the information and questions included in the questionnaire is clear and concise. Rattray and Jones (2007:237) propose that in order to perfect wording and content of a questionnaire significant pilot work needs to be conducted during the development phase. Modisane (2019:105) highlights that this process is important to identify some or all of the following: [1] spelling errors, [2] time to complete the questionnaire, [3] wording mistakes, [4] logical flow of the questionnaire and [5] understandability of the questions.

For this study, still during the initial development phase of the questionnaire, the questionnaire was scrutinized and analysed with the support and analysis by statistical specialists in the Social Sciences discipline. After the initial consultation process, the necessary adjustments were made to ensure that meaningful and relevant data will be collected to ensure it correlates with the objective of the study.

Subsequent to the first review and subsequent adjustments, the questionnaire was sent to a representative sample of the population, which included students and lecturers. Babbie (2004:256) argues that when respondents answer the questionnaire it provides better feedback than just to read through it. Rattray and Jones (2007:237) indicate that the ideal group to perform a pilot study on should be a smaller representative sample of the intended population.

For this study, the questionnaire link was sent via email to randomly selected participants consisting of 23 students and 12 lecturers from a traditional university. A deadline was set in the original email. A first reminder and a final reminder email was sent to the selected participants. They were excluded from the final questionnaire.

The benefit of making use of Google Forms is that the exact date and time the questionnaire is completed are recorded on the downloaded data. The action responses from the pilot group can be summarised as follows:

- 15 in total (6 lecturers, 9 Students: 1st year, 2nd years, 6 Hons)
- Initial completion of questionnaire: 6 responses (3 students, 3 lecturers)
- First reminder: 4 responses (2 students, 2 lecturers)
- Second reminder: 5 responses (4 students, 1 lecturers)
- 14 out of 15 opted to be considered for the incentive

Table 4-6: Pilot study response rates

SAMPLE DETAILS	STUDENTS	LECTURERS	OVERALL
Sample	23	12	35
Responses	9	6	15
Response rate	39%	50%	43%

Source: Responses from self-administered pilot questionnaire

Concluded from Table 4-6 is that even with a small sample size, a response rate above 50% is not to be expected. The initial pilot size and even the response rate is in line with the argument by Brace (2004:106-111) in that an informal pilot test of at least six individuals will be sufficient. Similarly, Modisane (2019:105) circulated his survey to 10 individuals. Thus, the pilot study performed for this study superseded that of Modisane (2019:105) and the suggestion by Brace (2004:106-111) resulting in a successful exercise. Caution or at least attention should be given to the low response rate of the pilot study and the possible reasons that may be attributable to this could be due to the fact that even though we are living in a technological era, individuals fail to regularly read their Gmail resulting in them not receiving the email in time to complete the questionnaire.

Feedback received via email, due to only close-ended questions included in the questionnaire, were considered and the necessary adjustments were made. The overall suggestions received from the respondents were to rather allow more than less time to complete the questionnaire and it was also emphasised that they felt the study could be very valuable for the accountancy curricula. After this final adjustment, the questionnaire was sent to a language editor to ensure that any spelling errors or sentence structure mistakes still present are corrected. Care was taken to identify the data received from the pilot study and not to include it in the final data analysis. After the pilot study, the steps to be followed for the distribution of the final self-developed questionnaire needed to be considered.

Fan and Yan (2010:133) identify four steps in performing self-developed questionnaires. Step 1 is the development of the questionnaire, concerning how the questionnaire is developed and uploaded onto the web. This is similar to the methods followed to design a paper-based questionnaire. Step 2 relates to the delivery of the questionnaire. It includes how the respondents are sampled, contacted and the delivery of the necessary information, delivering the link to the questionnaire, to complete the questionnaire. Step 3 is where the participants complete the web survey. This process starts when the respondents receive the link to the questionnaire, logs into the website, answers the questions, submits the answers and finally logs out of the website. The final step, Step 4 is where the data are collected by the researcher from the website.

As mentioned previously, this study follows a self-developed questionnaire approach. All the requirements of the literature discussed below were taken into account during the development of the questionnaire in this study. The questionnaire design, delivery process, completion rate and data analysis are discussed in more detail below.

De Vos *et al.* (2018:193) argue that each questionnaire, irrespective of how it is administered should be accompanied by a cover letter. This links to the questionnaire design and delivery process which includes the first consideration where a simple and brief instructions and response scale limited to a maximum of five points consideration. Monette *et al.* (2002:169-171) outline the following minimal items that should be included in the cover page or instructions:

- Sponsor of the research (if applicable)
- Contact details of the researcher
- Selection process of the respondent
- Other respondents selected
- Purpose of the study
- Who will benefit from the research
- An appeal for the person's co-operation
- Completion time of the questionnaire
- Incentive or payment for completing the questionnaire
- Assurance of anonymity and confidentiality
- Deadline for the questionnaire
- Disclosure of information and confidentiality for ethical purposes.

Grinnell and Unrau (2008:288) indicate that the cover page should be straight to the point, short and informative of the study. In this study the logical flow of distributing the questionnaire to the relevant participants started with developing the cover page, taking into consideration the minimum information as outlined by De Vos *et al.* (2018:193) and Grinnell and Unrau (2008:288). This included the following information that was sent to the relevant department heads of the two selected universities (U1 and U2) via email: The researcher's contact details were included accompanied with the affiliation of where the study is being performed. The promotor was also identified. This was followed by a brief background of the study and purpose of the questionnaire. The time to complete the questionnaire was also provided. This questionnaire was based on a possible incentive in the form of a random voucher being allocated to participants who opted to provide the researcher with their contact details. A full disclosure and explanation on this were provided. Emphasis was placed on the confidentiality of the participants' responses and entities participated. Confidentiality is further discussed in Paragraph 4.9. The value of the responses to the accountancy field of study was emphasised. The participation in the questionnaire was

explained with the rationale of their selection. Clarity was provided on what is meant by IT in the context of the questionnaire to eliminate any uncertainty. The ethical approval obtained from the two respective universities were also provided. The fact that the questionnaire remains voluntary was highlighted at the end of the introduction. The role of the researcher and ethical considerations are discussed in more detail in Paragraph 4.9. The cover page for this study covered all the relevant aspects as mentioned above as outlined in Annexure A.

The department heads were requested to distribute the information in the email communication to the relevant accountancy lecturers for them to place it on their LMS for students and lecturers to complete. No student or lecturer was contacted personally. Participants had 30 days to complete the questionnaire. This was done to avail enough time for participants to complete the questionnaire with space for one reminder during the initial request and the deadline. One reminder email request was sent to the different university departments.

Since the relevant department heads send out the link to the questionnaire, it is expected that as many as possible students and lecturers would complete the questionnaire. The target population for completing the questionnaire is specifically focussed on students and lecturers registered for, and teaching modules, within the accountancy field. This includes programmes where Accounting is the base for the degree and links to the following professional qualifications: SAIPA, SAICA, CIMA, Internal audit, Accounting etc.

After the initial email, one follow-up request was sent to the department heads requesting the circulation of the information to be send to the respective accountancy lecturers to place it on their relevant LMS for students to complete. The request process to complete the self-developed questionnaire is outlined in Table 4-7 with the key "✓" representing the successful execution of the planned steps.

Table 4-7: Questionnaire request timeline for U1 and U2

REQUESTS	U1	U2
Initial request to department heads	✓	✓
Reminder request to department heads	✓	✓
Due date	✓	✓

Source: Summary of information above

De Vos *et al.* (2018:208) argue that in order to report on findings from questionnaire responses the different scaling options should be considered. Neuman (2006:207) explains that when respondent's express attitudes in terms of agree or disagree, the Likert scale is used by the majority of researchers when questionnaires are administered. Welman *et al.* (2005:174) indicate that this scale is used when close-ended questions are included in a questionnaire. Monette *et al.* (2002:163) explain that when all the possible responses to a question is known, close-ended

questions are appropriate. Creswell *et al.* (2010:161) and Neuman (2006:287) conclude that the data collected from close-ended questions are easier to interpret due to the fact that respondents can only select limited answers based on a predefined list of options. Swart (2013:117) concludes that the Likert scale, with a minimum of four selection options, is the most appropriate level to use in the accountancy field. De Vos *et al.* (2018:212) explain that for the Likert scale to remain effective it should consist of between four to eight classifications.

Due to the ease of interpreting data from predefined responses, this study included only close-ended questions in the questionnaire. The Likert scale applied ranged between four to five response options. The options ranged from strongly disagree to strongly agree and novice to expert. As an additional measure to improve the relevance of the question responses and the content of the questionnaire, the self-developed questionnaire underwent a pilot test and corrections based on the pilot test as well as evaluation by a statistical expert. This is discussed in more detail in Paragraph 4.6.3. Table 4-8 illustrates these scales with an extract or relevant questions as included in the questionnaire in Annexure A.

Table 4-8: Likert scale classification ranges for this study

QUESTION		4-LIKERT SCALE			
What is your overall perception on your students' IT preparedness when they graduate?		1	2	3	4
		Novice	Advanced beginner	Proficient	Expert

QUESTION	5-LIKERT SCALE				
The assignments within the modules I teach provide students with opportunities to acquire and utilise IT competencies:	1	2	3	4	5
	Strongly disagree	Disagree	Agree	Strongly agree	Not Applicable – I don't know what IT opportunities exist in my module

Source: Annexure A

Table 4-8 outlines that no matter the question, close-ended questions provide a predefined selection of answers. It also shows that regardless of the response wording used, the options to questions posed should be limited to maximum five categories for data to be reported on. Even though one question may have more than five response options, through the grouping of the responses, the groupings can be simplified to maximum five. This was achieved through the grouping of the responses as follows: novice and advanced beginner = 1; proficient and expert = 2; and strongly disagree and disagree = 1, agree and strongly agree = 2, not applicable = 3. This is in line with the first consideration of questionnaire design that the response scale should be limited to five points.

The second consideration of questionnaire design was achieved through the decision to make use of a self-developed questionnaire. Google Forms was used and assisted to achieve this. An

existing questionnaire template was selected to ensure that the appearance of the questionnaire remained neat and user-friendly. The use of radio buttons that had to be selected with no typing involved further contributed to the user friendliness of the questionnaire. Figure 4-7 illustrates the first page of the questionnaire as respondents viewed it.

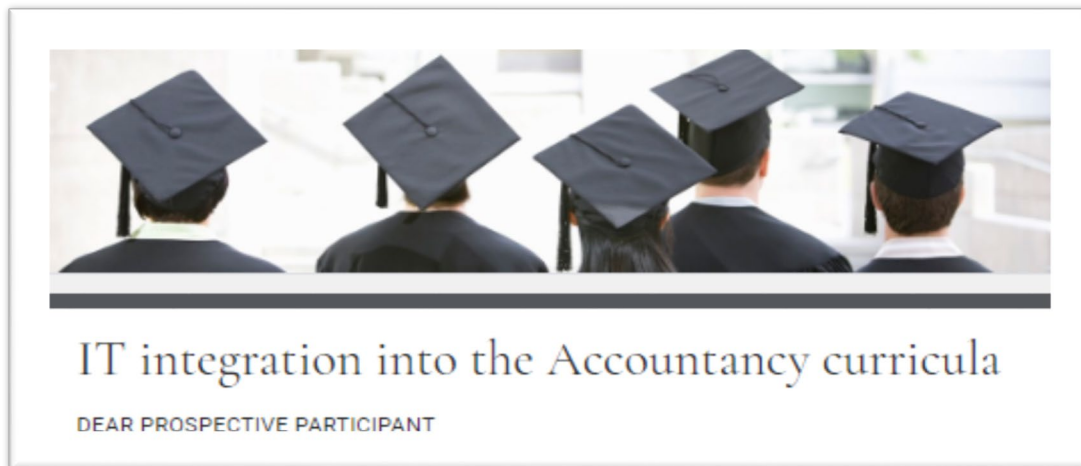


Figure 4-7: Self-developed questionnaire on Google Forms

Figure 4-7 represents the professional appearance strived for throughout this study when viewed by participants. The images were kept relevant to the population, students and lecturers at universities.

Where possible, the questions were structured in such a way that it was kept as short as possible with no uncertainties surrounding what was being asked. This was done to adhere to the third consideration to keep the length of the questionnaire as short as possible but still being able to gain the most information. Welman *et al.* (2005:174) argue that by drawing up a list of information that would be required to address the research question will ensure that only questions relevant to the study will be included. The question formulation guidelines as outlined by Creswell *et al.* (2010:159-160), De Vos *et al.* (2018:192), Mouton (2011:102-104) and Welman *et al.* (2005:174) were taken into consideration when formulating the questions for the questionnaire. These conditions can be summarised as follows:

- Brief and clear sentences, understandable and familiar to respondents.
- One idea being tested can be repeated by using different words to ensure it is being understood by participants.
- No bias should be evident in questions and question responses.
- One thought per question, avoid double questions.
- All questions should be relevant to the study.
- Consider cultural context of the questions and examples provided.

- Language of the respondents should be considered when formulating questions.
- Questions asked should be phrased at the correct reading level based on the population that will be covered.
- Formulate questions in the first person.
- Avoid hypothetical questions.
- The sequence of the questions should start with general, then non-threatening questions followed by more sensitive, personal questions.

Creswell *et al.* (2010:158-168) outlines that a questionnaire should be completed within 20 minutes. This questionnaire was estimated to take 15 minutes. This was achieved through careful consideration of what questions to include. A total of 28 questions for students and 25 questions for lecturers with radio buttons were included in the questionnaire. This limited the time needed to complete the questionnaire to an acceptable level.

The last condition (11) of question formulation conditions links to the fourth consideration in that the sequence of the questions should follow a logical flow, starting with the general, non-threatening questions followed by the personal questions. The first two questions of the questionnaire asked if the participant gives consent to the use of the data in the study and as whom the participant is answering the questions. Based on the answer to Question 2, the participant was redirected to the relevant part of the questionnaire, student (Question 3 to 30) or lecturer (Question 31 to 55). This was done to ensure that the questions posed to the participant is on the correct level and phrased accordingly. The last question was only available to students. Here those who opted to form part of the lucky draw for an incentive could provide their email addresses to ensure that they can be contacted once the draw took place. This remained voluntary and had no impact on the questions already answered. Since no personal questions were asked that could be viewed as sensitive, the questionnaire adhered to the conditions as set out by Mouton (2011:102-104) and Welman *et al.* (2005:174).

The fifth and final consideration that similar questions should be grouped together was achieved by taking into consideration the question sequence and the data required from the questionnaire. For both students and lecturers, the following themes applied:

- General demographics (language, university enrolled/employed at, curriculum enrolled for/teaching)
- School demographics (students only)
- Technology availability to students
- IT competencies of students (students and lecturers to rate students)
- When MS Word, Excel, “other” ICT programs, data security should be taught in the accountancy curricula.

- Resources provided by the university to assist in mastering certain ICT competencies.
- Perceptions of what ICT should be mastered at school level (control question to be compared to what should be taught at university level responses).
- Current IT integration per module and per competency at university level.
- Basic knowledge of new ICT competencies as proposed by SAICA.

The specific questions included in these themes are further clustered into different sections. These questions and subsequent sections are discussed in more detail in Paragraph 4.7.1.

The general demographic information is firstly asked to ensure that the relevant participant groups that should be included in the data analysis can be identified and is discussed in more detail in Chapter 5, Paragraph 5.3.2. Secondly, these questions are used as a variable for statistical and quantitative analysis. This analysis is also discussed in more detail in Chapter 5.

With the use of Google Forms, data is downloaded in MS Excel format. This is the final step as outlined by Fan and Yan (2010:133), data collection by the researcher. The use of MS Excel eases the manipulation and coding of data to ease the analysis thereof. In order to enable the analysis of data, Pallant (2013:11) argues that data should be converted into a computer readable format.

4.7 STATISTICAL AND DATA ANALYSIS TECHNIQUES

This study followed an exploratory mixed-method research approach, as outlined in Paragraph 4.5.3.4. Initially focus is placed on literature, qualitative research, where shared themes were identified and resulted in the classification of categories for this study. These categories as outlined in Chapter 2 are [1] the implementation and the use of ICT in South Africa, [2] theories that had an impact on this study and [3] SAICA ICT competency requirements. These categories were instrumental in the development of the questionnaire used in the collection of data, quantitative research. This is discussed in more detail in Paragraph 4.7.1.

Modisane (2018:117), in support of Sekaran and Bougie (2010:140) argue that to confirm the validity of the statistical analysis the statistical reliability needs to be analysed. This is achieved through the measurement of Cronbach's alpha coefficient. Pallant (2013:101) outlines that the scales selected to be included in a study needs to be reliable. For this study Cronbach's alpha coefficient was measured on the questions with the same number of Likert scales (Annexure B). Hair *et al.* (2010:125) explain that this outlines how well the different items match each other in their measurement of varying aspects of the same variable.

George and Mallery (2003:231) and Kline (2000:132) set an acceptable level at higher than 0.6. A summary of the different variables on which Cronbach's alpha coefficient was performed is

discussed in more detail in Chapter 5, Paragraph 5.4.1. Pallant (2013:107) explains that after the validity of the statistical analysis is determined, data analysis can be performed on the strengths between two continuous variables through Pearson's correlation. Babbie (2016:94-95) identifies two purposes for correlation. Firstly, the positive or negative impact and secondly the strength of the relationship between the variables can be identified. This study explored the strengths between two variables. This is discussed in more detail in Chapter 5, Paragraph 5.4.1 and 5.4.2. Lastly, the patterns, frequencies or proportions of cases that appear in each category were considered. Pallant (2013:218) explains that this is based on the cross-tabulation table. The result of this comparison is a chi-square. This is discussed in more detail in Chapter 5, Paragraph 5.4.3.

In order to report on and analyse the data obtained from the questionnaire responses, whether qualitatively or/and quantitatively, the data first need to be converted into statistical information. Pallant (2013:1) states that subsequent to data collection, that data need to be prepared for statistical analysis. Modisane (2019:13) utilised the Statistical Package for Social Sciences V24.0 (SPSS) (IBM SPSS, 2014) and MS Excel as statistical analysis tools. Before SPSS can be used to analyse and interpret information obtained data first need to be coded. This is discussed in more detail below.

4.7.1 Data coding process

Babbie (2016:26) argues that all observations start out as qualitative. This includes the check mark on a questionnaire. He further states that since it is not numerical in nature, converting these check marks into a numerical form could prove to be useful. Creswell *et al.* (2010:110) and Welman *et al.* (2005:213-214) state that collected data should be reduced to text that is manageable and understandable. De Vos *et al.* (2018:404) relate this to reducing the data. This can be achieved through quantifying data. It allows data to be combined, equated, and summarised easier (Babbie, 2016:26). Babbie (2016:412) and Kreuger and Neuman (2006) agree that quantification means converting data into "a machine-readable form". They state that in order to analyse data it first needs to be coded to ensure it is numerical in nature to allow the different statistical analysis to take place. Welman *et al.* (2005:214) are of the opinion that the main aim of this is to reduce the number of responses into limited variables. Henning (2004:104-114) concludes that there are a wide variety of data coding methods. Babbie (2016:412) explains that with the wide variety of responses available the researcher should code or decide on variables "appropriate to the theoretical concepts being examined in the study".

De Vos *et al.* (2018:411) argue that when research follows the grounded theory approach, as is the case for this study (refer to Paragraph 4.3.1), the three main data coding methods that can be applied namely open coding, axial coding and selective coding. Stumke (2014:75) supported

by Wiesche *et al.* (2017:688) describes open coding as the process where codes are developed as literature is reviewed. Strauss and Corbin (1990:96-97) describe axial coding as the process where data are replaced in new manners after open coding occurred. De Vos *et al.* (2018:413) point out that when grounded theory is applied, open and axial coding are used alternatively.

Lastly, selective coding is defined by De Vos *et al.* (2018:413) as the systematic process whereby the core categories of data are selected and further developing and refining categories not yet finalised. Even so, Strauss and Corbin (1990:58) postulate that the different data coding types are used interchangeably due to the lines between them being artificial. This study applied all three of these data coding methods in the sense that through literature several categories were identified. This enables the design of the questionnaire to cover the relevant categories as identified in literature.

Babbie (2016:413) emphasises that even though data coding is applied, as much detail as possible should always be kept. The rationale behind this is due to the fact that data coding categories can always be combined during analysis when less detail is required. Babbie (2016:414) contests that irrespective of the data coding chosen for a study it should correspond to the study's purposes and reflect the logic that comes forth from the data itself. However, it is important to code close-ended questions so that the categories are both rigorous and mutually exclusive. Deduced from this is that a code should only fit into one category.

For this study, and due to the fact that grounded theory was applied, in the literature review and through open, axial and selective coding, Table 4-9 Summarises the different categories identified linked to the different coding methods as outlined above.

Table 4-9: Open, axial and selective coding applied to this study

OPEN CODING: Code literature as it is being reviewed	AXIAL CODING: Open coding placed into new manners	SELECTIVE CODING: Further develop and refine core categories
Implementation and use of ICT in South Africa.	➤ Poverty and inequality ➤ Schools ➤ Universities and transformation ➤ Employer expectations in terms of the change in the work environment and the world	➤ Demographic information ➤ ICT exposure at high school ➤ Encounters and use of computers
Theories that had an impact on this study.	➤ TAM ➤ Maslow's ➤ Bloom's ➤ Curricula development	➤ Perceptions of when and how ICT should be integrated into the core accountancy modules
SAICA ICT competency requirements	➤ SAICA CF ➤ CA 2025 ➤ 4IR ➤ Gap: Employer expectations vs ICT being integrated in the accountancy curriculum	➤ Knowledge of new SAICA ICT competencies and general perceptions

Source: De Vos *et al.* (2018:411, 413); Strauss and Corbin (1990:58, 96-97); Stumke (2014:75); and Wiesche *et al.* (2017:688), adapted

These codes, which emerged from Table 4-9, were instrumental in the development of the questionnaire. Inferred from the categories identified in Chapter 2 and 3 by means of open and axial coding (Table 4-9), the questions set in the questionnaire were of such nature that it would result in more measurable data. Similarly, the categories identified in the questionnaire were as a result of the categories in Chapter 2 and 3 being analysed further to group all the and only those phenomena relevant to one another, selective coding (Table 4-9). The detailed selective coding themes identified in Chapters 2 and 3, represented in the self-developed questionnaire, are as follows:

- Section A – Demographic information
 - General demographics (language, university enrolled with/employed at, curriculum enrolled for/teaching)
 - School demographics (students only)
- Section B – ICT exposure at high school
 - School ICT demographics (students only)
 - Perceptions of what ICT should be mastered at school level (control question to be compared to what should be taught at university level responses).
- Section C – Encounters and use of computers
 - Technology availability to students
 - Resources provided by the university to assist in mastering certain ICT competencies.
- Section D – Perceptions of when and how ICT should be integrated into the core accountancy modules.
 - IT competencies of students (students and lecturers to rate students)
 - When MS Word, Excel, “other” ICT programs, data security should be taught in the accountancy curricula.
 - Current IT integration per module and per competency at university level.
- Section E – Knowledge of new SAICA ICT competencies and general perceptions

Once all the data are collected from participants, Babbie (2016:414-415) and Kreuger and Neuman (2006:394) agree that a codebook is a useful tool to use to ensure that the data coding process is guided and to ensure that codes can be located and interpreted during analysis. This process is discussed in detail in the following paragraph.

4.7.2 Codebook/Code sheet

Kreuger and Neuman (2006:394) suggest that a code sheet should also be kept when data are placed into different themes and categories. Similarly, Pallant (2013:11-14) refers to this as a codebook. This is the set of rules by which certain numerical values are assigned to variable attributes. De Vos *et al.* (2018:252) emphasise that, with regard to the code sheet, it is important

that every response, including non-responses, are coded. With regard to this study, respondents were required to answer every question. Consequently, non-responses are not applicable, but an option was added where the respondents could select a not applicable option if the question did not apply to them. Presumed from this, all the questions in the questionnaire from all the respondents should have a response that can be coded.

When combining the codebook and code sheet, the main categories that should be present are the questions, codes assigned to each question and the value assigned to each response. The code sheet for this study, taking into consideration the specifics of a codebook, as outlined by Pallant (2013:11-14) include the question number, the code name, variable name, full name, questionnaire question and the data coding instructions. This allows for the analysis and manipulation of the data in both SPSS and MS Excel since the data were downloaded into a MS Excel format.

The questions included in the questionnaire are firstly grouped based on Section A–E. Subsequently. The questions posed to students and lecturers are grouped as "S", representing students, and "L", representing lecturers. Where similar questions are posed to both groups, the question is only included once with the question number indicating "S,L". The code names are based on the section the question falls. For example, all Section A questions will start with A. The variable name is a short descriptive abbreviation of the full variable name. The questionnaire questions are also included in the event that more clarity is needed on what the question deals with. Finally, the responses are assigned data coding instructions. As outlined in Table 4-8 above, this is where a response is assigned a number. The data coding instructions for this study starts at "0", representing either "Not applicable", "Do not include", "None of the above" or "Don't know". For most of the questions, the data coding instruction stops at 5/6, except for the language and ICT competencies to be included questions, which all end at "11". A detailed layout of this is available in Annexure A.

Subsequent coding of the questionnaire responses, the data can now be analysed and interpreted. The analysis of data obtained through primary data by means of questionnaire responses that were developed based on the analysis of secondary data is discussed in detail in Chapter 5.

4.8 PRIMARY AND SECONDARY DATA SOURCES

This study followed a mixed-method research approach and more specifically an exploratory analysis. This entailed the review and analysis of literature, qualitative analysis followed by a quantitative approach, in this case, the administration of a self-developed questionnaire.

With regard to the literature review, the views and research from both global and local experts were utilised. This enabled the study to follow a structured approach to identify the categories relevant to this study. Subsequent to the literature review, a self-developed questionnaire was developed and circulated to university students and lecturers. With a few exceptions in the demographics of the participants, a Likert scale ranging between four (4) to six (6) was used in the questionnaire. Furthermore, only close-ended questions were asked.

De Vos *et. al.* (2018:113) argue that data should never be collected at the expense of someone. They emphasise that a research project should progress in an ethically correct manner.

4.9 ROLE OF RESEARCHER AND ETHICAL CONSIDERATIONS

De Vos *et. al.* (2018:114) define ethics as follows: “Ethics is a set of moral principles which is suggested by an individual or group, is subsequently widely accepted, and which offers rules and behavioural expectations about the most correct conduct towards experimental subjects and respondents, employers, sponsors, other researchers, assistants and students”. Modisane (2019:106) argues that researchers should continuously acknowledge and evaluate the influence they have on the research.

Several researchers have identified the main considerations that should be kept in mind when conducting research. They can be summarised as follows:

- Anonymity of participants (Alston & Bowles, 2003:28; Morris, 2006:246)
- Avoidance of harm (Babbie, 2007:27; De Vos *et. al.*, 2018:115-11)
- Voluntary participation (Rubin & Babbie, 2005:71)
- Informed consent (Grinnell & Unrau, 2008:37)
- Confidentiality of information (Modisane, 2019:107)

All the considerations mentioned above were adhered to in the development and administration of the questionnaire. All of the above-mentioned considerations were taken into account throughout the development and distribution of the questionnaire and the collection of data. No contact details, except where a participant opted to be considered for the lucky draw, were collected. The collected information, email addresses, are kept safe by means of a password-protected file and was only used to contact the lucky winner of the incentive. Harm to the participants was avoided by means of not identifying the participants in person and not asking any personal questions. The voluntary participation, consent and confidentiality of the information was cautiously emphasised in the introduction of the questionnaire. This is discussed in detail in Paragraph 4.6.3. In order to highlight the main ethical considerations both qualitative, literature review, and quantitative, questionnaire distribution, were considered.

The literature review was conducted on published, publicly available information, as discussed in Chapter 1, Paragraph 1.4.1. Since the information is not confidential due to its availability, as proposed by Cassim (2014:46), Kumar (2014:196) and Struwig and Stead (2001:80), the anonymity of participants, avoidance of harm, voluntary participation, informed consent and confidentiality of information did not pose a threat to this research. Where document review was performed, care was taken not to identify the two universities involved in the completion of the questionnaire.

The questionnaire, however, involved the views and perceptions of both students and lecturers. Due to the sensitivity of the information, care was taken to obtain the necessary ethical clearance from the two universities involved in answering the questionnaire before circulation thereof. As indicated in Paragraph 4.6.3 the aim of the questionnaire together with information on how anonymity of participants, avoidance of harm, voluntary participation, informed consent and confidentiality of information is assured are clearly outlined at the start of the questionnaire, before any questions are answered (Annexure A).

The development of the questionnaire, and the collection of data through literature review all links to the development of a competency framework, known as the ICTM for this study. In the development of a competency framework, the available methodologies should be considered. The methodologies available for the development of a competency framework are discussed in more detail below.

4.10 METHODOLOGIES IN LITERATURE FOR THE DEVELOPMENT OF A COMPETENCY FRAMEWORK

In order to address the main objective of this study, to develop an integrated ICT competency framework for prospective accountancy professionals, the most appropriate approach for this study had to be chosen. This aided in the collection and analysis of data relevant to the development of the ICTM. Modisane (2019:108-110) outlines that there are four main methods that can be followed in the development of a competency framework, [1] the research-based method, [2] the strategy-based method, [3] the value-based method, and [4] the practical method. Modisane (2019:108-110) is the main reference in this section due to the recentness of his research with regard to ICT competencies within the accountancy field.

The seminal method, the research-based method, as outlined by McClelland (1973:1) and Spencer and Spencer (1993:73) is also referred to as the traditional approach. Briscoe and Hall (1999:44) argue that this method entails the interviewing of high performers in an organisation. They further conclude that the weakness of this method is that emphasis is placed on the behaviour of previous or current behaviour in shaping the competencies of prospective

professionals. Since this study focuses on prospective accountancy professionals with 4RI in mind, this approach is not suitable as it focusses on past and current behaviour.

Cardy and Selvarajan (2006:235) state that the strategy-based method rests on the development of competencies for the future, the unknown. As much as this is a futuristic approach, not just focussing on the past, but striving to anticipate the future, Modisane (2019:109) points out that this is also this method's main flaw, that it attempts to cater for the unknown. Briscoe and Hall (1999:45) reason that one cannot always anticipate the future with sheer certainty. As such, this method is not applicable to this study as it does not attempt to predict the unpredictable, but rather equipping prospective accountancy professionals with the competencies needed now to enable them to thrive in the accountancy field and also to build on those ICT competencies as and when the opportunity or need presents itself.

Spurgin (2004:281) explains that the value-based method focusses on the ethical competencies within a business environment. Cardy and Selvarajan (2006:235) argue that these are the competencies that create the morals and ideologies that an organisation wants to be known for and wants to support. Since this study focusses on ICT competencies that can be implemented in the workplace, it focusses less on ethics and more on the application of competencies. Therefore, this method is also not applicable to this study.

Whiddett and Hollyforde (2003:33) indicate that the practical method, the method selected for this study, is where the significant competencies components required for a particular role are identified. Armstrong (2006:23) explains that this is the less complicated way of defining competencies required as it is abridged without complex methodologies or procedures. Whiddett and Hollyforde (2003:33) summarise this method in four steps: [1] preparation, [2] collection of information, [3] compilation of the framework, and [4] rolling out of the framework.

Armstrong (2006:23) indicates that the first step, preparation, is where the purpose of the framework is defined. Modisane (2019:110) explains that this step includes the key individuals of the study. For this study, the purpose is the development of the ICTM for prospective accountancy professionals. This is done through consultation of key individuals in the form of prospective employers, SAICA and universities. Whiddett and Hollyforde (2003:33) argue that the second step, collection of information, is the most extensive and onerous step of the development of a framework. Modisane (2019:110) concludes that this step is where the analytical procedures are chosen, the collection of data is performed and the preparation of the data for analysis and interpretation is done. Whiddett and Hollyforde (2003:33) identify that the data collection methods used in this step can be a mixture of any interviews, questionnaires and group sessions.

Modisane (2019:110) argues that the third step, compilation of the framework, is where data collected is analysed, the framework is drafted and evaluates and reviewing and concluding on the competencies. For this study, the data analysis gathered from the questionnaire is analysed in Chapter 5. Furthermore, the development, reviewing and concluding of the framework, the ICTM, are discussed in detail in Chapter 6. Whiddett and Hollyforde (2003:33) describe the last and final step as the rolling out of the framework. As identified by Modisane (2019:110) it is wished that the professional bodies will make use of and implement at least some of the findings from his research. It is an aspiration that at least some institutions will be encouraged to implement the ICTM to equip their prospective accountancy graduates with the basic ICT competencies for the accountancy field.

Since the implementation of the framework cannot be guaranteed, this study adapted Step 4 and developed ICT model-specific assignment learning outcomes within the four core accountancy modules in line with the already established module outcomes and in line with RBT, taking into consideration the time currently being spend on assignments. The four steps can be summarised as illustrated in Figure 4-8.

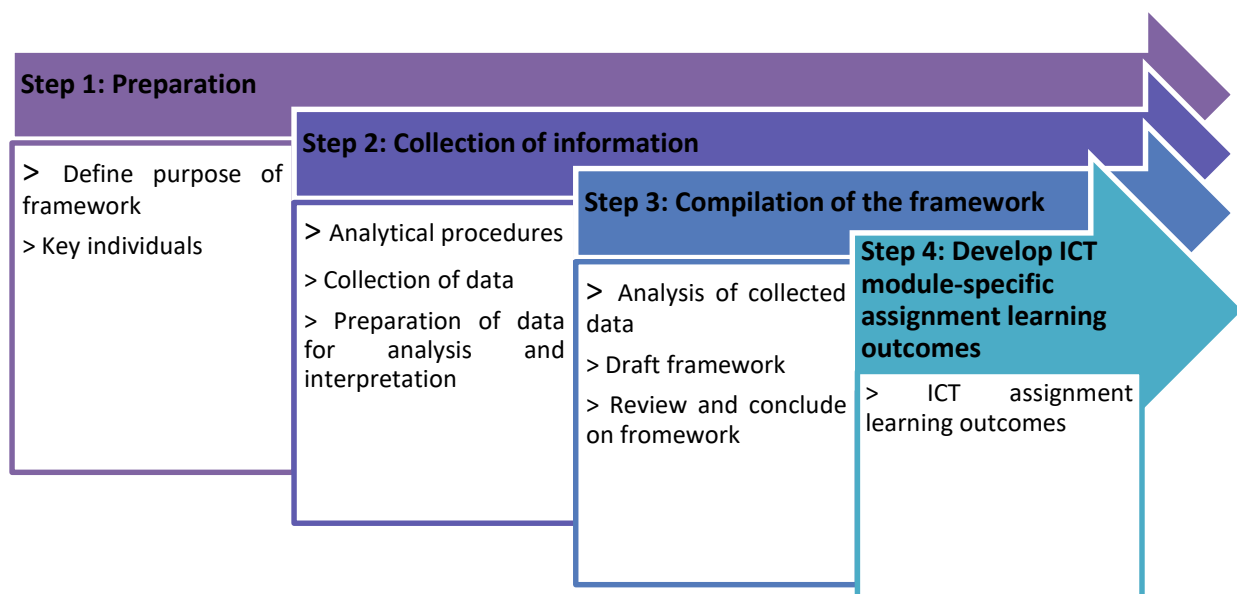


Figure 4-8: Practical method steps

Source: Armstrong (2006); Modisane (2019:111-112); and Whiddett and Hollyforde (2003), adapted

In conclusion, the practical method was the best fit for this research study as it follows the approach of identifying the important competencies components required for a particular role, in

this study the specific ICT competencies of a prospective accountancy professional. The four steps as outlined above of the practical method are discussed in detail in Chapter 6.

4.11 CONCLUSION

This chapter's purpose was to explain the research design and methodology used to answer the research question and the methods used to implement the research design of this study as outlined in Chapter 1, Paragraphs 1.2. The conclusion drawn from the literature discussed above, and also applied to this study, is that the research design for social sciences is underpinned by applied research and the research dimensions, ontology, epistemology and research methodology. Both reasoning approaches, inductive and deductive (Paragraph 4.3.1), can be applied with the exploratory mixed research method, comprising both qualitative and quantitative research methods, and is supported by the pragmatist research paradigm.

The literature suggests that data collection for qualitative research is unstructured and is achieved through document review and the analysis of secondary data. For quantitative data collection a structured method was followed utilising a self-developed questionnaire. Furthermore, different sampling methods were discussed by the different authors, but the appropriate sampling method applied for this study for the qualitative research method is purposive sampling and for the quantitative method, simple random sampling is appropriate.

Both qualitative and quantitative statistical data analysis were discussed since this study follows an exploratory mixed research method approach.

Concluded from the literature quoted is that research design follows a somewhat systematic approach with different research methodologies, adopted for by the researcher to suit the study performed. Following the identification and outline of the quantitative research and sampling methods used, the data collected through the self-developed questionnaire are analysed and interpreted in Chapter 5.

CHAPTER 5

DATA ANALYSIS

5.1 INTRODUCTION

The purpose of this chapter is to perform qualitative, quantitative and descriptive statistical data analytical methods to address the empirical objectives of this study as outlined in Chapter 1, Paragraph 1.3.2.2. The analysis was performed on the data obtained from the self-administered questionnaire, as outlined in Chapter 4, Paragraph 4.6.3.

Firstly, the number of responses obtained from U1 and U2 are discussed and further analysed. This is to ensure that only valid responses are included in the data analysis. In addition, the exploratory mixed-method research design, where qualitative research statistics (frequency tables and figures) are performed sequentially followed by quantitative research statistics (cross-tabulation, correlation and other), as outlined in Paragraph 4.5.3.4 are discussed. Secondly, the qualitative data obtained from different sections, as identified in Chapter 4, Paragraph 4.7.1 are discussed and analysed accordingly. The results and findings based on the analysis are also included under each section reference. Thirdly, the quantitative data as analysed and interpreted through the use of SPSS are discussed. Here correlations and relationships between different questions of the self-administered questionnaire are elaborated on.

The effect of the analysis of the data obtained from the self-developed questionnaire on Maslow's hierarchy of needs, RBT, SAICA, employer needs and TAM are discussed where applicable and a summary of the relevant findings are summarised in Table 5-8. Reference is also made to the impact, contribution and relevance of the different comparisons, analysis and mention of data to the development of the ICTM, that are discussed in more detail in Chapter 6.

Figure 5-1 below illustrates the different topics that are discussed in Chapter 5.

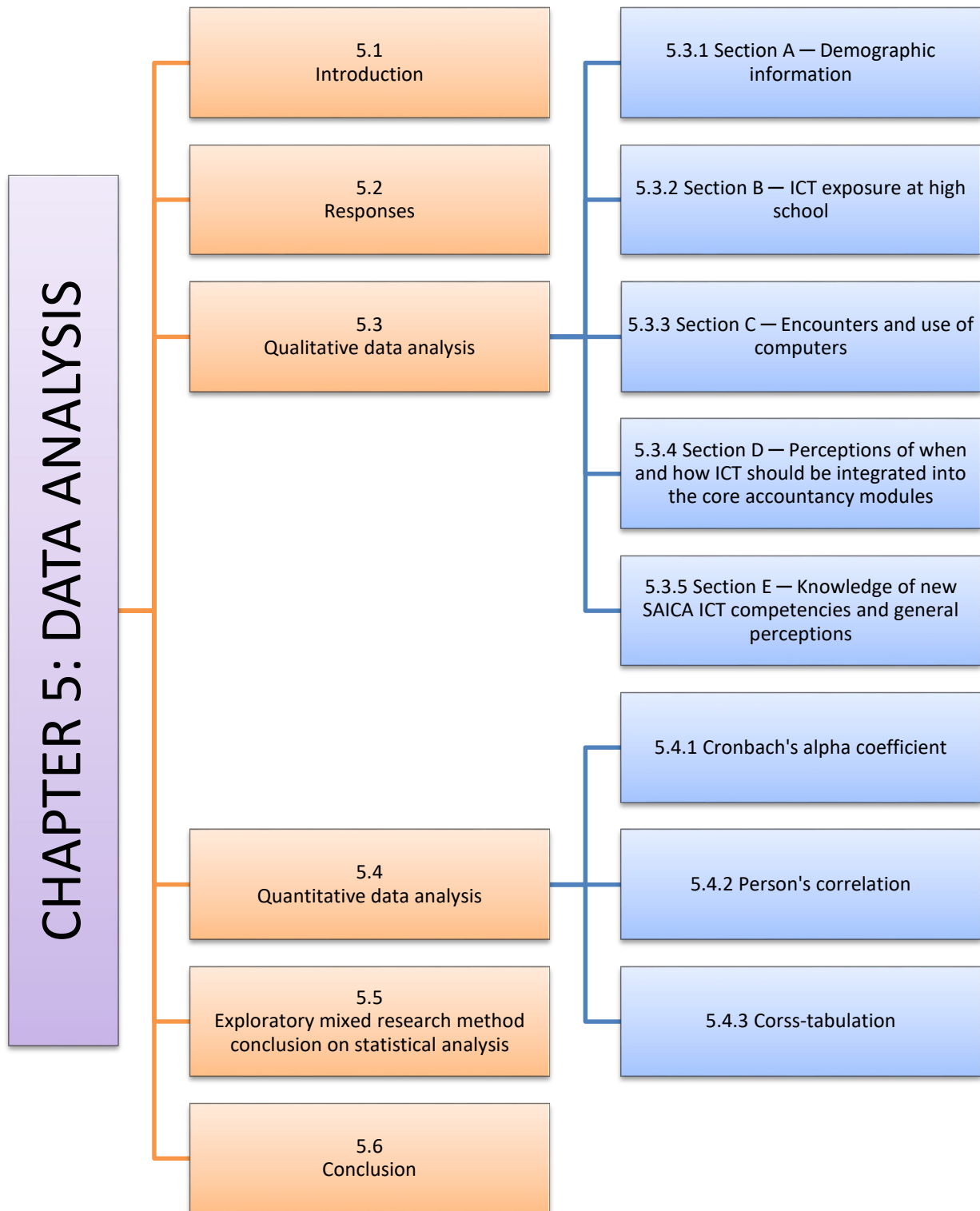


Figure 5-1: Chapter 5 discussion layout

Source: Summary of paragraphs below

5.2 RESPONSES

This study focusses on ICT integration into the accountancy curriculum. Responses from students and lecturers of two universities were collected to aid in the development of an ICTM.

As discussed in Chapter 4, Paragraph 4.6.3, the department heads of the two selected universities (U1 and U2) received an initial request to place the cover page and link to the self-developed questionnaire on their respective accountancy LMS systems for students and lecturers to complete. The initial requests included a due date for the completion of the questionnaire. A second, reminder request, was also sent to both universities closer to the due date. The response rates per university, U1 and U2, and per response group, students and lecturers, are summarised in Table 5-1.

Table 5-1: Questionnaire response rate per university and per response group

SAMPLE DETAILS	LECTURERS		STUDENTS		TOTAL		OVERALL SAMPLE TOTAL
	U1	U2	U1	U2	Lecturers	Students	
Total target population	25	25	1 634	3 588	50	5 222	5 272
Responses – initial request	2	6	161	131	8	292	347
Responses – after reminder	7	0	23	17	7	40	
Total response rate	9	6	184	148	15	332	6,6%

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Table 5-1 outlines that out of a target population size of 5 272, 347 responses were received, totalling a sample size of 6,6%. Converse *et al.* (2008:100), Ebert *et al.* (2018:1), Saleh and Bista (2017:64) and Sills and Song (2002:22) indicate that web-based questionnaires face the expected restriction of lower response rates. Pradhan (1999:41) points out that web-based questionnaires can even expect a 0% response rate. Boncheck *et al.* (1996) reported response rates of 8% and 6% for top-level and follow-up surveys. Similarly, Dey (1997:215) and Fan and Yan (2010:132) report a decline in the response rates among students. Silva and Durante (2014:307) suggest that the reason for the decline in the response rates of web-based questionnaires is due to the fact that respondents utilise the internet for entertainment and are not interested in answering questionnaires. Krosnick (1999:540) points out that questionnaires with a low response rate are viewed as being more accurate than those with a high response rate.

Similarly, studies performed by means of internet or online surveys, for example Fourie (2014:135) and Modisane (2019:102) reported very low response rates 1,79%, and 0,53%, respectfully. Taking into consideration the expected low response rates as indicated through literature and as evident from the studies mentioned above, the 6,6% response rate achieved for this study was considered sufficient to further analyse and report on.

Before this percentage can be accepted or rejected as acceptable, the responses had to be scrutinized to ensure that they represent valid responses. For this study, invalid responses represent one of the following three categories. Firstly, responses from students and lecturers not studying or working at U1 or U2. A question was included in the questionnaire including all the SAICA-accredited universities. Respondents had to select the relevant university where they are currently studying or teaching. The data did not reveal any students or lecturers that are not studying or teaching at either U1 or U2.

Secondly, any student or lecturer not studying or lecturing modules within the accountancy field, for example Law, Economics, Mathematics or Risk Management degrees are also excluded from the collected data. A question was included listing all the possible accountancy modules relevant to U1 and U2. The data revealed eight students enrolled for a curriculum not listed as one of the accountancy curricula. The excluded students represent students studying towards a degree that include Accounting at some point in time through their curricula, but not studying towards a pure accountancy degree.

As a final elimination step, any responses that can be identified as unreliable, in this case where all options for a particular question were selected that contradicts one another, was excluded. Korn (2015) argues that if an inconsistent answer is present in a sample, the safest option, statistically would be to delete the item. The questions that assisted to identify unreliable responses was the question on when a specific ICT competency should be included in a module and the response included all of the following options: [0] do not include this competency in the module; [1] 1st year; [2] 2nd year; [3] 3rd year; [4] 4th year, if a four-year degree; and [5] honours. It is clear from this response that the participant only selected all the options without reading the questions. The response was further scrutinized to identify if this type of response was an isolated incident or if it occurred for more than one question. It was clear that this was not the only question where all options were selected that contradicted one another. Subsequently, the responses of 10 students were excluded based on the above-mentioned unreliability criteria. A final summary of the usable and reliable sample size is summarised in Table 5-2.

Table 5-2: Final sample size after elimination process

SAMPLE DETAILS	STUDENTS	LECTURERS	TOTAL
Total target population	5 222	50	5 272
Total responses before elimination process applied	332	15	347
Criteria 1: Not U1 or U2	-	-	-
Criteria 2: Not accountancy	(8)	-	(8)
Criteria 3: Unreliable responses	(10)	0	(10)
Final sample size	314	15	329
Final sample size %	6%	30%	6,2%

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Table 5-2 concludes on a final total sample size of 6,2%. This is significantly higher than the sample size obtained by Modisane (2019:102-103) of 0.53% who performed a similar study focussed on university responses. Based on this, the 6,2% response rate was accepted as sufficient to further analyse and report on in the development of the ICTM. If this percentage is compared to what is outlined by the guideline of Stoker (1985), Chapter 4, Paragraph 4.6.2.1, the responses that would be acceptable with the number of participants in the target population (5 222) would be 14% (140 responses). Since the response rate for this study is 44%, significantly higher, it is deemed to be acceptable based on previous research and the guideline as set out in literature.

From this point forward, the students and lecturers who participated in this study are referred to as respondents, since they responded to the questions. The number of student respondents is referred to as n=314 and the number of lecturer respondents is referred to as n=15 (Table 5-2).

