

# Formal Assessment practices of Computer Application Technology teachers

by

Magdalena P Brits

29347557

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Supervisor: Mrs. Maryke Mihai

Co-supervisor: Prof. Max Braun

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## **Abstract**

The aim of the research reported in this dissertation of limited scope (mini-dissertation) was to study the practices, opinions, experiences and the quality of the formal assessments developed by the Computer Application Technology teachers in the Further Education and Training phase of South African schools. The main focus is on the cognitive levels to which teachers set assessment tests or examinations for theoretical and practical aspects of the subject content together with the extent to which the knowledge base of the curriculum is addressed.

The research used a qualitative methodology in which various formal assessments set by teachers were evaluated. Krathwohl's Two Dimensional Taxonomy and the Department of Education's analysis grid were used to assess the components needed to achieve higher cognitive levels of assessment in the tests or examinations used for learners in Computer Application Technology. Krawthwohl's cognitive dimension was extended through the addition of "Higher Application" above the analysis, evaluation and creation levels.

The research is based on fieldwork in the Johannesburg East District where fifteen teachers from different schools participated. The teachers were from a variety of backgrounds in teaching the subject. Each of the teachers voluntarily completed an open-ended questionnaire that was based on their own interpretation of the setting of formal assessment tests or examinations. Document analysis was performed on the preliminary theory examinations that were set by the teachers using an adapted form of Krathwohl's two-dimensional taxonomy which was made specific for CAT. The teachers were requested to supply an example of a taxonomy which they themselves had used when analyzing the preliminary theory examination according to cognitive levels.

The research findings were derived from the responses to the questionnaires that indicated the teachers' opinions about the setting of formal assessments as well as from formal test papers the teachers provided. The vast majority of the participant teachers used examinations set by others, either those purchased from publishers or publically accessible past papers downloaded from the internet with minimal change. It appears that the teachers did not use any taxonomy of cognitive levels even when they designed their own question papers. The cognitive level addressed was primarily memorisation and recall.

The teachers were more concerned about the format and style of their examination papers than the cognitive levels the papers addressed. Additionally the overwhelming majority did not believe that training in assessment design would be of value to them (as experienced teachers), although some suggested that such training may be useful for beginning teachers.

This suggests that further research on the teachers' experiences in using taxonomies when setting formal assessments, as well as potential in-service training interventions that address their knowledge of cognitive levels and appropriate assessments is needed.

**Keywords:**

Computer Application Technology; Formal assessment; Taxonomies; Cognitive levels.

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## Explanation of terminology used in the research

<b>Term</b>	<b>Definition</b>
Computer Application Technology – South Africa	The effective use of information and communication technologies in an end-user computer application environment in different sectors of society (Department of Education, 2003, p. 9)
Computer Science - Internationally	The introduction to concepts in which learners are trained in computing concepts, computer programming and computer operations (Wells, 2012).
End-user	The person who uses computer applications in any environment, as opposed to those who developed or supported it (Department of Education, 2003, p. 59).
External assessment	Any assessment activity, instrument or programme where the design, development and implementation have been initiated, directed and, coordinated by Provincial Education Departments and the Department of Basic Education (Department of Basic Education, 2011b, p. viii)
Formal assessment task	A systematic way of assessment used by teachers to determine how well learners are progressing in a grade and in a particular subject (Department of Basic Education, 2011b, p. viii)
Informal assessment task	The building towards formal assessment (Department of Basic Education, 2011b, p. ix).
Information and communication technology (ICT)	A form of convergence technology including computer technology and communication technology (Simmons & Hawkins, 2009).
Internal assessment	An assessment which is done internally by teachers. (Department of Basic Education, 2011b, p. ix)
Promotion	The movement of a learner from one grade to the next when that learner meets the minimum required level of achievement per subject in a particular grade (Department of Basic Education, 2011b, p. x)

## List of Acronyms

CAT	Computer Application Technology
CAPS	Curriculum and Assessment Policy Statement
CS	Computer Science
DoE	Department of Education
FET	Further Education and Training which is the final high school phase Grades 10 - 12
GDE	Gauteng Department of Education
HG	Higher Grade
ICDL	International Computer Driving Licence
ICT	Information and Communication Technology
IT	Information Technology
LPG	Learner Program Guidelines
NCS	National Curriculum Statement
NPA	National Protocol for Assessment
NPPPPR	National Policy Pertaining to the Programme and Promotion Requirements
PAT	Practical Assessment Task
SA	Subject Advisor
SAG	Subject Assessment Guidelines
SBA	School Based Assessment
SG	Standard Grade

## Chapter 1: Background

### 1.1 Introduction

In the education system the learners' performance is challenged by the type of assessments that are set by teachers (Gagne, Wager, Golas, & Keller, 2005, p. 266). Assessment includes different ways of obtaining information from learners namely classroom observations, projects, and tests, whereas the term test is a specific type of assessment applied at a particular time and date (Miller, Linn, & Gronlund, 2009, p. 28). Teachers' opinions and practices concerning different assessment types and how they plan these different assessments when setting them by using cognitive taxonomies was the focus of this study.