The rest of this chapter focuses on interpreting and analysing the data obtained from the questionnaire. This is made possible through the data coding process applied, as outlined in Chapter 4, Paragraph 4.7.1. The graphs and figures represented were created using MS Excel and SPSS, based on the codebook and code sheet available in Annexure B.

5.3 QUALITATIVE DATA ANALYSIS

The qualitative data analysis portion of this study stems from the themes identified in Chapters 2 and 3. The themes were included in the self-developed questionnaire. Subsequently, the information contained in Sections A–E as grouped for the questions contained in the questionnaire, outlined in Chapter 4, Paragraph 4.7.1, is discussed, analysed and interpreted in more detail below.

5.3.1 Section A – Demographic information

The questions included in this section focusses on both student and lecturer home language, university enrolled/employed at, enrolled curriculum or curriculum teaching, academic year enrolled for or academic year teaching. Then specific to students, only the year matriculated, type of school matriculated from and the language of the available school materials were asked. This is discussed in more detail below.

Firstly, as mentioned in Paragraph 5.2, the university enrolled/employed at and the enrolled curriculum or curriculum teaching were asked as a control question and no details regarding this are divulged in this study. This enables the researcher to eliminate any participant not included in the target population, U1 and U2 in the accountancy field. Thus, these questions have no statistical purpose and were not discussed or analysed further.

Next, respondents were asked to indicate what their home language is. The rationale behind asking home language is to identify the range of the sample obtained in terms of ethnicity. The 11 official South African languages were listed in alphabetical order with the additional option to indicate any "other" language. The listed languages were [0] Other, [1] Afrikaans, [2] English, [3] IsiNdebele, [4] IsiXhosa, [5] IsiZulu, [6] Sepedi, [7] Sesotho, [8] Setswana, [9] SiSwati, [10] Tshivenda and [11] Xitsonga. This was done to avail foreign respondents the opportunity to indicate their home language that falls outside the official South African language. The responses are summarised in Figure 5-2.

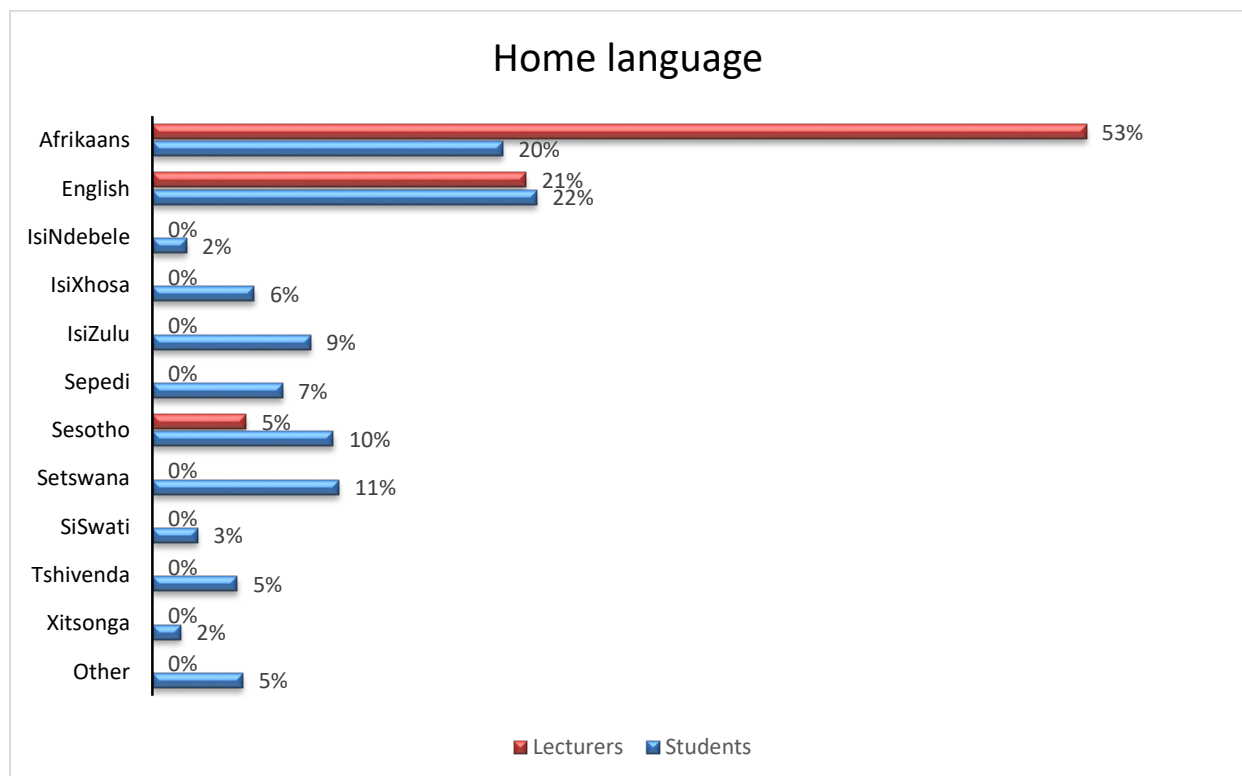


Figure 5-2: Home language (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-2 outlines that the majority of the respondents to this study's questionnaire speaks either English or Afrikaans. Most of the respondents are represented in these two languages. The anomaly between the two groups is the representation of the other languages. Lecturers are only repetitive in one other language, Sesotho, with students falling within all the other languages, even "other", which includes French, Ndonga, Sona, Cibemba, Gujarati, to name a few. With this in mind the sample may not be representative of the South African student population that will become accounting professionals. This fact is highlighted as such as a limitation to this study in Chapter 7, paragraph 7.9. This is not indicative of anything but is an indication that most of the

respondents understood and could answer the English questionnaire. Also prevalent from Figure 5-2 is that a wide range of culture diversity was obtained.

Following the home language, respondents had to indicate the year of academic enrolment for students. Similar to the home language question, the year of academic enrolment serves as an indication of the range of the sample obtained in terms of academic year. Respondents could select one of five options: [1] 1st year, [2] 2nd year, [3] 3rd year, [4] 4th year (if a four-year degree/diploma); and [5] honours. Option [4] was included to ensure all lengths of degrees were taken into consideration. However, this option represents the final year of study to obtain a degree. Subsequently, the 3rd and 4th year (if a four-year diploma/degree) responses are referred to as the final year of study. Therefore, only an outline of how many 1st, 2nd, final year students (3rd and 4th year (if a four-year diploma/degree)) and honours students are illustrated. The responses are summarised in Figure 5-3.

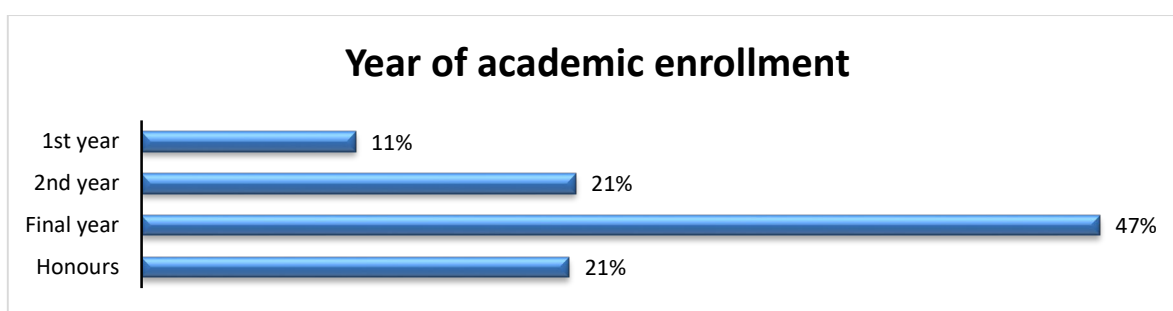


Figure 5-3: Year of academic enrolment (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-3 draws the attention to the year group represented most and least in this study. Only 11% of the respondents are currently enrolled for their 1st year of study. This contrasts with the 47% final year students that participated in the study. The 2nd year of study and honours year are equally represented in this study. For this study the final year respondents are considered as the more important participants as they have more knowledge of what is being done and what is expected of them in the accountancy curriculum compared to first years with little to no knowledge thereof. Thus, the representation of the first year and final year students are acceptable for this study.

Lecturers were also required to indicate the year levels they teach. This serves the same purpose of that from students, with the addition of the specific modules being taught. This is to determine the range of the sample obtained in terms of academic year and core modules being taught. Figure 5-4 illustrates the spread of the participating lecturers across the academic year levels and the four core modules.

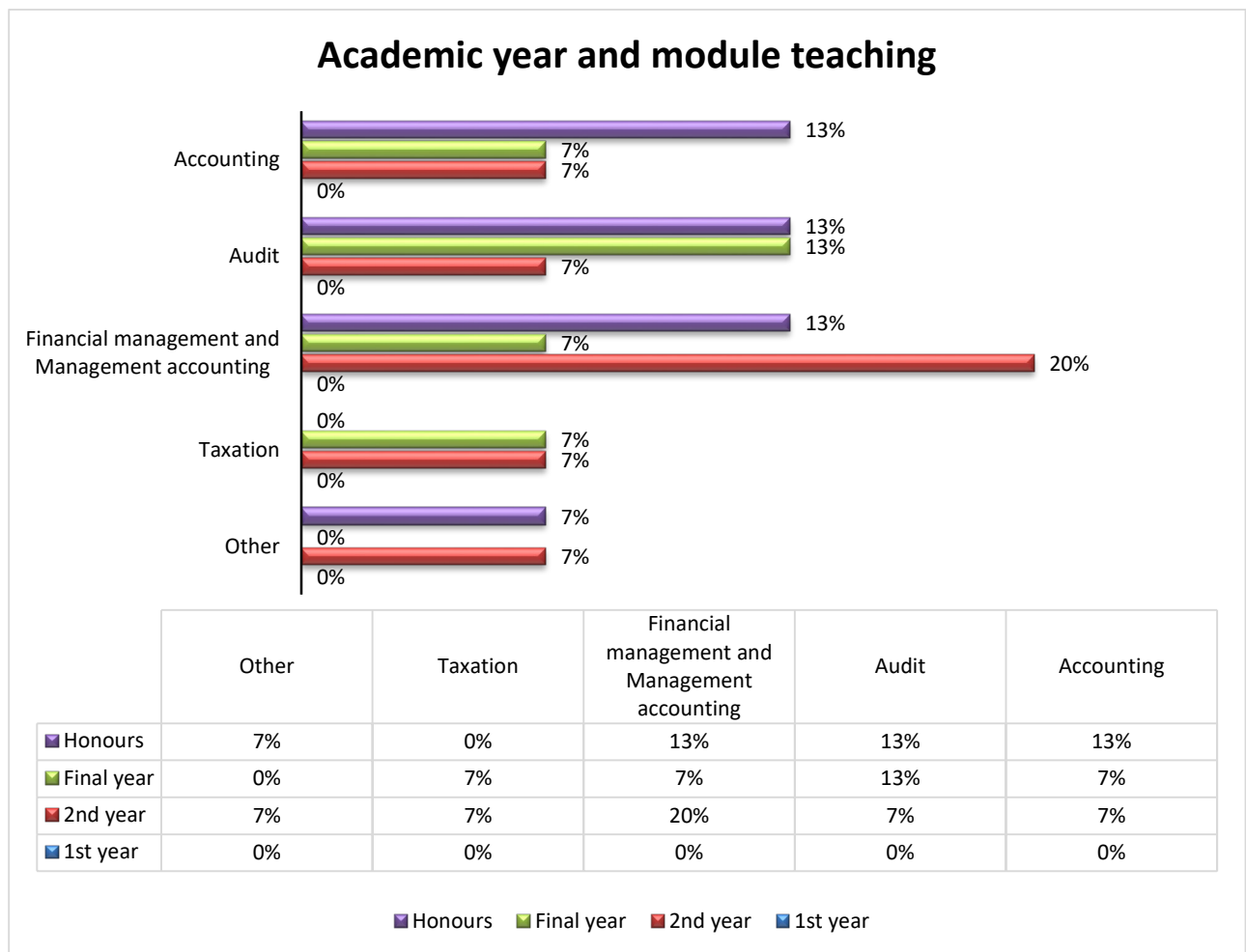


Figure 5-4: Academic year and module teaching (Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-4 outlines that lecturers teaching 2nd year students in Financial Management and Management Accounting is mostly represented at 20%. Secondly, the lecturers involved in teaching honours students in Accounting, Auditing and Financial Management and Management Accounting are also represented well at 13%. Taxation would appear to be the least represented module from the respondent lecturers representing only 7% of final and 2nd year of teaching.

In conclusion, the responses indicate that all academic year levels, except the 1st year, are represented. This is a limitation to the study as the importance of ICT within the 1st year of study is seen as important in the development of the ICTM based on a student's prior knowledge and exposure to ICT and 1st year lecturers would be able to identify any shortcoming and develop them where needed. This is listed as such in Chapter 7, Paragraph 7.9. Nevertheless, all four core modules, Accounting, Auditing, Financial Management and Management Accounting and Taxation are represented by the respondent lecturers.

The next questions in Section A pertain to students only. This is to establish the different schooling and subsequently ICT exposure, based on the type of schooling, received by students. It also had an impact on the perceived ICT competencies students believe they possessed when they matriculate. Furthermore, this information assisted in the integration of which ICT competencies, basic, intermediate or expert, at which year levels of study. The respondents' exposure to ICT at school indicates if there is a gap in ICT competencies when they enter university. If respondents did not have the opportunity to acquire and utilise ICT competencies at school level, one can assume that they will not possess the basic building block to accountancy ICT competencies when they enter university. This links to Maslow's hierarchy of needs and Bloom's taxonomy in basic needs need to be met first before the next need is considered and that knowledge on the basics should be mastered first before intermediate knowledge can be fostered.

Firstly, the type of school students matriculated from was considered. Here three different types of schools were identified: [1] Public: Fee-free school, [2] Public: Private school and [3] Private: Independent school. The first school type was considered being completely government-funded. No fees are collected from parents and all resources are obtained from the state. Just landed (2020) states that these schools are only found in the areas where poverty is high. The second school is where it is partially funded by government with parents paying a monthly school fee. The last school is where no funding is obtained from government and all fees and resources are funded by and paid for by parents. The main difference between these three schools are where Public: No-fee schools cater to the poorest and in contrast private schools cater to what is perceived the wealthy, as they can afford additional school fees above their daily living expenses. This study aims to identify the different students who participated in the study to identify possible anomalies between the different school group students in the exposure to, perception of and importance of ICT. This is discussed in more detail in Paragraph 5.4.3. Figure 5-5 illustrates the number of students per type of school matriculated from.

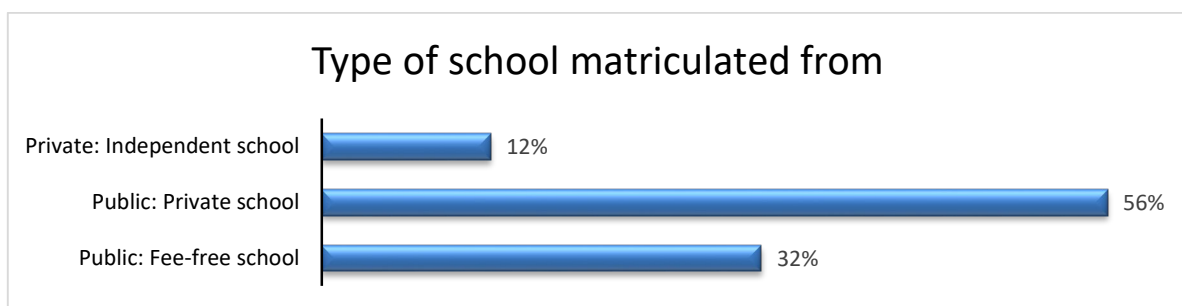


Figure 5-5: Type of school matriculated from (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Concluded from Figure 5-5 is that all three types of schools are represented in this study. The majority, 56%, representing Public: Private schools and the minority, 12%, representing Private: Independent schools. This led to the expectation that the majority of respondent students ($68\%=56\%+12\%$) would have had some exposure to ICT during their years at school.

The last question in this section required respondents to indicate in what language their school material was available in. This serves to indicate if students would be expected to at least understand university material in their modules represented in either Afrikaans or English. From all the respondents, 82% in English. Also, 18% of respondents received their method of instruction in Afrikaans. This is an indication that all students should at least understand ICT instruction, as it is English-based.

Subsequent to the type of school attended, the ICT exposure received at these schools and the perceived competency in ICT had to be considered to enable the researcher to identify a possible gap between perceived accountancy ICT competencies and what is expected by universities, SAICA and employers. This is discussed in more detail below.

5.3.2 Section B – ICT exposure at high school

This section only pertains to student respondents. Identifying ICT exposure at school enables the researcher to take into consideration the different demographics of students when they enter university. Irrespective of where students come from, when they enter university, they will be exposed to a standard level of knowledge specific to their university of choice. This may give rise to an ICT knowledge problem since some have prior knowledge of or no knowledge of ICT. The question as to what ICT exposure a student had at school had four options: [0] none of the above, [1] basic use of IT (MS Word, MS Excel, MS PowerPoint, etc.), [2] accounting and auditing computer applications and [3] CAT: Computer science and Information systems. Since the respondents could choose all the applicable options, the total number of answers totalled 347, being 33 more than the total number of student respondents. This is because some students selected more than one option. Care was taken to ensure that those respondents did not select option "0" and other options, since this was considered as an inconsistent answer, for one cannot have none of the above and other options. All responses were considered valid. The availability of the different ICT subjects at school is outlined in Figure 5-6.

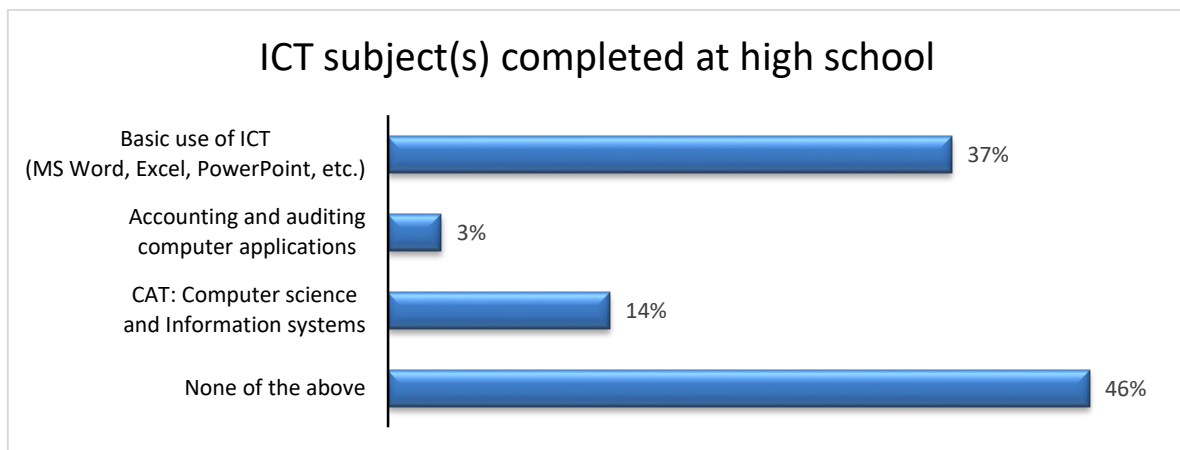


Figure 5-6: ICT subject(s) completed at high school (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-6 outlines that the majority of the respondents, 46%, did not complete any ICT related subject at high school. This raises concern as to the ICT competencies of students when they enter university. By contrast, 37% of respondents had at least exposure to the basic use of ICT. Basic ICT as included in the question refers to the basic accountancy ICT competencies covered by this study. It is thus expected that some of the students will be competent in basic accountancy ICT competencies when they enter university. A cross-tab is applied to further analyse and conclude on this in Paragraph 5.4.3. What is expected versus what is perceived may portray something different.

The perception of ICT competencies is sometimes seen as a personal reflection. Since students perceive themselves in the highest of orders, it is expected that they will perceive their ICT competencies when matriculating higher than what it actually is. The question was posed to the students to rate their own ICT competencies when they matriculated. Specific reference was not made to what specific ICT competencies are referred to. This was purposefully done to get the general perception of the respondents. One of the following four available option could be selected: [1] Novice – The use of IT is new to me, [2] Advanced beginner – I often use IT, [3] Proficient – I regularly use IT with ease, but still need some assistance and [4] Expert – I use IT daily with ease and am able to apply different technical aspects of the program without assistance.

The researcher is mindful that the type of ICT used may have distraught the answers to this question. Irrespective of the question referring to programs, if a student considers the use of ICT as the browsing of social media, instant messaging or browsing the internet, the ICT competencies could be rated as expert. Figure 5-7 outlines the responses from students.

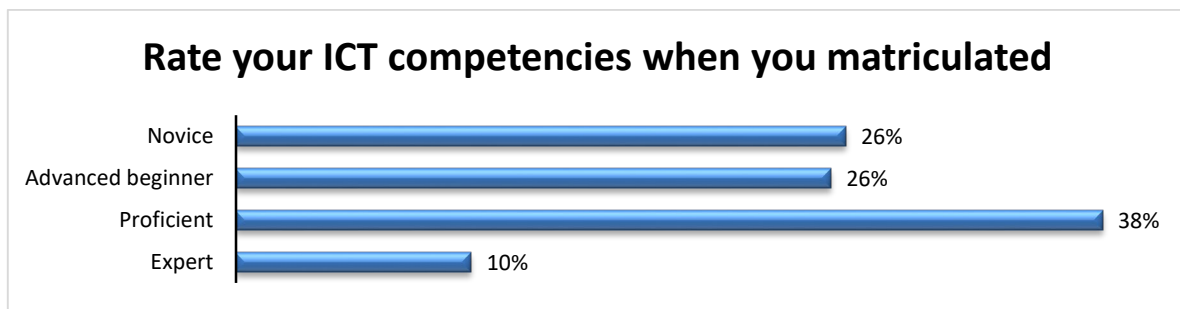


Figure 5-7: ICT competencies when matriculated (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

A surprising result from Figure 5-7 is that 52% (26% novice and 26% advanced beginner) of students consider themselves as beginners with regard to ICT competencies when they matriculated. This is in line with the results outlined in Figure 5-6, in that with 46% of students not being exposed to ICT as a subject in high school. This supports this study in that the exposure to ICT may be limited from school to university level. This finding was important in the development of the ICTM where Maslow's hierarchy of needs and RBT were considered to determine which needs have been met and the level of assessment starting at basic competencies.

In line with the exposure to and the perceived competency of ICT competencies, students were asked to indicate which ICT competencies they thought students should possess when entering university. The different options available were: [1] MS Word, [2] MS Excel, [3] MS PowerPoint, [4] Database software (MS SQL, MS Access, IBM Notes, etc.), [5] internet tools (Storage clouds, search engines, best practices), [6] Professional research tools (Scopus, EBSCOhost, JSTOR, etc.), [7] Sage Pastel; [8] CaseWare, [9] Other accountancy software, [10] Data security competencies and [11] New technology developments. These options are included in the revised SAICA CF (2019a:7) and include the basic expected ICT competencies (Option 1, 2, 3, 6, 7, 8 and 9) and those ICT competencies necessary in the 4IR (Option 4, 5, 10 and 11). As with the different ICT subjects completed at high school, this question required students to select all the relevant options. Due to this, the number of responses (1 171) superseded the number of respondents (314). The response per option, organised from highest to lowest, is illustrated as a percentage of the sample size of 314. The selected options are outlined in Figure 5-8.

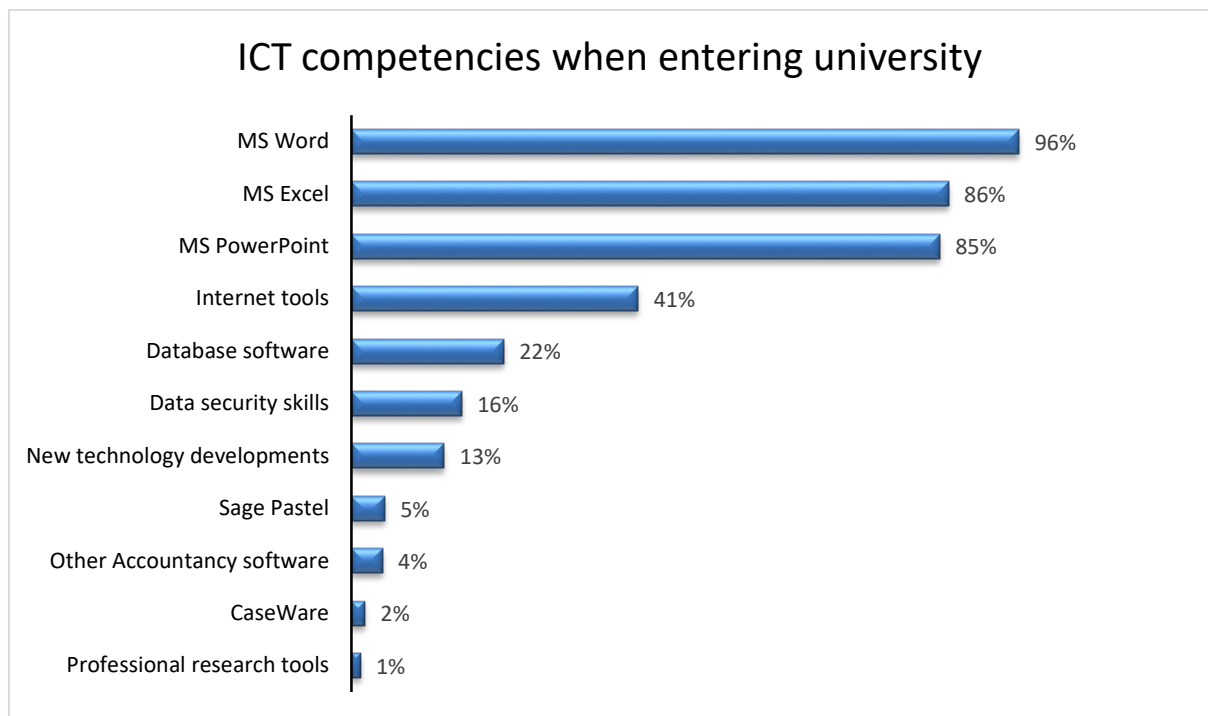


Figure 5-8: ICT competencies required when entering university (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-8 indicates a clear preference to the required ICT competencies when entering university. MS Word, followed by MS Excel and MS PowerPoint are the clear favourites of ICT competencies to possess when entering university, representing the view from student respondents in excess of 85% for all three computer programs. These competencies are in line with what is expected by SAICA and employers, as discussed in Chapter 3, Table 3-4. Also clear from the students' perceptions were the non-essential need for professional research tools, accountancy software, which includes CaseWare and Sage Pastel with all these options being represented at a rate of 5% and lower. The response was expected as these are specialised ICT competencies, specific to accountancy and is usually developed after school.

In conclusion, Section B identified the majority of student respondents did not do any ICT courses at school. Linked to this, 52% of students rated themselves as beginners with regard to ICT competencies when they matriculated. This is evidence of the required ICT competency integration level that should be considered when students enter university, being at a basic level since not all students were exposed to ICT or even at the same ICT level at school. Lastly it was concluded that students perceive MS Word, MS Excel and MS PowerPoint as the top three computer programs that should be taught to accountancy students. This is in line with the three ICT competencies identified in Chapter 3, Table 3-4.

Closely linked to a student's ICT competency and the ICT competencies when entering university is the further development of these ICT competencies. The availability of ICT modules and integration opportunities alone are not the sole driving force of what ICT competencies a student could and will master, but the availability of ICT resources, for example computers, Wi-Fi and ICT support staff, to name a few, could also play a significant role. The encounters and use of computers are discussed in more detail below.

5.3.3 Section C – Encounters and use of computers

In order to establish the opportunities where and how students have to further develop and practise their ICT competencies, the different places where they can access a computer (personal computer / laptop) were established. This same question was also asked to lecturers. This is considered important to determine the knowledge lecturers have on the accessibility to computers of students. This may cast light on why ICT is or is not integrated into the accountancy curriculum.

This section firstly required respondents to ask questions on the availability of ICT equipment. Firstly, from a student perspective realistically having access to the necessary "tools", being a computer, to integrate ICT. Secondly, from a lecturer's perspective in terms of expecting students to integrate ICT, based on their knowledge of the availability of the "tools" needed. This question required students and lecturers to select the different places where they (students) or their students (lecturers) have access to a computer. The six options available were: [0] I don't have access/Don't know where they have access, [1] home, [2] school/university, [3] gym, [4] internet café and [5] other places (these include parents, workplace, friend's house, residence/hostel, work and public library). Like previous questions with more than one option, this question required respondents to select all the relevant options resulting in the responses exceeding the respondents. Consequently, the options selected per category is reflected as a percentage of the responses rather than the respondents. Figure 5-9 outlines the different responses.

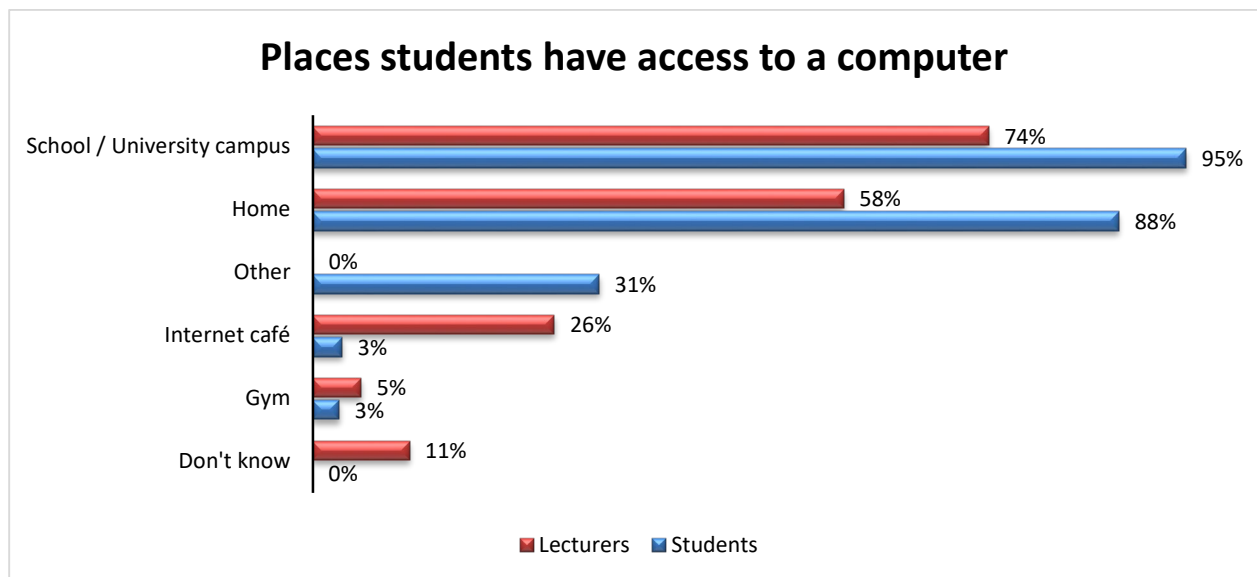


Figure 5-9: Places students have access to a computer (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-9 outlines that most of the students, from a student (95%) and lecturer perspective (74%), have access to a computer at university followed by access at their homes. Students also indicated that a number of them can access a computer at other places. The most prevalent anomaly is where only 58% of lecturers perceive that their students have access to a computer at home compared to the 88% of students who indicated that they do in fact have access at home. Another anomaly is the 26% of lecturers that perceive their students to access computers at internet cafés where only 3% of students indicated that this is the case. Also, 11% of lecturers indicated that they do not know where students access computers. The response from 0% of students that they do not have access to a computer indicates that the integration of ICT competencies would be possible since all the student respondents have access to a computer at one place or another. For the successful implementation of the ICTM it is crucial to know that all students will have access to a computer, being in different locations, to enable them to acquire and implement ICT competencies.

The implementation of ICT competencies during the start of the Covid-19 pandemic has sparked concern. The results in Figure 5-9 outlines that 95% of students have access to a computer on campus. This places the spotlight on how students are able to access online learning without access to campus due to the lockdown restrictions. This needed to be considered in the development of the ICTM in that the integration of ICT competencies should be of such a nature that students are able to perform the necessary tasks that require ICT with the minimum resources.

Additional to where a student can access a computer, the different devices they own were also considered. This could aid in the successful integration of ICT competencies in that if a student owns a device that would enable them to utilise ICT at their leisure, the integration opportunities could be created successfully outside the class environment at a student's own pace.

As with the previous question, this question was posed to both students and lecturers with a similar intention, firstly, from a student's perspective in terms of realistically having access to the necessary "tools", being a device, to integrate ICT competencies. Secondly, from a lecturer's perspective in terms of expecting students to integrate ICT competencies, based on their knowledge of the availability of the "tools" needed. This question required students and lecturers to select the different devices they own or have access to. The five options available were: [0] None of the above/Don't know, [1] Laptop/Notebook, [2] Desktop computer (PC), [3] Tablet, and [4] smartphone. Like previous questions with more than one option, this question required respondents to select all the relevant options resulting in the responses exceeding the respondents. Consequently, the options selected per category are reflected as a percentage of the responses rather than the respondents. Figure 5-10 outlines the different responses

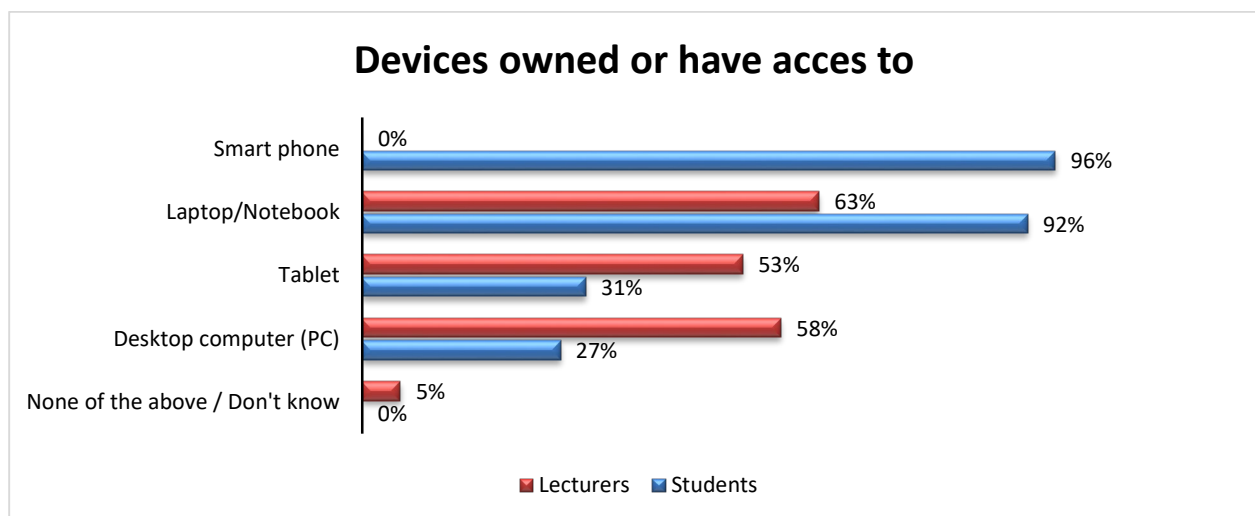


Figure 5-10: Devices owned or have access to (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-10 illustrates that 92% students and above have access to, at least, a laptop/notebook and/or a smartphone. A total of 63% of lecturers agree to student access to a laptop/notebook with 58% also indicating that students have access to a desktop. By contrast, 27% of students indicate that they have access to a desktop, being the device that received the lowest response rate. Nevertheless, a positive that can be extracted from this question is the fact that 0% of students, as with the previous question, indicated that they do not have access to any device.

This further speaks to the possible effective integration of ICT within the accountancy curriculum as students have access to the necessary tools.

The devices owned by students link to the point of access. As outlined in Chapter 2, Paragraph 5.2, the Covid-19 pandemic unveiled the ICT gap being experienced in South Africa. Where schools and universities had to close down and online learning being offered, those who do not own or have access to a device are left behind. Similarly, this had to be considered in the development of the ICTM in that the integration of ICT competencies should be of such a nature that students are able to perform the necessary tasks that require ICT with the minimum resources.

Subsequent to the accessibility and access to devices respondents were asked to rate their current ICT competencies based on seven computer applications and programs. These applications and programs were identified in Chapter 2 and 3 from literature on what is required by SAICA and expected from employers. The seven applications and programs required by respondents to rate are [1] MS Word, [2] MS Excel, [3] MS PowerPoint, [4] Using search engines to browse the internet (Google, Firefox, etc.), [5] Sage Pastel (Accounting software program), [6] Other Accounting software and [7] CaseWare (Accounting software program). Respondents could only select one of the following options: [0] N/A - never used program/application, [1] Novice – The use of IT is new to me, [2] Advanced beginner – I often use IT, [3] Proficient – I regularly use IT with ease, but still need some assistance and [4] Expert – I use IT daily with ease and am able to apply different technical aspects of the program without assistance.

There were three questions that speak to the same purpose, rating specific ICT competencies. Firstly, the question posed to students for them to rate their competency with regard to the specific computer programs or applications. Secondly, lecturers were asked to rate the competencies of their students and thirdly, their own ICT competencies based on the same computer programs or applications.

Chapter 3, Paragraph 3.3.2, Table 3-3 outlines that even though several ICT competencies are required by SAICA in their latest published CF and in their revised 2025 CF and literature, the most practical and highly recommended competencies this study focusses on are MS Word, MS Excel and MS PowerPoint. Due to this the analysis for data obtained through these questions were reported on individually for the three competencies mentioned and in aggregate for the rest. The results obtained from these questions are illustrated in Figure 5-11 to Figure 5-14.

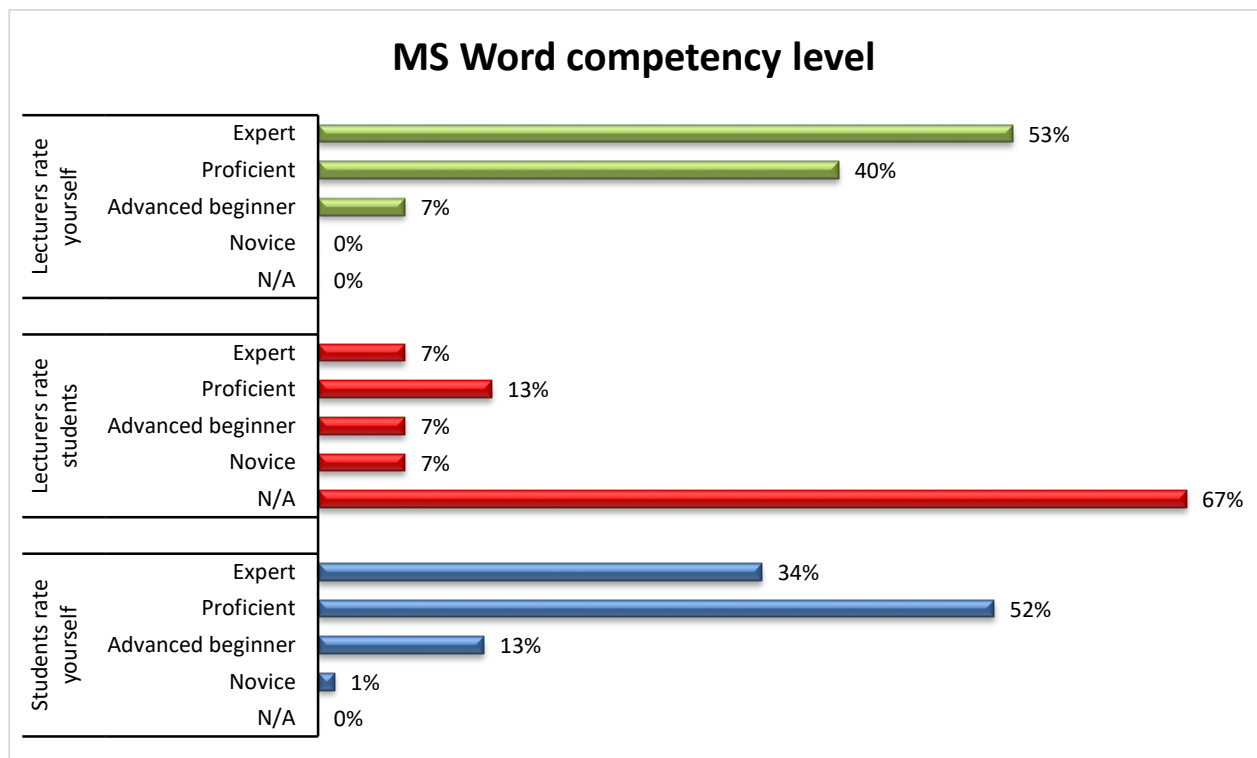


Figure 5-11: MS Word competencies rated (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-11 outlines the clear perception of lecturers at 67% that their students either do not possess any competency in or do not use MS Word. Nevertheless, 52% of students rate themselves as being proficient in the use of MS Word. A total of 34% of students even went as far as rating themselves as experts. The perceived competencies in MS Word of lecturers indicate that the integration of ICT needs to start at a basic level, in line with Maslow's hierarchy of needs and RBT's knowledge levels.

In addition, comparing lecturer perceived competency in using MS Word, 53% perceive themselves to be experts, closely followed by 40% being proficient. Since a significant portion of lecturers will be able to understand and apply MS Word, based on their perceived competency level, the integration thereof in the accountancy curriculum will be possible with either little to now training from a teaching perspective.

Another valuable finding from this question is that if lecturers perceive their students not to use MS Word, 67%, there is a possibility that MS Word is not integrated in their modules. Or, from another perspective, students are not able to integrate MS Word because they do not know how to use it. This further supports this study to empower students with the basic competencies of MS Word.

Like the MS Word question, respondents had to select their competency level in using MS Excel. Chapter 3, Paragraph 3.3.1 outlines that MS Excel remains a focal point of both SAICA and employers as it can be used for an immeasurable variety of things. The responses to the competency level of MS Excel are illustrated in Figure 5-12.

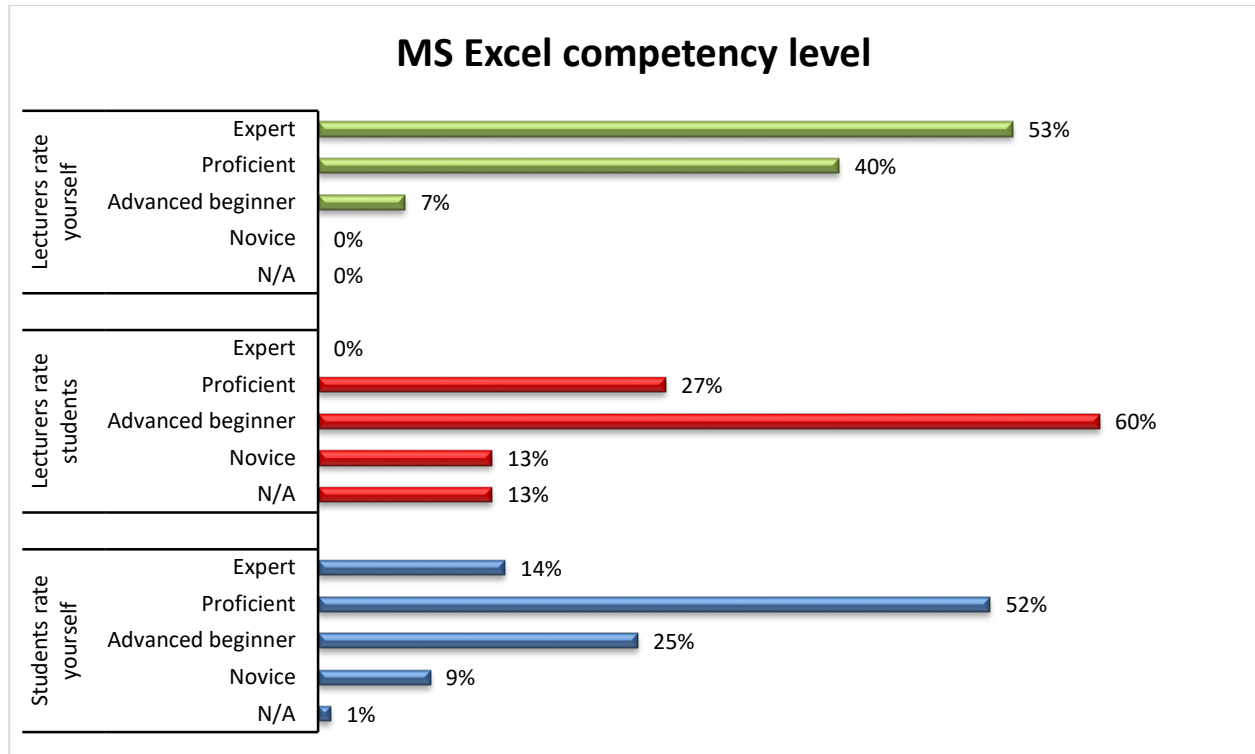


Figure 5-12: MS Excel competencies rated (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

In contrast to Figure 5-11, Figure 5-12 indicates that lecturers perceive that 60% of their students at least use MS Excel at a beginner level. This is not in line with students' perceptions, where they indicate that 52% of them are at a proficient level when it comes to using MS Excel. As with MS Word, a small percentage, 14%, of students perceive themselves to be experts in using this computer program. Lecturers on the other hand, perceive themselves more the expert, 53%, when it comes to MS Excel. Only 1% of students indicated that they do not use MS Excel. This again speaks to one of two possibilities, either it is not integrated into their accountancy curriculum or they do not have the basic competency to use it. Likewise, this finding supports this study to empower students with the basic competencies of also MS Excel, a perceived and highly ranked ICT competency by employers and SAICA. Also, since a significant portion of lecturers will be able to understand and apply MS Excel, based on their perceived competency level, the integration thereof in the accountancy curriculum will be possible with either little to no training from a teaching perspective.

The last competency relevant to this study is the use of MS PowerPoint. Figure 5-13 illustrates the finding from the data collected.

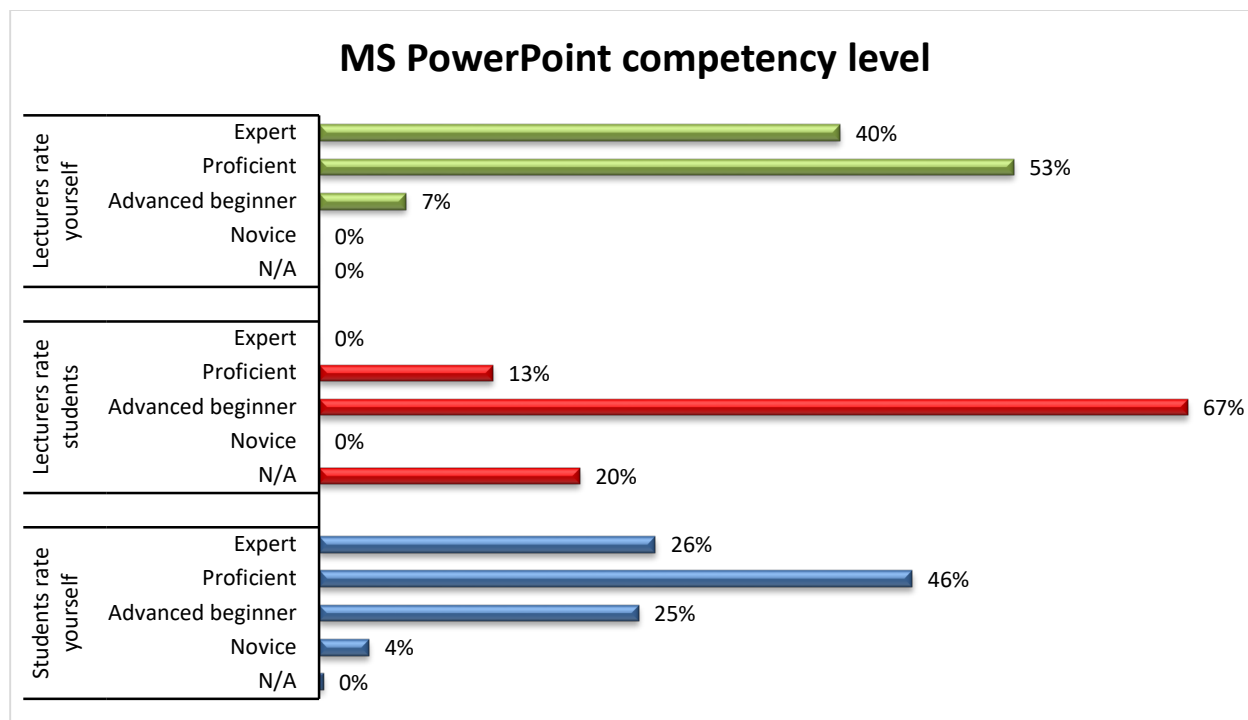


Figure 5-13: MS PowerPoint competencies rated (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Like MS Word, Figure 5-13 outlines that 20% of responding lecturers, perceive that student respondents do not possess MS PowerPoint competencies or that they do not use it. A total of 67% of responding lectures are of the opinion that students have basic beginning knowledge of MS PowerPoint. While 46% of student respondents, are of the view that they can use MS PowerPoint with little to no assistance at a proficient level and 26% even consider themselves experts compared to lecturers' assessment of 0%. As expected, majority of lecturers rate themselves as proficient, 53%, and even experts, 40%. This is expected due to the format of presentations in lectures that often takes the format of a PowerPoint presentation.

The ICT competencies not specifically included in this study are the remaining one's respondents had to rate. One of those competencies is the highly debated use of accountancy software. Figure 5-14 below reports on the perceived competency levels of students and in aggregate for Sage Pastel, other accountancy software and CaseWare.

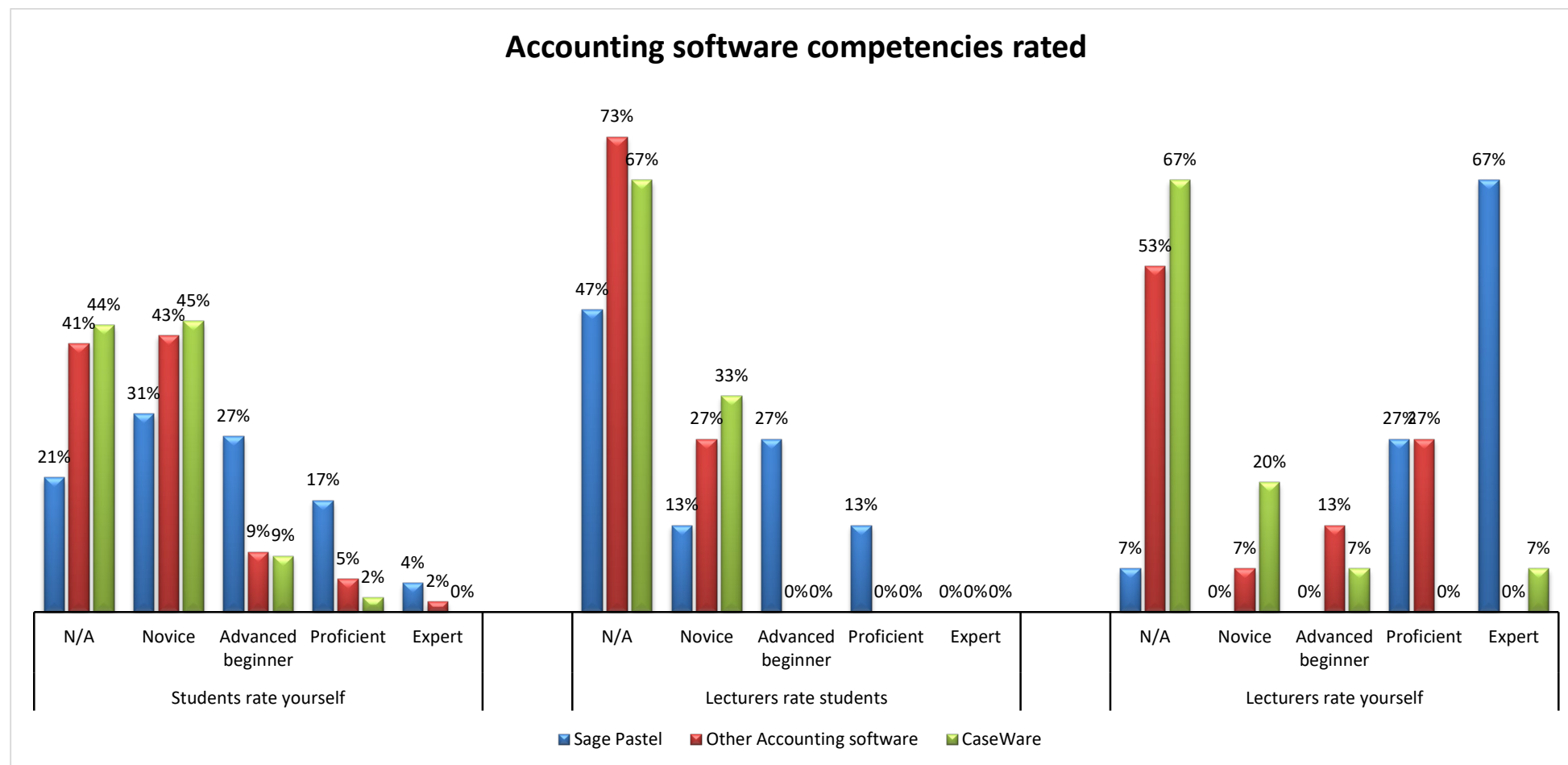


Figure 5-14: Accounting software competencies rated (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Even though the use of accountancy software is not covered in this study it is interesting to note, as outlined in Figure 5-14, that most lecturers are of the view that students do not use accounting software, but also do not use it themselves. By contrast, 67% of lecturers rated themselves as experts in the use of Sage Pastel. However, students indicated that while on average 40% of students do not use accounting software, on average 40% of them have used it before at a novice level. The clear outlier is the use of Sage Pastel. While CaseWare and other accounting software are rated as not used or at a novice level, both students and lecturers rate this accounting software at a proficiency level of 17% and 13%, respectively. This serves as a possible indication that Sage Pastel may be covered in the accountancy curriculum in either U1 or/and U2.

The last ICT competency to be rated, is the use of internet tools. As the students are classified as Generation Y, it is expected that this competency will receive a high proficient and even expert level. The findings are illustrated in Figure 5-15.

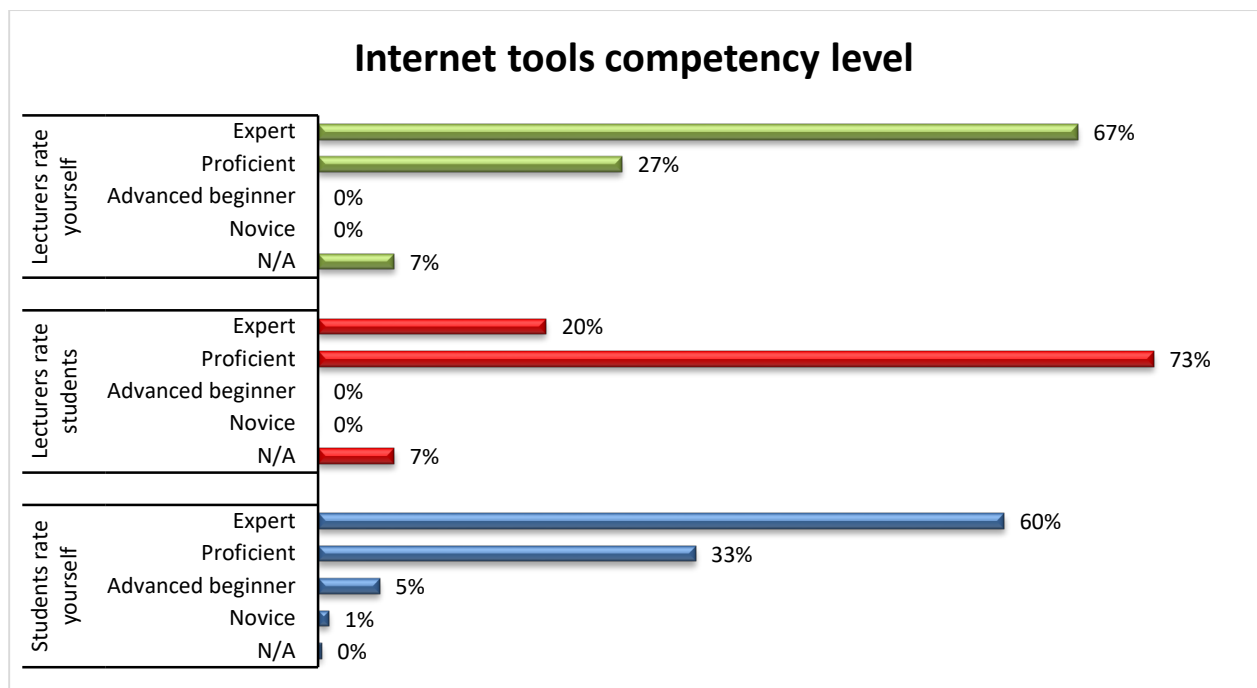


Figure 5-15: Internet tools competency level (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-15 confirms the expectation and reflects a significant rating from both students and lecturers that students are either proficient (33% and 73%) or experts (60% and 20%) in the use of internet tools. The anomaly is where the majority of students, 60%, perceive themselves to be experts and 73% of lecturers perceive students to be proficient. Irrespective of whether students are perceived as proficient or experts, this is an indication that they can effectively make use of the internet.

Where lecturers had to rate their own internet tool competency, 7% of lecturers indicated that they do not use the internet. This is the same percentage indicated by lecturers for students not using the internet. However, 67% of lecturers perceive themselves to be at an expert level in using internet tools. This is closely linked to the student perception of 60% at an expert level, the integration of this ICT competency should be able to be applied with little to no effort.

In conclusion, Figure 5-11 to Figure 5-13 highlights two aspects. One, perhaps MS Word, MS Excel and MS PowerPoint are not integrated in the four core accountancy modules since the majority of lecturers perceive students not to make use of the programs. Two, students may not possess the necessary competencies with regard to these programs as lecturers perceive them not to utilise it. Irrespective of which view is taken, the integration of these basic ICT competencies within the accountancy curriculum is necessitated.

Another thought that needs to be considered for the effective ICT integration into the accountancy curriculum is the resources available from the university that could aid in this regard. Both respondent groups were asked the question on whether their university provides them or students with different resources and support that will assist them or their students to acquire and utilise ICT skills. Four different resources necessary for the support in the use of ICT were considered. They are [1] computer labs, [2] Wi-Fi, [3] IT support staff and [4] computer labs with sufficient IT equipment in a working condition. The last option was included since it was identified in Chapter 2, Paragraph 2.2.2 that the availability of computer labs does not constitute that they are in a working condition. Four response options were available. They are [1] strongly disagree, [2] disagree, [3] agree, and [4] strongly agree. The responses from this question are summarised in Figure 5-16.

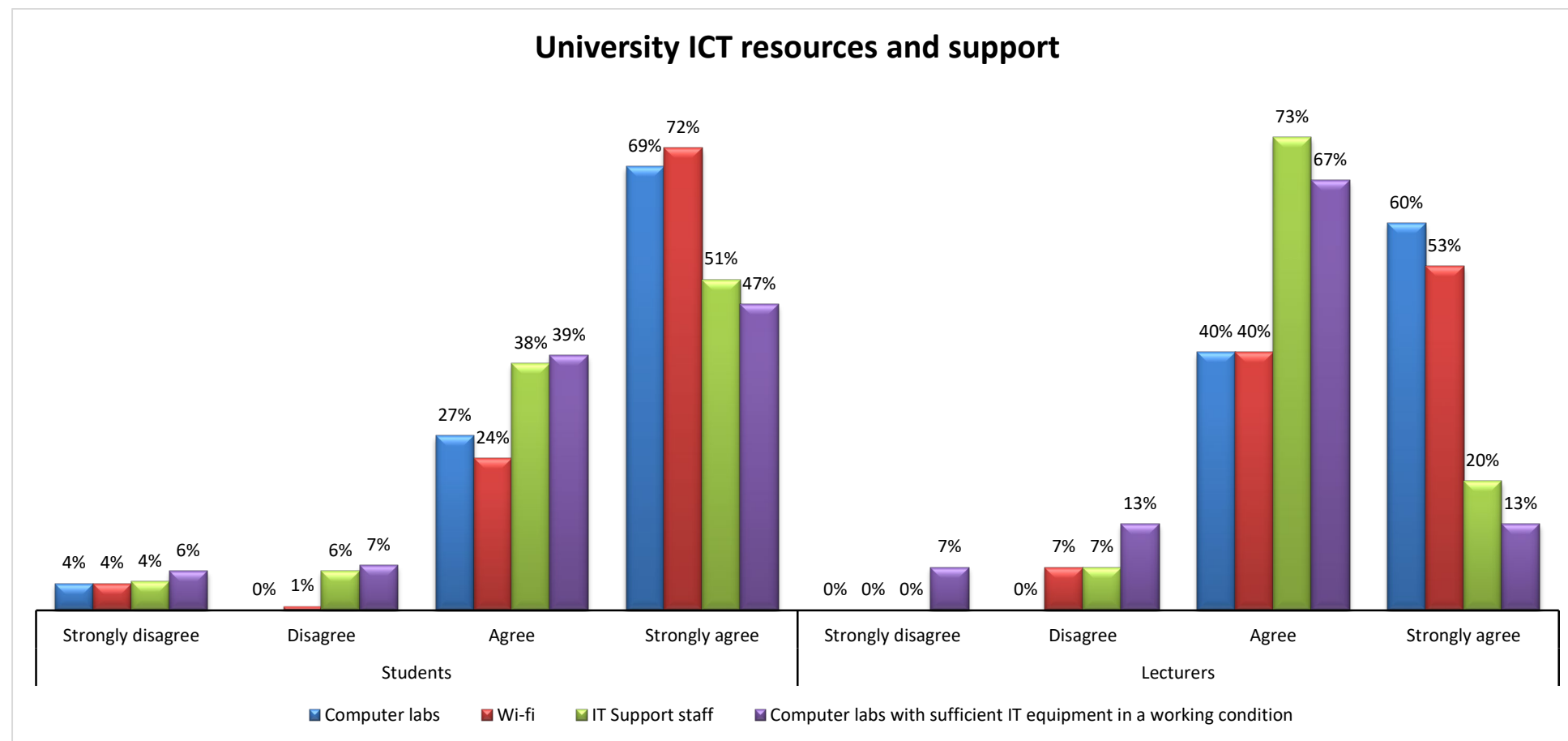


Figure 5-16: University ICT resources and support (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-16 outlines that only a small percentage of students (4%–6%) and no to little lecturers (0%–7%) are of the opinion that their universities do not provide their students with ICT resources and support. A total of 86% of students (72% strongly agree + 24% agree) identified that the availability of Wi-Fi is the resource mostly available. This contrasts with the views of lecturers who strongly agree that the availability of IT support staff, 83% (20% strongly agree + 73% agree), are the resource mostly provided by their universities to students. An interesting fact that is evident from the data from both students and lecturers on the availability of computer labs and the availability of computer labs with enough IT equipment in a working condition. A total of 96% of students (27% agree + 69% strongly agree) and 100% of lecturers (40% agree + 60% strongly agree) agree that computer labs are available to students at their universities. At a lower degree, 86% of students (47% agree + 39% strongly agree) and 80% (67% agree + 13% strongly agree) agree on the availability of computer labs with enough IT equipment in a working condition. Even though the latter is at a lower rate, it is still high and deduced from this is that students have the necessary facilities at their universities. Even so, this is in line with the findings as outlined in Chapter 2, Paragraph 2.2.2 that the availability of computer labs does not constitute that they are in a working condition.

In order to a slightly lesser degree, 89% of students (38% agree + 51% strongly agree) and 93% of lecturers (73% agree + 20% strongly agree) agreed that the IT support staff are available. There is, however, a low percentage of students and lecturers who are of the opinion that none of the listed resources are provided by their university.

Based on the resources available to students by their universities, their level of ICT competencies when they graduate can be seen as a direct result of the integration of and exposure to ICT during their studies. In order to establish the ICT competencies implemented by universities that indirectly results in students' ICT competencies when they graduate, lecturers were asked to indicate their perception of their students' ICT competencies when they graduate. This question was posed as a general perception with the following four options 1] novice, [2] advanced beginner, [3] proficient and [4] expert. The results are summarised in Figure 5-17.

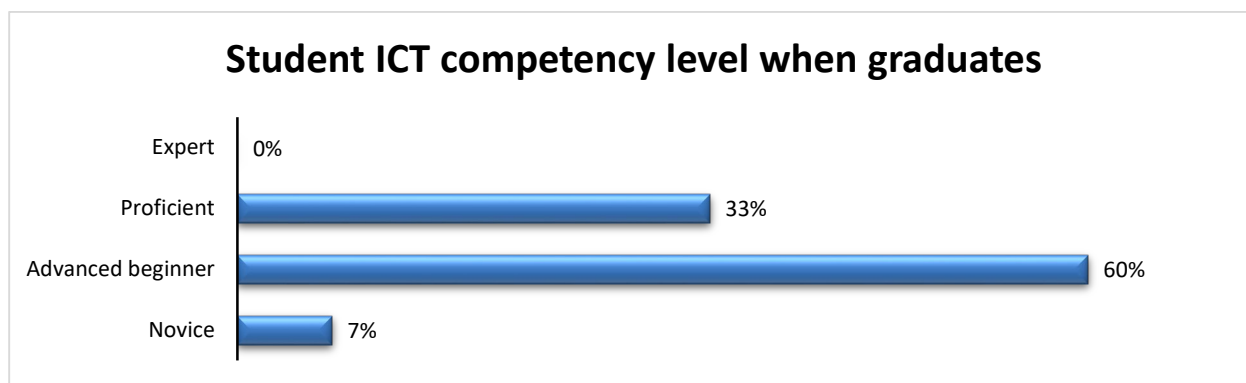


Figure 5-17: Student ICT competency level when graduates (Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-17 confirms what the literature in Chapters 2 and Chapter 3 identified. This is the fact that when accountancy students graduate, they do not possess all the basic ICT competencies required for the accountancy working environment. This is concluded based on lecturers who perceive that 60% of students as only being advanced beginners when they graduate. Even if they perceive 33% of students to be proficient in ICT competencies, there is a clear indication that the majority will not be able to demonstrate the required ICT competencies in the accountancy workplace. Once again, this perception supports this study in that ICT competencies need to be integrated into the accountancy curriculum to move the majority of prospective accountancy professionals from advanced beginners to proficient. This view aligns with the employer expectations and SAICA's ICT competency requirements as outlined in Chapter 2, Paragraphs 2.2.4 and 2.4 and Chapter 3, Paragraphs 3.3.1 and 3.3.2 for prospective accountancy professionals to possess the necessary competencies that will enable them to function in a technological dominated environment (4IR).

The finding that none of students are perceived as experts by the lecturers is in line with SAICA's goal in the CF, outlined in Chapter 3, Paragraph 3.3.2 and 3.5.1, in that a basic level of knowledge should be developed when a prospective accountancy professional enters the accountancy working environment.

In conclusion, Section C deals with the encounters with and use of computers. The aim is to identify the opportunities available to students that will enable them to further develop and practise their ICT competencies. The data collected illustrate that all students have access to a computer or ICT device, such as laptops, tablets, smartphones etc., required to utilise ICT. Also, universities are providing students with the necessary ICT resources and support. This points to a realistic expectation of integrating ICT into the four core modules in the accountancy curriculum.

In addition, the data highlighted the possibility that MS Word, MS Excel and MS PowerPoint are not integrated in the four core accountancy modules and students may not possess the necessary competencies with regard to these programs. This is emphasised by the perception of lecturers that most student's ICT competencies are perceived as advanced beginners when they graduate. With these findings supporting this study, the different types of ICT competencies and when they should be integrated, based on the opinions of students and lecturers are considered. This is discussed in more detail below as part of Section D.

5.3.4 Section D – Perceptions of when and how ICT should be integrated into the core accountancy modules

This section is considered crucial in the development of the ICTM. It is based on the ICT competencies a prospective accountancy professional is required to possess as identified through a literature review and document analysis as outlined in Chapter 2 and 3. The opinions of both students and lecturers were summarised and evaluated on when, in terms of which academic year, certain ICT competencies, specifically relating to MS Word, MS Excel, and any other competencies, including MS PowerPoint, should be integrated into the accountancy curriculum. Furthermore, when compulsory ICT modules are currently being taught were evaluated. This served as an indication of ICT integration as a viable option to consider based on the knowledge levels as suggested by RBT, outlined in Chapter 2, Paragraph 2.3.1.2 and Chapter 3, Paragraph 3.2 and 3.4.1.

In addition, the current ICT integration options being applied within the four core accountancy modules are also outlined. Respondents are asked to identify which type of ICT integration options will assist them or their students to acquire and utilise ICT competencies. The respondents are further required to indicate if they agree or do not agree that the assignments in their four core accountancy modules provide them with opportunities to acquire and utilise ICT competencies.

In addition, and to support this study in terms of the integration of ICT within the four core modules, without adding to the already technical overloaded accountancy curriculum, respondents were asked to identify the time spent on handwritten and ICT based assignments within the four core accountancy modules. Lecturers were also asked to identify how much time they spent on marking these assignments. This served as an indication of the realistic integration of ICT into the assignments of the four core accountancy modules. If implemented, it could also lead to the possible workload reduction with regard to the marking of assignments, but also the value placed on assignments from a lecturers' perspective.

First the opinions of the respondents were evaluated on when specific MS Word, MS Excel and other ICT competencies, including MS PowerPoint, should be taught in the accountancy curriculum. In order to begin with, the specific competencies for MS Word asked the opinions of the respondents on specific competencies as identified in Chapter 3, Paragraph 3.3.2, Table 3-4. In order to limit the length of the question, but still make it relevant to the study, not all the competencies were listed in the question. Therefore, as indicated in Table 3.4 the competencies are grouped in four categories: [1] basic competencies, [2] intermediate competencies, [3] expert competencies and [4] advanced competencies. Thus, the 11 competencies that required a response cover all four competency categories. Respondents had to indicate next to each competency in which year of study they felt the specific competency should be taught and as an alternative, not to include the competency at all. The six options available were: [0] do not include, [1] 1st year, [2] 2nd year, [3] 3rd year, [4] 4th year (if a four-year degree/diploma) and [5] honours. As previously mentioned in Paragraph 5.3.2, option [3] and [4] are summarised to represent the final year of study. The data collected and grouped in terms of the competency categories are illustrated in Figure 5-18.

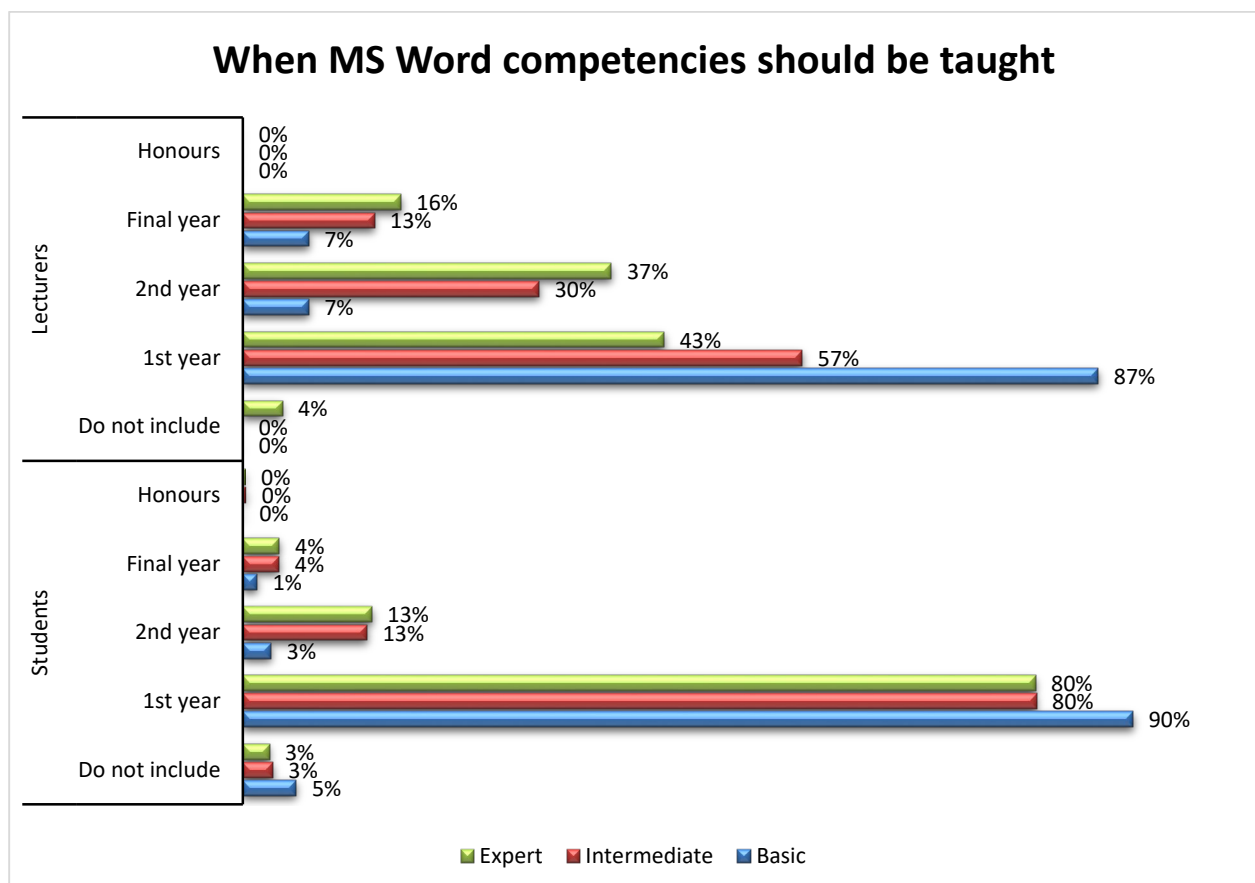


Figure 5-18: When MS Word competencies should be taught (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

As required by SAICA's CF, Figure 5-18 indicates that students (90%) and lecturers (87%) agreed on the inclusion of basic MS Word competencies within the 1st year of study. This will aid in creating the necessary building blocks for students to further their ICT competencies throughout their years of study. Students are of the opinion that intermediate (80%) and expert (80%) competencies should also be taught in the 1st year of study. This in contrast to the highest ranking views of lecturers who, as suggested by RBT, to initially in the 1st year of study, start with basic competencies (87%), moving to intermediate competencies (37%), in the 2nd year of study, and finally concluding with expert competencies (16%) in the final year of study. The conclusion is thus that lecturers understand to a greater extent the teaching hierarchy that needs to take place for students to learn competencies.

However, it can also be argued that since the question did not specify which competencies are perceived basic, intermediate and expert, students selected the competencies based on their personal views. This results in students enormously selecting the relevant competency in a specific year that they perceived to either be basic, intermediate or expert.

In support of this study only a small percentage of both students (3%–5%) and lecturers (0%–4%) feel that some of the MS Word competencies should not be included in the accountancy curriculum. This leads to the inference that the inclusion of the competencies listed in the question, should at a minimum, be integrated into the accountancy curriculum. In addition, both students (0%) and lecturers (0%) are of the opinion that no competencies should be taught at honours level. This leads to the recommendation that all MS Word competencies should be taught by the final year of study (3rd year or 4th year, if a four-year degree/diploma). This recommendation is made without taking into account any specific requirements from the yearbooks of U1 and U2 since it contains no information with regard to the integration of ICT competencies (Chapter 3, Paragraph 3.4).

In addition to MS Word, MS Excel is considered by literature as the most important computer program to be used and utilised by prospective accountancy graduates (Chapter 3, Paragraph 3.3.1). Like MS Word, the question pertaining to MS Excel also listed specific competencies. Respondents had 14 competencies to choose from relating to the four competency categories as outlined in Chapter 3, Paragraph 3.3.2, Table 3-4. The data collected and grouped are illustrated in Figure 5-19.

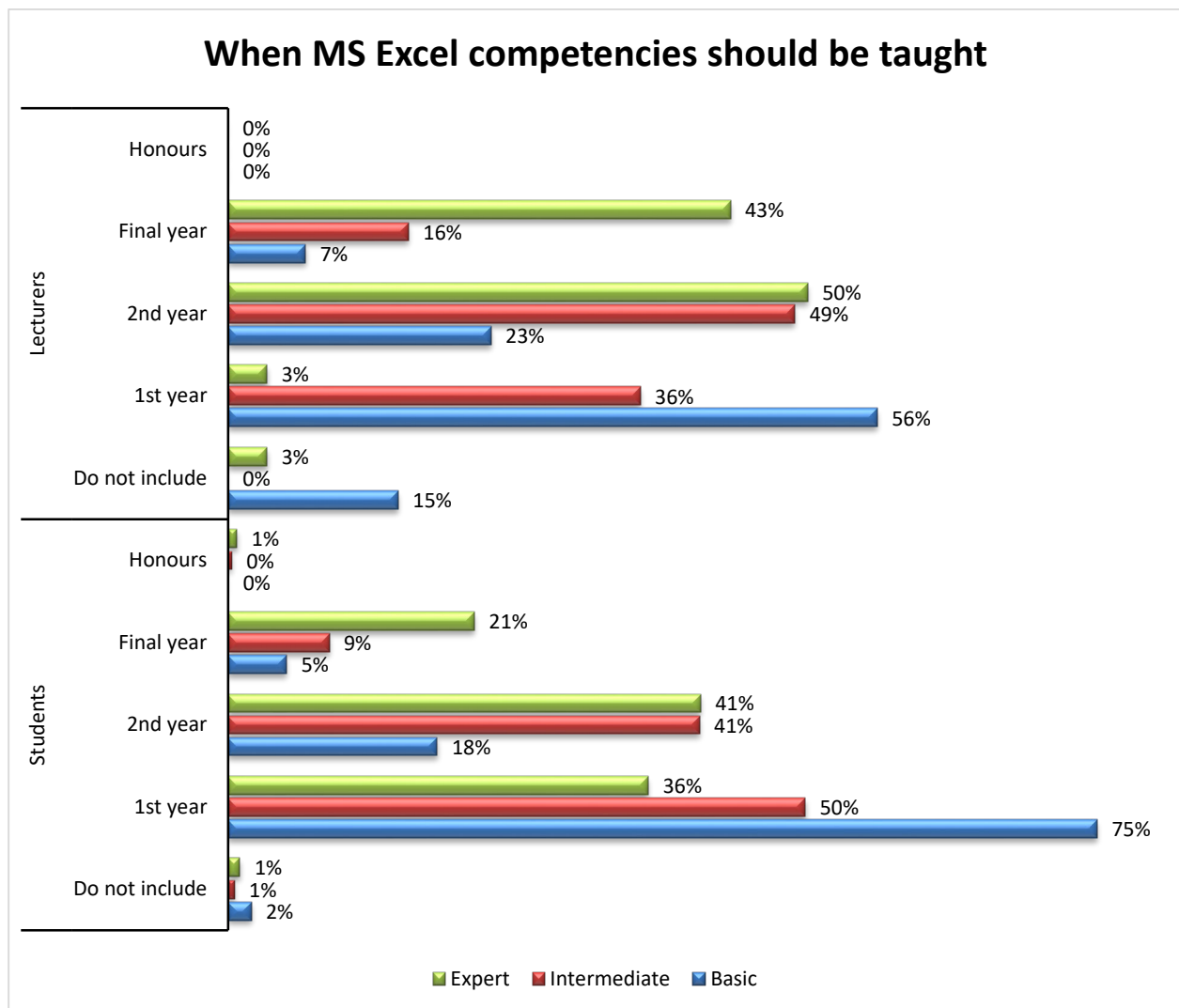


Figure 5-19: When MS Excel competencies should be taught (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

This is in line with the findings from Figure 5-18 students' view on when intermediate and expert MS Excel competencies should be taught. Majority, 50%, of students are of the opinion that intermediate competencies should also be taught at a 1st year level. Different to the MS Word competencies, there is a clearer build-up from basic to expert level with regard to MS Excel. This could be due to a clearer understanding by students with regard to which MS Excel competencies are perceived as basic, intermediate and expert.

Lecturers suggest that the expert MS Excel competencies be taught in both 2nd year (50%) and 3rd year (43%) of study. The anomaly here is that the expert competencies exceed the intermediate competencies in the 2nd year of study. Even so, the inclusion of both intermediate and expert competencies in at least the 2nd and 3rd year of study emphasis when they should be taught. This was taken into account in the development of the ICTM to ensure that a staggered

approach is followed to start with basic competencies in the 1st year of study and gradually move to intermediate competencies in the 2nd year of study and finally finishing with expert competencies in the final year of study.

Between 1–2% of students feel that none of the MS Excel competencies should be taught in the accountancy curriculum. Similarly, lectures indicated that 3% of the considered expert competencies should not be included in the accountancy curriculum with 0% concluding that intermediate competencies should not be included. The clear outlier is the view of 15% of lecturers who are of the opinion that basic competencies should not be included in the accountancy curriculum. This could be due to them expecting their students to already possess these competencies, resulting in them not seeing the need to include it in the accountancy curriculum. This is in line with the limitation identified in Paragraph 5.3.2 where it was identified that none of the lecturer respondents represent the 1st year students. This again leads to the conclusion that the inclusion of the competencies listed in the question, should at a minimum, be integrated into the accountancy curriculum.

In addition, both students (0%) and lecturers (0%) are of the opinion that none of these competencies should be taught at honours level, except for a 1% response from students on expert competencies. This leads to the suggestion that all MS Excel competencies should be taught by the final year of study (3rd year or 4th year, if a four-year degree/diploma). Similar to the conclusion on the inclusion of MS Word, this recommendation is made without taking into account any specific requirements from the yearbooks of U1 and U2 since it contains no information with regard to the integration of ICT competencies (Chapter 3, Paragraph 3.4).

Similarly, respondents were required to indicate when MS PowerPoint, database software, internet tools, professional research tools and accounting software should be included in the accountancy curriculum. Although only MS PowerPoint is relevant to this study it was deemed necessary by the researcher to investigate the views of both students and lecturers on the inclusion of the other ICT competencies since it has been identified through the literature review in Chapter 2 and Chapter 3 as important ICT competencies prospective accountancy graduates should possess. This question did not list specific competencies within the computer programs, but rather just the program. Respondents again had the option to only select the year in which they perceive the ICT competency to be taught or if not to be taught at all. A summary of the data collected is illustrated in Figure 5-20.

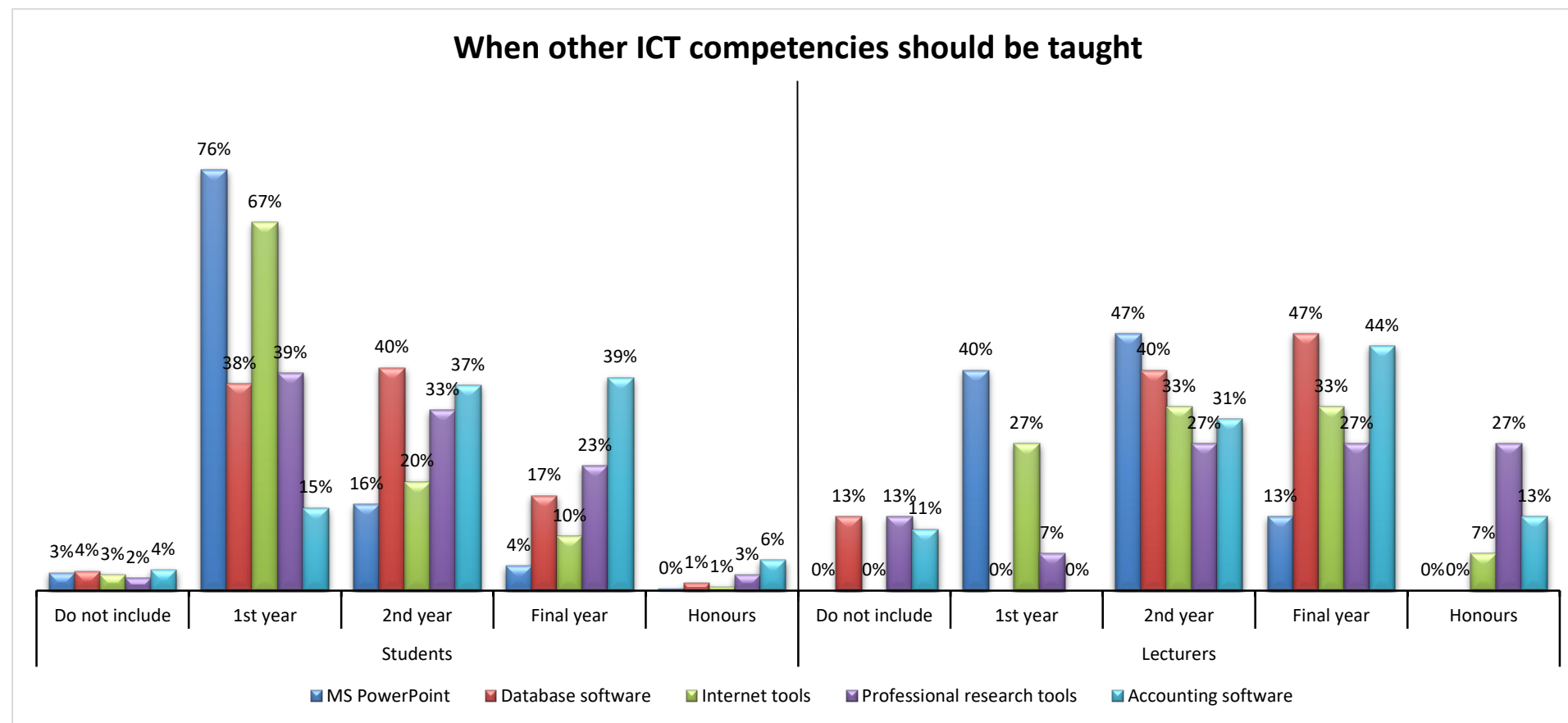


Figure 5-20: When other ICT competencies should be taught (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

The most important finding to be derived from Figure 5-20 is when and if MS PowerPoint should be taught. This is the ICT competency that received the highest percentage of inclusion from students where 76% indicated that it should be taught in the 1st year of study. This is in contrast with the view of lecturers where 40% indicated that it should be taught in the 1st year of study and 47% indicated that it should be taught in the 2nd year of study. The latter is more in line with this study in that students are not required to present information in the accountancy context in the 1st year of study based on the fact that the four core modules are all only taught from the 2nd year of study, as identified in Chapter 3, Paragraph 3.4, Table 3-5. Only 4% of students and 0% of lectures are of the opinion that this competency should be taught in the final year of study. The conclusion drawn from is that MS PowerPoint should be taught in the 2nd year of study, and perhaps only utilised in the final and honours year of study.

The second ICT competency students (67%) perceive as necessary to be taught in the 1st year of study is internet tools. However, lecturers have indicated that this ICT competency should be taught across the 1st year (27%), 2nd year (33%) and final year (33%) of study. This represents an equal spread of when internet tools should be taught. In the absence of a clear preference from lecturers, the fact that it should be taught is the important consideration that should be derived from this data.

Database software and professional research tools share a similar preference of when to be included in the accountancy curriculum. Students are of the opinion that these competencies can be taught from the 1st year of study until the final year of study (Database software: 1st year = 38%, 2nd year=40%, final year=17%, honours=1%; and Professional research tools: 1st year=39%, 2nd year=33%, final year=23%, honours=3%). Lecturers share this view, except for database software (Database software: do not include = 13%, 2nd year=40%, final year=47%, honours=0%; and Professional research tools: do not include=13%, 2nd year=27%, final year=27%, honours=27%).

By contrast the views of students and lecturers on when other ICT competencies should be included in the accountancy curriculum include some of them in the honours year. Therefore, the conclusion made is that basic MS Word and MS Excel competencies should be mastered by the final year of study, and other ICT competencies, such as MS PowerPoint, database software, internet tools, professional research tools and accounting software, can still be taught in the honours year.

In conclusion, the findings on when to teach MS Word, MS Excel and MS PowerPoint were taken into consideration in the development of the ICTM, Chapter 6. The integration of basic competencies will be integrated in the 1st year of study, gradually developing on that to integrate intermediate competencies in the 2nd year of study and finally ending with expert competencies

in the final year of study. Specific to the honours year, this year could perhaps be used as an academic year where ICT competencies already mastered are only applied with no new competencies added. It is the view of the researcher that ICT should still be utilised in the honours year to enable the students to keep up to date and in practise with the basic ICT competencies that they will need to utilise when they graduate and integrate into the accountancy workplace.

After considering the views of students and lecturers on when specific ICT competencies should be taught, the existence of a compulsory ICT module in their accountancy curriculum will be established. This serves as an indication of focus being placed on ICT competencies within the accountancy curriculum without integrating it.

Respondents had to indicate in which academic year their university is presenting compulsory ICT modules. All the relevant academic years had to be selected, resulting in responses in excess of the number of respondents. Where the number of student respondents are 314, the number of responses for this question totalled 445. Correspondingly, the number of lecturer respondents are 15 with 22 responses to this question. This is an indication that the presentation of compulsory ICT modules is presented in more than one academic year. Even so, the data represented in Figure 5-21 is still based on the total number of respondents (students: n=314; lecturers: n=15).

The perceptions of students and lecturers on when compulsory ICT is presented at their university is also compared to the data gathered in Chapter 3, Paragraph 3.4, Table 3-5. The information indicates that there are compulsory ICT modules in the 2nd year of study for U2 and the 3rd year of study for U1. This comparison is outlined in Figure 5-21.

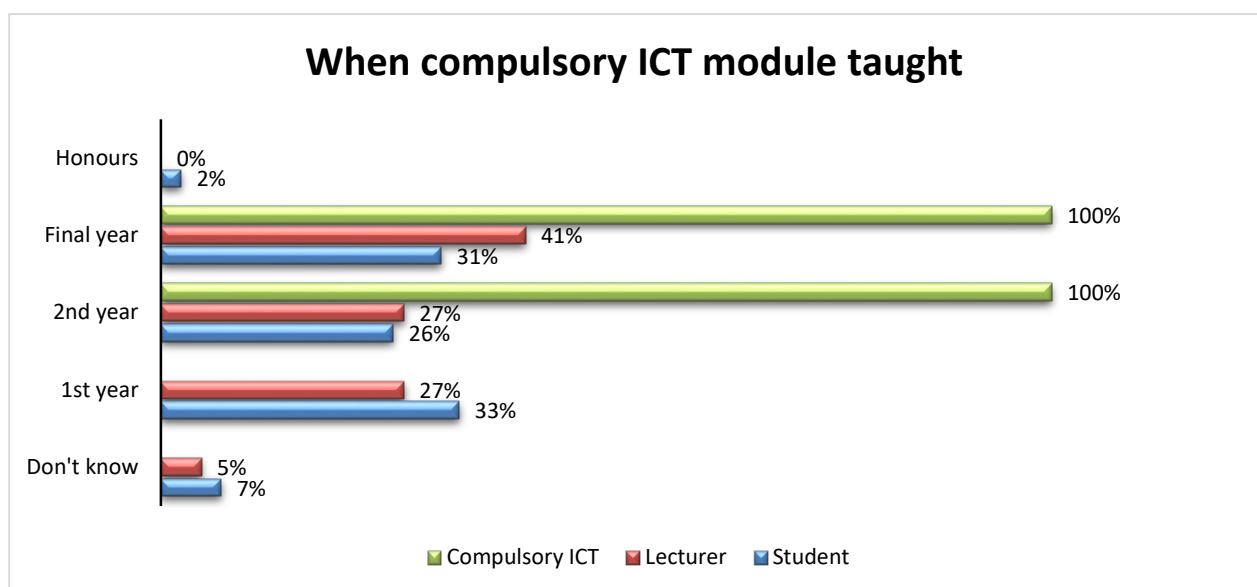


Figure 5-21: When ICT compulsory module taught at your university (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-21 indicates that either the respondents perceive other modules to include compulsory ICT competencies or they are not aware of what is considered as their compulsory ICT modules. This may also speak to the disconnection between lecturers and the curriculum. Further leading to the lack of integration of ICT competencies within their modules as they perceive their students to receive compulsory ICT modules at different intervals in their years of study. In order to overcome the inconsistency of when compulsory ICT is being taught, ICT integration into core accountancy modules could serve as an alternative to acquire and utilise ICT competencies.

Interest is taken in which ICT competencies are currently being applied within each core accountancy module. The ICT competencies listed range from general to the three specific computer programs (MS Word, MS Excel and MS PowerPoint) this study focusses on. The general ICT competencies are where the use of a computer is necessary to [1] gain access to the LMS; [2] submit written assignments electronically; and [3] completing an electronic test and quiz. Chapter 2, Paragraph 2.2.3 outlines that these ICT competencies will not necessarily enable prospective accountancy professionals to effectively apply ICT in the accountancy working environment. They can even be included in the category of browsing social media, where no particular competency is needed, except the clicking of buttons.

The aim of including basic and specific ICT competencies is to identify to what extent students use accountancy related ICT (specific computer programs) and what portion of time is spent on general ICT. Students had to select the specific core module in which they are required to utilise the different ICT competencies/computer programs listed. Since all the relevant modules could be selected, the number of responses exceeded the number of respondents per question. Care was taken to convert the response rate to represent 100% of the responses. Even so, the data represented in Figure 5-22 is still based on the total number of respondents (students: n=314). The findings are summarised in Figure 5-22.