This research used the Further Education and Training Phase (FET) phase (Grades 10 – 12) as context (Muller, 2003, p. 542) because Computing is only offered as a specific school subject in this phase. After 2005 Computer Studies (previously taught at Standard Grade and Higher Grade levels) became two separate subjects called Computer Application Technology (CAT) and Information Technology (IT) respectively. At the same time the subject Computyping was phased out and former Computyping teachers were retrained to teach CAT. Most of these teachers however, were not well qualified to teach CAT but were nonetheless required by the principals to teach the new subject (Davids, 2009), and in recent years to set assessments.

In the high schools of the province of Gauteng the subject CAT is taught by teachers from a broad range of backgrounds including newly qualified CAT teachers, those with only a Computyping background or with a Computer Studies background and teachers with little or no teaching experience, but who have commercially offered certifications such as the International Computer Driving Licence (ICDL) and other certificates (Department of Education, 2003, p. 5). Within certain schools there may be only one teacher who teaches CAT for learners in Grades 10 – 12 who take CAT (Computing At School, 2008, p. 2).

Since 2012 the Department of Basic Education has begun the implementation of revised syllabi known as the Curriculum and Assessment Policy Statement (CAPS) which introduced

additional expectations of teachers, including mastery of more content and the expectation that teachers would create their own theory and practical assessments. Computer Application Technology teachers are expected to once again join training programmes as a result.

This research studied the opinions and experiences of CAT teachers concerning formal assessment and their need for training for assessment. The teachers had various backgrounds of teaching the CAT subject and were from the Johannesburg East District of the Gauteng Province.

Each of the teachers voluntarily completed an open-ended questionnaire about their own interpretation of the formal assessment required by the Department of Education. The CAT teachers provided the papers that they had used for preliminary examination of theory for analysis and evaluation for purpose of the research. Teachers were also requested to provide their analysis of the preliminary examination they had used according to cognitive levels. They failed to provide this in spite of a follow-up in which an analysis grid (which was originally supplied to them by the Department of Basic Education during training in 2011) was given to them.

## **1.2 Rationale**

CAT is based on the effective use of information and communication technologies in an end-user computer application environment, in other words CAT is about learning the detailed use of application programs (Department of Education, 2003, p. 9) such as office suites. The theoretical concepts in CAT and IT are the same, but the practical focus and concepts differ. I wanted to analyse teachers' opinions on and experiences in setting their own formal assessments and their use of taxonomies in order to meet the requirements of the Department of Education requiring difficulty and cognitive levels for assessments.

### 1.3 Problem statement and purpose of the study

From January 2012, the implementation of a set of revised curricula known as the Curriculum and Assessment Policy Statement (CAPS) increased what is expected of teachers. Expectations include the mastery of additional content and self-development of assessments as theory and practical tests.

Development of assessments by teachers changes past practice since previously teachers in Gauteng were provided with a School Based Assessment (SBA) document that consisted of tasks and tests that were designed by subject advisors and senior teachers. Teachers were given the opportunity to use the SBA without change or, if they wished to change SBA-derived tests or create their own assessments, the assessments had to be approved by subject advisors. In addition publishers of textbooks provided teachers with guided lesson plans and examination papers for teachers to purchase. Since 2012 the formal assessment (SBA) for Grade 10 – 11 are moderated internally, but the subject advisors must moderate a sample, at Grade 12 level the assessments are moderated at a provincial level (Department of Basic Education, 2011a, p. 53).

It is thus an opportune time to examine the existing skills and practices of teachers regarding use, analysis and development of assessments.

The purpose of this research was to establish whether formal assessments are set by teachers or whether they just make use of previous/published papers. It sought to establish whether teachers analyse sourced papers or design their own by using taxonomies of learner cognitive skill levels, such as that provided by the Department of Basic Education (Appendix E), or any other such as that of Krathwohl (Krathwohl, 2002). The research also aimed to establish teachers' views, about training for formal assessments.