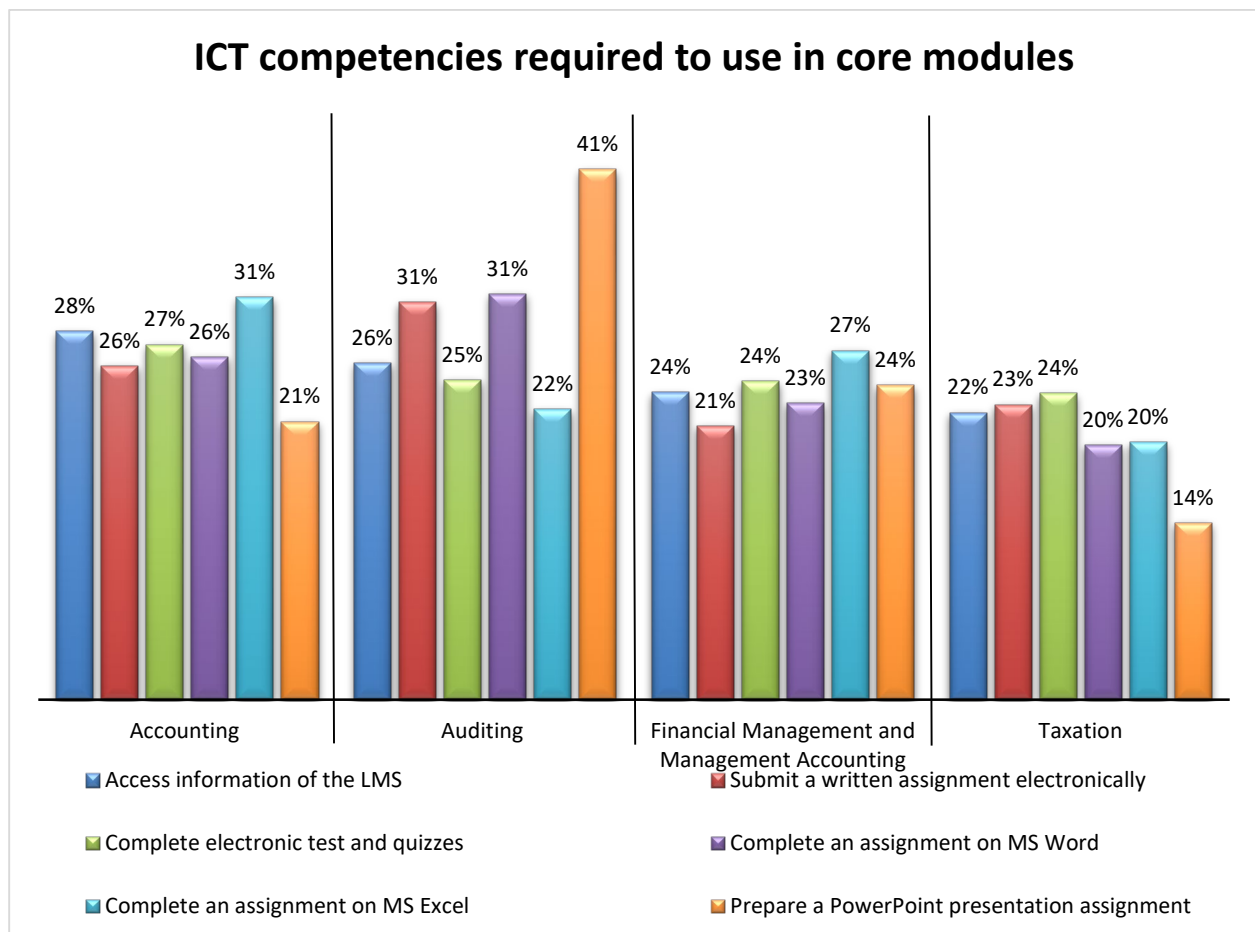


Figure 5-22: ICT competencies required to use in core modules (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Overall, Figure 5-22 outlines that students perceive Auditing, followed by Accounting, currently implementing a good number of the ICT competencies listed. The three specific computer programs are signified in all four core modules. MS PowerPoint stands out in Auditing as the ICT competency mostly used (41%) with Taxation reflecting it as the lowest (14%). MS Excel enjoys a slightly higher usage percentage (31%) than all the other ICT competencies in Accounting. In Auditing, MS Word also represents a 31% usage percentage, the second highest. Financial Management and Management Accounting and Taxation are all on a similar usage percentage of 27% and lower. This serves as an indication that all ICT competencies are currently being applied in the four core accountancy modules, some to a higher and some to a lesser degree. Therefore, the integration of the ICT competencies based on the three computer programs for this study are not regarded as a new phenomenon by students and lecturers. This could even aid in the effective integration of the ICTM.

Linking which ICT competencies are required to be utilised in the four core accountancy modules as viewed by students to what lecturers report are required from students served as an indication

of what is expected by lecturers versus what is being applied by students in terms of ICT integration. Lecturers had to select only the relevant ICT competencies they require their students to apply within their modules. The same options as in the previous question was available and consequently, the data represented in Figure 5-23 is still based on the total number of respondents (lecturers: n=15). Figure 5-23 outlines the responses obtained.

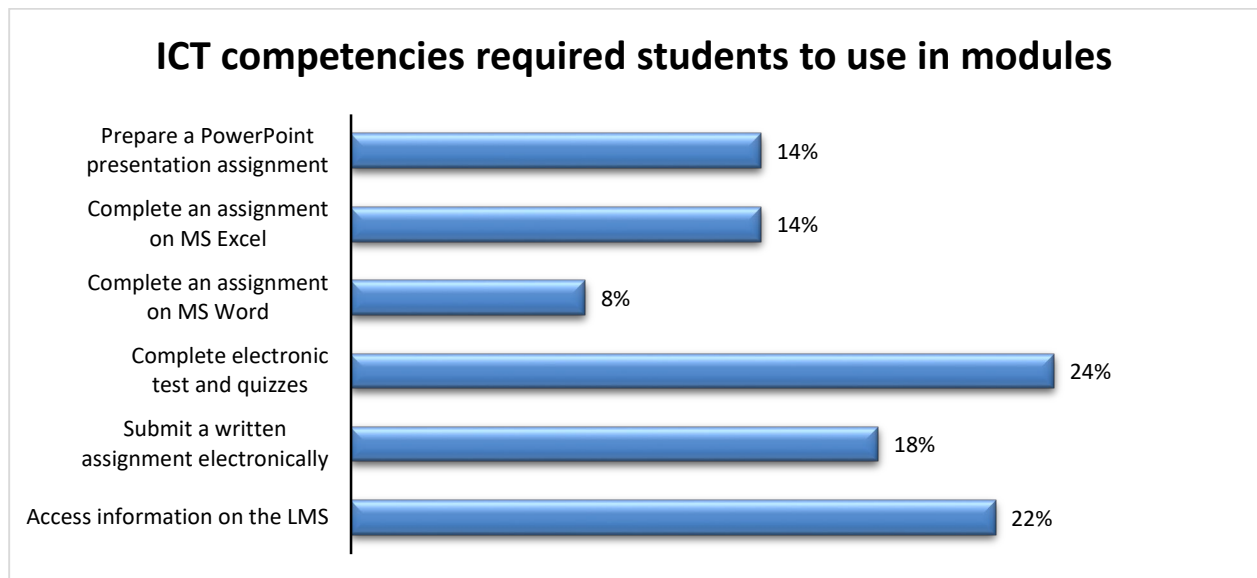


Figure 5-23: ICT competencies required students to use in modules (Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-23, lecturer expectations, are in contrast with the findings of Figure 5-22, student perceptions, with regard to the three specific computer programs. Lecturers indicate that the use of MS Word, MS Excel and MS PowerPoint are the ICT competencies least required from students. The ICT competency required the most is the completion of electronic tests and quizzes (24%), closely followed by the access of the LMS (22%). Even the submission of written assignments (18%) is required at a higher degree than that of the three main computer programs included in this study.

When compared to what students perceive they are required to make use of, the views of lecturers are in direct contrast with regard to the emphasis on basic and specific ICT competencies. Consequently, the conclusion is made that even though lecturers do not necessarily require students to make use of MS Word, MS Excel and MS PowerPoint, students still utilise these computer programs in their core modules. Another conclusion is that there exists a gap with regard to ICT integration in the four core accountancy modules when reference is made to MS Word, MS Excel and MS PowerPoint since the lecturers in charge of the teaching methods within the four accountancy modules does not require their students to utilise these ICT competencies.

After identifying this gap in the integration of MS Word, MS Excel and MS PowerPoint ICT competencies, further investigation was done on whether the assignments of the four core accountancy modules integrate ICT competencies or not. This allowed for clarity on where the ICT integration for specific modules are being applied. Students were asked to indicate if they [1] strongly disagree; [2] disagree; [3] agree; or [4] strongly agree that the assignments within the different core accountancy modules provide them with the opportunity to acquire and utilise ICT competencies. An option for general ICT assignments were also included to identify if ICT competencies are taught outside of the core accountancy modules. The responses from this question are summarised in Figure 5-24.

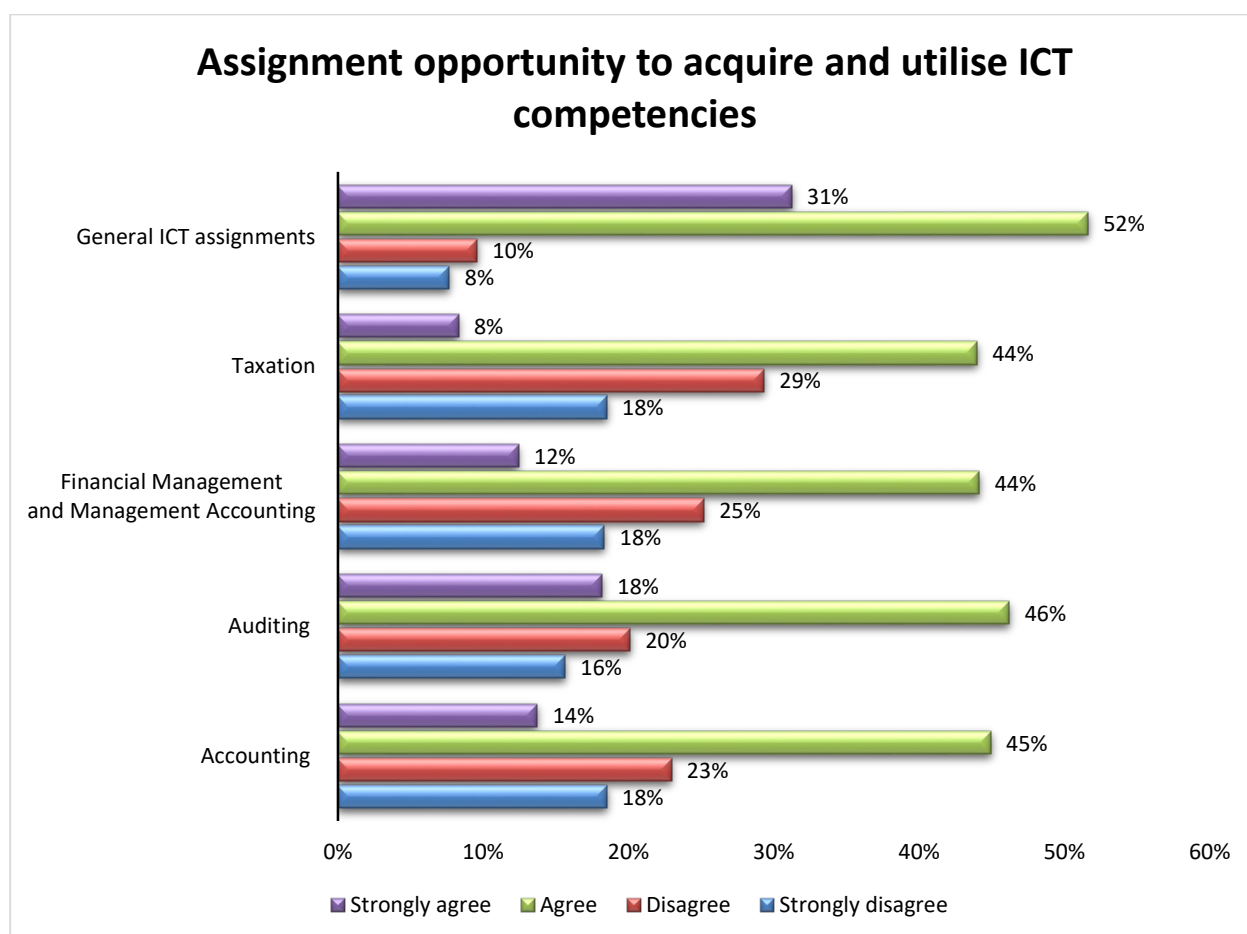


Figure 5-24: Assignment opportunities to acquire and utilise ICT competencies (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-24 concludes that between 52% and 45% of students are of the opinion that the assignments within their core modules are enabling them to acquire and utilise ICT competencies. Taken at face value, Auditing is viewed as the module that enables the utilisation of ICT competencies the most. Parallel to those who strongly agree to the opportunity in assignments,

between 18% to 8% of students just agree to the opportunity within the core accountancy module to acquire and utilise ICT competencies. When viewed in totality, between 64% and 52% agree to the ICT competency opportunities within their core modules. This serves as an indication of the realistic opportunities available for the successful integration of ICT competencies within the core accountancy modules.

Subsequent to student's views on the opportunities available through the assignments within the core accountancy modules, lecturers were asked to indicate if they thought that their own assignments, those created and distributed by them, avails their students with the opportunity to acquire and utilise ICT competencies. The options were not linked to specific modules, but just to the following options [1] strongly disagree; [2] disagree; [3] agree; or [4] strongly agree. Figure 5-25 outlines the findings.

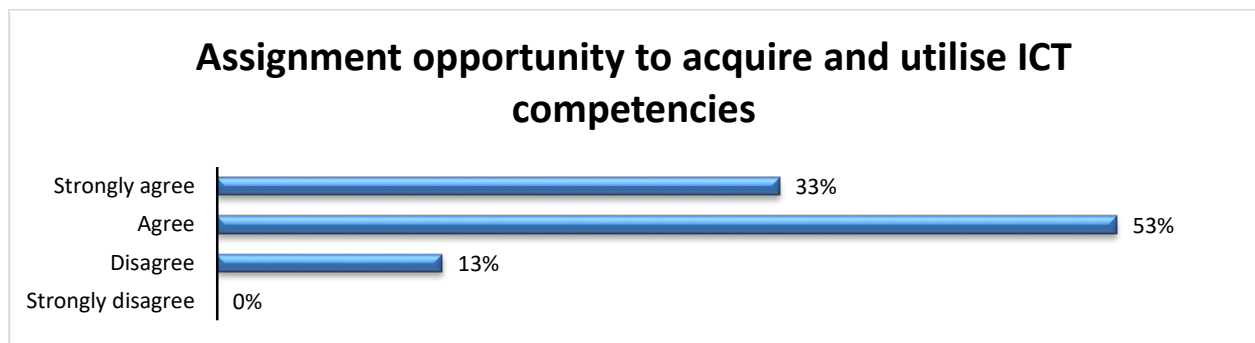


Figure 5-25: Assignment opportunity to acquire and utilise ICT competencies (Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

It is clear from Figure 5-25 that most of the lecturers 86% (33% + 53%) agree that their assignments provide the opportunity to students to acquire and utilise ICT opportunities. This again leads to the conclusion that through the use of assignments, ICT competencies could be effectively integrated into the core accountancy modules.

In conclusion, students utilise MS Word, MS Excel and MS PowerPoint to a higher degree than basic ICT competencies. Lecturers require students to use MS Word, MS Excel and MS PowerPoint at a lesser degree compared to basic ICT competencies. This is evidence that there is a gap of ICT competency integration. Subsequently, the majority of students and lecturers agree that assignments in core accountancy modules provide the opportunity for students to acquire and utilise ICT competencies.

Since an integration gap has been identified together with when students and lecturers think ICT competencies should be taught, the specific ICT competencies that will assist students in acquiring and utilising ICT competencies when integrated were investigated. Students had to

indicate, per core module which general ICT competencies making use of a computer to [1] submit written assignments electronically; and [2] completing an electronic test and quiz; and specific computer programs, [3] MS Word, [4] MS Excel and [5] MS PowerPoint they consider will give them to opportunity to acquire and utilise ICT competencies. Since all the relevant ICT competencies could be selected, the number of responses exceeded the number of respondents per question. Care was taken to convert the response rate to represent 100% of the responses. Even so, the data represented in Figure 5-26 is still based on the total number of respondents (students: n=314). The results are summarised in Figure 5-26.

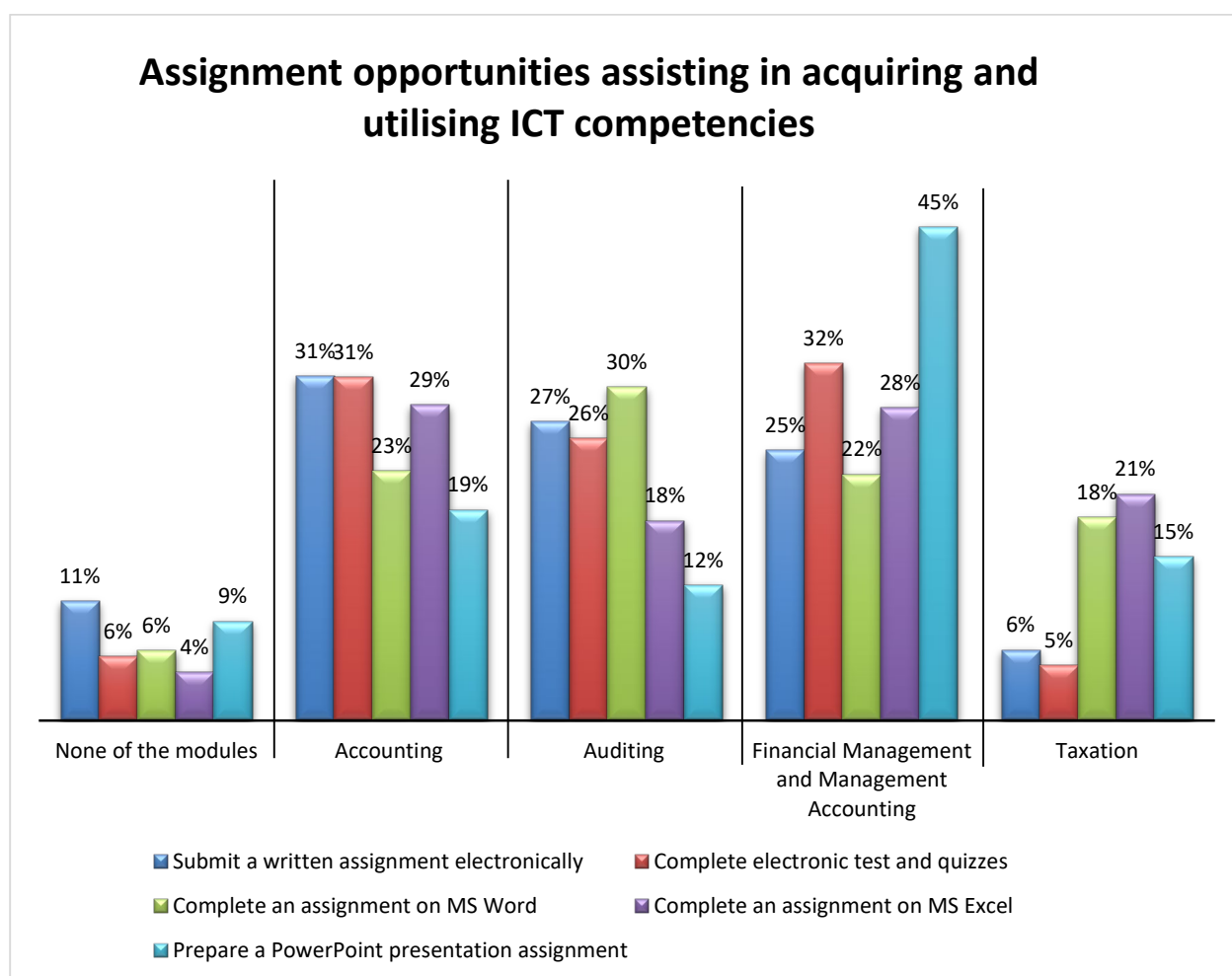


Figure 5-26: Assignment opportunity assisting in acquiring and utilising ICT competencies (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-26 displays a disproportion between basic ICT competencies and the specific computer program competencies. Students are of the opinion that by performing basic ICT competencies in Accounting (31%), Auditing (26%–27%) and Financial Management and Management Accounting (32% and 25%) they will acquire and utilise ICT competencies. These percentages

exceed that of the use of MS Excel in Accounting (29%), Auditing (18%) and Financial Management and Management Accounting (28%). In terms of MS Word, students are of the opinion that the utilisation thereof in Auditing (30%) will be beneficial. The usage of MS PowerPoint received a low rate of importance in Accounting (19%), Auditing (12%) and Taxation (15%) with the outlier in Financial Management and Management Accounting, where it is considered the most beneficial ICT competency at 45%. Overall Taxation is considered as the module where ICT integration will result in the least benefits, but also where basic ICT competencies are considered less beneficial with the specific computer programs considered more beneficial at 21% (MS Word), 18% (MS Excel) and 15% (MS PowerPoint).

In order to further investigate the correlation between the type of university enrolled at and the ICT acquisition and utilisation assignments offered within the core modules, a Pearson correlation is performed. This is discussed in more detail in Paragraph 5.4.2.

With no clear consensus or division between basic and specific ICT competencies, the response by lecturers on the overall inclusion of the basic and specific ICT competencies are considered. Also, since all the relevant ICT competencies could be selected, the number of responses exceeded the number of respondents per question. Care was taken to convert the response rate to represent 100% of the responses. Even so, the data represented in Figure 5-27 is still based on the total number of respondents (lecturers: $n=15$). The findings are summarised in Figure 5-27.

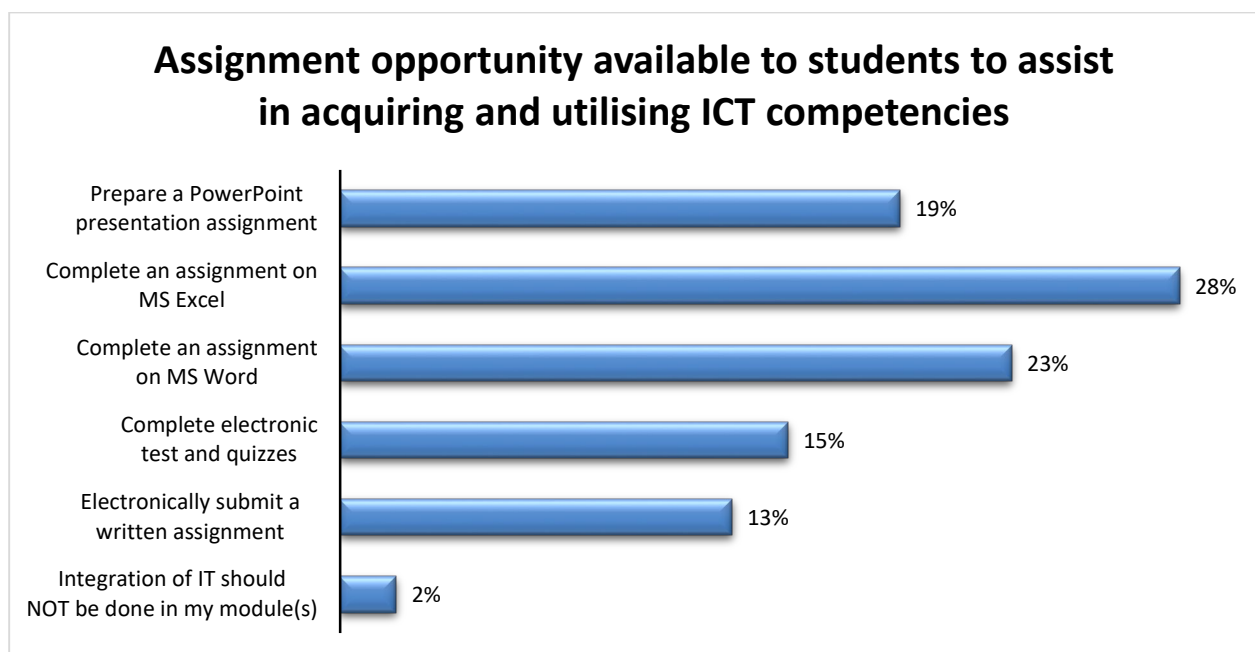


Figure 5-27: Assignment opportunity available to students to assist in acquiring and utilising ICT competencies (Lecturers: $n=15$)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-27 is in direct contrast with the information obtained from Figure 5-23, ICT competencies required from students to be used in modules, where lecturers indicate that the use of MS Word, MS Excel and MS PowerPoint are the ICT competencies least required from students. Figure 5-27 clearly indicates that lecturers are of the opinion that the inclusion of MS Word (23%), MS Excel (28%) and MS PowerPoint (19%) will benefit students to acquire and utilise ICT competencies. The use of basic ICT competencies is viewed as less beneficial by lecturers. This leads to the conclusion that the integration of MS Word, MS Excel and MS PowerPoint ICT competencies are considered necessary or rather important by lecturers.

When comparing the views of students and lecturers on the inclusion of ICT competencies to acquire and utilise ICT competencies and with the clear discrepancy between the two groups, the successful integration of ICT, as outlined in Chapter 2, Paragraph 2.3.3, the acceptance of ICT first needs to be established. It can be viewed that lecturers come from the accountancy work environment and they are aware of the role ICT competencies plays in the daily lives of prospective accountancy professionals. On the other hand, students who have not yet worked in that same environment may not realise the importance of ICT competencies in the accountancy work environment. Subsequently, this leads to the conclusion that the integration of ICT needs to be emphasised by lecturers in their modules to facilitate the effective integration thereof in the core accountancy modules.

In order to facilitate in the development of the ICTM, consideration had to be given to how much time is spent on assignments, both manual and ICT. Manual assignments represent assignments that are handwritten and do not require the use of a computer. ICT assignments represent those assignments that need to be done with the assistance of or completely with a computer through utilising MS Word, MS Excel or MS PowerPoint.

In two separate questions students were asked to indicate how much time they spent on handwritten and ICT assignments within the four core accountancy modules. The options available to select from were [1] 0 hours; [2] 1-3 hours; [3] 4-6 hours; [4] 7-9 hours; and [5] more than 10 hours.

The findings are summarised in Figure 5-28, with the handwritten assignments represented by the lines and the ICT assignments represented by the bars.

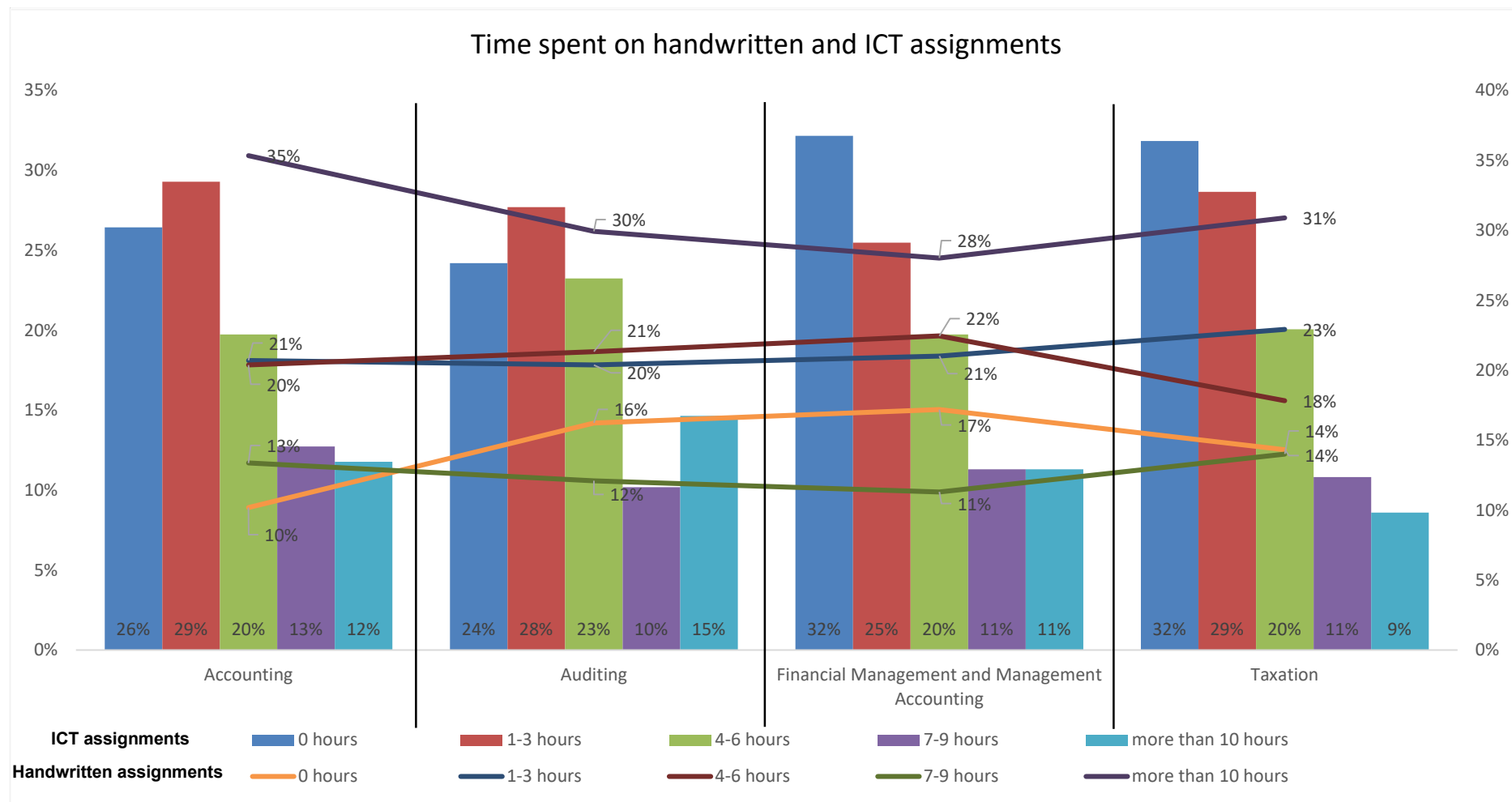


Figure 5-28: Time spent on handwritten and ICT assignments (Students: n=314)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-28 highlights that a small percentage of modules do not have any form of assignments. The handwritten assignments where 0 hours are spent on are Financial Management and Management Accounting (17%), Auditing (16%) and Taxation (14%). In addition, a greater percentage of students indicated that no ICT assignments are completed in Financial Management and Management Accounting and Taxation at a rate of 32%. This is closely followed by Accounting (26%) and Auditing (24%). Therefore, even though this is not the majority of the views, the rate of no ICT assignments far exceeds that of no handwritten assignments. This highlights the gap of ICT integration in these modules.

All four modules rate fairly close with regard to 1–3 hours spent on both handwritten and ICT assignments. Here, the ICT assignments (25%–29%) exceed that of the handwritten assignments (20%–23%). When the 4–6 hours and 7–9 hours, categories are compared, both handwritten (18%–22%) and ICT assignments (20%–23%) are almost identical. The time spent on handwritten assignments (28%–31%) for more than 10 hours exceeds that of ICT assignments (9%–15%). In totality, the time spent on handwritten assignments surpass that of ICT assignments. This indicates that students are spending more time writing out assignments with less time being spent on completing their assignments through utilising ICT competencies. This leaves the area for ICT integration open.

In order to further investigate the correlation between the type of university enrolled at and the time spent on handwritten and ICT assignments, a Pearson correlation is performed. This is discussed in more detail in Paragraph 5.4.2.

The views of students in terms of time spent on handwritten and ICT assignments are compared to the perception of lecturers. This provides a better understanding of what is currently being implemented in the accountancy curriculum. Lecturers were asked just to indicate how much time students spend on handwritten and ICT assignments, with the same time options available as for students. The information is summarised in Figure 5-29.

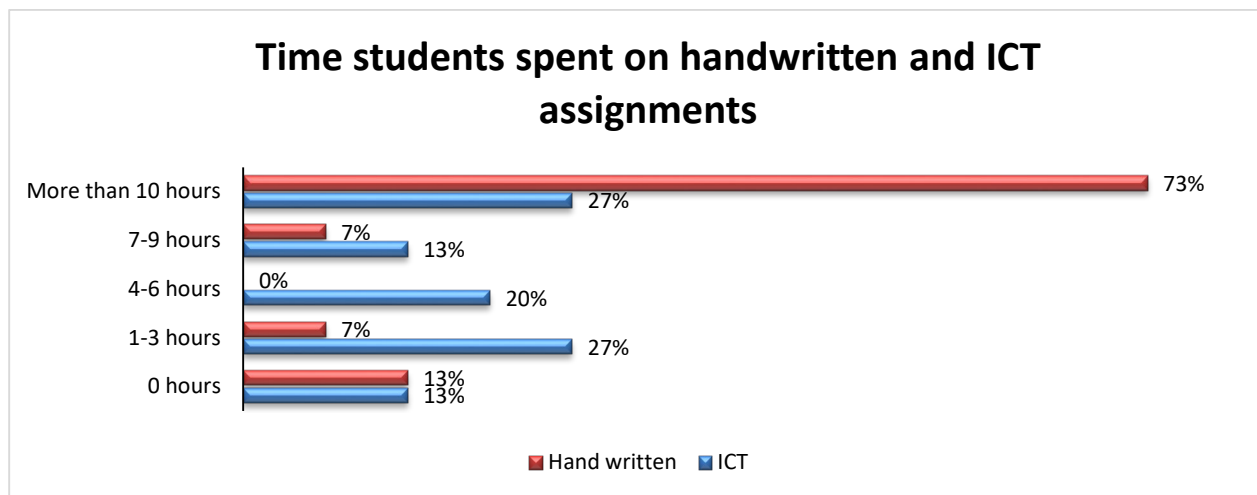


Figure 5-29: Time students spent on handwritten and ICT assignments (Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Clear from Figure 5-29 is the fact that 73% of lecturers indicate that their students spent most of their time on handwritten assignments. This far exceeds the lecturers who indicated that students spent a mere 27% of their time on ICT assignments. Even though this comparison is far apart from one another, the indication that students spent some time on ICT assignments is encouraging. However, comparing this to the views of students, one should consider if what lecturers require of students and what students are doing may not be the same. As with Figure 5-28, a small percentage of lecturers indicate that their students do not spend any time on assignments. Similar to the views of students the total time spent on handwritten assignments exceed that of ICT assignments. Again, this leads to the conclusion that students spend more time writing out assignments with less time being spent on completing their assignments through utilising ICT competencies. This leaves the area for ICT integration open.

Applying this finding to the development of the ICTM, 80% students spend between 7–10 hours per semester on handwritten assignments. This was used as a benchmark in the development of the ICTM on how many ICT competencies can be integrated in the accountancy curriculum to ensure that not too much time is spent on these assignments. Open Polytechnic (2020) and Safe support (2020) state that on average exams and tests avail 1,5 minutes per mark. In order to ensure that the integrated ICT assignments adhere to this benchmark no more than 400 marks (10 hours (600 minutes) with 1,5 minutes per mark) per module per year of study should be required for students to complete.

Since students spend most of their time writing out their assignments, the time spent by lecturers marking those handwritten assignments are considered. The information gathered from this question may shed light on how ICT integration could be integrated into the accountancy

curriculum without adding additional content in the already overloaded accountancy curriculum as outlined in Chapter 1, Paragraph 1.1. This may also serve as motivation for lecturers and ultimately universities to consider and ultimately implement the ICTM. Lecturers were asked to merely indicate how much time they spent on marking handwritten assignments.

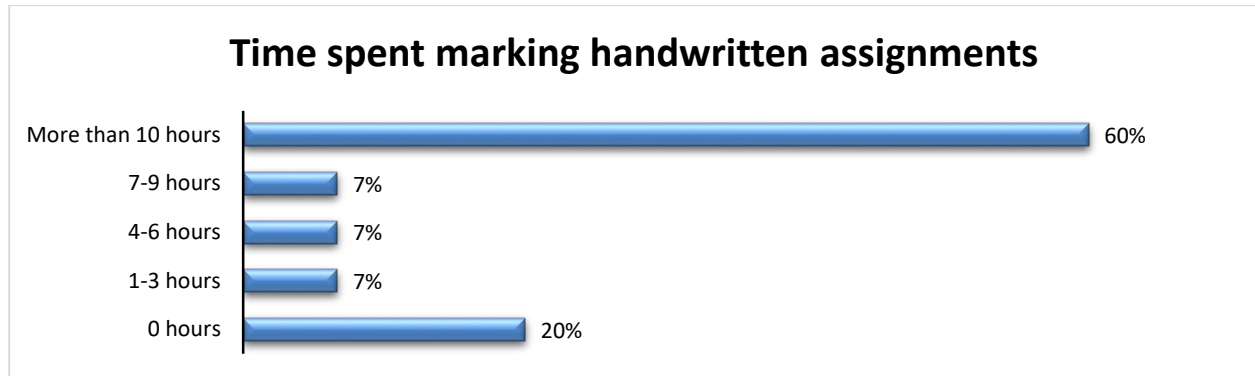


Figure 5-30: Time spent marking handwritten assignments (Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

The obvious depiction obtained from Figure 5-30 is that the majority of lecturers spend in excess of 10 hours marking handwritten assignments. This is in contrast to the 20% of lecturers who indicate that they do not spend any time on marking handwritten assignments. These respondents indicated that students merely need to submit their assignments as proof of doing it. This highlights the lack of integration and perhaps the mundane act of just putting something down on paper. Where if ICT competencies are integrated, students will be practising their ICT competencies and those assignments can then be electronically assessed. The electronic assessment of assignments may seem desirable to the 60% of lecturers who spend countless hours on marking assignments. This could result in a possible workload lessening.

In conclusion, Section D found that the integration of MS Word, MS Excel and MS PowerPoint will be most beneficial if it is done in a staggered approach starting with basic ICT competencies in the 1st year of study, moving to intermediate ICT competencies in the 2nd year of study and finally concluding with expert ICT competencies in the final year of study. It also found that the majority of the participants are of the view that no new ICT competencies should be taught in the honours year of study. Subsequently, the ICTM will only deal with the teaching on new ICT competencies within the first three years of a three-year accountancy degree. However, it should be noted that is the view of the researcher that ICT competencies should still be utilised in the honours year of study to ensure that students stay up to date and familiar with it.

In addition, a gap in the integration of accountancy related ICT competency was identified. Students are of the opinion that more basic ICT competencies will be beneficial to acquire and

utilise ICT competencies. By contrast, lecturers indicated that it will be less beneficial. This draws the attention to the elements identified in Chapter 2, Paragraph 2.3.3 with regard to TAM.

At the time of administering this self-developed questionnaire handwritten assignments were still considered as the main method of completing assignments. Due to the Covid-19 pandemic most if not all assignments have moved to an online electronic platform. As a result, the data collected based on handwritten assignments may differ for the future. This is seen as both a limitation and area of further research. It is reported on as such in Chapter 7 paragraph 7.9 and 7.10 respectively.

Finally, the time spent on handwritten assignments leaves room for the effective integration of ICT competencies in perhaps relieving the pressure from an assessment point of view for lecturers who spend in excess of 10 hours in marking the assignments. Also, the lack of ICT competencies in assignments were again highlighted. All these findings were taken into account in the development of the ICTM where the specific ICT competencies, in which academic year and how they can be integrated are implemented.

As a final step in the development of the ICTM, the perception of participants with regard to the development of the accountancy curriculum and new concepts, as identified by SAICA, Chapter 2, Paragraph 2.4.2 and Chapter 3, Paragraph 3.3.2, were considered. This is discussed in more detail below.

5.3.5 Section E – Knowledge of new SAICA ICT competencies and general perceptions

In order to ensure that the requirements from SAICA are adhered to with regard to the inclusion or exclusion of certain ICT competencies, this section required participants to answer general questions on the involvement of stakeholders in curriculum development, the increase in contribution or weighting in the core accountancy modules if ICT competencies are integrated and finally their understanding of blockchain technology and big data. The latter two concepts have been identified by SAICA as necessary to cover in the accountancy curriculum. Based on the information gathered from the questionnaire, this is discussed and considered further.

Since SAICA is a key stakeholder and the driving force behind the development and implementation of the accountancy curriculum, participants were asked to indicate if they [1] strongly disagree, [2] disagree, [3] agree or [4] strongly agree to the involvement of stakeholders in the involvement of the curriculum. Figure 5-31 summarised their views.

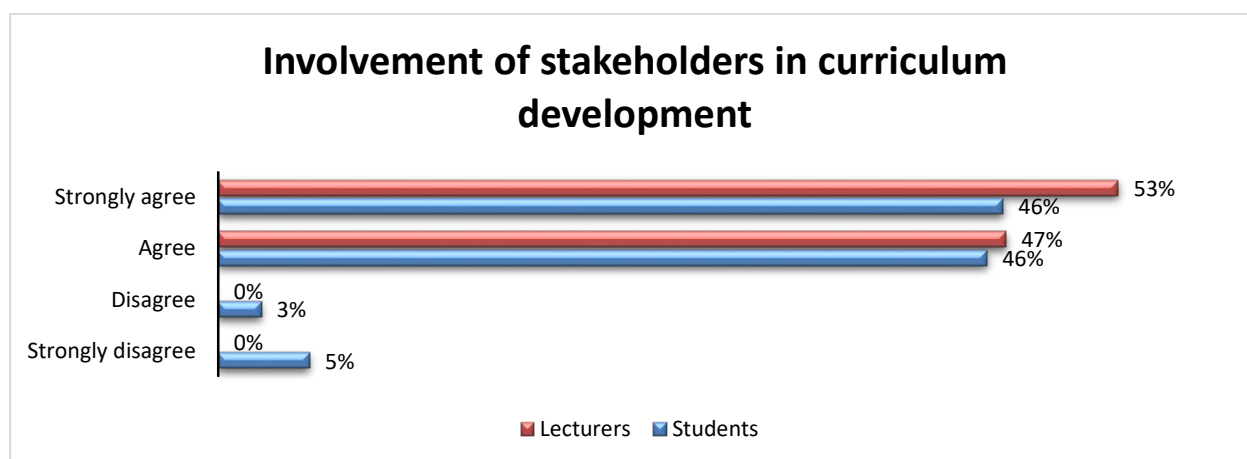


Figure 5-31: Involvement of stakeholders in curriculum development (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-31 illustrates a resounding positive response, by both respondent groups, on the involvement of stakeholders in curriculum development. This supports the inclusion of specific ICT competencies in the ICTM based on the views of SAICA and employers. This could also indicate the willingness of students, lecturers and universities on the implementation of the ICTM if so, suggested by the main stakeholders in the accountancy field.

With the integration of ICT competencies in the accountancy curriculum, and depending on the extent thereof, participants were asked on their view of perhaps assigning a greater weight there to. The questions responses were [1] strongly disagree, [2] disagree, [3] agree or [4] strongly agree. Figure 5-32 represents their views.

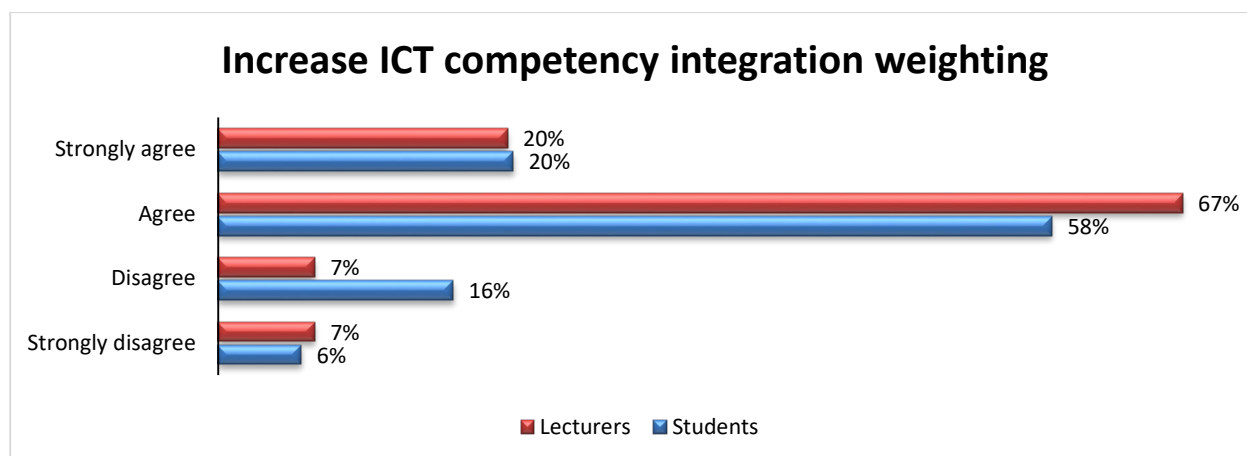


Figure 5-32: Increase ICT competency integration weighting (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-32 indicates that the majority of the respondents, 87% of students (67% agree + 20% strongly agree) and 78% of lecturers (58% agree + 20% strongly agree), would like the weighting assigned to ICT competencies, if integrated, to increase. This speaks to the willingness of participants to perhaps integrate ICT competencies on the condition that it will add something to their degree, in this instance, final marks. This could be achieved through the percentage assigned to assignments prepared electronically and utilising ICT competencies. Both students and lecturers could benefit from this approach in that students will practise and acquire new ICT competencies and lecturers could see a reduced workload due to handwritten assignments being reduced or even eliminated.

At a lesser degree 32% of students (16% disagree + 6% strongly disagree) and 14% of lecturers (7% disagree + 7% strongly disagree) disagree on the increase on ICT competency integration weighting. This could be due to them now fully grasping or buying into ICT integration and the benefit thereof. This links to the lack of guidance provided by SAICA in the CF as to how and which specific ICT competencies should be integrated into the accountancy curriculum. The conclusion drawn from this is that if the ICT integration does not increase the weighting in the module, these competencies are not being integrated and assessed at such a level to ensure compliance with SAICA's CF and employer expectation. Finally, those respondents who do not feel that the integration of ICT competencies should carry a heavier weighting in the module may be those who either do not integrate ICT or who are not competent in ICT competencies.

The final part of this section deals with two new concepts identified by SAICA to be included in the accountancy curriculum as part of 4IR concepts. This study aimed to establish the participant groups' understanding of these concepts before even attempting to integrate them.

Participants were asked what they understood from the term "blockchain". Pratap (2018) argues that it is the new way of storing data. Xu *et al.* (2019:870) state that it represents a network with no central authority point. These two explanations with two options of uncertainty "I have never heard of it and I don't really know; and one incorrect explanation, the new internet" were available for selection. The respondent's selections are illustrated in Figure 5-33.

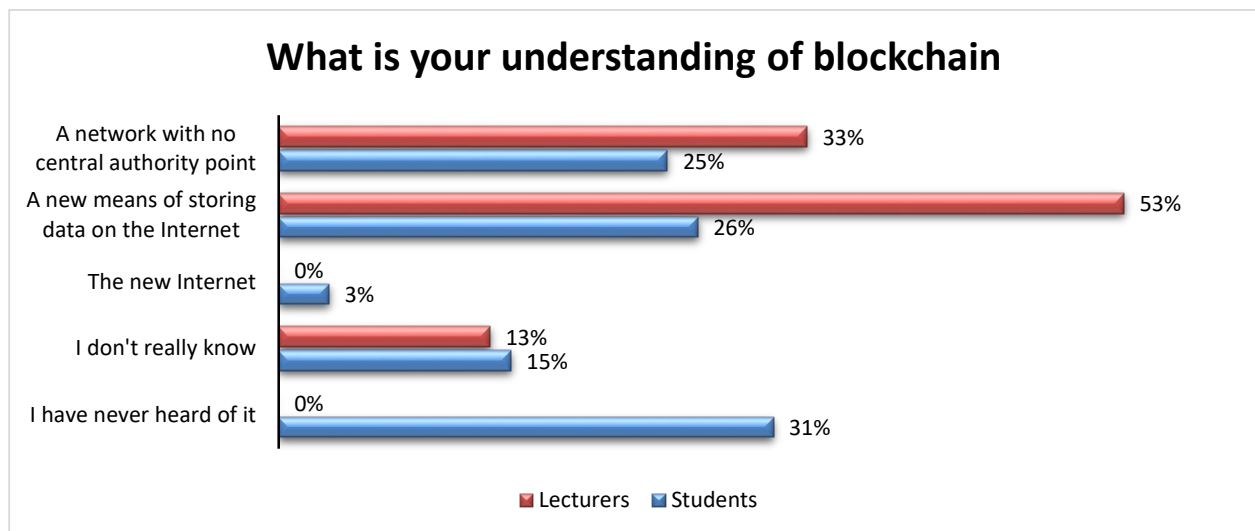


Figure 5-33: What is your understanding of blockchain (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-33 indicates that the majority of lecturers, 86% (53% and 33%), understand what is meant by blockchain, with only 51% (26% and 25%) of students answering the question correctly. Even so, a significant number of students (31% and 15%) and some lecturers (13%) have either never heard of the term or is not sure of its meaning. The conclusion drawn from this is that if lecturers do not know what is meant by the term, how can it be taught at a practical level in the accountancy curriculum as outlined in the CF (SAICA, 2019a:7).