## 1.4 Research questions

The problem leads to the main research question:

What are the practices, experiences and opinions on the assessment of CAT as implemented by teachers?

In addressing the main question, the study was guided by the following three sub-questions:

1. What are the teacher's opinions and experiences of formal assessment?
2. To what extent do teachers know, understand or use taxonomies when setting formal assessments?
3. What are the teachers' views on training for formal assessment?

## 1.5 Theoretical framework

The Department of Basic Education has provided teachers with the policy document known as the CAPS (Department of Basic Education, 2011a) in which guidelines towards formal assessment are given. The CAPS document is not a replacement for the earlier National Curriculum Statement (Department of Education, 2003) but provides the teachers with more detail on the planning of subjects as well as on the requirements for formal assessment (Department of Basic Education, 2011a, p. 3). In the CAPS, the formal assessments are grouped into three groups namely School Based Assessment (SBA), Practical Assessment Tasks (PAT) and lastly the Final Examination at the end of the year. Each assessment type is allocated a specific weight and criteria (Department of Basic Education, 2011, p. 47 – 53).

During the training of 2011 the national trainers of the DoE for CAT developed an analysis grid that was intended to assist teachers when they set their own formal assessment. The analysis grid is an electronic document in which the teachers identify the topics that are covered as well as the cognitive level for each question set in the test. The analysis grid then provides the percentage of the test that addresses each cognitive level. This helps the teacher to compose the distribution of the cognitive levels with that required by the curriculum statement.



As a theoretical framework, the research made use of Krathwohl's revised taxonomy to analyse the assessments of CAT set by teachers and to assess the degree to which the teachers' assessments conformed to requirements of the Department of Basic Education and the CAT curriculum requirements.

## **1.6 Methodology: data collection**

Researching the type of techniques used in both aspects of assessment (theory and practical) for CAT, I worked with a bounded system (Creswell, 2008, p. 476) in which the study focussed on formal assessment techniques used for CAT according to the policies, documents, etc. provided by the Department of Basic Education (DoE), Gauteng Department of Education (GDE) and by a group of teachers in a single district (Creswell, 2008, p. 476). In doing so the research made use of a case study design (Cohen, Manion & Morrison, 2007, p. 254). The case study design assisted the research to answer the "WHAT" research questions of the study (Maree, 2010, p. 75).

National Protocol for Assessment Grades R – 12 (NPA) (Department of Basic Education, 2011b) and the Curriculum and Assessment Policy Statement (CAPS) (Department of Basic Education, 2011a) as well as formal assessment tests that were set by participant teachers, were used during the research to develop a collective case study in which different types of assessment techniques are compared to provide insight to advance formal assessment (Creswell, 2008, p. 477). The instruments that were used during the case study research are questionnaires and document analysis. The assessments set by teachers provided records on the techniques of formal assessments used in CAT by the teachers (Maree, 2010, p. 76).

## **1.7 Trustworthiness**

The research made use of an expert pilot group of five teachers from Tshwane South to test if the questionnaire was stable and consistent in the questions that were asked (Creswell, 2008, p 170). This expert group approved of the questionnaire and suggested no changes. These questionnaires were then distributed at Johannesburg East district Computer Application

Technology's annual meeting which 20 teachers attended. From the distribution fifteen teachers voluntarily completed the questionnaires and placed the questionnaires in the envelope provided which was then returned for analysis. The district facilitator of Johannesburg East district was not involved in the selection as teachers selected themselves (Skenton, 2004, p. 67).

The completed questionnaires provide the participant teachers' opinions on formal assessment and the research relies on the honesty of those teachers in their answers. The participant teachers were provided with the right to withdraw from the research at any point as explained in Appendix B.

The researcher was not present during the distribution and return of the questionnaires and preliminary examination papers. In addition, the researcher, although a subject facilitator herself, is responsible for a district in the neighbouring city of Tshwane and was not known to the participant teachers as these are from a district in Johannesburg (Skenton, 2004, p. 66).

## **1.8 Significance of the research**

At the end of each year, the performance of Grade 12 teachers in teaching is evaluated and analysed according to the Grade 12 learners' final results (Mathers, Olivia & Laine, 2008, p. 1). Learners' performance is measured according to formal assessment results that were obtained throughout the year with the school based assessment (which counts 25%), the practical assessment task (counts 25%) and the external examination (counts 50%). Consequently, if the expectation by teachers of learners is high as reflected in formal assessments with a high standard, the learners' performance will more likely achieve a high standard. This is only possible if the teachers are capable of setting formal assessments of high standard (Dreyer, 2008, p. 10).