The second term participants were asked to indicate their understanding was of big data. Xu *et al.* (2019:870) explain that it represents large volumes of data that needs to be analysed for better decisions and strategic business moves. Hassani *et al.* (2018:256) define big data as the large volume of a business's day-to-day electronic transactions. As with the previous question, these two explanations together with two options of uncertainty "I have never heard of it and I don't really know; and one incorrect explanation, large volume of structured data to be used by accountants and auditors" were available for selection. The respondent's selections are illustrated in Figure 5-34.

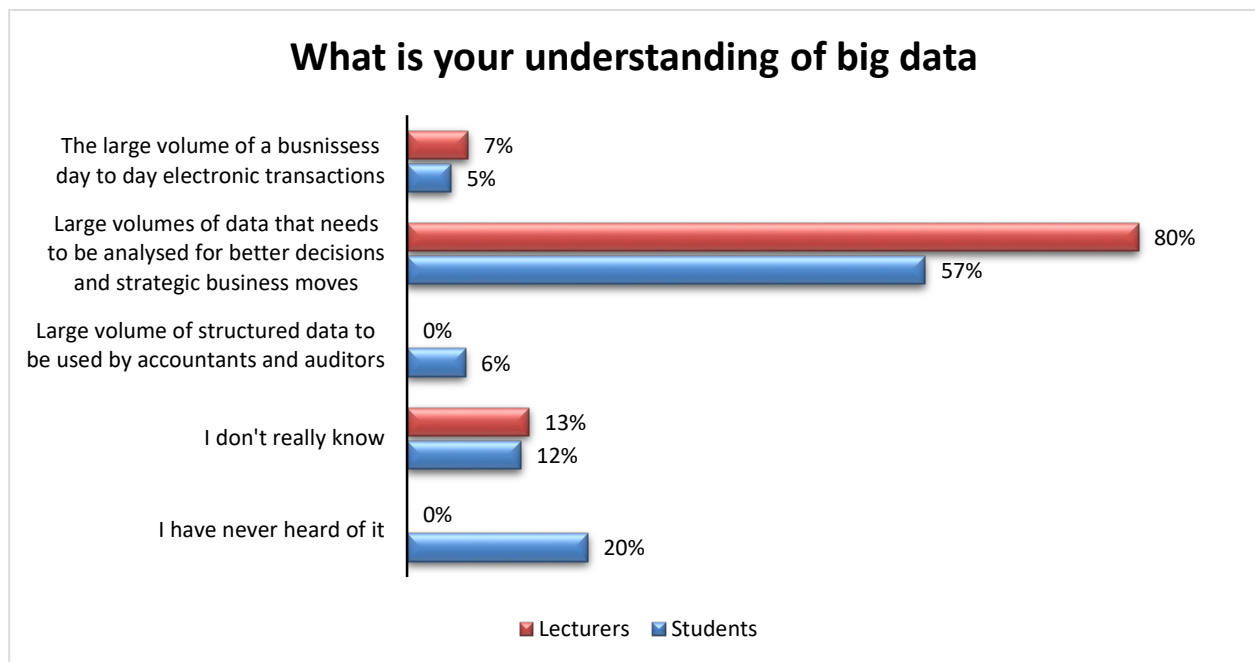


Figure 5-34: What is your understanding of big data (Students: n=314; Lecturers: n=15)

Source: Self-administered questionnaire, coded and summarised (Annexure B)

The results outlined by Figure 5-34 is that most lecturers, 87% (80% + 7%) know what is meant by the concept of big data. Like the term blockchain, 32% (20% + 12%) of students have either never heard of blockchain or do not really know what it means. Even so, a greater percentage of students (27% and 5%) know what is meant by big data compared to blockchain.

The suggestion, based on this finding of blockchain and big data is that these concepts be introduced in a theoretical way first, thus not requiring students to integrate this ICT competency in their core modules.

Following the qualitative analysis through the use of MS Excel, the quantitative data analysis using SPSS was used to determine the reliability of the Likert scales used in the self-developed questionnaire, Cronbach's alpha coefficient test. SPSS was also used to perform Pearson's correlation to determine strengths between different variables. Lastly, SPSS was used to perform cross-tabulation to identify the correlation by means of pattern or frequencies between questions with the same number of answers. This is discussed in more detail below.

5.4 QUANTITATIVE DATA ANALYSIS

This paragraph discusses the three quantitative data analysis techniques as outlined in Chapter 4, Paragraph 4.7. Firstly, the data collected from the self-administered questionnaire were verified as reliable. This is done through Cronbach's alpha coefficient analysis. Secondly, the correlation between different variables was analysed to determine the strength in their relationship. Thirdly,

the frequencies at which the different variables appear were considered. This is discussed in more detail below.

5.4.1 Cronbach's alpha coefficient

As outlined in Chapter 4, Paragraph 4.7, the coefficient was measured based on the questions with the same number of Likert scales (Annexure B). These questions relate to one another in the sense that their selection options are similar. For example, all the questions with the options relating to the module where an ICT competency should be included were grouped together. Based on this grouping X number of Cronbach's alpha coefficient tests were performed. The data were analysed through the use of SPSS.

Considering an acceptable coefficient level of 0.6, as discussed in Chapter 4, Paragraph 4.7, the results on the statements used in the self-developed questionnaire for this study, as gathered from SPSS are grouped and reported on in Table 5-3.

Table 5-3: Cronbach's alpha coefficient for internal consistency of the self-developed questionnaire

STATEMENT USED	RELIABILITY COEFFICIENT
Rate your IT competence in using the following software/programs.	0.723
The university provides me/students with the following resources and support to assist me/students in acquiring and utilising IT skills AND The assignments within the following core modules provide me with opportunities to acquire and utilise IT skills.	0.828
Indicate, in your opinion, at which level of study the listed components of MS WORD, EXCEL, OTHER ICT software should be taught in your accountancy curricula.	0.935
How much time per semester, on average, do you/your student spend on HANDWRITTEN/IT assignments.	0.814

Source: SPSS and Self-administered questionnaire, coded and summarised (Annexure B)

Table 5-3 indicates that the statements used in the self-developed questionnaire exceeds the 0.6 acceptability number. Bryman and Cramer (2002:295) state that when a Cronbach's alpha coefficient is closer to one, the sounder the scale and instrument. With the coefficient alpha exceeding a 0.7 for all of the statements used, it is concluded that the knowledge items within each statement is reliable.

With the reliability of the knowledge items confirmed, the correlation between the different variables were analysed and reported on. This is further discussed below.

5.4.2 Pearson's correlation

In order to determine the strengths between different variables, Pearson's correlation was performed. The most significant correlations for this study were to find the strengths between the perceived level of ICT competency of students when they matriculated (B3 – Annexure B) and at

what level of study students perceived specific MS Word, Excel and other ICT competencies should be taught at university (D1 to D36 – Annexure B). This was done to establish if the perceived level of competency has an influence on what is considered important to be taught at university level with regard to specific ICT competencies. The correlations were performed on the 314 student respondents which represents “n”.

When interpreting the results, Pallant (2013:137) explains that the direction of the relationship should be considered. This is indicated by a negative (-) sign for an adverse effect or just as a positive value for a direct effect. For this study, if the correlation represents a strong negative value, the higher perceived competency in ICT the less likely it will have an effect on when specific ICT competencies should be taught in the accountancy curriculum.

In addition, Pallant (2013:137) states that the strength of the relationship plays a more important role than the direction of the relationship. The relationship can range from -1 to 1. If a correlation of 0 is calculated it is indicative of no relationship between the variables. Whereas a correlation of 1 represents a perfect positive correlation and -1 perfect negative correlation. Cohen (1988:79-81) states that strength values between 0 and 1 are interpreted based on three guidelines, namely [1] $r=0.10$ to 0.29 ; [2] $r=0.30$ to 0.49 ; and [3] $r=0.50$ to 1.0 .

Pallant (2013:132) states that strength refers to the power one variable has in predicting another variable. The guidelines of Cohen (1988:79-81) suggest that for a large strength to be present, meaning for one variable to assist in the prediction of another variable, the Pearson's correlation will lie between 0.50 to 1.0 . For the variable to have a medium strength $r=0.30$ to 0.49 and for a small strength $r=0.10$ to 0.29 .

This study reports on the outliers and significant correlations of the variables being compared. Subsequently only the most relevant correlations (**significant at the 0.01 level and *significant at the 0.05 level) are reported on. The correlations for the above-mentioned data obtained from the self-developed questionnaire are summarised in Table 5-4 and discussed further below.

Table 5-4: Pearson correlation between perceived ICT competencies and which ICT competencies should be taught at university level (Students: n=314)

	B3	D1	D2	D3	D4	D5	D6	D7	D8	D10	D11	D12.1	D12.2	D12.3	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29	D30	D31	D34	D35
D1																																			
D2		.917"																																	
D3		.778"	.774"																																
D4		.843"	.838"	.884"																															
D5	-.165"	.662"	.690"	.613"	.663"																														
D6	-.120'	.392"	.409"	.426"	.459"	.604"																													
D7	-.136'	.366"	.368"	.352"	.340"	.489"	.579"																												
D8	-.157"	.769"	.710"	.708"	.803"	.726"	.539"	.539"																											
D10	-.169"	.336"	.376"	.313"	.323"	.560"	.713"	.532"	.397"																										
D11	-.218"	.344"	.346"	.341"	.355"	.508"	.577"	.484"	.408"	.735"																									
D12.1	-.117"	.379"	.368"	.406"	.412"	.422"	.378"	.399"	.456"	.343"	.355"																								
D12.2	-.145"	.189"	.208"	.276"	.232"	.303"	.373"	.390"	.272"	.364"	.385"	.624"																							
D12.3	-.120'			.141'		.201"	.351"	.365"	.172"	.391"	.388"	.452"	.761"																						
D13		.514"	.478"	.521"	.511"	.432"	.253"	.323"	.556"	.244"	.222"	.771"	.444"	.255"																					
D14		.360"	.361"	.408"	.399"	.366"	.369"	.337"	.438"	.300"	.315"	.860"	.561"	.402"	.811"																				
D15		.430"	.435"	.468"	.454"	.359"	.277"	.334"	.482"	.238"	.242"	.815"	.511"	.356"	.785"	.813"																			
D16		.330"	.344"	.364"	.365"	.395"	.356"	.360"	.402"	.310"	.320"	.897"	.635"	.471"	.694"	.819"	.797"																		
D17	-.131'	.193"	.225"	.210"	.211"	.252"	.323"	.295"	.226"	.313"	.283"	.662"	.782"	.595"	.499"	.631"	.571"	.695"																	
D18	-.139'	.160"	.166"	.253"	.185"	.262"	.304"	.419"	.247"	.263"	.286"	.594"	.835"	.840"	.456"	.565"	.525"	.621"	.725"																
D19	-.135'	.237"	.247"	.338"	.274"	.281"	.330"	.319"	.294"	.322"	.399"	.655"	.860"	.670"	.505"	.622"	.570"	.659"	.703"	.739"															
D20	-.158"	.171"	.200"	.257"	.215"	.312"	.340"	.422"	.276"	.381"	.379"	.609"	.903"	.717"	.474"	.548"	.507"	.613"	.713"	.750"	.775"														
D21		.133"	.183"	.169"	.167"	.239"	.320"	.380"	.169"	.363"	.338"	.569"	.787"	.741"	.404"	.515"	.451"	.578"	.639"	.718"	.645"	.786"													
D22						.170"	.274"	.329"	.128"	.294"	.340"	.413"	.692"	.832"	.234"	.369"	.350"	.419"	.553"	.609"	.607"	.691"	.693"												
D23	-.161"	.116'	.131'	.197"	.144"	.193"	.342"	.299"	.169"	.338"	.334"	.446"	.695"	.892"	.263"	.399"	.406"	.491"	.554"	.594"	.661"	.663"	.652"	.747"											
D24	-.152"			.163"		.199"	.354"	.287"	.171"	.379"	.381"	.418"	.697"	.911"	.230"	.361"	.347"	.470"	.536"	.568"	.654"	.649"	.627"	.744"	.939"										
D25	-.128'			.113'		.168"	.334"	.262"	.132"	.375"	.349"	.372"	.663"	.923"	.175"	.336"	.276"	.392"	.518"	.528"	.600"	.616"	.612"	.736"	.864"	.911"									
D26		.408"	.439"	.321"	.382"	.317"	.184"	.245"	.366"	.205"	.200"	.298"	.198"	.118"	.351"	.306"	.372"	.300"	.202"	.203"	.237"	.177"	.156"		.145"	.135"									
D27						.158"	.194"	.120"		.209"	.249"	.248"	.346"	.297"	.145"	.257"	.188"	.267"	.315"	.328"	.285"	.290"	.298"	.275"	.290"	.314"	.335"	.309"							
D28		.188"	.196"	.113'	.156"	.155"	.165"		.164"	.171"	.182"	.272"	.281"	.174"	.253"	.254"	.258"	.309"	.289"	.274"	.236"	.258"	.213"	.148"	.208"	.211"	.177"	.504"	.480"						
D29						.121"	.157"	.160"		.221"	.285"	.207"	.283"	.307"	.146"	.195"	.194"	.221"	.287"	.223"	.242"	.261"	.214"	.281"	.308"	.330"	.334"	.382"	.518"	.510"					
D30							.176"	.212"		.134'	.218"	.227"	.267"	.350"	.131"	.239"	.253"	.266"	.257"	.298"	.261"	.241"	.272"	.349"	.305"	.341"	.309"	.279"	.415"	.313"	.505"				
D31							.163"	.187"		.217"	.266"	.158"	.291"	.358"		.178"	.165"	.177"	.259"	.281"	.254"	.264"	.225"	.353"	.323"	.349"	.374"	.229"	.474"	.342"	.584"	.845"			
D32							.161"	.198"		.160"	.231"	.192"	.275"	.369"	.133"	.208"	.181"	.198"	.254"	.269"	.251"	.277"	.238"	.374"	.328"	.355"	.368"	.188"	.443"	.295"	.514"	.768"	.808"		
D34	-.174"	-.134'	-.111'								.137'																.122'								
D35	-.131'										.112'																						.835"		
D36	-.155"			-.180"		-.114'		-.142'									-.118'				-.118'												.756"	.828"	

**Correlation is significant at the 0.01 level

*Correlation is significant at the 0.05 level

Source: SPSS and Self-administered questionnaire, coded and summarised (Annexure B)

Table 5-4 represents the significant relationships between perceived ICT competency for different computer programs and the perceived specific ICT competencies to be included in the accountancy curriculum through the use of Pearson's product-moment correlation coefficient. Preliminary analysis was performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. Overall, there was a low, negative correlation between the perceived ICT competency when matriculated and when the specific ICT competencies should to be included in the accountancy curriculum. This is where high levels of perceived ICT competencies associated with lower levels of when specific ICT competencies should be included in the accountancy curriculum. By contrast, when specific ICT competencies should be included in the accountancy curriculum has a strong, positive correlation between one another. Since the level of ICT competency when matriculated has a negative correlation with when specific ICT competencies should be taught at university level, the ICTM

draws guidance on when which ICT competencies should be included from literature, as outlined in Chapter 3, Table 3-4 and the cross-tabulation data on this matter. This is discussed in more detail in Paragraph 5.4.3.

In addition, before the ICTM could include specific ICT competencies in the different year levels of study, what is currently being applied within different universities were considered. A correlation was performed on the type of university enrolled at (U1 – traditional university and U2 – comprehensive university (A3 - Annexure B)) and whether the current assignments within the core accountancy modules provide students with the opportunity to acquire and utilise ICT competencies (D52 to D56 - Annexure B). This correlation is considered important to identify if there is a difference in the ICT integration being applied between the two different types of universities. This could be an indication of which universities should strive to apply the ICTM and where the competency gap may be starting and could possibly be reduced through the implementation of the ICTM.

Since this study reports on the outliers and significant correlations of the variables being compared only the most relevant correlations (** significant at the 0.01 level and) are reported on for this correlation. Table 5-5 summarises the results.

Table 5-4: Pearson correlation between type of university enrolled at and ICT opportunities in the current core module assignments (Students: n=314)

	A3	D52	D53	D54	D55	D56
D52	.408**					
D53	.370**	.634**				
D54	.392**	.780**	.655**			
D55	.379**	.787**	.653**	.899**		
D56	.435**	.787**	.670**	.780**	.755**	
D57	.187**	.325**	.418**	.369**	.317**	.315**

**Correlation is significant at the 0.01 level

Source: SPSS and self-administered questionnaire, coded and summarised (Annexure B)

Table 5-5 indicates that there is a medium significance between the type of university and the ICT competency opportunities within the core accountancy modules. There are only positive correlations indicating that based on the module, the ICT competency opportunity increases in a positive manner. The two accountancy modules that have the highest significance are FM (D54) and MA (D54). Since these two modules are closely related in the sense that they cover managerial accounting topics, this result was expected.

After the consideration of the ICT competency opportunities within the different universities, the time spent on assignments, handwritten and ICT, is considered to identify if the ICTM would be able to be implemented within the accountancy curriculum without adding to the time already

spent on assignments. This could be achieved through the replacement or supplementation of handwritten assignments with ICT or additional ICT assignments. Accordingly, a correlation was performed between the type of university (A3 – Annexure B) and the time spent per core accountancy module on handwritten assignments (D59: Accounting, D60: Audit, D61: Financial Management, D62: Management Accounting, and D63: Taxation – Annexure B) and ICT assignments (D65: Accounting, D66: Audit, D67: Financial management, D68: Management Accounting, and D69: Taxation – Annexure B). Similar to the previous two correlations performed, this study reports on the outliers and significant correlations of the variables compared only the most relevant correlations (**significant at the 0.01 level and *significant at the 0.05 level) are reported on for this correlation. Table 5-6 summarises the results.

Table 5-5: Pearson's correlation between type of university enrolled at and time spent on handwritten and ICT assignments (Students: n=314)

	A3	D59	D60	D61	D62	D63	D65	D66	D67	D68
D59	-.369**									
D60	-.280**	.845**								
D61	-.259**	.827**	.891**							
D62	-.276**	.794**	.882**	.935**						
D63	-.285**	.856**	.890**	.887**	.864**					
D65	.525**	-.199**	-.171**	-.122*	-.173**	-.174**				
D66	.552**	-.177**					.775**			
D67	.507**	-.185**			-.113*		.838**	.783**		
D68	.502**	-.216**					.785**	.733**	.905**	
D69	.576**	-.237**	-.151**		-.136*	-.132*	.845**	.819**	.859**	.828**

**Correlation is significant at the 0.01 level

*Correlation is significant at the 0.05 level

Source: SPSS and Self-administered questionnaire, coded and summarised (Annexure B)

Table 5-6 outlines a medium negative and strong positive significance between the type of university and the time spent on handwritten (D59 to D63 – Annexure B) and ICT (D65 to D69 – Annexure B) assignments. Firstly, based on the university enrolled at, the time spent on handwritten assignments moved in the adverse direction, indicating that one university spent more time on handwritten assignments than those enrolled at the other university. These results indicate that one university is utilising ICT assignments in the sense that students are spending less time on handwritten assignments. This is relevant as it serves as an indication that ICT integration into the core accountancy modules are possible. This is discussed further in Chapter 6.

In order to further analyse the data obtained, the patterns present in different data categories are considered. This analysis is performed through the cross-tabulation tables performed by SPSS and discussed in more detail below.

5.4.3 Cross-tabulation

Cross-tabulation is applied in this study to compare the patterns or frequencies between two variables of the data collected through the self-developed questionnaire for students only. This is achieved through the calculation of the chi-square (p-value). Pallant (2013:221) posits that for a chi-square test to be significant, the p-value needs to be smaller than 0.05. If the p-value exceeds 0.05 the result indicates that the one variable is significantly different than the other variable(s). Ultimately resulting in no association between the two variables. Only the responses from students are used for this statistical analysis due to the small number of lecturer responses (n=15) not being feasible for the calculation of p-values.

Where variables had more than one choice option, SPSS could not determine statistical chi-square values due to too many variables being compared to one constant. As a result, only the important variables were analysed and discussed further in this paragraph. However, it should be noted that all variables are discussed under qualitative data analysis (frequencies) in the analysis of the self-developed questionnaire.

The chi-square (p-value) for this study was calculated on the type of university enrolled at (A3 – Annexure B), the ICT exposure at school (B1 – Annexure B), and places access to a computer (C1– Annexure B).

Firstly, the type of university enrolled at (A3 – Annexure B) was compared to [1] the type of school matriculated from (A8 – Annexure B); [2] if stakeholders should be involved in the development of the accountancy curriculum (E1 – Annexure B), [3] if the integration of ICT in the accountancy curriculum should result in the increase of its contribution to the year mark (E2 – Annexure B), [4] what blockchain is (E3 – Annexure B), and [5] what big data is (E4 – Annexure B). This was performed to establish if the type of school matriculated from has any effect on the university students enrol at. Also, the view on stakeholder involvement in the accountancy curriculum and the weight ICT should carry when integrated in the accountancy curriculum. This is mainly due to the ICT integration already being applied at the different universities as outlined in Paragraph 5.4.2, Table 5-6, Question D65 to 69. The understanding with regard to 4IR concepts, blockchain and big data was also considered based on the exposure thereto at the different universities.

The main reason for these cross-tabs was to establish if one university supersedes the other in terms of ICT integration. This serves as an indication of Maslow's hierarchy of needs adapted to the ICT education levels of a prospective accountancy professional (Chapter 2, Paragraph 2.3.2.2). The results of the p-value are summarised in Table 5-7.

In addition, the ICT exposure students had at school level (B1 – Annexure B) was compared to perceived ICT competencies of different computer programs (C5 to C11 – Annexure B). This also

falls within Maslow's adapted hierarchy of needs to determine what level of ICT needs of students are met. The results of the p-value are summarised in Table 5-7.

Lastly, the places of access to computers (C1 – Annexure B) were compared to the ICT resources provided by the university (C19 to C22 – Annexure B). Here specific focus was placed on the Covid-19 pandemic where students need to access online learning. If students only have access to certain ICT resources at university, access will be hindered and indicates that ICT integration and application may not be possible. Similar to the previous two cross-tabs, this also serves as an indication of the needs of students are being met in terms of ICT as indicated by the adapted Maslow's hierarchy of needs. The results of this the p-value and the above-mentioned cross-tabs are summarised in Table 5-7 below.

Table 5-6: Cross-tab significance (p-values) (n = 314)

VARIABLE 1	VARIABLE 2	ASYMPTOTIC VALUE (p > 0.05 = significant)	RESULT
A3	A8	0.215	*
	E1	0.974	*
	E2	0.070	*
	E3	0.000	Significant association
	E4	0.000	Significant association
B1	C5	0.000	Significant association
	C6	0.003	Significant association
	C7	0.019	Significant association
	C8	0.686	*
	C9	0.341	*
	C10	0.828	*
	C11	0.128	*
C1	C19	0.523	*
	C20	0.417	*
	C21	0.985	*
	C22	0.665	*

*No significant association as p > 0.05

Source: SPSS and self-administered questionnaire, coded and summarised (Annexure B)

Table 5-7 summarises all the cross-tabs performed for the statistically executable variables within SPSS. The majority of the cross-tabs do not result in a significant association as $p > 0.05$. Subsequently, only the type of university enrolled at (A3) and the result of what blockchain (E3) and big data (E4) is results in a significant association. This indicates that depending on the type of university enrolled at, the understanding of blockchain and big data will differ. For both E3 and E4 there were five options to select, [0] I have never heard of it, [2] a wrong answer, depending on the specific question, [3] and [4] a correct answer, depending on the specific question, and [4] I don't really know (Paragraph 5.3.5, Figure 5-33 and 5-34).

The cross-tab results per university based on the understanding of blockchain and big data are illustrated in Figure 3-35.

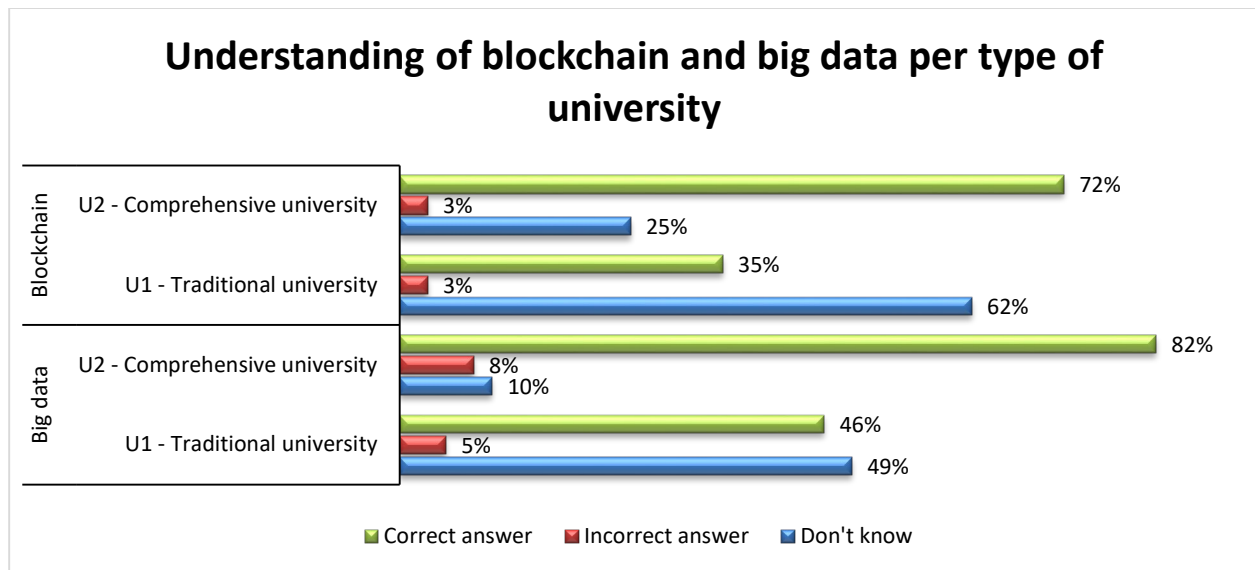


Figure 5-35: Understanding of blockchain and big data per type of university (Students: n=314)

Source: SPSS and self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-35 highlights the clear difference between the traditional university (U1) and the comprehensive university (U2). For both concepts, blockchain and big data, U2's respondents far exceeded the understanding thereof when compared to the understanding of U1's respondents. While 72% compared to 35% with regard to blockchain and 82% compared to 46% with regard to big data. This serves as an indication that with the fast pace at which technology is changing due to 4IR some universities cannot or are not keeping up with the pace.

Another significant association evident from Table 5-7 is between the ICT subjects completed at school (B1) and the perceived ICT competencies in MS Word (C5), MS Excel (C6), and MS PowerPoint (C7). Here the exposure to ICT at a school level is seen as having an effect on the perceived ICT competencies of students. Respondents could select one of five options to serve as an indication if they [0] N/A – never used program/application, [1] Novice – The use of IT is new to me, [2] Advanced beginner – I often use IT, [3] Proficient – I regularly use IT with ease, but still need some assistance and [4] Expert – I use IT daily with ease and am able to apply different technical aspects of the program without assistance (Paragraph 5.3.3, Figures 5-11 to 5-13). The cross-tab results per ICT subject completed at school based on the perceived ICT competencies are illustrated in Figure 3-36.

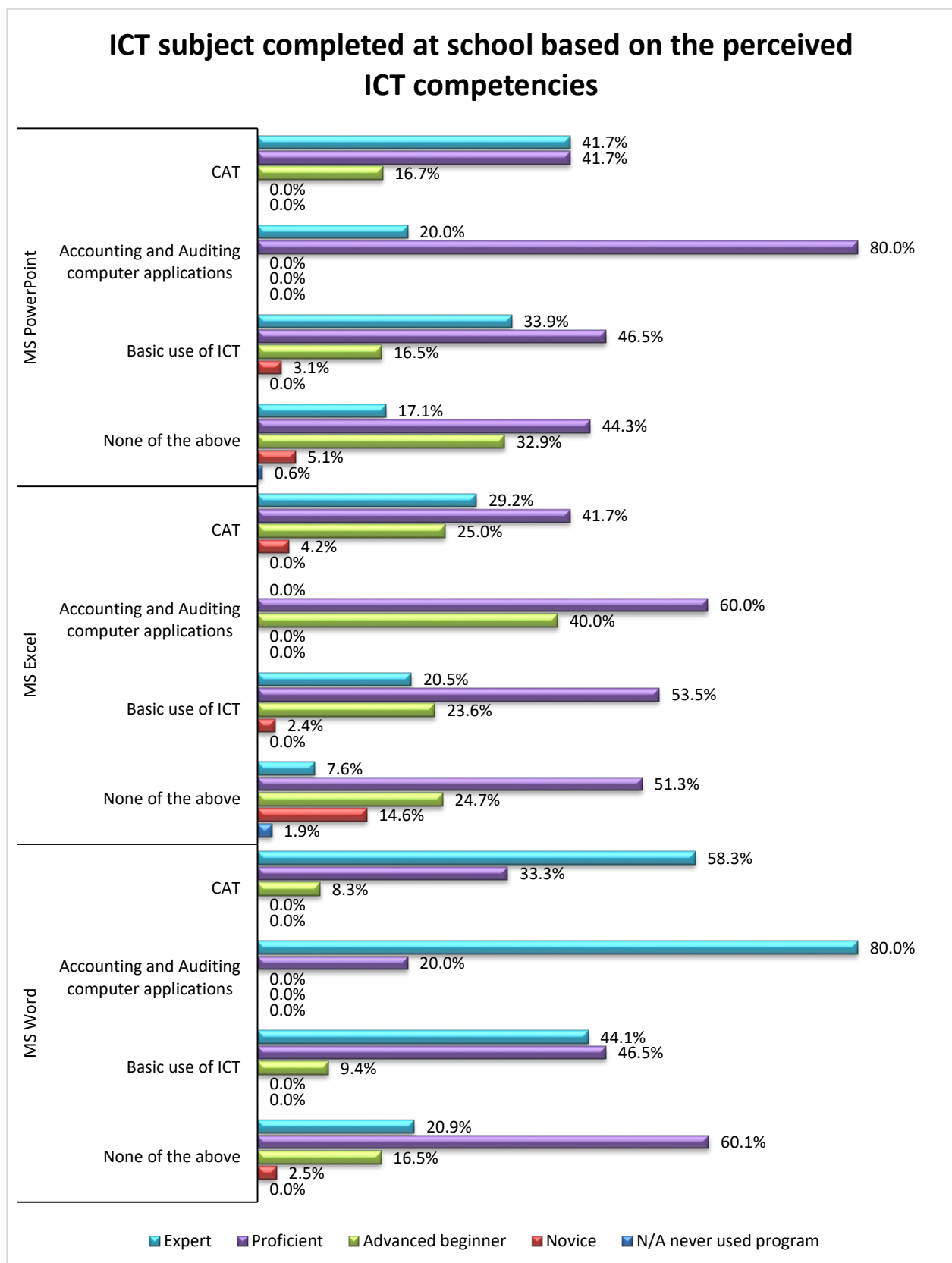


Figure 5-36: ICT subject completed at school based on the perceived ICT competencies (Students: n=314)

Source: SPSS and Self-administered questionnaire, coded and summarised (Annexure B)

Figure 5-36 outlines that if a student had ICT at school, they rate their competencies higher at a proficient and expert level for all three computer programs than those students who only had basic ICT or no ICT at school. The responses from this group rated MS Word at the highest expert rating at 80,0%, followed by MS PowerPoint at 20,0% with MS Excel not receiving an expert rating. By contrast this group rated MS Word the lowest proficiency level, 20,0%, followed by MS Excel, 60%, and MS PowerPoint receiving the highest rating, 80,0%. An interesting observation are the ratings of those students with no ICT exposure at school. MS Word received a rating at a proficient level of 60,1%, followed by MS Excel at an expert level of 58,3% and MS PowerPoint at 41,7%. Since these students did not have any exposure to ICT at school the concern is raised of what they perceive competency to be. Since no test of competency was included in the self-developed questionnaire, this is one of the limitations to this study.

Taking into account the qualitative data analysis and the quantitative data analysis, a conclusion based on the exploratory mixed research method should be reached to conclude on the information obtained through both mediums that assisted in the development of the ICTM. This is discussed in more detail below.

5.5 EXPLORATORY MIXED RESEARCH METHOD CONCLUSION ON STATISTICAL ANALYSIS

As outlined in Chapter 4, Paragraph 4.5.3.4 this research followed an embedded research design where a qualitative research method followed by a quantitative research method were applied. Creswell and Plano Clark (2007:67) argue that the one method provides a supportive role to the other. Subsequently, this paragraph will link the qualitative research analysis in Paragraph 5.3 and the quantitative research analysis in Paragraph 5.4 to indicate how they support one another to aid in the development of the ICTM.

All the significant findings of these two methods are included in the table to serve as an indication on the relevance of the findings to the study by linking it to the themes identified in Chapter 2 and 3, the self-developed questionnaire (Table 2-10), the chapter section classification (Chapter 4, Paragraph 4.7.1). The development of the ICTM considerations based on this table is discussed in more detail in Chapter 6, Paragraph 6.4. The different qualitative analysis and quantitative analysis of data are summarised in Table 5-8.

Table 5-7 : Exploratory mixed research method conclusion on statistical analysis

THEMES FROM LITERATURE (Chapters 2 and 3)	EXPLANATION / RELEVANCE	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED Student questionnaire (Annexure A)	WHERE APPLIED Lecturer questionnaire (Annexure A)	CHAPTER 4 SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)
Type of schooling	➤ Public: Fee-free school ➤ Public: Private school ➤ Private: Independent school	Paragraphs ➤ 2.2.1 ➤ 2.2.2	Question 10–11	N/A	Section A	<u>Paragraph 5.3.1</u> ➤ Only 12% of respondents attended private: independent schools (Figure 5-5). The conclusion is that due to the poverty situation in South Africa and the current circumstances in public schools, ICT exposure to the majority of respondents are not adequate.	N/A
ICT exposure at school level	➤ Available ICT subjects at school ➤ ICT competency when matriculated	Paragraph ➤ 2.2.2	Question 12, 16	Question 42	Section B	<u>Paragraph 5.3.2</u> ➤ 46% of respondents were not exposed to any ICT at school (Figure 5-6). ➤ 52% perceived themselves as beginners (Figure 5-7). ➤ MS Word, MS Excel, MS PowerPoint perceived by students most important ICT competency to possess when entering university (Figure 5-8).	<u>Paragraph 5.4.3</u> ➤ Significant association between type of ICT exposed to at school and perceived competency in MS Word, MS Excel and MS PowerPoint (Table 5-7 and Figure 5-35). ➤ Respondents with Accounting and Auditing programs at school rated their perceived competencies higher than any other ICT exposure.

Table 5-7: Exploratory mixed research method conclusion on statistical analysis (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	EXPLANATION / RELEVANCE	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED Student questionnaire (Annexure A)	WHERE APPLIED Lecturer questionnaire (Annexure A)	CHAPTER 4 SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)
ICT being integrated in accountancy curricula, specifically for the four core accountancy modules.	➤ Core modules incorporating ICT required competencies	➤ Paragraph 2.2.3 ➤ Table 2-1 ➤ Figure 2-3 ➤ Paragraph 3.4	Question 9, 24, 27–30	Question 39, 50–51, 53–58	Section D	<u>Paragraph 5.3.4</u> Currently utilising: ➤ Students – MS Word, MS Excel MS PowerPoint (Figure 5-22). ➤ Lecturers – Basics (Figure 5-23). Perceived necessary: ➤ Students – Basics. ➤ Lecturers – MS Word, MS Excel MS PowerPoint. (Figures 5-18 and 5-20). Assignment types: ➤ Less ICT more handwritten assignments (Figures 28 to 29). ➤ Assignments provide opportunity to acquire and utilise non-technical competencies (Figures 5-23 to 5-27). Time spent doing assignments: ➤ Between 7 to 10 hours (Figures 5-28 and 5-29). Time spent marking: ➤ Lecturers more than 10 hours marking handwritten assignments (Figure 5-30).	<u>Paragraph 5.4.2</u> ➤ Type of university and ICT assignment opportunities have a direct correlation. Resulting in some universities staying up to date with 4IR changes and some not (T5-4).

Table 5-7: Exploratory mixed research method conclusion on statistical analysis (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	EXPLANATION / RELEVANCE	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED Student questionnaire (Annexure A)	WHERE APPLIED Lecturer questionnaire (Annexure A)	CHAPTER 4 SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)
ICT Gap: Employer expectations vs ICT being integrated in the accountancy curriculum	➤ Competencies in various ICT applications	➤ Paragraphs 2.2.3; 2.2.4 ➤ Table 2-1 ➤ Figure 2-3 ➤ Paragraphs 3.3.1; 3.3.2 ➤ Tables 3-2 to 3-4	Question 17, 22	Question 42, 48	Section C and D	<u>Paragraphs 5.3.3</u> ➤ Students rate MS Word and MS Excel at proficient level and MS PowerPoint at beginner level (Figures 5-11 to 5-13). ➤ ICT level when graduate at beginner level (Figure 5-17).	N/A
Bloom's taxonomy (RBT)/Curriculum development	➤ At what level is what being accessed in terms of ICT	➤ Paragraph 2.3.1 ➤ Table 2-4 ➤ Paragraphs 3.2.; 3.4.1; 3.5 ➤ Tables 3-1; 3-8	Question 25–26, 31	Question 52,59	Section D	<u>Paragraph 5.3.4</u> ➤ MS Word, MS Excel, MS PowerPoint used in all core modules (Figures 5-22 and 5-23).	N/A
Maslow's hierarchy of needs adapted to accountancy educational levels	➤ In which year of study is what being integrated or used in terms of ICT	➤ Paragraph 2.3.2.2. ➤ Figure 2-6 ➤ Paragraphs 3.2.; 3.5 ➤ Tables 3-1; 3-8	Question 18–20	Question 44–46	Section D	<u>Paragraph 5.3.4</u> ➤ Integration to be introduced in a staggered approach (Figures 5-18 to 5-20). ➤ Students are not clear on which ICT competencies are regarded as basic, intermediate and advanced (Figures 5-18 to 5-20). ➤ Lecturers results clear on basic, intermediate and advanced competencies (Figures 5-18 to 5-20).	<u>Paragraph 5.4.2</u> ➤ Significant correlation between when ICT competencies should be taught at university level and ICT competencies when matriculated (Table 5-4).

Table 5-7: Exploratory mixed research method conclusion on statistical analysis (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	EXPLANATION / RELEVANCE	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED Student questionnaire (Annexure A)	WHERE APPLIED Lecturer questionnaire (Annexure A)	CHAPTER 4 SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)
External factors that will influence the acceptance of the ICTM, TAM 2	➤ Type of schooling, ICT exposure at school level, ICT being integrated at university, employer expectations and SAICA's CF.	➤ Paragraph 2.3.3 ➤ Table 2-8	Question 9-13, 16, 24, 27 - 30	Question 39, 42, 50–51, 53–58	Section B and D	<u>Paragraph 5.3.2</u> ➤ 46% of respondents were not exposed to any ICT at school (Figure 5-6). ➤ 52% perceived themselves as beginners (Figure 5-7). ➤ MS Word, MS Excel, MS PowerPoint perceived by students most important ICT competency to possess when entering university (Figure 5-8). <u>Paragraph 5.3.4</u> ➤ Integration to be introduced in a staggered approach (Figures 5-18 to 5-20). ➤ Students are not clear on which ICT competencies are regarded as basic, intermediate and advanced (Figures 5-18 to 5-20). ➤ Lecturers results clear on basic, intermediate and advanced competencies (Figures 5-18 to 5-20).	<u>Paragraph 5.4.3</u> ➤ Significant association between type of ICT exposed to at school and perceived competency in MS Word, MS Excel and MS PowerPoint (Table 5-7 and Figure 5-35). ➤ Respondents with Accounting and Auditing programs at school rated their perceived competencies higher than any other ICT exposure. <u>Paragraph 5.4.2</u> ➤ Significant correlation between when ICT competencies should be taught at university level and ICT competencies when matriculated (Table 5-4).

Table 5-7: Exploratory mixed research method conclusion on statistical analysis (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	EXPLANATION / RELEVANCE	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED Student questionnaire (Annexure A)	WHERE APPLIED Lecturer questionnaire (Annexure A)	CHAPTER 4 SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)
SAICA's ICT requirements in terms of the revised CF	➤ Basic to advanced competencies	➤ Paragraphs 2.4.1; 2.4.2 ➤ Table 2-9 ➤ Paragraph 3.3.2 ➤ Table 3-5	Question 21–22	Question 47	Section D	<u>Paragraph 5.3.4</u> ➤ Integration to be introduced in a staggered approach (Figures 5-18 to 5-20). ➤ Students are not clear on which ICT competencies are regarded as basic, intermediate and advanced (Figures 5-18 to 5-20). ➤ Lecturers results clear on basic, intermediate and advanced competencies (Figures 5-18 to 5-20).	<u>Paragraph 5.4.2</u> ➤ Significant correlation between when ICT competencies should be taught at university level and ICT competencies when matriculated (Table 5-4).
					Section E	<u>Paragraph 5.3.5</u> ➤ Blockchain and big data not a familiar concept to students (Figures 5-33 and 5-34).	<u>Paragraph 5.4.3</u> ➤ Students at traditional universities know to a lesser degree what is meant by blockchain and big data (Table 5-7; Figure 5-35).

Table 5-7: Exploratory mixed research method conclusion on statistical analysis (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	EXPLANATION / RELEVANCE	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED Student questionnaire (Annexure A)	WHERE APPLIED Lecturer questionnaire (Annexure A)	CHAPTER 4 SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)
4IR	➤ Impact of ICT on the lives of prospective accountancy professionals, ➤ Availability of ICT resources, private and at university	➤ Paragraph 2.4.3 ➤ Paragraph 3.4	Question 14–15, 23, 32 - 33	Question 40–41, 43, 49, 60–61	Section C and E	<u>Paragraph 5.3.3 and 5.3.5</u> ➤ Sufficient resources available to students that will aid in the integration of ICT (Figures 5-9; 5-10 and 5-16). ➤ ICT level when graduate at beginner level (Figure 5-17). ➤ Blockchain and big data not familiar concepts to students (Figures 5-33 and 5-34).	<u>Paragraph 5.4.3</u> Students at traditional universities know to a lesser degree what is meant by blockchain and big data (Table 5-7; Figure 5-35).

Source: Summary of Chapters 2, 3 and 5

Table 5-8 outlines the strong correlation between perceived ICT competencies and which specific ICT competencies should be included in the accountancy curriculum. This supports the literature in Chapter 2 indicating that Maslow's hierarchy of needs stems from the satisfaction of basics first, then more advanced skills can be obtained. In turn, this also speaks to RBT, as outlined in Chapter 2 where basic knowledge should be assessed first before intermediate and advanced knowledge can be covered. This aided in the development of the ICTM whereas students enter university with different ICT competency levels and where basic ICT competencies are perceived important for some in the 1st year, for other it may be seen as unnecessary as they have already mastered it at school, speaking to their perceived ICT competency levels when matriculated. This also speaks to SAICA's CF requirements and employer needs. If students perceive their ICT competencies to be at a higher-level as what it actually is, SAICA's CF requirements may be discarded and employer needs will not be met. For prospective accountancy professionals to successfully

integrate into the working environment they need to meet the 4IR ICT needs. These are the needs that should be taught at university level. Chapter 6 outlines such needs and discusses this further in detail.

5.6 CONCLUSION

This chapter analysed and reported on the data obtained from respondents at two universities, U1 and U2 firstly on a qualitative basis, secondly on a quantitative basis and lastly in summary on a mixed-method basis. The data were gathered through a self-developed questionnaire. Out of the target population of 5 242, a 6,2% sample size was obtained. This represents all reliable responses from the two selected universities, which includes respondents studying at or teaching at U1 or U2, studying towards or teaching accountancy degrees and eliminating any unreliable responses.

The student respondents are representative of all the years of study (1st year till honours year) and matriculated from all three types of schools. Lecturer respondents are representative of all four core accountancy modules in all the years of study, excluding the 1st year.

Majority of student respondents did not do any ICT courses at school and they rate themselves as beginners with regard to ICT competencies. In line with this, they are of the opinion that the inclusion of MS Word, MS Excel and MS PowerPoint are the most important ICT competencies to be included in the accountancy curriculum. With the access to and provision by universities to the necessary "tools" to acquire and utilise ICT competencies this will be possible. Contrasting to this are the place of access, majority having access on campus. This places pressure on both students and universities who were not able to access computers for online learning during the Covid-19 lockdown regulations. This impacts the development of the ICTM where consideration should be given to integrate ICT competencies that will require ICT integration with the minimum resources.

The ICT competency gap was reiterated when lecturers rated the majority of their students as advanced beginners when they graduated. This leaves the opportunity for ICT integration to minimise the ICT competency expectation gap. It was determined that the integration of ICT competencies should be done in a staggered approach. Basic ICT competencies should be taught in the 1st year of study, followed by intermediate ICT competencies in the 2nd year of study, with advanced ICT competencies in the final year of study. The clear consensus from the respondents are that no new ICT competencies should be taught in the honours year of study. Through the analysis of the data a gap in ICT integration was identified that supports the aim of this study, to develop an ICTM. Students are not required to make use of ICT integration in their core accountancy modules. Instead, accessing information on the LMS and submitting and completing

test and quizzes on the LMS enjoys preference. This leaves the accountancy curriculum with the opportunity to integrate ICT competencies. Since lecturers identified the use of MS Word, MS Excel and MS PowerPoint as the three main ICT competencies that would enable students to acquire and utilise ICT competencies, linking to the evidence of the literature review, these three computer programs were the main focus point for the development of the ICTM.

Furthermore, a comparison between handwritten and ICT assignments were made. The results indicate that there are modules that do not integrate ICT competencies in the completion of assignments. On average students spend between 7–10 hours per semester on handwritten assignments. This serves as a benchmark for the development of the ICTM to ensure that not too much time is spent on ICT integrated assignments. The possible contribution when integrating ICT competencies within the accountancy curriculum was also identified. This could possibly lighten the "marking load" of assignments for lecturers.

The inclusion of "new" ICT competencies, blockchain and big data, were identified as concepts that could rather be integrated on a theoretical perspective since a great number of respondents are not sure what is meant by it.

The reliance on the knowledge items were calculated by means of Cronbach's alpha coefficient test. The questions with similar selection options were found to be reliable. Where possible, a conclusion was made on the correlation between different questions. For most of them a medium to high correlation was obtained. Lastly, cross-tabs were performed on relevant data and it was found that the type of ICT exposure and the university enrolled at have a significant association with the perceived competencies of students and what they understand with regard to blockchain and big data.

The qualitative and quantitative data analyses were summarised to represent the exploratory mixed research method. Comparisons were drawn between themes identified in Chapter 2 and 3 and this were linked to the data analysis in Chapter 5. Subsequently, a conclusion was drawn, and several considerations were made to be taken into account in the development of the ICTM.

All of the evidence from the literature review in Chapter 2 and 3 together with the quantitative evidence from data collected from the self-developed questionnaire as identified, analysed and reported on this chapter were used as guidelines in the development of the ICTM in the following chapter, Chapter 6.

CHAPTER 6

DEVELOPMENT OF THE ICTM

6.1 INTRODUCTION

This chapter addresses the development of the ICTM for prospective accountancy professionals as outlined in Chapter 1, Paragraph 1.3.2.2. In doing so, the process and method used to address the primary objective are discussed. Furthermore, the overall research question as identified in Chapter 1, Paragraph 1.2, on what specific ICT competencies and how these competencies could be integrated into the already established accountancy curriculum content of prospective accountancy professionals are also discussed.

As outlined in Chapter 4, Paragraph 4.7.1, data obtained through both qualitative and quantitative research are coded through applying open, axial and selective coding. The open and axial coding were applied in Chapter 2 where qualitative research was performed. Here the themes were identified to address the theoretical objectives in Chapter 1, Paragraph 1.3.2.1. In addition, the in-depth document analysis performed in Chapter 3 to identify the specific ICT competencies as required by employers and SAICA together with how these competencies could be integrated into the accountancy curricula, to address the theoretical objectives in Chapter 1, Paragraph 1.3.2.1, also assisted in the development of the ICTM. Lastly, selective coding was applied in Chapters 4 and 5. Chapter 4, Paragraph 4.6.3 outlines the questionnaire design for this study that assisted in the collection of data from two respondent groups. In Chapter 5 the data collected from the self-developed questionnaire were analysed and interpreted in both qualitative (Excel) and quantitative (SPSS) methods.

This chapter starts with a summary and brief discussion on the themes as identified in Chapter 2, without repeating the findings. Thereafter the findings from the document review in Chapter 3 relating to the specific ICT competencies as identified through literature is compared and aligned to the curriculum design steps, RBT, as outlined in Chapter 2. In addition, the findings from the data analysis in Chapter 5 are summarised and linked to the themes identified in Chapter 2 and the findings of Chapter 3. The result is the mapping of the different core modules per year of study, per learning outcome, linked to a specific ICT competency-based on the three computer programs relevant to this study, MS Word, MS Excel and MS PowerPoint. The overall suggestions and recommendations are then discussed as part of Chapter 7. Figure 6-1 outlines the different discussion points for this chapter.

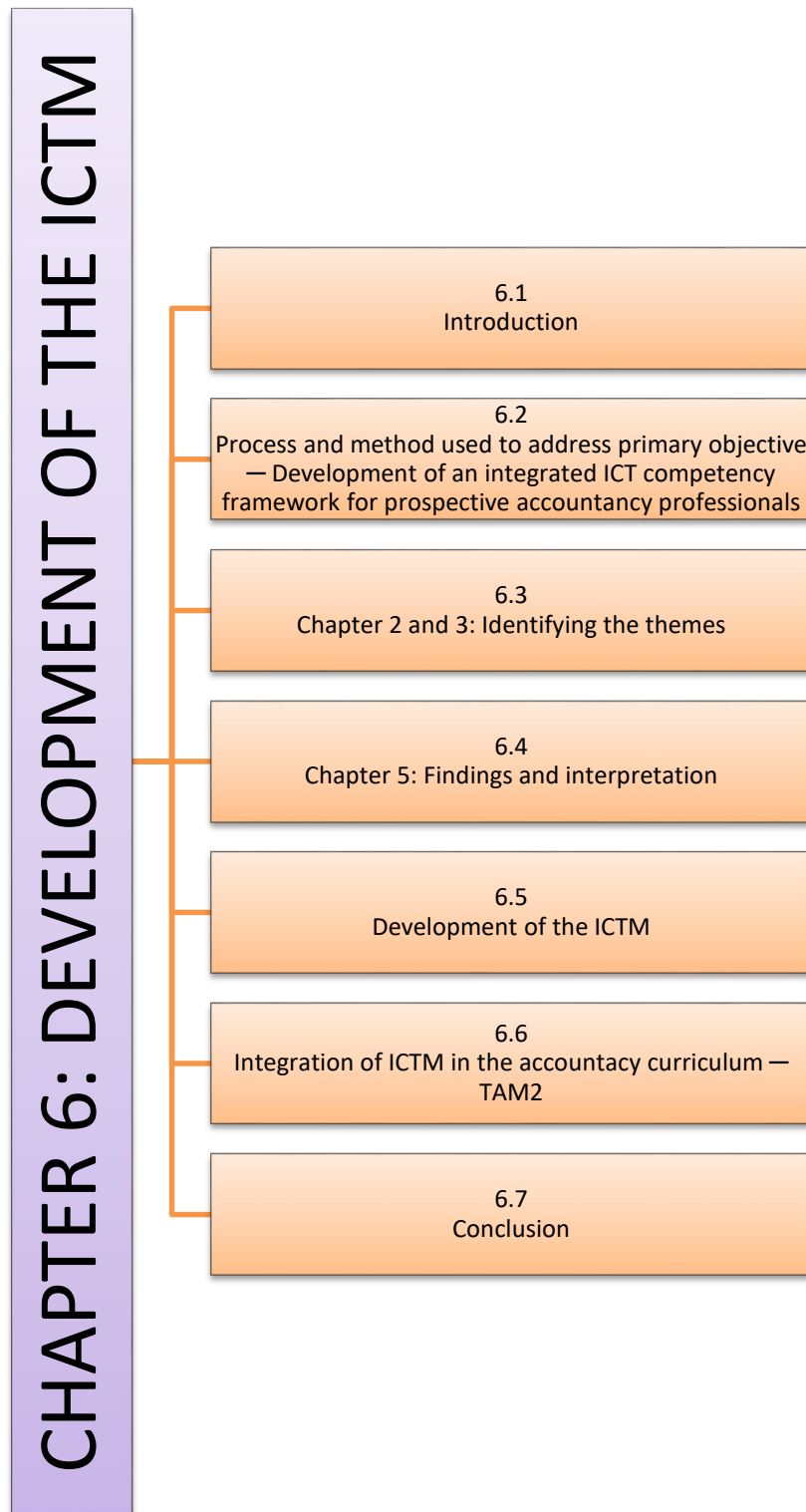


Figure 6-1: Chapter 6 discussion layout

Source: Summary of paragraphs below

6.2 PROCESS AND METHOD USED TO ADDRESS PRIMARY OBJECTIVE – DEVELOPMENT OF AN INTEGRATED ICT COMPETENCY FRAMEWORK FOR PROSPECTIVE ACCOUNTANCY PROFESSIONALS

Based on the literature on the different methodologies available for the development of a competency framework, as discussed in Chapter 4, Paragraph 4.10, the practical method for the development of a competency framework is selected as the most appropriate method in the development of the ICTM (Armstrong, 2006; Modisane, 2019:110; Whiddett & Hollyforde, 2003). The four steps are summarised and how they were applied in this study are outlined in Table 6-1.

Table 6-1: Process followed in the development of the ICTM

PROCESS		APPLICATION IN THIS STUDY
Step 1	Preparation	In the preparation phase of the development of the ICTM, the following theoretical objectives as identified in Paragraph 1.3.2.1 are addressed: ➤ In-depth literature review on the current implementation and use of ICT in South Africa, with specific focus on poverty and inequality, schools, universities and transformation and employer expectations. ➤ Literature review on educational theories to ensure that the development of the ICTM is done in a structured way, motivational theories to identify what will encourage students and universities to implement the ICTM and the TAM to identify how ICT can be integrated successfully. ➤ In-depth document analysis of the four core module outcomes per year of study as published in the yearbooks of two universities, SAICA ICT competency requirements, SAICA's 2025 proposed ICT competencies, and the 4IR ICT requirements by means of employer ICT expectations within the accountancy field.
Step 2	Collection of information	In developing the ICTM the following information is needed and gathered through literature review (Chapter 2 & 3) and the distribution of a questionnaire (Chapter 4 & 5): ➤ The specific ICT competencies required by employers and SAICA (literature). ➤ The specific ICT competencies perceived as important by students and lecturers (questionnaire). ➤ The different ICT integration opportunities available within the accountancy curriculum as perceived by both students and lecturers within the university setting (questionnaire).
Step 3	Compilation of the framework	Firstly, through the analysis of data gathered from the questionnaire, Chapter 5, emphasis is placed on: ➤ Specific ICT competencies deemed necessary and important by students and lecturers, this is compared to those deemed necessary by employers and SAICA, as identified through the literature review, to identify similarities and discrepancies to ensure that those ICT competencies included in the ICTM adheres to the ICT competencies as outlined by SAICA and required by employers. ➤ Emphasis is also placed on the perceived usefulness of the ICT competencies by students and lecturers that sheds light on the integration or lack thereof into the accountancy curriculum. Secondly, the development of the ICTM, as developed in Chapter 6, outlines the following: ➤ The specific ICT competencies possible to integrate into the four core accountancy modules. ➤ The specific methods integration can be possible. ➤ When which specific ICT competencies can be implemented. ➤ How these specific ICT competencies can be assessed in terms of RBT.

Table 6-1: Process followed in the development of the ICTM (continues)

PROCESS		APPLICATION IN THIS STUDY
Step 4	Develop ICT module-specific assignment learning outcomes	As mentioned in Chapter 4, Paragraph 4.10, this step refers to the development of ICT assignments within the four core accountancy modules that are in line with the already established module outcomes and in line with RBT, taking into account the time being spend on assignments.

Source: Armstrong (2006); Modisane (2019:111-112); and Whiddett and Hollyforde (2003), adapted

Table 6-1 summarises the steps followed in the development of the ICTM. Subsequent to preparing for this study, Step 1 and Step 2 deal with the qualitative data collection of information are discussed in Chapters 2 and 3, respectively, and the quantitative data collection of information is outlined in Chapters 4 and 5. Step 3 is where all the information obtained in Chapters 2 and 3 are compared to the analysis and interpretation of the data collected in Chapter 5. This process is documented in Paragraph 6.5. Step 4, the final step, designs ICT assignment learning outcomes within the four core accountancy modules in line with the already established module outcomes and in line with RBT, taking into account the time already being spend on assignments, as identified in Chapter 5, Paragraph 5.3.4. These aspects are discussed in more detail below.

6.3 CHAPTER 2 AND 3: IDENTIFYING THE THEMES

Firstly, Chapter 2 addressed the theoretical objectives in Chapter 1, Paragraph 1.3.2.1 (Refer to Table 7-1; objectives 1, 2, and parts of 3, 4, 6, 7, and the empirical objective 11). Through the application of open and axial coding (Chapter 4, Paragraph 4.7.1; Table 4-9), the importance of ICT in the South African context (Paragraph 2.2) considering poverty linked to the type of schooling, ICT exposure at school (Paragraph 2.2.2) and university implementation and exposure to ICT (Paragraph 2.2.3; Table 2-1; Figure 2-3) and employer ICT expectations (Paragraph 2.2.4). This led to the themes that impacts the development of the ICTM in terms of: [1] type of schooling, [2] ICT exposure at school level, [3] ICT integration in the accountancy curriculum, specifically in the four core accountancy modules, and [4] employer ICT expectations, outlined in Table 2-10.

Through the identification of the different elements that impact this study in Chapter 2, the ICTM is designed taking into account the current South African circumstances surrounding poverty linked to schooling conditions (Refer to Table 7-1; theoretical objective 1). Literature found that due to poverty remaining a significant stumbling block in South Africa, many households focus more on their basic needs, such as food, safety and shelter, rather the advancement of technology in their everyday lives.

Poverty links to the type of school learners attend. The poorer communities attend public fee-free schools. Literature reveals that these schools, where majority of learners receive their primary and secondary school education, lack the technology resources to teach ICT competencies. This places the onus on the higher education sector to empower students when it comes to technology.

In support of this study, this finding emphasises the need for ICT integration at an educational level to develop well-rounded students that can function in a working environment. For that to happen, it is suggested that ICT competencies should be integrated rather than being taught in silos.

In the required integration of ICT competencies conclusion, what is currently being applied at university level within the four accountancy modules are investigated (Paragraph 2.2.3). Literature did not provide sufficient information on the level of ICT integration based on the yearbooks of the nine selected universities. Additionally, it was found that the majority of universities provide separate ICT modules in either the first or 2nd year of study (Table 2-1; Figure 2-3). One university was found not to offer any ICT modules. In order to ensure that ICT competencies are developed and assessed at the appropriate level and to be applied within the accountancy field, it is suggested that ICT competencies be integrated in the four core accountancy modules from the 1st year of study, at a basic level, 2nd year of study, at an intermediate level, and finally in the final year of study, at an advanced level. This will ensure that ICT competencies are acquired and assessed at a staggered approach (Bloom's taxonomy) and that basic needs are met first before the next level of needs are addressed (Maslow's hierarchy of needs).

Secondly, Chapter 2 addressed the theoretical objective in Chapter 1, Paragraph 1.3.2.1 (Refer to Table 7-1; objective 2), also through the application of open and axial coding. The educational (Paragraph 2.3.1; Table 2-4), motivational (Paragraph 2.3.2.2; Figure 2-6) and TAM (Paragraph 2.3.3; Table 2-8) theories that had an impact on this study were investigated. This led to the synopsis of the following additional themes: [5] at what level should what ICT competency be assessed, [6] in which year of study should what be integrated in terms of ICT, and [7] the external factors that will influence the acceptance of the ICTM, such as type of schooling, ICT exposure at school level, ICT integration at university level, employer expectations and SAICA's CT, outlined in Table 2-10.

The above-mentioned themes link to and support the themes initially identified. When specific competencies should be taught is guided by RBT where competencies should be assessed in a staggered approach. Knowledge needs to be obtained at a basic level first and gradually move up to advanced levels. This directly influences the year of study in which specific ICT competencies should be taught. It was identified that the integration of ICT would be beneficial to start from the 1st year of study, straight through to honours level.

Lastly, literature states that once the importance of ICT is identified and outlined to students and lecturers, the acceptance of the successful integration of ICT could increase (Paragraph 2.3.3 and Table 2-8). This could be done through the emphasis on employer and SAICA expectations in terms of ICT competencies. Employers indicate that prospective accountancy professionals do not possess the basic ICT competencies as would be expected (Paragraph 2.2.4). This could be due to how and when ICT competencies are taught and if ICT is accepted by students and lecturers within the accountancy modules. In addition, SAICA emphasise the importance of ICT in their digital acumen (Paragraphs 2.4.1, 2.4.2 and 3.3.2; Tables 2-9 and 3-5). Accordingly, Paragraph 2.4.3 outlines that the digital acumen will ensure the development of prospective accountancy professionals that are equipped for the 4IR (Refer to Table 7-1; theoretical objectives 3 and 4). If students understand that their employability could be enhanced if they possess the required basic ICT competencies, they would be more likely to embrace the ICT integration. This led to the last two themes identified through literature: [8] SAICA's ICT requirements; and [9] 4IR. All of the themes identified, [1] to [9] (Table 2-10), addressed the theoretical objective and empirical objective in Chapter 1, Paragraphs 1.3.2.1 and 1.3.2.1 (Refer to Table 7-1; theoretical objectives 6, 7, and empirical objective 11).

Thirdly, Chapter 3 addressed the theoretical and empirical objectives in Chapter 1, Paragraph 1.3.2.1 (Refer to Table 7-1; theoretical objectives 8, and parts of 3, 4, 6, 7, and empirical objective 11) where an in-depth document analysis of SAICA's ICT competency requirements, digital acumen (Paragraph 3.3.2; Table 3-5), are compared to the SAICA 2025 proposed CF, the specific ICT expectations as outlined by employers (Paragraphs 3.3.1 and 3.3.2; Tables 3-2 to 3-4) in the selected recent literature in the accountancy field, and the ICT integration opportunities. Paragraph 3.4 outlines the ICT integration opportunities as a result of the document analysis of two universities published yearbooks' learning outcomes per year of study, per core module. This further resulted in specific themes to be included in the ICTM. These themes addressed the empirical objective in Chapter 1, Paragraph 1.3.2.2 (Refer to Table 7-1; theoretical objectives 6, 7, and empirical objective 11) by assisting in the development of the questionnaire, Chapter 4, Paragraph 4.6.3, to further identify the integration opportunities and the already implemented ICT competencies within the four core accountancy modules, at which level they can be assessed, what specific ICT competencies prospective accountancy professionals are required to acquire and how it can be integrated (Paragraphs 3.2, 3.3, 3.4.1 and 3.5; Tables 3-1 to 3-4, 3-8). This addressed the theoretical and empirical objective in Chapter 1, Paragraphs 1.3.2.1 and 1.3.2.1. (Refer to Table 7-1; objectives 3, 4, and 8).

Applying the literature review findings from Chapter 3 to the ICTM, the ICT competency expectations of SAICA (Paragraph 3.3.2; Table 3-5) and employers (Paragraphs 3.3.1 and 3.3.2;

Figures 3-2 to 3-4) were identified, as part of the acceptance of ICT. It was found that the three main computer programs that prospective accountancy graduates need to possess when they enter the accountancy field is MS Word, MS Excel, and MS PowerPoint. Subsequently, the specific ICT competencies for these programs were further identified and grouped according to level of competence (Table 3-6). This aids in the identification of the specific ICT competencies to be integrated in the different years of study to in turn link to RBT's knowledge levels (staggered approach) (Table 3-7).

The themes identified in Chapter 3 were also applied in the questionnaire, as mentioned above. This in turn addressed the empirical objective in Chapter 1, Paragraph 1.3.2.2, firstly to develop the questionnaire, as already mentioned (Refer to Table 7-1; objective 6). Secondly to identify the ICT integration opportunities within the four accountancy modules as outlined in their learning outcomes per year of study per module as indicated in the learning outcomes (Refer to Table 7-1; objectives 7 and 8).

Subsequently, to the identification of the specific ICT competencies to be included in the accountancy curriculum based on the different competency levels, the ICTM takes into account the module outcomes already formulated for the core accountancy modules (Paragraph 3.4). These learning outcomes are paired with the specific ICT competencies of the three identified computer programs that form the basis of the ICTM (Table 3-8). Caution is taken to integrate all of the different levels of ICT competencies per specific year of study based on the different competency levels within RBT's different knowledge levels.

All of the themes mentioned above were considered necessary and instrumental in the development of the ICTM and addressed the empirical objective in Chapter 1, Paragraph 1.3.2.2 (Refer to Table 7-1; theoretical objectives 6, 7, and empirical objective 11). Though inclusion of these themes in the form of specific questions in the self-developed questionnaire, the shortcomings and opportunities available within the accountancy curriculum for the integration of ICT competencies can be identified. The analysis and interpretation of the data obtained from the self-developed questionnaire are discussed in more detail in Paragraph 6.5.

Table 6-2 builds on Table 2-10 and Table 3-8, which summarises the themes identified in Chapters 2 and 3. This summary outlines the different themes identified and how it applies to the development of the ICTM. A further link is made where specific questions were formulated to the respondent groups, students and lecturers, in the self-developed questionnaire.

Table 6-2: Themes identified through the in-depth literature review and document analysis instrumental in the development of the ICTM

YEAR OF STUDY	SIMILAR LEARNING OUTCOMES PER MODULE PER YEAR FOR U1 AND U2	COMPUTER PROGRAMS TO BE INTEGRATED IN THE ACCOUNTANCY CURRICULA			RBT KNOWLEDGE LEVELS
		MS EXCEL, including DATA ANALYSIS	MS WORD	MS POWERPOINT	
	THEMES				
	<u>Chapter 2:</u> ➤ Type of schooling and ICT exposure at school level. ➤ Maslow's hierarchy of needs adapted to accountancy educational levels.	<u>Chapter 2:</u> ➤ ICT integration for core accountancy modules. ➤ ICT Gap: Employer expectations vs ICT being integrated in the accountancy curriculum. ➤ SAICA's ICT requirements in terms of the revised CF, and 4IR. <u>Chapter 3:</u> ➤ Main computer programs and specific ICT competencies per program to be integrated in accountancy curriculum.			<u>Chapter 2 and Chapter 3:</u> ➤ Bloom's taxonomy (RBT)/Curriculum development. ➤ external factors that will influence the acceptance of the ICTM, TAM 2.
	EXPLANATION				
	Due to different schools and ICT exposure start with basic ICT competencies in the 1 st year of study	In order to adhere to SAICA and employer expectations and to reduce the ICT expectation gap, the current core accountancy module learning outcomes are linked to the possible integration opportunities of the three identified computer programs that will be able to be integrated in the accountancy curriculum.			In order to assist in the development of ICT competencies the educational knowledge levels are applied to the integration opportunities to ensure that the ICTM design is structured correctly in terms of scaffolding knowledge levels and to emphasise the importance of ICT to facilitate the acceptance of technology.
	1 st year	✓			1–2
2 nd year	✓	✓	✓	2–3	
3 rd year	✓	✓	✓	4–6	
Honours year	✓	✓	✓	4–6	

Source: Table 2-10 and Table 3-8 combined

Table 6-2 summarises the main themes identified in Chapter 2 and Chapter 3 obtained through the literature review and document analysis, focussing on ICT in accountancy and relevant to this study. These themes ensure that all the relevant and pressing aspects current to the accountancy

profession with relation to ICT are addressed. Subsequent to the development of the self-developed questionnaire as outlined in Chapter 4, Paragraph 4.6.3 the data obtained were analysed and interpreted in Chapter 5. A summary of the findings is discussed below.

6.4 CHAPTER 5: FINDINGS AND INTERPRETATION

The analysis of the data obtained through the questionnaire, as outlined in Chapters 4 and 5 to address the empirical objective in Chapter 1, Paragraph 1.3.2.2 (Refer to Table 7-1; objectives 10 and 11), was based on the themes and codes identified through the literature review in Chapters 2 and 3. Chapter 4, Paragraph 4.7.1 outlines that selective coding was applied in analysing and interpreting the data obtained from the questionnaire to assist in the development of the specific ICT outcomes per year module, matched with the relevant learning outcomes per year of study and per core module. Building on Table 6-2, the different questions in the questionnaire were grouped into sections with similar motives.

The qualitative, quantitative and descriptive statistical data analysis in Chapter 5 supported the findings as identified in literature (Chapter 2 and 3). Firstly, Paragraph 5.3.2 and Figure 5-6 highlighted the limited exposure to ICT learners are exposed to when in school. The majority of learners attended public schools and the majority of them did not complete any ICT modules (Paragraph 5.3.1; Figure 5-5). Paragraph 5.4.3 supported by Table 5-7 and outlined in Figure 5-35 identified that the competency rating by students in the three computer programs has a significant association with the ICT exposure at school. In addition, students rated their ICT competencies when they matriculated at a beginner level (Paragraph 5.3.2; Figure 5-7). This leads to the conclusion that the ICTM needs to include basic ICT competencies in the 1st year of study to bridge the different levels of ICT competencies of students due to their school backgrounds and ICT competency levels.

Taking into consideration the level of ICT competencies when matriculated the resources available to students to assist in acquiring and utilising ICT competencies at university level were considered in Paragraph 5.3.3 and outlined in Figures 5-9 and 5-10. Additionally, Figure 5-16 outlined that universities provide their students with the necessary ICT support. The conclusion was that students have sufficient resources available that will enable them to acquire and utilise ICT competencies when integrated into the core accountancy modules.

Paragraph 5.3.4 and Figures 5-18 to 5-20 identified that MS Word, MS Excel and MS PowerPoint are perceived as the most important computer programs to be included in the accountancy curricula. Also, the application of 4IR concepts as outlined in the proposed CF (SAICA, 2019a:7) were found not to be a suitable integration competency as there are limited to no knowledge of the concepts of blockchain and big data (Paragraph 5.3.5; Figures 5-33 and 5-34). A crosstab

performed in Paragraph 5.4.3 and outlined in Table 5-7 and Figure 5-35 between the type of university and the understanding of these concepts resulted in traditional universities understanding the concepts to a lesser degree. This points to the fast-changing business environment and in line with literature, the slow adjusting pace of accounting education. The ICTM subsequently only includes the integration of MS Word, MS Excel and MS PowerPoint and suggests that the other concepts be introduced in on a theoretical basis. This is also due to these three computer programs perceived to be the most important ICT competencies when entering university as outlined in Paragraph 5.3.2 and outlined in Figure 5-8. Also, these three computer programs were rated highest

Paragraph 5.3.3 and Figures 5-11 to 5-13 identified that in rating the competency level based on the different computer programs, students rated their competencies in MS Word and MS Excel at a proficient level, with MS PowerPoint being rated at a beginner level. This contrasted with the lecturer rating, where all three computer programs received an overall beginner level rating. In addition, Paragraph 5.3.3 and Figure 5-17 identified that lecturers are of the opinion that the majority of students graduate with a beginner ICT competency level. In order to overcome this expectation gap, the ICTM starts with the inclusion of ICT competencies at a basic level and based on a staggered approach work towards an expert level to ensure that students graduate with a similar level of ICT competency.

Paragraph 5.3.4 and Figures 5-18 to 5-20 concluded that when specific ICT competencies should be integrated into the accountancy curriculum received mixed reactions from the student and lecturer respondents. It was found that lecturers have a better understanding as to when specific ICT competencies should be included in the accountancy curriculum. This was concluded based on the summary of the different ICT competencies into the different competency levels as outlined in Chapter 3, Table 3-6. The misconception of students as to when specific ICT competencies should be included in the accountancy curriculum was identified in Paragraph 5.4.2 as having a direct negative correlation to the perceived ICT competencies when matriculated. The ICTM took this into account by outlining which specific ICT competencies per computer program can be integrated in the specific years of study to start at a basic level of competency and moving to an intermediate level of competency and finally ending with an advanced level of competency level in the final year of study, resulting in a staggered approach.

In addition, Paragraph 5.3.4 and Figures 5-18 to 5-20 identified that both students and lecturers were in consensus that no new ICT competencies should be included in the accountancy curriculum in the honours year of study. Subsequently, the ICTM suggests that the acquired ICT competencies should only be applied in the honours year of study.

Paragraph 5.3.4 and Figures 5-22 and 5-23 outlined that the current ICT integration in the accountancy curriculum are integrated to a small degree. The current integration of ICT competencies in the core accountancy modules at university level are limited to MS Word, MS Excel and MS PowerPoint. The contrast, however, was the view of lecturers who require to a great extent that their students only access the LMS system or complete online tests and quizzes. This contrast identifies a gap where the perceived ICT integration and what is actually being integrated is not the same. This is taken into account in the development of the ICTM where the specific ICT competencies are specified in such a manner that the method of integration thereof is clear.

As an additional observation, Paragraph 5.3.4 and outlined in Figures 5-24 to 5-27 identified the assignments within the core modules are perceived to have the necessary opportunity to integrate ICT competencies. This serves as validation of this study in that ICT competencies should be integrated into the core accountancy modules. However, a correlation identified in Paragraph 5.4.3 supported by Table 5-4 was that traditional universities apply ICT integration to a lesser degree to that being performed by the comprehensive university. This leaves room and opportunity for the integration of ICT competencies in pure ICT assignments since it is already being applied in one university.

By assessing to what extent ICT competencies are currently being applied in the assignments of the core modules, Paragraph 5.3.4 and outlined in Figures 5-28 and 5-29 found that the majority of assignments are being performed by hand. Also, the time spent on assignments was identified as between 7–10 hours per semester. This is applied in the ICTM to guide the integration of ICTM not to exceed the already implemented and expected assignment hours.

These sections together with where the data were analysed and interpreted, as outlined in Table 5-8, are applied to the development of the ICTM in Table 6-3.

Table 6-3: Exploratory mixed research method (Table 5-8) applied to the development of the ICTM

THEMES FROM LITERATURE (Chapters 2 and 3)	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED (Annexure A)	SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)	CONCLUSION (Chapter 6: Development of ICTM considerations)
Type of schooling (Public: Fee-free school; or Public: Private school; or Private: Independent school)	Paragraphs ➤ 2.2.1 ➤ 2.2.2	Student questionnaire: Question 10–11 Lecturer questionnaire: N/A	Section A	<u>Paragraph 5.3.1</u> ➤ Only 12% of respondents attended private: independent schools (Figure 5-5). The conclusion is that due to the poverty situation in South Africa and the current circumstances in public schools, ICT exposure to the majority of respondents are not adequate.	➤ N/A	➤ Start with the basic ICT competencies one would expect students to possess when finishing school due to 88% of respondents attending public schools.
ICT exposure at school level (Available ICT subjects at school, ICT competency when matriculated)	Paragraph ➤ 2.2.2	Student questionnaire: Question 12, 16 Lecturer questionnaire: Question 42	Section B	<u>Paragraph 5.3.2</u> ➤ 46% of respondents were not exposed to any ICT at school (Figure 5-6). ➤ 52% perceived themselves as beginners (Figure 5-7). ➤ MS Word, MS Excel, MS PowerPoint perceived by students most important ICT competency to possess when entering university (Figure 5-8).	<u>Paragraph 5.4.3</u> ➤ Significant association between type of ICT exposed to at school and perceived competency in MS Word, MS Excel and MS PowerPoint (Table 5-7 and Figure 5-35). ➤ Respondents with Accounting and Auditing programs at school rated their perceived competencies higher than any other ICT exposure.	➤ At least MS Word, MS Excel, MS PowerPoint should be integrated into the accountancy curriculum. ➤ Start with the basic ICT competencies one would expect students to possess when finishing school due to 46% of respondents not being exposed to ICT at school. ➤ Since different levels of ICT exposure at school is evident, the ICT integration should be at such a level that not only basic ICT competencies are tested, but also where the integration of ICT in the accountancy field is applied.

Table 6-3: Exploratory mixed research method (Table 5-8) applied to the development of the ICTM (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED (Annexure A)	SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)	CONCLUSION (Chapter 6: Development of ICTM considerations)
ICT being integrated in accountancy curricula, specifically for the four core accountancy modules (Core modules incorporating ICT required competencies)	➤ Paragraph 2.2.3 ➤ Table 2-1 ➤ Figure 2-3 ➤ Paragraph 3.4	Student questionnaire: Question 9, 24, 27–30 Lecturer questionnaire: Question 39, 50–51, 53–58	Section D	<u>Paragraph 5.3.4</u> Currently utilising: ➤ Students – MS Word, MS Excel and MS PowerPoint (Figure 5-22). ➤ Lecturers – Basics (Figure 5-23). Perceived necessary: ➤ Students – Basics. ➤ Lecturers – MS Word, MS Excel and MS PowerPoint. (Figures 5-18 and 5-20). Assignment types: ➤ Less ICT more handwritten assignments (Figures 28 to 29). ➤ Assignments provide opportunity to acquire and utilise non-technical competencies (Figures 5-23 to 5-27). Time spent doing assignments: ➤ Between 7 to 10 hours (Figures 5-28 and 5-29). Time spent marking: ➤ Lecturers more than 10 hours marking handwritten assignments (Figure 5-30).	<u>Paragraph 5.4.2</u> Type of university and ICT assignment opportunities have a direct correlation. Resulting in some universities staying up to date with 4IR changes and some not (T5-4).	➤ At least MS Word, MS Excel, MS PowerPoint should be integrated into the accountancy curriculum. ➤ Room for more ICT assignments as the majority of assignments are done in a handwritten format. ➤ Limit integration and ICT assignments to 7–10 hours per semester.

Table 6-3: Exploratory mixed research method (Table 5-8) applied to the development of the ICTM (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED (Annexure A)	SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)	CONCLUSION (Chapter 6: Development of ICTM considerations)
ICT Gap: Employer expectations vs ICT integrated in the accountancy curriculum (Competencies in various ICT applications)	➤ Paragraphs 2.2.3; 2.2.4 ➤ Table 2-1 ➤ Figure 2-3 ➤ Paragraphs 3.3.1; 3.3.2 ➤ Tables 3-2 to 3-4	Student questionnaire: Question 17, 22 Lecturer questionnaire: Question 42, 48	Section C and D	<u>Paragraphs 5.3.3</u> ➤ Students rate MS Word and MS Excel at proficient level and MS PowerPoint at beginner level (Figures 5-11 to 5-13). ➤ ICT level when graduate at beginner level (Figure 5-17).	N/A	➤ At least MS Word, MS Excel, MS PowerPoint should be integrated into the accountancy curriculum. ➤ End result should be expert level of ICT competencies. ➤ Gap exists between what is expected and what is currently being integrated.
Bloom's taxonomy (RBT)/Curriculum development (At what level is what being accessed in terms of ICT)	➤ Paragraph 2.3.1 ➤ Table 2-4 ➤ Paragraphs 3.2.; 3.4.1; 3.5 ➤ Tables 3-1; 3-8	Student questionnaire: Question 25–26, 31 Lecturer questionnaire: Question 52,59	Section D	<u>Paragraph 5.3.4</u> ➤ MS Word, MS Excel, MS PowerPoint used in all core modules (Figures 5-22 and 5-23).	N/A	➤ At least MS Word, MS Excel, MS PowerPoint should be integrated into the accountancy curriculum.
Maslow's hierarchy of needs adapted to accountancy educational levels (In which year of study is what being integrated or used in terms of ICT)	➤ Paragraph 2.3.2.2. ➤ Figure 2-6 ➤ Paragraphs 3.2.; 3.5 ➤ Tables 3-1; 3-8	Student questionnaire: Question 18–20 Lecturer questionnaire: Question 44–46	Section D	<u>Paragraph 5.3.4</u> ➤ Integration to be introduced in a staggered approach (Figures 5-18 to 5-20). ➤ Students are not clear on which ICT competencies are regarded as basic, intermediate and advanced (Figures 5-18 to 5-20). ➤ Lecturers results clear on basic, intermediate and advanced competencies (Figures 5-18 to 5-20).	<u>Paragraph 5.4.2</u> ➤ Significant correlation between when ICT competencies should be taught at university level and ICT competencies when matriculated (Table 5-4).	➤ Integrate MS Word, MS Excel, MS PowerPoint in a staggered approach from basics, intermediate and then advanced competencies. ➤ Lecturers understand this better, students no clear consensus. ➤ Since different levels of ICT exposure at school is evident, the ICT integration should be at such a level that not only basic ICT competencies are tested, but where the integration of ICT in the accountancy field are applied.

Table 6-3: Exploratory mixed research method (Table 5-8) applied to the development of the ICTM (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED (Annexure A)	SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)	CONCLUSION (Chapter 6: Development of ICTM considerations)
External factors that will influence the acceptance of the ICTM, TAM 2 (Type of schooling, ICT exposure at school level, ICT being integrated at university, employer expectations and SAICA's CF)	➤ Paragraph 2.3.3 ➤ Table 2-8	Student questionnaire: Question 9–13, 16, 24, 27–30 Lecturer questionnaire: Question 39, 42, 50–51, 53–58	Section B AND D	<u>Paragraph 5.3.2</u> ➤ 46% of respondents were not exposed to any ICT at school (Figure 5-6). ➤ 52% perceived themselves as beginners (Figure 5-7). ➤ MS Word, MS Excel, MS PowerPoint perceived by students most important ICT competency to possess when entering university (Figure 5-8). <u>Paragraph 5.3.4</u> ➤ Integration to be introduced in a staggered approach (Figures 5-18 to 5-20). ➤ Students are not clear on which ICT competencies are regarded as basic, intermediate and advanced (Figures 5-18 to 5-20). ➤ Lecturers results clear on basic, intermediate and advanced competencies (Figures 5-18 to 5-20).	<u>Paragraph 5.4.3</u> ➤ Significant association between type of ICT exposed to at school and perceived competency in MS Word, MS Excel and MS PowerPoint (Table 5-7 and Figure 5-35). ➤ Respondents with Accounting and Auditing programs at school rated their perceived competencies higher than any other ICT exposure. <u>Paragraph 5.4.2</u> ➤ Significant correlation between when ICT competencies should be taught at university level and ICT competencies when matriculated (Table 5-4).	➤ At least MS Word, MS Excel, MS PowerPoint should be integrated into the accountancy curriculum. ➤ Start with the basic ICT competencies one would expect students to possess when finishing school due to 46% of respondents not being exposed to ICT at school. ➤ Since different levels of ICT exposure at school is evident, the ICT integration should be at such a level that not only basic ICT competencies are tested, but where the integration of ICT in the accountancy field is applied. ➤ Start with the basic one would expect students to possess when finishing school due to students not being exposed to ICT at school.

Table 6-3: Exploratory mixed research method (Table 5-8) applied to the development of the ICTM (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED (Annexure A)	SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)	CONCLUSION (Chapter 6: Development of ICTM considerations)
SAICA's ICT requirements in terms of the revised CF (Basic to advanced competencies)	➤ Paragraphs 2.4.1; 2.4.2 ➤ Table 2-9 ➤ Paragraph 3.3.2 ➤ Table 3-5	Student questionnaire: Question 21–22 Lecturer questionnaire: Question 47	Section D	<u>Paragraph 5.3.4</u> ➤ Integration to be introduced in a staggered approach (Figures 5-18 to 5-20). ➤ Students are not clear on which ICT competencies are regarded as basic, intermediate and advanced (Figures 5-18 to 5-20). ➤ Lecturers results clear on basic, intermediate and advanced competencies (Figures 5-18 to 5-20).	<u>Paragraph 5.4.2</u> ➤ Significant correlation between when ICT competencies should be taught at university level and ICT competencies when matriculated (Table 5-4).	➤ MS Word, MS Excel, MS PowerPoint at staggered approach from basics, intermediate and then advanced competencies. ➤ Lecturers understand this better, students no clear consensus. ➤ Since different levels of ICT exposure at school is evident, the ICT integration should be at such a level that not only basic ICT competencies are tested, but where the integration of ICT in the accountancy field is applied.
			Section E	<u>Paragraph 5.3.5</u> ➤ Blockchain and big data not a familiar concept to students (Figures 5-33 and 5-34).	<u>Paragraph 5.4.3</u> ➤ Students at traditional universities know to a lesser degree what is meant by blockchain and big data (Table 5-7; Figure 5-35).	➤ Blockchain and big data included at theoretical base not integrated to overcome fast-changing pace of ICT integration.

Table 6-3: Exploratory mixed research method (Table 5-8) applied to the development of the ICTM (continues)

THEMES FROM LITERATURE (Chapters 2 and 3)	CHAPTERS 2 AND 3 INVESTIGATED	WHERE APPLIED (Annexure A)	SECTION CLASSIFICATION (Paragraph 4.7.1)	QUALITATIVE DATA ANALYSIS (Paragraph 5.3)	QUANTITATIVE AND DESCRIPTIVE DATA ANALYSIS (Paragraph 5.4)	CONCLUSION (Chapter 6: Development of ICTM considerations)
4IR (Impact of ICT on the lives of prospective accountancy professionals, Availability of ICT resources, private and at university)	➤ Paragraph 2.4.3 ➤ Paragraph 3.4	Student questionnaire: Question 14–15, 23, 32–33 Lecturer questionnaire: Question 40–41, 43, 49, 60–61	Section C and E	<u>Paragraph 5.3.3 and 5.3.5</u> ➤ Sufficient resources available to students that will aid in the integration of ICT (Figures 5-9; 5-10 and 5-16). ➤ ICT level when graduate at beginner level (Figure 5-17). ➤ Blockchain and big data not familiar concepts to students (Figures 5-33 and 5-34).	<u>Paragraph 5.4.3</u> Students at traditional universities know to a lesser degree what is meant by blockchain and big data (Table 5-7; Figure 5-35).	➤ ICT integration possible. ➤ End result should be expert level of ICT competencies. ➤ All have access to a device – integration possible. ➤ Universities provide necessary ICT resources. ➤ With the fast changing ICT environment due to 4IR some universities are not able to keep up with curriculum changes.

Source: Table 5-8, adapted

Table 6-3 summarises Step 1, 2 and the first part of Step 3 followed in the development of the ICTM, as outlined in Paragraph 6.2. The specific ICT competencies to be integrated in the accountancy curriculum together with when they should be integrated are considered. Also, specific needs from a student and lecturer perspective is also highlighted. The inclusion of MS Word, MS Excel and MS PowerPoint are identified as the computer programs that received the highest acceptance level for ICT integration from both students and lecturers. This is in line with literature where these three computer programs were rated as the top three ICT competencies, a prospective accountancy professional should possess. Moreover, the pace of inclusion comes down to the staggered approach as suggested by RBT and Maslow's hierarchy adapted. The successful integration of ICT competencies is enhanced by the fact that all student participants have access to the "tools", such as laptops, PC's, tablets, smartphones, Wi-Fi, computer labs and IT support staff, to name a few, required to acquire and utilise ICT competencies. Lastly, and perhaps the most important finding is that due to the different school backgrounds of students, not all will start their university career with the same level of ICT competencies. This

places the onus on universities to introduce at the 1st year of study, ICT competencies, whether specific to accountancy or just in general, to enable and empower students to be able to acquire and utilise ICT competencies necessary for their future careers.

Taking into account all the findings listed above, the proposed ICTM is outlined below.

6.5 DEVELOPMENT OF THE ICTM

The ICTM incorporates the specific ICT competencies, basic, intermediate and advanced of the three computer programs, MS Word, MS Excel and MS PowerPoint that can be integrated into the four core accountancy modules, Accounting, Auditing, Financial Management and Management Accounting, and Taxation. The main objective of the ICTM is to bridge the gap between what ICT competencies employers and SAICA expect a prospective accountancy professional to possess when they enter the accountancy workplace versus what universities are currently teaching their students. Subsequent to that, the ICTM also aims to integrate ICT competencies without adding to the already technical accountancy curriculum that are often viewed as being overloaded. This takes into account the findings in Chapter 5, Paragraph 5.3.4, that ICT assignments should be limited to between 7–10 hours per semester per module.

In order to achieve this, the ICTM starts with outlining the similar learning outcomes of the two selected universities that formed the target population as obtained from their yearbooks, discussed in Chapter 3, Paragraph 3.4.1. These learning outcomes of the four core modules, as defined in Chapter 3, Table 3-5, are ordered from the 1st year of study till the honours year. Furthermore, the competencies from basic, intermediate and advanced levels, as summarised in Chapter 3, Table 3-4, are allocated to the relevant learning outcomes as prescribed by RBT, discussed in Chapter 3, Paragraph 3.4.1. Reference is only made to one of the three levels of competency and not the specific competency. It is suggested that the outline of the specific competencies included in the three levels of competencies should be read in conjunction with the ICTM. Reference is also made to the relevant RBT level to ensure that the different assessment opportunities within the modules for the specific year of study are appropriate and valid. Again, only reference is made to the level and it is suggested that the ICTM be read in conjunction with the explanation of the different RBT levels, specific reference is made to these levels linked to ICT competencies in Chapter 3, Paragraph 3.4.1.

In turn, all this information is compared to the data obtained from the questionnaire and as analysed in Chapter 5. The reflections as summarised in Table 6-3 are considered to ensure that all the necessary implementation and execution considerations are taken into account. The ICTM is delineated in Table 6-4 below.

Table 6-4: The ICTM at a glance

MODULE	SIMILAR LEARNING OUTCOMES PER MODULE PER YEAR FOR U1 AND U2	ICT INTEGRATION OPTION (Qualitative data analysis – Chapter 3)			ICT COMPETENCY LEVEL (Table 3-6)	RBT KNOWLEDGE LEVELS (Table 3-8)
		MS EXCEL, including DATA ANALYSIS	MS WORD	MS POWE RPOIN T		
ACC1	Basic routine accounting transactions, individually and within different entity forms.	✓			Basic	1–2
	Prepare basic set of financial statements, including notes to financial statements.	✓				
ACC2	Practical application at an intermediate level of routine events and transactions within the accounting environment.	✓			Intermediate	2–3
	Prepare intermediate set of financial statements, including notes to financial statements.	✓	✓			
AUD2	Describe and discuss audit process, pre-engagement and planning, risk and assertions.		✓		Intermediate	2–3
FM & MA 2	Evaluate, select, and apply the appropriate techniques or methods in the field of Financial Management and Management Accounting.	✓			Intermediate	2–3
	Analyse and evaluate complex information, including financial statements.	✓				
	Reliably and logically present and communicate information or decisions.		✓	✓		
TAX2	Reliably, accurately and coherently prepare basic tax calculations.	✓			Intermediate	2–3
	Identify and calculate the tax implications in respect of farming.	✓				
ICT2	Solve programming problems using a computer.	#	#	#	#	#
	Analyse, design, program and use algorithms.					
	Use computer programs and demonstrate them.					
ACC3	Understanding and apply a range of complex consolidation procedures in terms of IFRS.	✓			Advanced	4–6
	Prepare a set of financial statements that fully comply with a selection of IFRS.	✓	✓			
	Identify, analyse, critically reflect on, and address selected complex accounting problems.	✓				
AUD3	Identify, analyse, critically reflect on, and address complex problems within business contexts, in terms of selected International Standards on Auditing (ISA).	✓	✓		Advanced	4–6
	Develop and communicate ideas and opinions in the correct context considering corporate governance, Professional Ethics and International Standards on Auditing (ISA) principles.		✓	✓		

Table 6-4: The ICTM at a glance (continues)

MODULE	SIMILAR LEARNING OUTCOMES PER MODULE PER YEAR FOR U1 AND U2	ICT INTEGRATION OPTION (Qualitative data analysis - Chapter 3)			ICT COMPETENCY LEVEL (Table 3-6)	RBT KNOWLEDGE LEVELS (Table 3-8)
		MS EXCEL, including DATA ANALYSIS	MS WORD	MS Power Point		
FM & MA 3	Identify, analyse, evaluate, critically reflect on, and solve complex, integrated problems	✓			Advanced	4–6
	Develop ideas and opinions and communicate these ideas and opinions in a well-formed argument in a professional manner.		✓			
	Make decisions with an understanding of how decisions in one area of an organisation impact other areas.		✓			
TAX3	Identify, analyse, critically reflect on, and address selected complex taxation problems.	✓	✓		Advanced	4–6
	Prepare complex tax calculations in compliance with tax law.	✓	✓			
ICT3	Integrated ICT in the accounting environment.	#	#	#	#	#
	Use ICT to identify and analyse business and accountancy problems.					
	Manage information processes, recognising that problem-solving in an IT environment is context- and system bound, and does not occur in isolation.					
ACC4	Compile and criticise advanced external financial reports, including consolidated financial reports.	✓			Apply only: Basic – Advanced	4–6
	Analyse and address complex, abstract and/or integrated external financial reporting problems.	✓				
	Present contextualised external financial reporting opinions and arguments on unfamiliar, complex, and uncertain problems by selecting and applying methods, standards, and techniques appropriate to external financial reporting practice.	✓	✓	✓		
AUD4	Perform assurance engagements and evaluate and criticise manual and computerised internal control and governance systems.	✓	✓		Apply only: Basic – Advanced	4–6
	Identify, analyse, and address complex, abstract and/or integrated assurance.	✓	✓			
	Present contextualised assurance reports, opinions, and arguments on unfamiliar, complex, and uncertain.	✓	✓			

Table 6-4: The ICTM at a glance (continues)

MODULE	SIMILAR LEARNING OUTCOMES PER MODULE PER YEAR FOR U1 AND U2	ICT INTEGRATION OPTION (Qualitative data analysis - Chapter 3)			ICT COMPETENCY LEVEL (Table 3-6)	RBT KNOWLEDGE LEVELS (Table 3-8)
		MS EXCEL, including DATA ANALYSIS	MS WORD	MS Power Point		
FM & MA 4	Demonstrate integrated knowledge and understanding of the underlying theories, methods, and techniques available in the field of Financial Management and Management Accounting.	✓			Apply only: Basic - Advanced	4 – 6
	Demonstrate the ability to critically interrogate multiple sources of knowledge, such as financial and non-financial information of businesses as well as the general economic environment and review that information as well as the manner in which it was produced.	✓				
	Demonstrate the ability to present contextualised Management Accounting and finance opinions, arguments, and recommendations on unfamiliar, complex and uncertain events.		✓			
	Demonstrate the ability to apply knowledge, theories, methods, and techniques in the field of Financial Management and Management Accounting to solve complex investment, financing, and dividend decisions, within the context of the company as well as the context of the environment.	✓				
	Demonstrate the ability to develop creative responses with regard to the responsible financial management of a company and its assets by critically reviewing the information, evaluating the processes and effectively using the financial aids within the boundaries of the strategic aim of the company.	✓	✓			
TAX4	Perform and criticise advanced tax calculations based on an extensive and deep knowledge of the relevant authority, methods and techniques relevant to tax practice.	✓	✓		Apply only: Basic - Advanced	4 – 6
	Identify, analyse, and address complex, abstract and/or integrated tax problems.	✓	✓			
	Present contextualised tax opinions and arguments on unfamiliar, complex, and uncertain problems.	✓	✓			

This key refers to the suggestion made in the ICTM that a basic ICT module to be introduced in the 1st year of study to cover basic competencies of MS Excel (including data analysis), MS Word and MS PowerPoint.