This research is timely while assessment design becomes the responsibility of teachers and is novel in addressing the formal assessment of Computer Application Technology in the Further Education and Training phases. A contribution that this research may make is therefore the provision of information to improve the institution of training for formal

assessment in CAT, and in the use of appropriate design principles that apply analytical frameworks such as the cognitive and psychomotor taxonomies as may be relevant for theory and practical components of the curriculum.

## **1.9 Conclusion**

This research is divided into five chapters. The aims of each of these chapters are indicated below.

Chapter 1 introduces the research, sets its context and discusses the special problem facing teachers of Computer Application Technology. The main research question and three sub-questions are introduced. It also describes a broad overview of the methods of the research and terms used in the mini-dissertation are clarified.

Chapter 2 provides an overview of literature in which the subject matter of CAT is described nationally and internationally. The discussion addresses similarities between ICTs and CAT and illustrates the type of assessment models available for CAT teachers in literature and relates this to the formal assessment guidelines provided by the Department of Education and the role of the teacher.

Chapter 3 discusses the research methodology and describes the design and data collection methods.

Chapter 4 provides the data analysis and a synthesis of the research findings.

The research conclusion and recommendations are presented in Chapter 5 which summarises the research, its findings (related to the questions guiding the research), critically reflects on research limitations and provides recommendations for future research.

The next chapter introduces relevant literature to assist in the understanding of the subject Computer Application Technology and what formal assessment in the subject requires.

## **Chapter 2: Literature Review and Conceptual Framework**

### **2.1 Introduction**

The National Curriculum Statements characterised the kind of teachers that teach CAT as teachers who are qualified, competent, dedicated and caring (Department of Education, 2003, p. 4). This type of teacher needs to be able to fulfil various roles outlined in the Norms and Standards for teachers (Department of Education, 2003, p. 5) such as being mediators of learning, interpreters and designers of learning programmes and materials, etc.

The CAT vision requires learners to master the collection, analysis and editing of data and to learn to manipulate, process, present and communicate information to different sectors of society (Mokhele, Bouwer, de Wet & Veldman, 2008). But all of this is only possible when the teachers themselves meet the ideal criteria. If the teachers are not competent in one of the criteria for mastery the learners also will struggle to achieve competence and may find the subject as boring and not recognise it as a high priority subject (Yardi & Bruckman, 2007).

### **2.2 The subject matter**

It is important for a teacher to have a good subject knowledge of the subject and the relevant skills in order to be able to set formal assessments of a high standard, but teachers should not only be able to “copy” from previous formal assessments, but need to be creative and innovative in setting their own formal assessments (Birenbaum, Breuer, Cascallar, Dochy, Dori & Ridway, 2006, p. 2). It is the nature of the rapid change of information and computer technology that CAT teachers cannot be textbook-bound because computer technology especially changes every year and textbooks only get updated every 3 to 5 years. Therefore teachers must continually update the technologies that they use and teach (Tosun, 2006) and are thus further challenged in the creation of their own formal assessments.

In this report the word *Computing* is used to identify the curriculum relating to the use of computers, the development of their applications (or programmes) and the use of their applications, while every country has its own terminology in the teaching of the field. In South Africa there are two subjects related to the Computing curriculum, namely Computer Application Technology (CAT) and Information Technology (IT), which are presented in schools from grade 10 onwards. In the United Kingdom (UK) and in Wales the Computing Curriculum is divided into several parts, namely, Computer Science (CS) presented in schools from year 5 to 10 (ages 11 to 16 years), Information Technology (IT), Digital Literacy, Technology Enhanced Learning (TEL) and Information and Communication Technology (ICT) taught from KS4 (ages 14–16) and 5 (ages 16–19) (Computing At School, 2012, p. 3).

A brief national and international explanation of the subject follows.

### **2.2.1 The South African perspective of Computing as Computer Application Technology**

Much has been written about how to introduce ICTs into schools and what is expected of teachers who use ICTs in their classes (Howie, Muller & Patterson, 2005 and Simmons & Hawkins, 2009). ICTs is a general reference to the way in which teachers make use of computers and any other type of technology as a tool in their own specified subjects to assist with their teaching (Bialobrzeska & Cohen, 2005, p. 120). ICT is not formally assessed in schools in earlier years and is done from Grade R to 9. In 2000 a national survey of Information Communication Technology in South African schools was performed (Lundall & Howell, 2000, p. 4). During the survey the following was concluded:

*“In Grades 1 to 7 computers tend to be used to perform drill and practice, and problem solving exercises. From Grade 8 upwards, computers tend to be used for a greater variety of purposes in the teaching and learning process, although the presentation of assignments and problem-solving exercises [by learners] tend to predominate.”* [by learners, added]

A problem found in South Africa is that Computer Application Technology (CAT) is seen as less important than the school subject Information Technology (IT) because CAT is not

recognised by universities or the Department of Education as qualifying for entry to Bachelors degree study (Department of Education, 2008, p. 8). The context and presentation of these computer-oriented subjects overlap, but their major foci differ, the more challenging subject of IT is thus correspondingly seen by learners as having a higher status than the subject of CAT, even though the number of learners taking CAT (a total of 44555 in 2012) is much larger than the number taking IT (a total of 4428 in 2012). These numbers were provided to district officials during the CAPS training of February 2013.

Information Technology is a subject that is based on finding solutions to problems through logical thinking, information management and communication and is focussed on the design and development of computer applications using current development tools. Its major focus is the teaching of computer programming (Department of Education, 2003, p. 9) which forms part of Computer Science as a discipline. To teach IT, teachers must themselves have mastered computer programming, which has usually been achieved through formal education in Computer Science at tertiary level, by means of a degree, diploma or certificate programmes.

Computer Application Technology is a subject in which the study of integrated components of a computer system and the practical techniques for their efficient use and application to solve everyday problems are taught (Department of Basic Education, 2011a, p. 8). In teaching CAT teachers make use of appropriate information and communication technologies (ICTs) to design, manage and process the solutions to problems by means of end-user applications and communication (Department of Basic Education, 2011a, p. 8). The specific aims in teaching CAT are to (Department of Basic Education, 2011a, p. 10):

- teach end-user software applications proficiently within a defined scenario;
- teach the concepts of ICTs with regard to the technologies that make up a Computing system;
- teach the various technologies, standards and protocols involved in the electronic transmission of data via a computer based network; and
- assist the learners with recognising the legal, ethical, environmental, social, security and health issues that are related to the use of ICTs and how to use ICTs responsibly.

In the Gauteng province schools often appoint or transfer teachers from other disciplines to teach CAT. The only criterion that appears to apply is that if the teacher is computer-literate he/she can teach CAT (Isaacs, 2007). Yet teachers who have not been explicitly trained in the needs of the subject may be expected to be challenged by the requirements of developing their own materials, activities and assessments (Wanyama, 2010, p. 1). It is of interest that the changing curriculum (Department of Basic Education, 2011a, p. 12) has introduced the need of web-page development to the curriculum, which may in the future require an elementary level of programming skills of the learner, and hence the teacher. This may well further exacerbate the challenges.

Research on the teaching and curriculum challenges of the subject of Computer Application Technology is a new field in South Africa and therefore this study had to rely on departmental documents, namely, the National Protocol of Assessment (Department of Basic Education, 2011b), the Curriculum Assessment Policy Statement (Department of Basic Education, 2011a) as well as the published textbooks that are recommended by the Department of Basic Education.

Published research of the subject matter of Computing at an international level is analysed next.

### **2.2.2 An international perspective of Computing as Information Communication Technology**

Internationally the terms Information Technology (IT), Computer Science (CS) or Information and Communication Technology (ICT) are used when researchers refer to the school subjects which address computer-oriented disciplines.

In the United Kingdom, Information Technology refers to the application of computer systems to solve real world problems (Computing At School, 2012, p. 5) such as network or database administration. With Information Technology the main aspects lie with the manipulation of information and the requirements set out by businesses. Therefore Information Technology is the use of computers, in industry, businesses, etc. (Kolderie & McDonald, 2009). Information Technology is used at all levels in education but is not

presented as a school subject. Thus “Information Technology” corresponds with ICTs in South African usage.

“Computer Science” is the study of how computer systems are built, work and optimally programmed. This is concerned with algorithmic thinking, and the ways in which a real-world problem can be broken up in order to construct an efficient solution. In Computer Science the academic aspects are on the study of computers and algorithmic processes that includes hardware and software designs and programming (Wilson, Sudol, Stehlik & Stephenson, (2010, p. 24). This leads to Computer Science being a practical subject where innovation, creativity and resourcefulness are encouraged (Computing At School, 2012, p. 9). Even in the United Kingdom with the offering of Computer Science they experience the problem that ICT is gradually becoming a low-status, low-achievement subject (Computing At School, 2012, p. 3). Thus in the UK, Wales and the USA the school subject of “Computer Science” corresponds most closely with IT in South Africa.