Source: Ahmed (1999:14, 109, 113, 174); Anderson and Krathwohl (2001:67-68); Bloom *et al.* (1956:207-208); Chapter 5 data analysis; Krathwohl (2002:215); Modisane (2019:162-164); O'Brian (2017:112); SAICA (2019b:7); SAICA (2018:49 & 2019a:7); Stumke (2014:145); U1 and U2 yearbooks; Table 3-5; Table 3-6; and Table 3-8, adapted

Table 6-4 stipulates which computer program can be integrated at which year of study to test which specific learning outcomes per core accountancy modules. It is designed in such a way to facilitate lecturers in their planning of assignments by referring to where they could possibly integrate ICT competencies.

As a final step in the development of the ICTM ICT assignment learning outcomes are developed. This is in line with RBT linking to the learning outcomes per module already established and considering the time already being spend on assignments as concluded on in Paragraph 5.3.4. The conclusion and the basis of the ICTM ICT assignment learning outcomes time and subsequently mark allocation do not exceed 7-10 hours. This is as the statistical data analysis concluded that on average students spend between 7-10 hours on the assignments within a core module in a specific year of study.

Since 1,5 minutes per mark is used as an average, indicated by Open Polytechnic (2020) and Safe support (2020), for exams and tests, the total marks per year of study per module for all the assignments in that module and that year of study will be limited to a maximum of 400 marks. This is calculated as follows: 600 minutes (10 hours) / 1.5 minute per mark, per module per year of study. This development stems from the learning outcomes, computer program competency levels (basic, intermediate, advanced) and RBT knowledge levels as summarised in Table 6-4. Specific assignment learning outcomes are formulated per module per year level to outline the specific ICT integration assignment learning outcomes. Also, the estimated time that will be required to complete the suggested ICT assignment learning outcomes were also considered. Table 6-5 outlines the integrated ICT assignment learning outcomes.

Table 6-5: The ICTM assignment learning outcomes

MODULE	ASSIGNMENT QUESTION LINKED BASED RBT KNOWLEDGE LEVELS LINKED TO LEARNING OUTCOMES (Table 3-8)	MARK PER QUESTION	AVERAGE TIME TO COMPLETE QUESTION (1.5 minutes per mark)
ACC1	Complete the Statement of financial position and statement of other comprehensive income by inserting the missing numbers in the MS Excel template provided. <i>Where possible make use of formulas to calculate totals and other amounts.</i>	50 marks	75 minutes
	Prepare basic set of financial statements, including notes to financial statements in MS Excel on the template provided. <i>Ensure that the statements are presented in Arial 11, black and left-aligned.</i>	50 marks	75 minutes
	TOTAL TIME	100 marks	2 ½ hours
ACC2	Calculate the following making use of MS Excel formulas: *Depreciation *Net profit/loss for the year *Asset fair value *Short-term and long-term portion of lease *Book value of assets <i>Where possible make use of formulas to calculate totals and other amounts.</i>	100 marks	150 minutes
	Prepare intermediate set of financial statements in MS Excel (<i>Ensure that the statements are presented in Arial 11, black and left-aligned</i>), including notes to financial statements prepared in MS Word. <i>The financial statements should be presented on the company's letterhead. Ensure that the statements are presented in Arial 11, black and justified.</i>	50 marks	75 minutes
	TOTAL TIME	150 marks	3 hours 45 min
AUD2	Write a report to the management team of the company in MS Word where you describe and discuss the audit process, pre-engagement and planning process, any risks, and the assertions relevant to the audit. <i>The report should be presented on the company's letterhead. Ensure that the reports are presented in Arial 11, black and justified.</i>	100 marks	150 minutes
	TOTAL TIME	100 marks	2 ½ hours
FM & MA 2	Evaluate, select, and apply the appropriate techniques or methods in the field of Financial Management and Management Accounting in MS Excel. <i>Where possible make use of formulas to calculate totals and other amounts.</i>	50 marks	75 minutes
	Analyse and evaluate complex information, including financial statements in MS Excel. <i>Where possible make use of formulas to calculate totals and other amounts.</i>	50 marks	75 minutes
	Reliably and logically present and communicate information or decisions in a management report completed in MS Word and in a presentation prepared in MS PowerPoint. <i>The report and presentation should be presented on the company's letterhead and selected format. Ensure that the reports are presented in Arial 11, black and justified.</i>	50 marks	75 minutes
	TOTAL TIME	150 marks	3 hours 45 min

Table 6-5: The ICTM assignment learning outcomes (continues)

MODULE	ASSIGNMENT QUESTION LINKED BASED RBT KNOWLEDGE LEVELS LINKED TO LEARNING OUTCOMES (Table 3-8)	MARK PER QUESTION	AVERAGE TIME TO COMPLETE QUESTION (1.5 minutes per mark)
TAX2	Reliably, accurately, and coherently prepare basic tax calculations in MS Excel. <i>Where possible make use of formulas to calculate totals and other amounts.</i>	50 marks	75 minutes
	Identify and calculate the tax implications in respect of farming in MS Excel. <i>Where possible make use of formulas to calculate totals and other amounts.</i>	50 marks	75 minutes
	TOTAL TIME	100 marks	2 ½ hours
ACC3	Understanding and apply a range of complex consolidation procedures in terms of IFRS in MS Excel. <i>Where possible make use of formulas to calculate totals and other amounts.</i>	100 marks	150 minutes
	Prepare a set of financial statements that fully comply with a selection of IFRS in MS Word. <i>The financial statements should be presented on the company's letterhead. Ensure that the statements are presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	100 marks	150 minutes
	Identify, analyse, critically reflect on, and address selected complex accounting problems in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	100 marks	150 minutes
	TOTAL TIME	300 marks	7 ½ hours
AUD3	Calculate materiality, sample sizes and prepare audit working papers in MS Excel. Report on your findings in MS Word in a report to management in terms of selected International Standards on Auditing (ISA). <i>The financial statements should be presented on the company's letterhead. Ensure that the statements are presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	100 marks	150 minutes
	Develop and communicate ideas and opinions in the correct context considering corporate governance, Professional Ethics and International Standards on Auditing (ISA) principles in MS Word and present your findings to management by means of a MS PowerPoint presentation. <i>The report and presentation should be presented on the company's letterhead and selected format. Ensure that the reports are presented in Arial 11, black and justified.</i>	100 marks	150 minutes
	TOTAL TIME	200 marks	3 hours

Table 6-5: The ICTM assignment learning outcomes (continues)

MODULE	ASSIGNMENT QUESTION LINKED BASED RBT KNOWLEDGE LEVELS LINKED TO LEARNING OUTCOMES (Table 3-8)	MARK PER QUESTION	AVERAGE TIME TO COMPLETE QUESTION (1.5 minutes per mark)
FM & MA 3	Identify, analyse, evaluate, critically reflect on, and solve complex, integrated problems in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	100 marks	150 minutes
	Develop ideas and opinions and communicate these ideas and opinions in a well-formed argument in a professional manner in MS Word. <i>The communication should be presented on the company's letterhead. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents), charts and tables to compare prior year and current year figures.</i>	100 marks	150 minutes
	Make decisions with an understanding of how decisions in one area of an organisation impact other areas in MS Word. <i>The communication should be presented on the company's letterhead. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	100 marks	150 minutes
	TOTAL TIME	300 marks	7 ½ hours
TAX3	Identify, analyse, critically reflect on, and address selected complex taxation problems in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	100 marks	150 minutes
	Prepare complex tax calculations in compliance with tax law in MS Excel and MS Word. <i>Your answer should include charts, pivot tables and formulas and presented in Arial 11, black and justified.</i>	150 marks	225 minutes
	TOTAL TIME	250 marks	6 hours 15 min
ACC4	Compile and criticise advanced external financial reports, including consolidated financial reports in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	50 marks	75 minutes
	Analyse and address complex, abstract and/or integrated external financial reporting problems in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	50 marks	75 minutes
	Present contextualised external financial reporting opinions and arguments on unfamiliar, complex, and uncertain problems by selecting and applying methods, standards, and techniques appropriate to external financial reporting practice in MS Word. <i>The communication and presentation should be presented on the company's letterhead and required format. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	100 marks	150 minutes
	TOTAL TIME	200 marks	3 hours

Table 6-5: The ICTM assignment learning outcomes (continues)

MODULE	ASSIGNMENT QUESTION LINKED BASED RBT KNOWLEDGE LEVELS LINKED TO LEARNING OUTCOMES (Table 3-8)	MARK PER QUESTION	AVERAGE TIME TO COMPLETE QUESTION (1.5 minutes per mark)
AUD4	Perform assurance engagements and evaluate and criticise manual and computerised internal control and governance systems and present your findings in MS Word.	50 marks	75 minutes
	Identify, analyse, and address complex, abstract and/or integrated assurance in MS Word. <i>The communication should be presented on the company's letterhead and required format. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	50 marks	75 minutes
	Present contextualised assurance reports, opinions, and arguments on unfamiliar, complex, and uncertain circumstances in MS Word. <i>The communication should be presented on the company's letterhead and required format. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	50 marks	75 minutes
	TOTAL TIME	150 marks	3 hours 45 min
FM & MA 4	Demonstrate integrated knowledge and understanding of the underlying theories, methods, and techniques available in the field of Financial Management and Management Accounting in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	50 marks	75 minutes
	Demonstrate the ability to critically interrogate multiple sources of knowledge, such as financial and non-financial information of businesses as well as the general economic environment and review that information as well as the manner in which it was produced in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	50 marks	75 minutes
	Demonstrate the ability to present contextualised Management Accounting and finance opinions, arguments, and recommendations on unfamiliar, complex and uncertain in MS Word. <i>The communication should be presented on the company's letterhead and required format. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	50 marks	75 minutes
	Demonstrate the ability to apply knowledge, theories, methods, and techniques in the field of Financial Management and Management Accounting to solve complex investment, financing, and dividend decisions, within the context of the company as well as the context of the environment in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	50 marks	75 minutes
	Demonstrate the ability to develop creative responses with regard to the responsible financial management of a company and its assets by critically reviewing the information, evaluating the processes and effectively using the financial aids within the boundaries of the strategic aim of the company in MS Word. <i>The communication should be presented on the company's letterhead and required format. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	50 marks	75 minutes
	TOTAL TIME	250 marks	6 hours 15 min

Table 6-5: The ICTM assignment learning outcomes (continues)

MODULE	ASSIGNMENT QUESTION LINKED BASED RBT KNOWLEDGE LEVELS LINKED TO LEARNING OUTCOMES (Table 3-8)	MARK PER QUESTION	AVERAGE TIME TO COMPLETE QUESTION (1.5 minutes per mark)
TAX4	Perform, in MS Excel, and criticise, in MS Word, advanced tax calculations based on an extensive and deep knowledge of the relevant authority, methods and techniques relevant to tax practice. <i>The communication should be presented on the company's letterhead and required format. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	50 marks	75 minutes
	Identify, analyse, and address complex, abstract and/or integrated tax problems in MS Excel. <i>Your answer should include charts, pivot tables and formulas.</i>	50 marks	75 minutes
	Present contextualised tax opinions and arguments on unfamiliar, complex, and uncertain problems in MS Word. <i>The communication should be presented on the company's letterhead and required format. Ensure that the document is presented in Arial 11, black and justified. Your answer should include references to supporting documentations and calculations (as formulated in MS Excel and external documents) charts and tables to compare prior year and current year figures.</i>	50 marks	75 minutes
	TOTAL TIME	150 marks	3 hours 45 min

Source: Table 6-4, adapted

Table 6-5 presents the suggested integration of ICTM in the core accountancy modules. Even though this module provides assessment types based on the three main computer programs identified, lecturers are left with the freedom to still decide on how they want to assess and teach specific topics. Caution should just be taken to ensure that the appropriate RBT knowledge levels per year of study is linked to the correct ICT competency levels as outlined in Chapter 3, Table 3-6. The structure of the ICTM is also done in such a way that a lecturer and their students will be able to know and identify which ICT competencies could be assessed, basic, intermediate or advanced, during which learning outcomes and at what year of study. The time to be spend on the ICT assignments are also outlined to ensure that students do not spend in excess of 7–10 hours on the completion thereof. The reason why the integrated ICT assignments do not fill the 10-hour maximum time frame is to allow students to perform handwritten assignments as this is still the primary form of test and exam completion.

Part of the final step in the development of the ICTM links to the successful implementation thereof. The structure of the ICTM could enable lecturers to identify and demonstrate to their students the importance of ICT in the accountancy workplace. In doing this, the acceptance of technology, as suggested by TAM2 in Chapter 2, Paragraph 2.3.3 could be fostered and will enable a higher acceptance of ICT by students and perhaps lecturers studying to become prospective accountancy professionals. All of this speaks to the implementation of the ICTM or not by lecturers in their accountancy curriculum.

6.6 INTEGRATION OF ICTM IN THE ACCOUNTANCY CURRICULUM – TAM2

As outlined in Chapter 2, Paragraph 2.3.3, the acceptance of technology rests on the perceived usefulness and the perceived ease of use thereof. The usefulness and perceived ease of use are subjective to several external variables. It is the view of the researcher that if lecturers consciously interpret and strive to communicate to their students the effect thereof, the acceptance of ICT within the accountancy curriculum could be successful.

Table 6-6 summarises the external variables that affect the acceptance of technology as outlined in Chapter 2, Paragraph 2.3.3. It further provides suggestions of how the external variables can be viewed from a student and also lecturer perspective to aid in the acceptance of the integration of ICT competencies within the accountancy curriculum.

Table 6-6: TAM2 adapted to accountancy students

EXTERNAL VARIABLE	TAM 2 (Legris <i>et al.</i> 2003:196-197)	ADAPTED TO ACCOUNTANCY (Adapted, own interpretation)
Subjective norm	Influence others have on a user's decision on the use of technology, underpinned by experience and voluntariness.	➤ Lecturers can incorporate key ICT competencies in assignments to illustrate how ICT can be used in their respective subject matter, in effect in practice. ➤ Experience can follow a twofold view: scholarly experience with the technology (limited/extensive) and continuous exposure to the ICT competency could lead to ease of use. ➤ Voluntariness could take the form of mastering a certain aspect, could lead to less class time on that specific competency.
Image	The desire of a user to maintain a certain image among others.	➤ Lecturers can incorporate key ICT competencies in assignments and expect presentations/show and tell sessions, where a student would want to show sufficient knowledge of the specific ICT competency in order to maintain his/her image among their peers.
Job relevance	The appropriateness of the technology to the job.	➤ Lecturers can incorporate key ICT competencies in assignments to illustrate how ICT can be used in their respective subject matter, in effect in practice.
Output quality	Satisfactory execution of the task with the technology.	➤ Lecturers can incorporate key ICT competencies in assignments with a suggestion of different alternatives to execute the task. Students then have to decide on the most appropriate method to ensure satisfactory execution.
Result demonstrability	The production of noticeable outcomes.	➤ Lecturers can incorporate key ICT competencies in assignments to illustrate how ICT can be used in their respective subject matter, in effect in practice. Here professional financial statements, management reports, audit reports, budgets, etc. can be produced to illustrate to students what they would be able to produce through the use of ICT.

Source: Legris *et al.* (2003:196-197), adapted

Table 6-6 outlines that when lecturers consider the external variables of TAM 2 in the incorporation of ICT in their specific modules, it could lead to the perceived usefulness of ICT. This could in turn affect and lead to the perceived ease of use of ICT. The overall desired result to be achieved is that students accept the ICTM due to their perceived usefulness and perceived ease of use.

6.7 CONCLUSION

This chapter outlined the design followed to develop the ICTM. The practical method was used in the development. In addition, the different themes obtained from the in-depth literature review (Chapter 2) and document analysis (Chapter 3) used in the development of the self-developed questionnaire (Chapter 4), and the data analysed and interpreted (Chapter 5) were used.

The design of the ICTM took the form of an explanatory table with the core accountancy modules listed from 1st year of study till honours year, including the learning outcomes per module where ICT integration would be possible. These learning outcomes are linked to one of the three

computer programs, MS Word, MS Excel or MS PowerPoint based on the learning outcome. These integration options are further linked to the three different ICT competency levels and the relevant RBT knowledge level to ensure a staggered approach is taken to develop basic competencies first before more difficult competencies are attempted.

Subsequently the ICTM suggests ICT assignment learning outcomes linked to the identified learning outcomes per module per year of study and further to the three different computer programs. Care was taken on the number of marks that should be required from students to complete to ensure that it is limited to the benchmark of 7–10 hours, as identified in Chapter 5, Paragraph 5.4.3. The guideline of 1,5 minutes per marks as used to achieve this.

Subsequent to the design of the ICTM, the acceptance thereof is also considered. The external factors as outlined by TAM 2 are adapted to the teaching accountancy environment to show how certain aspects could possibly be considered and transferred to students by lecturers to outline how important ICT is in the accountancy workplace. This is done in an effort to foster a sense of usefulness that could lead to a greater importance for ICT and through the integration of ICT competencies lead to a sense of ease of use.

The final conclusions on all the chapters, recommendations, limitations, areas of further research and contributions of the study are discussed in detail in Chapter 7.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

The purpose of this chapter is to combine all the conclusions reached in all the previous chapters. This serves as a measurement on whether the problem statement as outlined in Chapter 1 was addressed. Firstly, the measurement of the achievement of the primary, secondary, theoretical and empirical objectives are summarised. The conclusion provides a synopsis at the end of the study on the relevance of Chapter 2 to 6 on the final ICTM.

Secondly, the realisation of the primary, secondary, theoretical and empirical objective set out in Chapter 1, Paragraph 1.3 are also evaluated in this chapter. The theoretical and empirical objectives as formulated for this study in Chapter 1 are discussed with reference to the relevance of the objectives in Chapters 1 to 6.

Thirdly, all the limitations, areas for further research and contributions that emerged from this study in Chapters 2 to 6 are summarised and discussed in this chapter. All the discussion points mentioned above are structured as outlined in Figure 7-1 below.

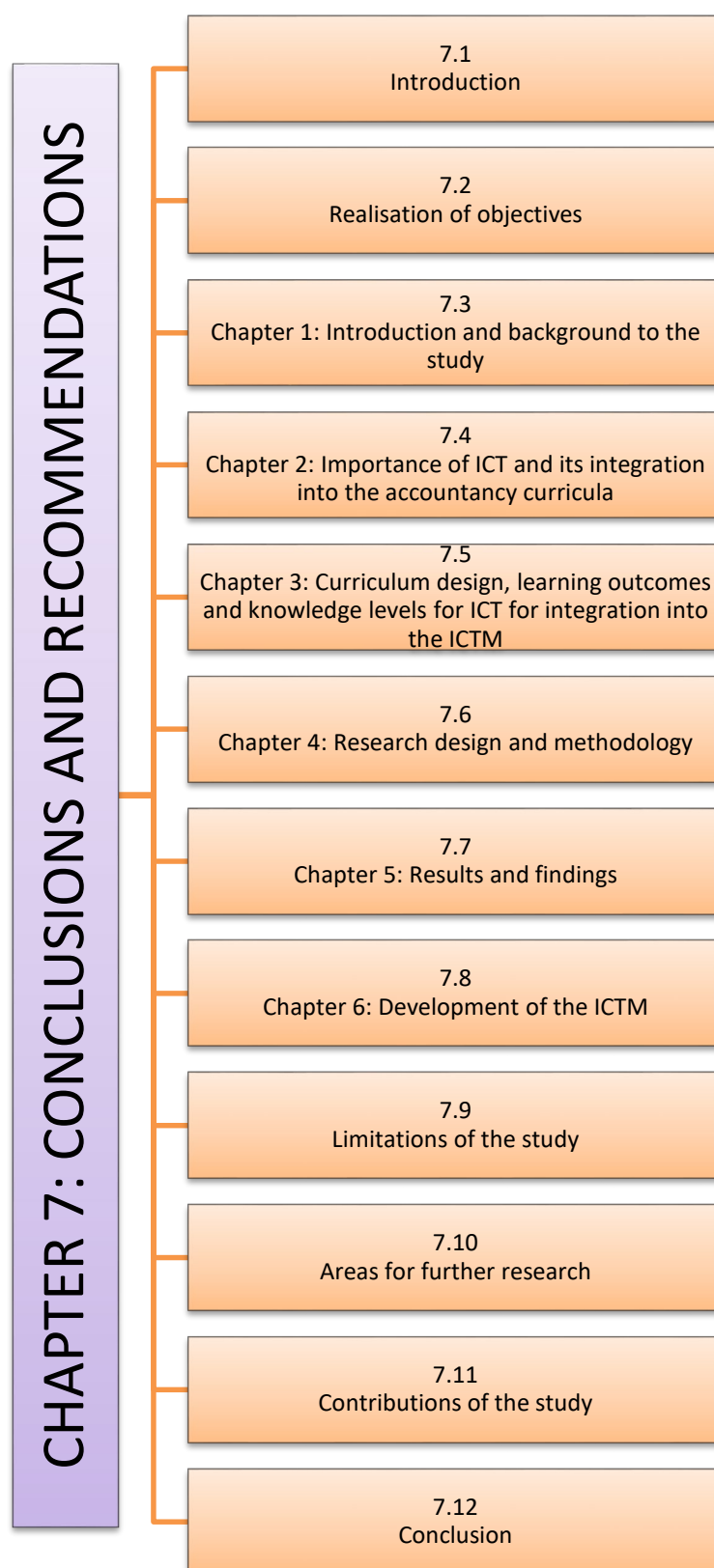


Figure 7-1: Chapter 7 discussion outlay

Source: Summary of paragraphs below

7.2 REALISATION OF OBJECTIVES

The achievement of the secondary, theoretical and empirical, objectives as formulated in Chapter 1, Paragraphs 1.3.2.1 and 1.3.2.2 are simplified in Table 7-1 and cross-referenced to where they were investigated in the initial chapters and the conclusions summarised in this chapter.

Table 7-1: Realisation of objectives and chapter references

OBJECTIVE (Chapter 1, Paragraph 1.3.2; Chapter 7, Paragraph 7.3)	THEORETICAL	EMPIRICAL	CHAPTERS 2 to 6 REFERENCE	CHAPTER 7 REFERENCE
1. Identify the current implementation and use of ICT in South Africa focussing on poverty and inequality, schools, universities and transformation and employer expectations of prospective accountancy professionals.	✓		Chapter 2	Paragraph 7.4
2. Investigate the different educational, motivational and technology acceptance theories that had an impact on this study.	✓		Chapter 2	Paragraph 7.4
3. Identify the ICT competencies required by prospective accountancy professionals by analysing SAICA's latest published and proposed CF and literature on 4IR.	✓	✓	Chapter 2 and 3	Paragraphs 7.4 and 7.5
4. Identify the possible ICT integration necessities and opportunities in the accountancy curricula, by analysing the views of the different stakeholders, SAICA (professional body), DHET (university requirements) and employers (current markets).	✓		Chapter 2 and 3	Paragraphs 7.4 and 7.5
5. Identify the most appropriate research design and methodology for this study.	✓		Chapter 4	Paragraph 7.6
6. Determine the main themes for this study, in order to develop the self-developed questionnaire.	✓	✓	Chapter 2, 3 and 4	Paragraphs 7.4, 7.5 and 7.6
7. Identify the current status of ICT integration in the accountancy curriculum of two selected universities.	✓	✓	Chapter 2 and 3	Paragraphs 7.4 and 7.5
8. Compare the general learning outcomes of the core accountancy modules of two selected universities with the ICT competencies expected by employers and required from SAICA CF.	✓	✓	Chapter 3	Paragraph 7.5
9. Developed a questionnaire to send out to the students and lecturers of one traditional university and one comprehensive university within the accountancy department.		✓	Chapter 4	Paragraph 7.6

Table 7-2: Realisation of objectives and chapter references (continues)

OBJECTIVE (Chapter 1, Paragraph 1.3.2; Chapter 7, Paragraph 7.3)	THEORETICAL	EMPIRICAL	CHAPTERS 2 to 6 REFERENCE	CHAPTER 7 REFERENCE
10. Perform qualitative, quantitative and descriptive statistical data analysis methods and analyse the results to identify similarities, anomalies and correlations between different questions. Also, to verify the reliability of questions included in the self-developed questionnaire where possible.		✓	Chapter 4 and 5	Paragraphs 7.6 and 7.7
11. Identify and link specific expectations to be included in the ICTM from the two respondent groups by analysing the questionnaire administered to the different respondent groups with the literature review.		✓	Chapter 2, 3, 5 and 6	Paragraphs 7.4, 7.5, 7.7 and 7.8
12. Develop an integrated information and communications technology competency framework model for prospective accountancy professionals.		✓	Chapter 6	Paragraph 7.8

Source: Chapter 1, Paragraph 1.3.2, and Chapter 7

Table 7-1 indicates that by achieving the primary objective of this study as outlined in Chapter 1 “to develop an integrated information and communications technology competency framework model for specific ICT competencies in the four core accountancy modules” has been achieved in Chapter 6. This is deduced from the fact that all the initial theoretical and empirical objective formulated in Chapter 1 was achieved.

The secondary objectives, inclusive of the theoretical and empirical objectives, formulated in Chapter 1, refers to the identification of the specific ICT competencies expected from employers, required by SAICA and necessary for prospective accountancy professionals to possess when they enter the workplace. Table 7-1 outlines that these objectives, numbered from 1. to 12., have been realised in Chapters 2, 3, 4, 5, and 6. How these objectives were achieved are discussed in detail below.

7.3 CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

In Chapter 1 this study introduces the problem statement (Paragraph 1.2), research objectives (Paragraph 1.3) and the research design and methodology (Paragraph 1.4). These elements are also briefly discussed in relevance to the different chapters. The problem statement and primary objective of this study are discussed as part of the conclusion in Paragraph 7.12. The secondary objective, theoretical (Paragraph 1.3.2.1) and empirical (Paragraph 1.3.2.3), are individually analysed in the relevant chapters, Paragraphs 7.4 to 7.8.

Chapter 1 concludes that employer ICT expectations are not being met by universities. This was concerning when taking into account the rapid change of the accountancy work environment. In order to overcome this, a change in the accountancy curriculum is suggested. This change will take the shape of balancing out the technical with the pervasive competencies, specifically for this study, ICT competencies. Since limited guidance is provided from SAICA as to what the specific ICT competencies are and how they could be taught at university level, employer expectations are continuously not met.

The problem statement as outlined in Paragraph 1.2 indicates that with limited literature available on what specific ICT competencies should be included and taught at university level leaves a gap and the need for further investigation thereof. Through the review of available literature in Chapters 2 and 3, and the collection and analysis of data in Chapters 4 and 5, the specific ICT competencies required and necessary for prospective accountancy professionals to possess were identified. A conclusion was reached on the inclusion of specific ICT competencies linked to the years of study and also RBT as part of the development of the ICTM in Chapter 6.

7.4 CHAPTER 2: IMPORTANCE OF ICT AND ITS INTEGRATION INTO THE ACCOUNTANCY CURRICULUM

The aim of Chapter 2 was to investigate the implementation and exposure of learners and students to ICT in South Africa. Through this investigation, the current stance of ICT in schools, linking to poverty in South Africa and the exposure of students at university level are discussed. This was done to achieve the theoretical objectives 1, 2, and parts of 3, 4, 6, 7, and the empirical objective 11 as outlined in Table 7-1.

Theoretical objective 1 was achieved in Paragraph 2.2.1 which covered poverty and inequality in South Africa. With the rise in poverty and unemployment in normal circumstances, numerous learners and students are not enjoying the financial freedom to have access to computers and the internet. This places the onus on government to provide them with the required ICT resources and opportunities at school and university level. Paragraph 2.2.2 outlines that even with several strategic plans implemented by the South African government to expose learners at school level to ICT, they have fallen short. This is due to more than half of schools not currently possessing functioning computer centres with the necessary resources, such as teachers and power, to effectively transfer ICT knowledge. Where schools are not able to provide this essential competency to learners before they enter university, it is up to universities to provide those fortunate enough to be accepted with the necessary and basic ICT competencies required to study at university and also required by the workplace.

Theoretical objective 4 was achieved in Paragraph 2.2.3 and outlined in Table 2-1 and Figure 2-3, where literature found that not all universities provide compulsory ICT modules, leaving a gap with regard to what is expected from SAICA and employers of prospective accountancy professionals. SAICA outlines the competencies a prospective accountancy professional should possess when they enter the workplace. Paragraph 2.4.1 points out that even with this guidance being constantly revised and updated in line with the changing accountancy work environment, limited guidance is available on how and what specifically in terms of ICT should be taught at university level. Furthermore, universities are left to design their accountancy curriculum to fit their own needs. This further leads to an ICT expectation gap between what employers expect of prospective accountancy professionals and what universities are teaching, identified in Paragraph 2.2.4.

Paragraph 2.2.1 identified the gaps in literature and further emphasised and even exasperated due to the Covid-19 conditions. Since poverty and unemployment are increasing due to several companies and businesses having to close down due to Covid-19 restrictions, the balance between essentials versus the nice to haves is shifting. This also influenced education at school and university level.

With this great divide between what is available to students at university and at home, the design of the ICTM needs to take into account the different theories that had an impact on this study.

Theoretical objective 2 was achieved in Paragraph 2.3.1 which established that RBT is identified as the most relevant educational taxonomy. The different learning outcomes, assessment and learning activities based on RBT are identified in Paragraph 2.3.1 and summarised in Table 2-8. This ensures that competencies are taught in a staggered approach. This was supported in Paragraph 2.3.2.2 and illustrated in Figure 2-6 by Maslow's hierarchy of needs where basic requirements need to be met before the next requirement can be attempted, translated into a staggered approach. Specific to this study, the effective integration of ICT is outlined in TAM2. Paragraph 2.3.3 summarised in Table 2-8 propose that the external variables should be considered to facilitate the successful integration of ICT in the accountancy curriculum.

In support of this study, theoretical objective 3 was achieved in Paragraph 2.4.3 the discussion around 4IR points to and emphasises the importance of ICT in all aspects of the professional work environment. This view was adopted by SAICA in their proposed CF, CA 2025 as explained in Paragraphs 2.4.1 and 2.4.2. The shift from basic competencies to being able to adapt and apply specific competencies are being proposed. The ICT competencies included in the proposed CF are inclusive of the most relevant 4IR competencies as provided in Table 2-9, but still lack guidance on what they specifically entail and how it should be integrated or taught.

Secondly, theoretical objectives 6, 7, and empirical objective 11 was achieved by summarising all the themes as identified in Chapter 2 in Table 2-10 that assisted in the development of the self-administered questionnaire discussed in more detail in Paragraph 7.6.

After identifying the different views from a South African perspective, different theories and stakeholders on the stance of, importance of and gap in ICT competencies, Chapter 3 further investigated the required ICT competencies, both locally and internationally. This is discussed in more detail next. This was done to achieve the theoretical objectives 8, and parts of 3, 4, 6, 7, and empirical objective 11 as outlined in Table 7-1.

The overall conclusion from Chapter 2 was that due to poverty, the current school system and South Africa's dated ICT resources and exposure, students are not adequately prepared for the 4IR. This is further highlighted by literature calling for the accountancy curriculum to adapt as to include 4IR ICT competencies. This can be achieved when RBT, linked to Maslow's hierarchy of needs and TAM is considered in the development of accountancy specific ICT competencies as outlined by SAICA.

7.5 CHAPTER 3: CURRICULUM DESIGN, LEARNING OUTCOMES AND KNOWLEDGE LEVELS OF ICT FOR INTEGRATION INTO THE ICTM

The aim of Chapter 3 was to outline the required specific ICT competencies expected from employers identified through the review of local and international literature in Paragraph 3.3.1 and summarised in Tables 3-2 to 3-4. This is then compared to the expected ICT competencies based on SAICA's proposed (2019a) and published (2018) CF ICT competency requirements as discussed in Paragraph 3.3.2 and summarised in Table 3-5. This was done to achieve the theoretical objective 3.

Theoretical objective 4 was achieved in Paragraphs 3.3.1 and 3.3.2 with the final comparison in Table 3-5. With the different views of employers, the top three ICT competency computer software programs highlighted to be integrated into the accountancy curriculum are MS Word, MS Excel (including data analysis), and MS PowerPoint. In turn, the specific ICT competencies included in the computer programs are identified in Paragraph 3.3.2 and grouped in Table 3-6 in four competency levels: [1] basic, [2] intermediate, [3] expert, and [4] advanced. This allows the integration mapping based on the specific learning outcomes per year of study per core module.

Followed on this theoretical objective 8 was achieved with the comparison of the similar learning outcomes per year of study per core module of U1 and U2. Only those learning outcomes that would allow for the successful integration of the mentioned ICT competencies were considered. Since U1 and U2 present their accountancy curriculum in a similar way, based on when which

core module is taught, the comparison of the final learning outcomes was achieved with limited to no disparities. The learning outcomes were also linked based on the RBT verbs, which allowed for the identification of lower-order and high-order thinking based on RBT.

In addition, the different learning outcomes per year of study were linked to SAICA's knowledge and proficiency levels. This was achieved in linking SAICA's knowledge and proficiency levels with RBT's knowledge and cognitive levels. In doing this, the integration of the ICT competencies is achieved in a scaffolding approach, as outlined by RBT.

All of the data gathered, and the inclusion or exclusion of certain ICT competencies supported the themes identified in Chapter 2, Table 2-10 and aided in the development of the self-developed questionnaire to achieve theoretical objectives 6 and 7 and the empirical objective 11. More specifically, which ICT competencies should be taught during which year of study and in which core module. The design of the self-developed questionnaire and the results of these findings are discussed in Chapter 4 and Chapter 5, respectively. This was done to achieve the theoretical objectives 5 and 6, and empirical objective 9, and parts of 10 as outlined in Table 7-1.

The overall conclusion from Chapter 3 was that the inclusion of MS Word, MS Excel and MS PowerPoint is considered the most valuable ICT computer programs prospective accountancy professionals should possess when they enter the workplace. There are also already similar developed learning outcomes within the core accountancy modules of two selected universities that enabled the development of ICT integration opportunities linked to RBT's knowledge levels, not to overload the accountancy curriculum further.

7.6 CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

This chapter outlined the research design followed and the research methodology applied in Chapters 2 and 3 and the analysis of data with the integration thereof in Chapters 5 and 6, respectively. Paragraph 4.5.3 concluded that the most appropriate research methodology for this study was the exploratory mixed research method, inclusive of qualitative (Paragraph 4.5.1) and quantitative (Paragraph 4.5.2) research methods, making use of grounded theory, secondary data analysis and questionnaires to achieve the theoretical objective 5.

Through the use of this integrated research method the author was able to conceptualise the required specific ICT competencies required by employers and SAICA from prospective accountancy professionals. This was discussed in Paragraph 4.6.2 to achieve the theoretical objective 6 by utilising the main themes as identified in Chapters 2 and 3 to be included in a self-developed questionnaire. Empirical objective 9 was subsequently also achieved in Paragraph 4.6.3 taking into account the different themes identified and applying it to the guidelines from

literature to develop the questionnaire that was send out to students and lecturers of one traditional university and one comprehensive university within the accountancy department.

The empirical objective 10 was achieved in Paragraph 4.7 when the statistical and data analysis techniques were concluded to be performed on a qualitative, quantitative and descriptive method. It was further identified in Paragraph 4.7.1 and 4.7.2 that the use of a codebook will be used to convert the data into a format easily readable by a computer.

Chapter 5 discussed the analysis and interpretation of the data collected through the self-developed questionnaire as well as the empirical results discussed in Chapters 3 and 4. This was done to achieve parts of the empirical objectives 10 and 11 as outlined in Table 7-1.

The overall conclusion from Chapter 4 was that the mixed-research method was the most appropriate method to collect data for this study. The qualitative research method collected, in an unstructured way, data from literature with the quantitative research method collecting, in a structured way, data from the self-developed questionnaire. Data collected from literature was coded into common themes used in the development of the questionnaire and also served as the themes for the analysis and interpretation of the data collected from the questionnaire.

7.7 CHAPTER 5: RESULTS AND FINDINGS

The aim of this chapter was to identify, through the analysis and interpretation of the collected data from a self-developed questionnaire on Maslow's hierarchy of needs, RBT, SAICA, employer needs and TAM. This addressed the empirical objectives 10 and 11 in Paragraph 5.3 where qualitative statistical data analysis was performed and in Paragraph 5.4 where quantitative and descriptive statistical analysis was performed.

Initially, Paragraph 5.3.1 analysed the demographic information. This was mainly performed to ensure that only valid responses were included in the analysis and interpretation of the data collected. Also included was where students attended school as illustrated in Figure 5-5. It was found that the majority of the students who responded attended Public: Fee-free schools. As indicated in Table 6-3, it was concluded that the majority of the student respondents did not receive the adequate exposure to ICT competencies due to the poverty situation in South African and the current circumstances in public schools.

Paragraph 5.3.2 outlined the ICT exposure students had at school. Figure 5-6 outlined that a significant portion of student respondents did not have any exposure to ICT at school. In line with this finding it was found that more than 50% of the student respondents perceive themselves as beginners in terms of ICT competencies, as illustrated in Figure 5-7. A significant finding deduced from Figure 5-8 was that respondents perceived MS Work, MS Excel and MS PowerPoint to be

the most important computer programs to be integrated into the accountancy curriculum. This was in line with the findings in Paragraph 3.2.1 that these three computer programs are perceived by employers to be the most important ICT competencies a prospective accountancy professional can possess.

Paragraph 5.3.3 investigated the encounters and use of computers by students. Overall Figures 5-9 to 5-10 and 5-16 found that students have sufficient resources available to them in the form of devices and technical support from their respective universities to be able to acquire and utilise ICT competencies. Additionally, Figure 5-11 to 5-13 and 5-17 confirmed the conclusion of Paragraph 5.3.1 that students did not receive adequate exposure to ICT competencies at school. Majority of the respondents rated themselves or their students at a beginner level in terms of ICT competencies.

Paragraph 5.3.4 analysed and interpreted the perceptions of the respondents on when and how ICT should be integrated into the core accountancy modules. Figure 5-18 to 5-20 illustrated that the use of MS Word, MS Excel and MS PowerPoint was perceived necessary at a basic level. Another conclusion was made that lecturers indicated that the specific ICT competencies for the three computer programs needs to be integrated in a staggered approach. This was found to be in contrast to the responses from students who were not clear on which ICT competencies were regarded as basic, intermediate and advanced. Also, how these three computer programs are currently being utilised within the core accountancy modules were analysed. Figure 5-22 concluded that students are currently making use of MS Word, MS Excel and MS PowerPoint in all the core accountancy modules. Figure 5-23 further identified that lecturers perceive their students to utilise these computer programs at a basic level.

Since the previous responses indicated that ICT was being utilised, additional questions were asked to identify what type of ICT competencies were integrated into the accountancy curriculum. Figure 5-24 to 5-27 concluded that the current assignments within the core accountancy modules do offer students the opportunity to acquire and utilise ICT competencies. To further pinpoint which ICT competencies are being integrated, Figure 5-28 to 5-29 highlighted the fact that currently students are completing assignments in a handwritten format. This method significantly exceeded the completion of assignments electronically through the utilisation of ICT competencies. The conclusion that was drawn from this is that even though the perception was that ICT is being integrated into the accountancy curriculum, this is not the case since the majority of assignments are still being completed in a handwritten format. Also, the opportunity to integrate ICT competencies within assignments were identified as possible. To establish how much time students will spend on the ICT integrated assignments within the core modules Figure 5-28 to 5-29 concluded that assignments took on average between 7-10 hours. Paragraph 5.3.4 outlined

that in keeping to the proposed time limit of assignments of 7-10 hours, to avoid the further overload of the accountancy curriculum, a maximum 400 marks per core module per year of study was incorporated in the ICTM as outlined in Table 6-5.

Paragraph 5.3.5, outlined in Figures 5-33 and 5-34, found that the 4IR and SAICA inclusion of blockchain and big data was not a familiar concept to students. This further supports the findings in Paragraph 3.2 that the ICTM only includes MS Word, MS Excel and MS PowerPoint due to the unfamiliar nature of the other concepts.

The quantitative and descriptive statistical data analysis in paragraph 5.4.2 investigated if there were any significant correlations or associations between the questions in the self-developed questionnaire. Table 5-4 found a significant correlation between the type of university a student attends and the available ICT assignment opportunities. This indicated that some universities are keeping up with the fast changing ICT environment whilst others are not. This still leaves the opportunity for the integration of the ICTM to mitigate this gap. Another significant correlation was between a students perceived ICT competencies when they matriculated and when specific ICT competencies should be integrated into the accountancy curriculum. This indicated that not all students start university at the same ICT competency level. This was considered in the formulation of the ICTM in Table 6-4 where ICT competencies were linked to the learning outcomes of the specific modules to start at a basic level and gradually, in a scaffolding approach, move to an advanced level.

Table 5-7 and Figure 5-35 highlighted a significant association between the type of ICT exposure a student had at school and their perceived competency in MS Word, MS Excel and MS PowerPoint. A conclusion similar to the previous one was made where the inclusion of ICT competencies was linked to the learning outcomes of the specific modules to start at a basic level and gradually, in a scaffolding approach, move to an advanced level. Another significant association was made between the type of university students attend and their level of knowledge around the terms blockchain and big data. This also highlighted the finding that some universities are keeping up with the fast changing ICT environment whilst others are not still leaving the opportunity for the integration of the ICTM.

Chapter 6 takes into account the different themes as identified in Chapters 2 and 3 together with the evidence obtained in Chapter 5. This was done to achieve empirical objective 12 as outlined in Table 7-1.

The overall conclusion from Chapter 5 was that students do not possess the necessary basic ICT competencies when they enter university and when they graduate. The integration of at least MS Word, MS Excel and MS PowerPoint was also highlighted. The integration of ICT is also not being

applied in a structured way, as would be expected from RBT. The type of ICT integration was found to be less on the integration and more on the access of information basis. Even though the assignments within the accountancy modules are providing opportunities for the acquisition and utilisation of ICT competencies, the majority of students perform their assignments in a handwritten format. This highlights the need and opportunity to integrate ICT competencies in the already developed and offered assignments. The limit to these assignments was established to be between 7-10 hours per module, per year of study.

7.8 CHAPTER 6: DEVELOPMENT OF THE ICTM

This chapter's main aim was to integrate the different themes as identified in Chapters 2 and 3 and the analysis of the data in Chapter 5 into a model to indicate what specific ICT competencies can be integrated in which academic year of study and in which core modules. In effect, it was to achieve empirical objective 12.

Paragraph 6.5 concluded that the synopsis from all the previous chapters indicated that the inclusion of MS Word, MS Excel and MS PowerPoint needs to be integrated into the accountancy curriculum in a staggered approach as suggested by RBT and Maslow's hierarchy of needs. This was achieved through formulating ICT integration assignments linked to the learning outcomes of the different core modules per year of study starting with basic competencies in the 1st year of study, moving to intermediate competencies in the 2nd year of study and concluding with expert competencies in the 3rd year of study. This was done in Table 6-4 where the ICTM was outlined at a glance.

Taking into consideration the maximum time ICT assignments should take to complete, the findings from Paragraph 5.3.4 were integrated into the developed ICTM assignment learning outcomes as outlined in Table 6-4. This was done to ensure that the accountancy curriculum is not overloaded with additional content, but still providing lecturers with the guidance as to which ICT competencies can be developed for the specific learning outcomes per core module, per year of study. Thus, ensuring that the ICT competencies are integrated in the appropriate knowledge levels within an achievable designed assignment.

As a final part in the design of the ICTM, Paragraph 6.6 considered the acceptance of the integration of ICT competencies. Literature suggests that the perception on the ease of use and the usefulness of ICT have a direct impact on the successful integration of ICT. Table 6-6 provided some examples of how the external variables can be adapted to accountancy to facilitate the acceptance of the ICTM.

The ICTM was designed in such a way that students and lecturers can link the intended ICT integration opportunity with the technical competency as outlined in the learning outcomes of the

module, which in turn is linked directly to SAICA's CF requirements and to a suggested time limit per assignment.

The overall conclusion from Chapter 6 was that the integration of specific ICT competencies was linked to the already developed learning outcomes of the core accountancy modules. The ICT integration was applied in the staggered approach as outlined by RBT to the different years of study to ensure that the basic knowledge is obtained first before more advanced ICT competencies are required and attempted by students. The number of marks and the time allocation to the ICT integration opportunities per year of study per module was outlined to ensure that it is limited to maximum 7-10 hours per module per year of study. The integration of the ICTM was also outlined to be dependent on the external factors within the teaching environment.

In solving the problem statement, certain limitations were noted and are discussed in more detail below.

7.9 LIMITATIONS OF THE STUDY

With limited literature available on specific ICT competencies required and the integration opportunities thereof in the accountancy curriculum, this study had to draw inspiration from a wide variety of "other" literature, not specifically focussing on the accountancy field.

Following on this, the uniqueness of this study further placed limitations on the available literature within the accountancy field with regard to ICT and ICT integration. With these limitations, focus was only placed on the top three ICT competencies as identified through the literature review. As a result, the ICTM only includes specific ICT competencies for MS Word, MS Excel, and MS PowerPoint. Further research is required on the "other" ICT competencies as outlined by SAICA's proposed 2025 CF. This resulted in another limitation where the ICT competencies of other professional bodies, such as the Institute of Professional Accountants, the Institute of Management Accountants, and the Association of Chartered Certified Accountants, to name a few, were not specifically taken into account.

Since this study only focusses on the inclusion of ICT in the four core accountancy modules, the ethical component of ICT was not considered. This is viewed as a limitation to this study since SAICA outlines that prospective accountancy professionals should display ethical behaviour in any and all tasks performed by them.

Due to universities only providing study guides once registered for a module, the relevant study guides for all the nine universities could not be obtained. This resulted in information being summarised and scrutinized from yearbooks only. The limitation here is that more detail is usually contained in study guides that could potentially provide more detail on what ICT competencies

are expected from students in the core accountancy modules. However, this gap was overcome through the inclusion of specific questions relating to ICT integration in the self-developed questionnaire.

The self-developed questionnaire was only administered to two universities with a low response rate. With the majority of the respondents to this study's questionnaire speaking either English or Afrikaans, the sample may not be representative of the South African student population that will become accounting professionals, considering the number of other languages not represented. This places a limitation on the available data to extrapolate over the entire target population. Also, the non-representation of lecturers teaching 1st year modules is also considered a limitation to the study. This is due to the importance of establishing basic ICT competencies within the 1st year. Even so, the collected data provided useful insights on the development of the ICTM.

Also, since no test of competency was included in the self-developed questionnaire, the perceived rate of competency compared to the ICT exposure at school could not be confirmed.

Since the development and administering of the self-developed questionnaire took place before the Covid-19 pandemic, handwritten assignments were still considered as the main method of completing assignments. Since the Covid-19 pandemic most if not all assignments have moved to an online electronic platform resulting in this assumption perhaps not being accurate any more. As a result, the data collected based on handwritten assignments may differ for the future and is seen as a limitation to this study.

Taking into account these limitations, the next paragraph addresses recommendations for further research that should be implemented based on this study.

7.10 AREAS FOR FURTHER RESEARCH

The integration of the other ICT competencies as proposed by SAICA (2019a) should be investigated to outline what specific ICT competencies can be integrated into the core accountancy modules. Further research is required to outline the integration level for these ICT competencies to start from a basic level and gradually moving to an expert level throughout the accountancy degree. With most of university learning being moved to an online platform due to the Covid-19 pandemic, the use of ICT to complete assignments should be investigated. It should be investigated whether students are still required to submit hand-written assignments electronically or if they need to complete the assignments making use of MS Excel, Word and PowerPoint. With one comprehensive university being the leaders in the development and integration of 4IR courses and competencies, the acceptance and success of these ventures should be further investigated to identify aspects that could possibly be integrated by other universities.

The development of specific assignments for each year of study, integrating ICT competencies should be investigated. Through the application of the ICTM in a target group setting the specific assignments per core module can be linked to ensure workplace integration opportunities.

Research should also be done on the success with regard to the integration of ICT competencies versus not integrating ICT competencies at all. The effect that the ICTM may have on developing students from different backgrounds to possess a similar level of ICT competencies at the end of their accountancy degree can be investigated. This can aid in the adjustment of and even emphasise the importance of ICT integration in the accountancy curriculum to adhere to employer expectations and SAICA's requirements.

Lastly, the necessity of the other ICT competencies as outlined by SAICA (2019a) should be considered to establish when they can and should be implemented in a prospective accountancy professional's path, either at university level or during their career.

7.11 CONTRIBUTION OF THE STUDY

By investigating the ICT integration opportunities to prospective accountancy professionals and identifying the specific competencies and when they could possibly be integrated, a contribution is made to the accountancy information systems literature. These integration opportunities would be ideal to enable the accountancy curricula to not be further overloaded with content but also to embrace ICT through integration. It could also in turn provide relief to lecturers with regard to the marking workload.

Since the study focusses primarily on the integration of ICT at university level, taking into account the recommendations/concerns of the regulatory body (SAICA) and other stakeholders (employers) the recommendations of this study are directed at universities and not directly to SAICA and employers. But, through the publishing of additional articles derived from this study the findings of this study will be indirectly communicated to regulatory bodies and the relevant stakeholders.

In turn it will ensure that there is little to no doubt on whether universities adhere to the ICT competencies as stipulated by SAICA and to assist universities in the development of employable accountancy graduates.

The further contribution of this study is that students are exposed to the ICT environment at university. This exposure will close the gap between employers' expectations and what universities deliver to the job market. The model will also assist universities to prepare guidelines and mapping of the ICT competencies to fill the gaps in the CA 2025 guidelines for the preparedness for the 4IR. This ICTM will guide global accounting curricula to develop a more

detailed curriculum and include the integration of ICT competencies in the core modules. The ICTM will also assist on the implementation of the future ICT competencies for prospective accountants.

7.12 CONCLUSION

The problem statement in Chapter 1, Paragraph 1.2, indicates that there is limited literature available on the specific ICT competencies to be integrated into the accountancy curriculum. Even with the guidance provided by SAICA in the CF, universities still lack guidance on the specific ICT competencies to include in the teaching of the four core accountancy modules. By implementing the ICTM, lecturers are able to choose from a wide variety of ICT competencies on the correct educational level to adhere to SAICA's knowledge requirements. The ICTM serves as a guideline for the available ICT competencies that can be integrated into the already developed learning outcomes of the four core accountancy modules. This model assists in solving the problems stated in the problem statement discussed in Chapter 1.

Chapter 1 further identified the problem that prospective accountancy professionals do not meet the ICT competency expectation needs of employers. Several research objectives were set to address the problem. In order to solve the problem, the formulated objectives had to be achieved.

This was achieved through this study following a mixed-method research approach, including both qualitative (literature review) and quantitative (data collection) research methods. It is concluded that overall, the research afforded the essential background for the development of the ICTM. The ICTM provides lecturers with a point of reference of the different specific ICT competencies that can be integrated into the core accountancy modules linked to the already developed learning outcomes.

The final evaluation of this study indicated that the study achieved its objectives by developing an integrated information and communications technology competency framework model for specific ICT competencies in the four core accountancy modules.

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ANNEXURE A - SELF-DEVELOPED QUESTIONNAIRE

IT integration into the Accountancy curricula

DEAR PROSPECTIVE PARTICIPANT

This survey is conducted by Mrs. Olive Stumke towards a Ph.D. degree in Accountancy, titled: "Development of an integrated ICT competency framework for prospective Accountancy professionals", at the North-West University (Vaal Triangle Campus) under the supervision of Dr. JJ Swart (CA) SA, RA.

BACKGROUND

- * This survey has been designed to identify integration opportunities for IT into the already overloaded Accountancy curricula, without adding to the volume of technical content.
- * By completing this survey, you agree that the information you provide may be used for future related research purposes, including dissemination through peer-reviewed publications and conference proceedings.

INCENTIVE

- * If you choose to participate in this survey, it will take you no more than 15 minutes to complete.
- * When you complete the survey, you will stand a chance to win a R500 Take-a-lot voucher.
- * To be eligible for this voucher:
 - > complete all the questions in this survey,
 - > provide your email address and
 - > click SUBMIT on the last page of the survey.

NOTE: If you exit the survey before completing all the required questions, the survey will not grant you access again.

CONFIDENTIALITY

- * All responses are confidential and will be outlined and summarised in the form of statistical data analysis per participating group.
- * All data will only be used for research purposes and participants will not be identified individually.
- * Once you have submitted all your answers, you will not be able to withdraw from this study based on the anonymous nature of this survey.
- * Email addresses will ONLY be used to contact you if you are the lucky winner and will in no way be connected to you personally.

VALUE OF YOUR RESPONSES

- * The information we gain from this survey will assist in the development of an integrated ICT competency framework for South African universities to build a more proficient accounting profession.
- * The survey remains voluntary and you are under no obligation to complete it. You have the option to withdraw from the survey at any time.

HONEST OPINION

We request you to please be completely entirely honest when answering the questions. It remains voluntary and you may opt not to answer the questionnaire. If you decide to answer the questionnaire, please answer all the questions.

In the context of this questionnaire, IT is deemed to mean: the use of IT tools, including but not limited to the Internet, MS Word and MS Excel.

ETHICS

Ethical clearance was successfully obtained from the North-West University with the relevant ethics clearance number: NWU-00118-19-A4.

We thank you for your participation and assistance in this research project.

* Required

1. I hereby give consent that my responses to this questionnaire (data) may be used for further analysis in the same field of study. *

Mark only one oval.

- ☐ Yes
☐ No

2. In which capacity are you answering this questionnaire? *

Mark only one oval.

- ☐ Student *Skip to question 3.*
☐ Lecturer *Skip to question 34.*
☐ Employer / Training office *Skip to question 62.*

Student only survey

Demographic information

This information will only be used to ensure that the relevant participant groups are included in the data analysis. No participant or institution will be identified in any way. Data will be analysed and reported on in aggregate.

3. What is your home language? *

Mark only one oval.

- ☐ Afrikaans
☐ English
☐ IsiNdebele
☐ IsiXhosa
☐ IsiZulu
☐ Sepedi
☐ Sesotho
☐ Setswana
☐ SiSwati
☐ Tshivenda
☐ Xitsonga
☐ Other (please specify)

4. Please specify other language (If applicable)

5. At which university are you currently enrolled? *

Mark only one oval.

- ☐ North-West University;
- ☐ Nelson Mandela Metropolitan University;
- ☐ University of Cape Town;
- ☐ Rhodes University;
- ☐ University of Fort Hare;
- ☐ University of Free State;
- ☐ University of Johannesburg;
- ☐ University of KwaZulu-Natal;
- ☐ University of South Africa (UNISA);
- ☐ University of Stellenbosch;
- ☐ University of Pretoria;
- ☐ University of the Witwatersrand; and
- ☐ University of the Western Cape.
- ☐ A University of Technology (please specify)

6. Specify your University of Technology (If applicable)

7. Which curriculum are you currently enrolled for? *

Mark only one oval.

- ☐ Extended BCom CA
- ☐ BCom CA
- ☐ Extended BCom Financial Accountancy
- ☐ BCom Financial Accountancy
- ☐ Diploma in Financial Accountancy
- ☐ CTA (BCom CA Hons)
- ☐ BTech
- ☐ Other

8. Please specify other curriculum enrolled for (if applicable)

9. Level of current academic enrolment (Most year modules registered for): *

Mark only one oval.

- ☐ 1st year
- ☐ 2nd year
- ☐ 3rd year
- ☐ 4th year (if a 4 year degree/diploma)
- ☐ Honours

10. In which year did you matriculate? *

Mark only one oval.

- ☐ 2018
- ☐ 2017
- ☐ 2016
- ☐ 2015
- ☐ 2014
- ☐ 2013
- ☐ 2012
- ☐ 2011
- ☐ 2010
- ☐ 2009
- ☐ 2008
- ☐ 2007
- ☐ 2006
- ☐ 2005
- ☐ 2004
- ☐ 2003
- ☐ 2002

11. What type of school did you matriculate from? *

Mark only one oval.

- ☐ Public: Fee-free school
- ☐ Public: Private school
- ☐ Private: Independent school

12. Which one of the following types of IT subjects did you complete at secondary school: *

Check all that apply.

- ☐ Basic use of IT (MS Word, Excel, PowerPoint, etc.)
- ☐ Accounting and auditing computer applications
- ☐ CAT: Computer science and Information systems
- ☐ None of the above

13. Language in which study material, for the majority of subjects, was available at secondary school: *

Mark only one oval.

- ☐ Afrikaans
- ☐ English
- ☐ IsiNdebele
- ☐ IsiXhosa
- ☐ IsiZulu
- ☐ Sepedi
- ☐ Sesotho
- ☐ Setswana
- ☐ SiSwati
- ☐ Tshivenda
- ☐ Xitsonga

14. Select all the device(s) that you own or have access to: *

Check all that apply.

- ☐ Laptop/Notebook
- ☐ Desktop computer (PC)
- ☐ Tablet
- ☐ None of the above
- ☐ Smart phone

15. Select the different places where you have access to a computer (PC / laptop): *

Check all that apply.

- ☐ Home
- ☐ School / University campus
- ☐ Gym
- ☐ Internet café
- ☐ Other: _____

16. Rate your IT skills when you matriculated: *

Mark only one oval.

- ☐ Novice - The use of IT is new to me.
- ☐ Advanced beginner - I often use IT.
- ☐ Proficient - I regularly use IT with ease, but still need some assistance.
- ☐ Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.

17. Rate your IT competence in using the following software/programs: In this question please note the meaning of the following: 1) Novice: This software/program is new to me; 2) Advanced beginner: I often use the software/program; 3) Proficient: I regularly use this software/program with ease, but still need some assistance; 4) Expert: I use this software/program daily with ease and am able to apply different technical aspects of the program without assistance. *

Mark only one oval per row.

	Novice	Advanced beginner	Proficient	Expert	N/A - never used program/application
MS Word	☐	☐	☐	☐	☐
MS Excel	☐	☐	☐	☐	☐
MS PowerPoint	☐	☐	☐	☐	☐
Using search engines to browse the Internet (Google, Firefox, etc.)	☐	☐	☐	☐	☐
Sage Pastel (Accounting software program)	☐	☐	☐	☐	☐
CaseWare (Accounting software program)	☐	☐	☐	☐	☐
Other Accounting software	☐	☐	☐	☐	☐

18. Indicate, in your opinion, at which level of study the listed components of MS WORD should be taught in your Accountancy curricula: *

Mark only one oval per row.

	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours	Do not include
Align text	☐	☐	☐	☐	☐	☐
Insert / Change bullets and numbering	☐	☐	☐	☐	☐	☐
Copy / Cut text	☐	☐	☐	☐	☐	☐
Formatting (Changing font size, color, direction, etc)	☐	☐	☐	☐	☐	☐
Insert headers and footers	☐	☐	☐	☐	☐	☐
Edit and use quick access tool bar	☐	☐	☐	☐	☐	☐
Comparing documents	☐	☐	☐	☐	☐	☐
Adding graphics	☐	☐	☐	☐	☐	☐
Creating a table of contents	☐	☐	☐	☐	☐	☐
Translating documents	☐	☐	☐	☐	☐	☐
Auto formatting	☐	☐	☐	☐	☐	☐

19. Indicate, in your opinion, at which level of study the listed components of MS EXCEL should be taught in your Accountancy curricula: *

Mark only one oval per row.

	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours	Do not include
Create a new workbook	☐	☐	☐	☐	☐	☐
Apply cell borders and shading	☐	☐	☐	☐	☐	☐
Use AutoSum to add your data	☐	☐	☐	☐	☐	☐
Put your data in a table	☐	☐	☐	☐	☐	☐
Sort and Filter your data	☐	☐	☐	☐	☐	☐
Add meaning to your data using Quick Analysis	☐	☐	☐	☐	☐	☐
Use formulas (eg. Vlookup, SumIFs, etc)	☐	☐	☐	☐	☐	☐
Conditional formatting	☐	☐	☐	☐	☐	☐
Preparing professional charts and tables	☐	☐	☐	☐	☐	☐
Pivot tables	☐	☐	☐	☐	☐	☐
Writing macros	☐	☐	☐	☐	☐	☐
Preparing budgets	☐	☐	☐	☐	☐	☐
Preparing forecasts	☐	☐	☐	☐	☐	☐
Business modelling	☐	☐	☐	☐	☐	☐

20. Indicate, in your opinion, at which level of study the listed "other" IT software/programs should be taught in your Accountancy curricula: *

Mark only one oval per row.

	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours	Do not include
MS PowerPoint	☐	☐	☐	☐	☐	☐
Database software (MS SQL, MS Access, IBM Notes, etc.)	☐	☐	☐	☐	☐	☐
Internet tools (Storage clouds, search engines, best practices)	☐	☐	☐	☐	☐	☐
Professional research tools (Scopus, EBSCOhost, JSTOR, etc)	☐	☐	☐	☐	☐	☐
Sage Pastel	☐	☐	☐	☐	☐	☐
CaseWare	☐	☐	☐	☐	☐	☐
Other Accountancy software	☐	☐	☐	☐	☐	☐

21. I am of the opinion that the following data security skills should be taught in an Accountancy curricula: *

Mark only one oval per row.

	Strongly disagree	Disagree	Agree	Strongly agree	N/A - Do not include
Password protection	☐	☐	☐	☐	☐
Back-up procedures	☐	☐	☐	☐	☐
Anti-virus measures	☐	☐	☐	☐	☐

22. I am of the opinion that stakeholders (Professional bodies, universities and employers), should have some involvement on what should be taught as a minimum in terms of IT at university level: *

Mark only one oval.

- ☐ Strongly disagree
☐ Disagree
☐ Agree
☐ Strongly agree

23. The university provides me with the following resources and support to assist me in acquiring and utilising IT skills: *

Mark only one oval per row.

	Strongly disagree	Disagree	Agree	Strongly agree
Computer labs	☐	☐	☐	☐
Wi-fi	☐	☐	☐	☐
IT Support staff	☐	☐	☐	☐
Computer labs with sufficient IT equipment in a working condition	☐	☐	☐	☐

24. The assignments within the following core modules provide me with opportunities to acquire and utilise IT skills: *

Mark only one oval per row.

	Strongly disagree	Disagree	Agree	Strongly agree
Accounting	☐	☐	☐	☐
Auditing	☐	☐	☐	☐
Financial Management	☐	☐	☐	☐
Management Accounting	☐	☐	☐	☐
Taxation	☐	☐	☐	☐
General IT assignments	☐	☐	☐	☐

25. What IT skills do you think an Accountancy student should possess when they ENTER university? *

Check all that apply.

- ☐ MS Word
☐ MS Excel
☐ MS PowerPoint
☐ Database software (MS SQL, MS Access, IBM Notes, etc.)
☐ Internet tools (Storage clouds, search engines, best practices)
☐ Professional research tools (Scopus, EBSCOhost, JSTOR, etc.)
☐ Sage Pastel
☐ CaseWare
☐ Other Accountancy software
☐ Data security skills
☐ New technology developments

26. **At your current university, in what level(s) of study do Accountancy students receive compulsory IT training as part of their curriculum: ***

Check all that apply.

- ☐ 1st year
☐ 2nd year
☐ 3rd year
☐ 4th year (if a 4 year degree/diploma)
☐ Honours
☐ Don't know

27. **How much time per semester, on average, do you spend on HAND WRITTEN assignments (eg. homework, group assignments, class assignments)? ***

Check all that apply.

	0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours
Accounting	☐	☐	☐	☐	☐
Auditing	☐	☐	☐	☐	☐
Financial Management	☐	☐	☐	☐	☐
Management Accounting	☐	☐	☐	☐	☐
Taxation	☐	☐	☐	☐	☐

28. **How much time per semester, on average, do you spend on IT assignments (eg. typing/completing an assignment in MS Word, Excel, PowerPoint)? ***

Check all that apply.

	0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours
Accounting	☐	☐	☐	☐	☐
Auditing	☐	☐	☐	☐	☐
Financial Management	☐	☐	☐	☐	☐
Management Accounting	☐	☐	☐	☐	☐
Taxation	☐	☐	☐	☐	☐

29. **I am required to make use of IT in the following manners for my core modules: ***

Check all that apply.

	Accounting	Auditing	Financial Management	Management Accounting	Taxation
Access information of the learner management systems	☐	☐	☐	☐	☐
Submit a written assignment electronically	☐	☐	☐	☐	☐
Complete electronic test and quizzes	☐	☐	☐	☐	☐
Complete an assignment on MS Word	☐	☐	☐	☐	☐
Complete an assignment on MS Excel	☐	☐	☐	☐	☐
Prepare a PowerPoint presentation assignment	☐	☐	☐	☐	☐

30. In your opinion, what type of IT integration will assist you to acquire and utilise IT skills? *

Check all that apply.

	Accounting	Auditing	Financial Management	Management Accounting	Taxation	None of the modules
Submit a written assignment electronically	☐	☐	☐	☐	☐	☐
Complete electronic test and quizzes	☐	☐	☐	☐	☐	☐
Complete an assignment on MS Word	☐	☐	☐	☐	☐	☐
Complete an assignment on MS Excel	☐	☐	☐	☐	☐	☐
Prepare a PowerPoint presentation assignment	☐	☐	☐	☐	☐	☐

31. If IT was to be integrated into core modules, the contribution / weight to the year marks of those modules should increase. *

Mark only one oval.

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Agree
- ☐ Strongly agree

32. What is your understanding of "Blockchain" technology? *

Mark only one oval.

- ☐ The new Internet.
- ☐ A new means of storing data on the Internet.
- ☐ A network with no central authority point.
- ☐ I don't really know.
- ☐ I have never heard of it.

33. What is your understanding of "Big data"? *

Mark only one oval.

- ☐ Large volumes of data that needs to be analysed for better decisions and strategic business moves.
- ☐ The large volume of a business day to day electronic transactions.
- ☐ Large volume of structured data to be used by accountants and auditors.
- ☐ I don't really know.
- ☐ I have never heard of it.

Skip to question 72.

Lecturer only survey

Demographic information

This information will only be used to ensure that the relevant participant groups are included in the data analysis. No participant or institution will be identified in any way. Data will be analysed and reported on in aggregate.

34. What is your home language? *

Mark only one oval.

- ☐ Afrikaans
- ☐ English
- ☐ IsiNdebele
- ☐ IsiXhosa
- ☐ IsiZulu
- ☐ Sepedi
- ☐ Sesotho
- ☐ Setswana
- ☐ SiSwati
- ☐ Tshivenda
- ☐ Xitsonga

35. At which university are you currently teaching? *

Mark only one oval.

- ☐ North-West University;
- ☐ Nelson Mandela Metropolitan University;
- ☐ University of Cape Town;
- ☐ Rhodes University;
- ☐ University of Fort Hare;
- ☐ University of Free State;
- ☐ University of Johannesburg;
- ☐ University of KwaZulu-Natal;
- ☐ University of South Africa (UNISA);
- ☐ University of Stellenbosch;
- ☐ University of Pretoria;
- ☐ University of the Witwatersrand; and
- ☐ University of the Western Cape.
- ☐ A University of Technology (Please specify)

36. Specify your University of Technology (If applicable)

37. Which curriculum are you currently teaching? *

Mark only one oval.

- ☐ Extended BCom CA
- ☐ BCom CA
- ☐ Extended BCom Financial accountancy
- ☐ BCom Financial Accountancy
- ☐ Diploma in Accountancy
- ☐ CAT (BCom CA Hons)
- ☐ B Tech
- ☐ Other

38. Please specify other curriculum you currently teach (If applicable)

39. What modules are you currently teaching? *

Check all that apply.

	1st year	2nd year	3rd year	4th year (if a four year degree/diploma)	Honours	Not applicable
Accounting	☐	☐	☐	☐	☐	☐
Auditing	☐	☐	☐	☐	☐	☐
Financial management	☐	☐	☐	☐	☐	☐
Management accounting	☐	☐	☐	☐	☐	☐
Taxation	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐

40. Select the different places students at your university have access to a computer: *

Check all that apply.

- ☐ Home
- ☐ School / University campus
- ☐ Gym
- ☐ Internet café
- ☐ Other: _____

41. Select all the device(s) that students at your university own or have access to: *

Check all that apply.

- ☐ Laptop/Notebook
- ☐ Desktop computer (PC)
- ☐ Tablet
- ☐ None of the above

42. Rate the IT competencies of your students in using the following software/programs: In this question please note the meaning of the following: 1) Novice: This software/program is new to me; 2) Advanced beginner: I often use the software/program; 3) Proficient: I regularly use this software/program with ease, but still need some assistance; 4) Expert: I use this software/program daily with ease and am able to apply different technical aspects of the program without assistance. *

Mark only one oval per row.

	Novice	Advanced beginner	Proficient	Expert	Not Applicable
MS Word	☐	☐	☐	☐	☐
MS Excel	☐	☐	☐	☐	☐
MS PowerPoint	☐	☐	☐	☐	☐
Using search engines to browse the Internet (Google, Firefox, etc.)	☐	☐	☐	☐	☐
Sage Pastel	☐	☐	☐	☐	☐
CaseWare	☐	☐	☐	☐	☐
Other Accounting software	☐	☐	☐	☐	☐

43. Rate your own IT competencies in using the following software/programmes: **Mark only one oval per row.*

	Novice	Advanced beginner	Proficient	Expert	Not Applicable - I do not use this software/program
MS Word	☐	☐	☐	☐	☐
MS Excel	☐	☐	☐	☐	☐
MS PowerPoint	☐	☐	☐	☐	☐
Using search engines to browse the Internet (Google, Firefox, etc.)	☐	☐	☐	☐	☐
Sage Pastel	☐	☐	☐	☐	☐
CaseWare	☐	☐	☐	☐	☐
Other Accounting software	☐	☐	☐	☐	☐

44. Indicate, in your opinion, at which level of study the listed components of MS WORD should be taught in your Accountancy curricula: **Mark only one oval per row.*

	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours	Do not include
Align text	☐	☐	☐	☐	☐	☐
Insert / Change bullets and numbering	☐	☐	☐	☐	☐	☐
Copy / Cut text	☐	☐	☐	☐	☐	☐
Formatting (Changing font size, color, direction, etc)	☐	☐	☐	☐	☐	☐
Insert headers and footers	☐	☐	☐	☐	☐	☐
Edit and use quick access tool bar	☐	☐	☐	☐	☐	☐
Comparing documents	☐	☐	☐	☐	☐	☐
Adding graphics	☐	☐	☐	☐	☐	☐
Creating a table of contents	☐	☐	☐	☐	☐	☐
Translating documents	☐	☐	☐	☐	☐	☐
Auto formatting	☐	☐	☐	☐	☐	☐

45. Indicate, in your opinion, at which level of study the listed components of MS EXCEL should be taught in your Accountancy curricula: *

Mark only one oval per row.

	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours	Do not include
Create a new workbook	☐	☐	☐	☐	☐	☐
Apply cell borders and shading	☐	☐	☐	☐	☐	☐
Use AutoSum to add your data	☐	☐	☐	☐	☐	☐
Put your data in a table	☐	☐	☐	☐	☐	☐
Sort and Filter your data	☐	☐	☐	☐	☐	☐
Add meaning to your data using quick analysis	☐	☐	☐	☐	☐	☐
Use formulas (eg. Vlookup, SumIFs, etc)	☐	☐	☐	☐	☐	☐
Conditional formatting	☐	☐	☐	☐	☐	☐
Preparing professional charts and tables	☐	☐	☐	☐	☐	☐
Pivot tables	☐	☐	☐	☐	☐	☐
Writing macros	☐	☐	☐	☐	☐	☐
Preparing budgets	☐	☐	☐	☐	☐	☐
Preparing forecasts	☐	☐	☐	☐	☐	☐
Business modelling	☐	☐	☐	☐	☐	☐

46. Indicate, in your opinion, at which level of study the listed "other" IT software/programs should be taught in your Accountancy curricula: *

Mark only one oval per row.

	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours	Do not include
MS PowerPoint	☐	☐	☐	☐	☐	☐
Database software (MS SQL, MS Access, IBM Notes, etc.)	☐	☐	☐	☐	☐	☐
Internet tools (Storage clouds, search engines, best practices)	☐	☐	☐	☐	☐	☐
Professional research tools (Scopus, EBSCOhost, JSTOR, etc)	☐	☐	☐	☐	☐	☐
Sage Pastel	☐	☐	☐	☐	☐	☐
CaseWare	☐	☐	☐	☐	☐	☐
Other Accountancy software	☐	☐	☐	☐	☐	☐

47. I am of the opinion that the following data security skills should be taught in your Accountancy curricula: *

Mark only one oval per row.

	Strongly disagree	Disagree	Agree	Strongly agree	N/A - Do not include
Password protection	☐	☐	☐	☐	☐
Back-up procedures	☐	☐	☐	☐	☐
Anti-virus measures	☐	☐	☐	☐	☐

48. I am of the opinion that stakeholders (Professional bodies, universities and employers), should have some involvement on what should be taught as a minimum in terms of IT at university level: *

Mark only one oval.

- ☐ Strongly disagree
☐ Disagree
☐ Agree
☐ Strongly agree

49. The university avails the following resources and support to students to assist them in acquiring and utilising IT skills: *

Mark only one oval per row.

	Strongly disagree	Disagree	Agree	Strongly agree
Computer labs	☐	☐	☐	☐
Wi-fi	☐	☐	☐	☐
IT Support Staff	☐	☐	☐	☐
Computer labs with sufficient IT equipment in a working condition	☐	☐	☐	☐

50. The assignments within the modules I teach provide students with opportunities to acquire and utilise IT skills: *

Mark only one oval.

- ☐ Strongly disagree
☐ Disagree
☐ Agree
☐ Strongly agree
☐ Not Applicable - I don't know what IT opportunities exist in my module

51. What is your overall perception on your students IT preparedness when they graduate? *

Mark only one oval.

- ☐ Novice
☐ Advanced beginner
☐ Proficient
☐ Expert

52. At which level of study does Accountancy students receive compulsory IT training as part of their curriculum? *

Check all that apply.

- ☐ 1st year
☐ 2nd year
☐ 3rd year
☐ 4th year (if a 4 year degree/diploma)
☐ Honours
☐ Don't know

53. **How much time per semester, on average, does a student spend on HAND WRITTEN assignments (eg. homework, group assignments, class assignments)? ***

Mark only one oval.

- ☐ 0 hours
☐ 1-3 hours
☐ 4-6 hours
☐ 7-9 hours
☐ More than 10 hours

54. **How much time per semester, on average, does a student spend on IT assignments (eg. typing/completing an assignment in MS Word, Excel, PowerPoint)? ***

Mark only one oval.

- ☐ 0 hours
☐ 1-3 hours
☐ 4-6 hours
☐ 7-9 hours
☐ More than 10 hours

55. **How much time per semester, on average, do you currently spend on MARKING all Hand Written assignments per module? ***

Mark only one oval.

- ☐ 0 hours
☐ 1-3 hours
☐ 3-6 hours
☐ 7-9 hours
☐ More than 10 hours
☐ I only give a mark for assignments handed in and don't mark it as a "test"

56. **How much time per semester, on average, do you currently spend on MARKING all IT assignments per module? ***

Mark only one oval.

- ☐ 0 hours
☐ 1-3 hours
☐ 3-6 hours
☐ 7-9 hours
☐ More than 10 hours
☐ I only give a mark for assignments handed in and don't mark it as a "test"

57. **I require students to make use of IT in the following manners for the module(s) I teach: ***

Check all that apply.

- ☐ Access information of the learner management systems
☐ Submit a WRITTEN assignment electronically
☐ Complete electronic tests and quizzes
☐ Complete an assignment / project on MS Word
☐ Complete an assignment / project on MS Excel
☐ Prepare a PowerPoint presentation assignment
☐ Other: _____

58. In your opinion, what type of IT integration will assist students acquire and utilise IT skills? *

Check all that apply.

- ☐ Electronically submit a written assignment
- ☐ Complete electronic tests and quizzes
- ☐ Complete an assignment / project on MS word
- ☐ Complete an assignment / project on MS excel
- ☐ Prepare a PowerPoint presentation assignment
- ☐ Integration of IT should NOT be done my module(s)

59. If IT was to be integrated into core modules, the contribution / weight to the year marks of those modules should increase. *

Mark only one oval.

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Agree
- ☐ Strongly agree

60. What is your understanding of "Blockchain" technology? *

Mark only one oval.

- ☐ The new Internet.
- ☐ A new means of storing data on the Internet.
- ☐ A network with no central authority point.
- ☐ I don't really know.
- ☐ I have never heard of it.

61. What is your understanding of "Big data"? *

Mark only one oval.

- ☐ Large volumes of data that needs to be analysed for better decisions and strategic business moves.
- ☐ The large volume of a businesses day to day electronic transactions.
- ☐ Large volume of structured data to be used by accountants and auditors.
- ☐ I don't really know.
- ☐ I have never heard of it.

ANNEXURE B – CODEBOOK AND CODE SHEET FOR THIS STUDY

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
Section A - Demographic information																
S,L1	A1	hlang	Home language	What is your home language?	Other	Afrikaans	English	IsiNdebele	IsiXhosa	IsiZulu	Sepedi	Sesotho	Setswana	SiSwati	Tshivenda	Xitsonga
	A2	hlang other		Please specify other language (if applicable)												
S,L2	A3	Univ	Enrolled university	At which university are you currently enrolled/teaching?		U1	U2									
S,L3	A4	curr	Enrolled curriculum	Which curriculum are you currently enrolled for/teaching?	Other	Extended BCom CA	BCom CA	Extended BCom Financial Accountancy	BCom Financial Accountancy	Diploma in Financial Accountancy	CTA (BCom CA Hons)	BTech				
	A5	curr other		Please specify other curriculum enrolled for/teaching (if applicable)												
S4	A6	year	Academic year enrolled for	Level of current academic enrolment (Most year modules registered for/teaching:		1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
S5	A7	matyear	Year matriculated	In which year did you matriculate?		2002-2005	2006-2009	2010-2013	2014-2017	2018-2019						
S6	A8	schooltype	School type matriculated	What type of school did you matriculate from?		Public: Fee-free school	Public: private school	Private: Independent school								

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
S7	A9	lang school mat	Language school material available in	Language in which study material, for the majority of subjects, was available at secondary school:		Afrikaans	English	IsiNdebele	IsiXhosa	IsiZulu	Sepedi	Sesotho	Setswana	SiSwati	Tshivenda	Xitsonga
L4	A10-14	modteach 10-14	Modules teaching	What year level are you currently teaching in:												
	A10			Accounting	Not applicable	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	A11			Auditing	Not applicable	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	A12			Financial Management and Management Accounting	Not applicable	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	A13			Taxation	Not applicable	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	A14			Other	Not applicable	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
Section B - ICT exposure at high school																
S8	B1	schoolit	IT done at school	Which one of the following types of IT subjects did you complete at secondary school:	None of the above	Basic use of IT (MS Word, Excel, PowerPoint, etc.)	Accounting and auditing computer applications	CAT: Computer science and Information systems								

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
S9	B2	Itcomp req enteruni v	What IT competency when entering university	What IT skills do you think an Accountancy student should possess when they ENTER university?		MS Word	MS Excel	MS PowerPoint	Database software (MS SQL, MS Access, IBM Notes, etc.)	Internet tools (Storage clouds, search engines, best practices)	Professional research tools (Scopus, EBSCOhost, JSTOR, etc.)	Sage Paste l	CaseWare	Other accountancy software	Data security skills	New technology developments
S10	B3	Itcomp @ matric	IT comp level when matriculated	Rate your IT skills when you matriculated:		Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
Section C - Encounters and use of computers																
S11,L5	C1	compac c	Places access to a computer	Select the different places where you/your students have access to a computer (PC / laptop)	Don't know	Home	School / University campus	Gym	Internet café	Other						
	C2	compac c other		Please specify other												
S12,L6	C3	devices	Devices access to / own	Select all the device(s) that you own or have access to:	None of the above / Don't know	Laptop/Notebook	Desktop computer (PC)	Tablet	Smartphone	Other						
	C4	devices other		Please specify other												
S13,L7	C5-10	comptpr ogm5-10	Rate your competency	Rate your IT competence in using the following software/programs: In this question please note the meaning of the following: 1) Novice: This software/program is new to me; 2) Advanced beginner: I often use the software/program; 3) Proficient: I regularly use this software/program with ease, but still need some assistance; 4) Expert: I use this software/program daily with ease and am able to apply different technical aspects of the program without assistance.												

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
	C5			MS Word	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C6			MS Excel	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C7			MS PowerPoint	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C8			Using search engines to browse the internet (Google, Firefox, etc.)	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some	Expert - I use IT daily with ease and am able to apply different technical							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
								assistance.	aspects of the program without assistance.							
	C9			Sage Pastel (Accounting software program)	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C10			Other accounting software	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C11			CaseWare (Accounting software program)	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION										
					0	1	2	3	4	5	6	7	8	9	10
L8	C12-18	stucomp tprog12-18	Rate your students competency	Rate the IT competencies of your students in using the following software/programs:											
	MS Word			N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	MS Excel			N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	MS PowerPoint			N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C14														

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
	C15			Using search engines to browse the internet (Google, Firefox, etc.)	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C16			Sage Pastel (Accounting software program)	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C17			Other Accounting software	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some assistance.	Expert - I use IT daily with ease and am able to apply different technical aspects of the program without assistance.							
	C18			CaseWare (Accounting software program)	N/A - never used program/application	Novice - The use of IT is new to me.	Advanced beginner - I often use IT.	Proficient - I regularly use IT with ease, but still need some	Expert - I use IT daily with ease and am able to apply different technical							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
								assistance.	aspects of the program without assistance.							
S14,L9	C19-22	univres19-22	University resources provided	The university provides me/students with the following resources and support to assist me/students in acquiring and utilising IT skills.												
	Computer labs				Strongly disagree	Disagree	Agree	Strongly agree								
	Wi-Fi				Strongly disagree	Disagree	Agree	Strongly agree								
	IT Support staff				Strongly disagree	Disagree	Agree	Strongly agree								
	Computer labs with sufficient IT equipment in a working condition				Strongly disagree	Disagree	Agree	Strongly agree								
L10	C23	stugrad preparedness	Student preparedness when graduate	What is your overall perception on your students IT preparedness when they graduate?		Novice	Advanced beginner	Proficient	Expert							
Section D - Perceptions of when and how ICT should be integrated into the core accountancy modules																
S15.L11	D1-11	wordteach1-11	When should Word competency be taught	Indicate, in your opinion, at which level of study the listed components of MS WORD should be taught in your Accountancy curricula:												
	Align text			Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours							
	Insert / Change bullets and numbering			Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours							
	Copy / Cut text			Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
	D4			Formatting (Changing font size, colour, direction, etc)	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D5			Edit and use quick access tool bar	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D6			Comparing documents	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D7			Adding graphics	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D8			Insert headers and footers	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D9			Creating a table of contents	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D10			Translating documents	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D11			Auto formatting	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
S16,L12	D12-25	exceltea ch12-25	When should Excel competency be taught	Indicate, in your opinion, at which level of study the listed components of MS EXCEL should be taught in your Accountancy curricula:												
	D12			Create a new workbook	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D13			Apply cell borders and shading	Do not include	1st year	2nd year	3rd year	4th year (if 4 year degree/diploma)	Honours						
	D14			Use AutoSum to	Do not include	1st year	2nd year	3rd year	4th year (if 4 year	Honours						

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
				add your data					degree/diploma)							
	D15			Put your data in a table	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D16			Sort and Filter your data	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D17			Add meaning to your data using Quick Analysis	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D18			Use formulas (e.g. Vlookup, SumIFs, etc)	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D19			Conditional formatting	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D20			Preparing professional charts and tables	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D21			Pivot tables	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D22			Writing macros	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D23			Preparing budgets	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D24			Preparing forecasts	Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	D25			Business modelling	Do not include	1st year	2nd year	3rd year	4th year (if four-year	Honours						

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION										
					0	1	2	3	4	5	6	7	8	9	10
									degree/diploma)						
S17,L13	D26-33	otherteach26-33	When should other IT competency be taught	Indicate, in your opinion, at which level of study the listed "other" IT software/programs should be taught in your Accountancy curricula:											
	MS PowerPoint			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	Database software (MS SQL, MS Access, IBM Notes, etc.)			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	Internet tools (Storage clouds, search engines, best practices)			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	Professional research tools (Scopus, EBSCOhost, JSTOR, etc)			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	Sage Pastel			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	CaseWare			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	Other accountancy software			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	Other (please specify)			Do not include	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
	S18,L14			D34-36	datasec34-36		I am of the opinion that the following data security skills should be taught in an accountancy curricula:								

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
	D34		Data security to be taught	Password protection	N/A - Do not include	Strongly disagree	Disagree	Agree	Strongly agree							
	D35			Back-up procedures	N/A - Do not include	Strongly disagree	Disagree	Agree	Strongly agree							
	D36			Anti-virus measures	N/A - Do not include	Strongly disagree	Disagree	Agree	Strongly agree							
S19,L15	D37	compIT	University compulsory IT module	At your current university, in what level(s) of study do Accountancy students receive compulsory IT training as part of their curriculum:	Don't know	1st year	2nd year	3rd year	4th year (if four-year degree/diploma)	Honours						
S20	D38-43	itegmod 38-43	IT integration per module	I am required to make use of IT in the following manners for my core modules:												
	D38			Access information of the learner management systems		Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D39			Submit a written assignment electronically		Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D40			Complete electronic test and quizzes		Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D41			Complete an assignment on MS Word		Accounting	Auditing	Financial Management and Management	Taxation							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
		D42						Accounting								
				Complete an assignment on MS Excel		Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D43			Prepare a PowerPoint presentation assignment		Accounting	Auditing	Financial Management and Management Accounting	Taxation							
L16	D44	typeitintegr	Type of IT integration in module teaching	I require students to make use of IT in the following manners for the module(s) I teach:		Access information of the learner management systems	Submit a written assignment electronically	Complete electronic test and quizzes	Complete an assignment on MS Word	Complete an assignment on MS Excel	Prepare a PowerPoint presentation assignment					
S21	D45-50	itintegrateskill45-50	Type of IT integration to better IT skills	In your opinion, what type of IT integration will assist you to acquire and utilise IT skills												
	D45			Submit a written assignment electronically	None of the modules	Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D46			Complete electronic test and quizzes	None of the modules	Accounting	Auditing	Financial Management and Management Accounting	Taxation							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
	D47			Complete an assignment on MS Word	None of the modules	Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D48			Complete an assignment on MS Excel	None of the modules	Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D49			Prepare a PowerPoint presentation assignment	None of the modules	Accounting	Auditing	Financial Management and Management Accounting	Taxation							
	D50			Integration of IT should NOT be done this module	None of the modules	Accounting	Auditing	Financial Management and Management Accounting	Taxation							
L17	D51	itintegrbestskilllec	Type of IT integration to better IT skills from lecturer perspective	In your opinion, what type of IT integration will assist students acquire and utilise IT skills?	Integration of IT should NOT be done my module(s)	Electronically submit a written assignment	Complete electronic test and quizzes	Complete an assignment on MS Word	Complete an assignment on MS Excel	Prepare a PowerPoint presentation assignment						
S22	D52-57	itopport52-57	Assignments in modules opportunity to utilise IT skills	The assignments within the following core modules provide me with opportunities to acquire and utilise IT skills												
	D52			Accounting		Strongly disagree	Disagree	Agree	Strongly agree							
	D53			Auditing		Strongly disagree	Disagree	Agree	Strongly agree							
	D54			Financial Management		Strongly disagree	Disagree	Agree	Strongly agree							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
	D55			Management Accounting		Strongly disagree	Disagree	Agree	Strongly agree							
	D56			Taxation		Strongly disagree	Disagree	Agree	Strongly agree							
	D57			General IT assignments		Strongly disagree	Disagree	Agree	Strongly agree							
L18	D58	teachitoport	Assignments in modules I teach gives opportunity to utilise IT skills	The assignments within the modules I teach provide students with opportunities to acquire and utilise IT skills:		Strongly disagree	Disagree	Agree	Strongly agree							
S23	D59-63	timehwa ss59-63	Time spent on handwritten assignments	How much time per semester, on average, do you/your student spend on HANDWRITTEN assignments (e.g. homework, group assignments, class assignments)?												
									More than 10 hours							
	D59			Accounting		0 hours	1-3 hours	4-6 hours	7-9 hours							
	D60			Auditing		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
	D61			Financial Management		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
	D62			Management Accounting		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
	D63			Taxation		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
L19	D64	timehwa ss	Time spent on handwritten assignments	How much time per semester, on average, does a student spend on HANDWRITTEN assignments (e.g. homework, group assignments, class assignments)?		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
S24	D65-69	timeitas s65-69	Time spent on IT assignments	How much time per semester, on average, do you spend on IT assignments (eg. typing/completing an assignment in MS Word, Excel, PowerPoint)?												
	D65			Accounting		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
	D66			Auditing		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
	D67			Financial Management		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
	D68			Management Accounting		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
	D69			Taxation		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
L20	D70	timeitass	Time spent on IT assignments	How much time per semester, on average, does a student spend on IT assignments (e.g. typing/completing an assignment in MS Word, Excel, PowerPoint)?		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
L21	D71	timemark	Time spent on marking assignments	How much time per semester, on average, do you currently spend on MARKING all HandWritten assignments per module?		0 hours	1-3 hours	4-6 hours	7-9 hours	More than 10 hours						
Section E - Knowledge of new SAICA ICT competencies and general perceptions																
S25,L22	E1	shinvolvement	Stakeholder involvement in curr design	I am of the opinion that stakeholders (Professional bodies, universities and employers), should have some involvement on what should be taught as a minimum in terms of IT at university level:		Strongly disagree	Disagree	Agree	Strongly agree							

QUESTION #	SPSS CODE NAME	SPSS VARIABLE NAME	FULL VARIABLE NAME	QUESTIONNAIRE QUESTION	DATA CODING INSTRUCTION											
					0	1	2	3	4	5	6	7	8	9	10	11
S25.L23	E2	integrincrmk	IT integration increase contribution to year marks	If IT was to be integrated into core modules, the contribution / weight to the year marks of those modules should increase.		Strongly disagree	Disagree	Agree	Strongly agree							
S25.L24	E3	bc	Blockchain understanding	What is your understanding of "Blockchain" technology?	I have never heard of it	The new internet	A new means of storing data on the internet	A network with no central authority point	I don't really know							
S25.L25	E4	bd	Big data understanding	What is your understanding of "big data"?	I have never heard of it	Large volumes of data that needs to be analysed for better decisions and strategic business moves	The large volume of a business' day to day electronic transactions	Large volume of structured data to be used by accountants and auditors	I don't really know							

Source: Babbie (2016:414-415); De Vos *et al.* (2018:252); Kreuger and Neuman (2006); and Pallant (2013:11), adapted

ANNEXURE C – SUBMITTED ARTICLE


Scientific Research

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Welcome **Olive Stumke**
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Current Position: User Center
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My Profile

Olive Stumke

Telephone: +27823863475

E-mail: olive.stumke@gmail.c...

Affiliation: North-West University

Paper submitted successfully.

Journal	Open Journal of Social Sciences (JSS)
Paper ID	1764116
Paper Title	Investigating the integration of ICT competencies into the accountancy curriculum using Bloom's taxonomy
Paper page	1
Keywords	Accountancy curriculum, Accountancy graduates, Bloom's taxonomy, ICT competencies, Integration, Accountancy curriculum
Abstract	Integrating ICT competencies in the accountancy curriculum remains a challenge at South African universities. This challenge is mainly due to limited IT resources of students, which became evident during online teaching due to Covid-19 pandemic. This exploratory mixed research study highlights that ICT competencies within the accountancy curriculum should be done in a structured way. The qualitative part of the study focused on a literature review on Bloom's taxonomy. The quantitative portion utilized a self-developed questionnaire where data was collected from two participating universities on the perceived inclusion of ICT com-petencies, when these competencies should be taught, the ICT integration current-ly being implemented in the accountancy curriculum and the opportunities within the assignments for the acquire and utilize ICT competencies. The participating universities agreed with the inclusion of MS Excel and MS Word. However, the results between the literature review and the questionnaire on when ITC competency levels should be taught is not aligned. The results highlight that the use of assignments within the accountancy curriculum does afford the opportunity to integrate ICT competencies. It is recommended that universities integrate the specific ICT competencies for MS Excel and MS Word in the accountancy curriculum by means of the assignments already available starting at a basic level in the first year of study and moving in a scaffolding approach through the different years of study and competency levels.

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ANNEXURE D – LANGUAGE EDITING CERTIFICATE



Jomone Müller

Language Practitioner
SATI No. 1002831
BA Hons (Language practice)

www.jmuller.co.za
Tel: +27 84 406 0029
jomone@jmuller.co.za

DECLARATION OF LANGUAGE EDITING

19 October 2020

To whom it may concern

This is to confirm that I, the undersigned, have language edited the completed research of *Olive Stumke* entitled: Development of an integrated Information and Communications Technology competency framework for prospective Accountancy professionals.

No changes were permanently affected and were left to the discretion of the author. The responsibility of implementing the recommended language changes rests with the author of the article.

Yours truly

A handwritten signature in black ink, appearing to read 'J Müller'.

Jomone Müller