ICT is an established National Curriculum subject in the United Kingdom and Wales, introduced more recently (from 1999) than Computer Science (which was introduced in the 1970’s) (Wells, 2012). The term “ICT” as a school subject refers to the creative use of application software and computer systems for example query conventions for database applications. The main concern for ICT is with the design, development and evaluation of systems, with particular emphasis on the data, functional and usability requirements of end users. ICT is seen as a discipline and not just a skill (Computing At School, 2009, p. 1). Its primary aspects of theory, systems and application are drawn from the disciplines of Technology, Design, Engineering, Mathematics, Physical Sciences and Social Sciences (Computing At School, 2009, p. 2). ICT learners learn logical reasoning, algorithmic thinking, and design and structured problem solving. Therefore the teachers must be knowledgeable about all those aspects to be able to guide appropriate learning (Ofsted, 2011, p. 32). “ICT” of the UK is the closest school subject to the South African CAT.

Even at international level there is confusion between Information Technology, ICT and Computer Science (Morris, 2012), where the latter two address the same realm as CAT and IT in South Africa, respectively. In the United Kingdom the curriculum for ICT has been refined in recent years as there are schools that do not implement the subject as intended



because many teachers confuse the aims of ICT and Computer Science (Morris, 2012; Ofsted, 2011; Wells, 2012).

### **2.2.3 Obstacles in teaching Computer Application Technology**

Whether looking at CAT from a South African or an international perspective (ICT) similar obstacles are evident, starting with the obstacle that there is a status level distinction accorded to the different Computing subjects in schools. During the research it was found that in the United Kingdom, schools have offered Computer Science as a core subject since the 1970's while ICT is offered as a curriculum (additional, non-core elective) subject for the past 20 years (Wells, 2012). In the United States of America, they refer to Computer Science as the core subject and do not offer end-user computing (equivalent to CAT) as a subject. In South Africa two schools subjects are offered, namely Computer Application Technology and Information Technology, where IT is the core subject and CAT is a non-core elective (Department of Basic Education, 2011b).

Secondly, as a newly introduced subject and correspondingly few specially trained teachers, many teachers teach CAT (or end-user computing such as ICT in the UK) without the proper knowledge or competence, probably because there is limited appropriate training for Computing teachers (Cavus, 2008). Not only are the CAT teachers faced with these obstacles but they may even be the only computer literate teacher at their school and consequently be requested by the principal to support all the computers and their users that are in the school (Mokhele, Bouwer, De Wet & Veldman, 2008, p. 1). This can lead to the teachers focussing on other responsibilities and not on classroom activities including informal and formal assessment.

To elaborate on the second obstacle as stated by Cavus (2008) on the issue of teachers lacking knowledge and/or skills in making use of technology, Myers, Ebie, Klopping & Saily (2008, p. 3) show that even though teachers are provided with all the necessary technology, that some technologies (e.g. data projector) are not used extensively to assist with the lesson because teachers spend more time on reading from the textbook in the so-called and much maligned "*talk and chalk*" mode of teaching. Even Computing Teachers appear to be intimidated by some technologies (Myers et al., 2008, p. 3) as they themselves do not make use of the computer for informal assessment.

With technology changing all the time, some teachers are less knowledgeable than the learners facing them (Myers et al., 2008, p. 7). Teachers rarely receive training for the newest available technology, yet should be provided with training every year (Provenzo, Brett & McCloskey, 2005, p. 27). It is the declared intention of the South African Department of Education to annually provide CAT teachers with a list of emerging technologies that need to be covered for formal assessment at the end of the each year (Department of Basic Education, 2011a, p. 52). This latter however, does not address the need for training in order to remain current with the rapidly changing technological landscape.

All of the above obstacles influence the way in which teachers develop their own formal assessments in Computer Application Technology.

### **2.3 Formal assessment**

The existing lack of skills of teachers is not only limited to the technological content but also to the particular assessment that is used (SAQA, 2005, p. 12; Dreyer, 2008, p. 3). Assessment according to Dreyer (2008, p. 5) is the process of gathering and discussing information from multiple and diverse sources (e.g. observations, tasks, group discussions, tests, etc.). With these sources teachers can develop an understanding of what learners know and understand (Birenbaum et al., 2006, p. 3). Assessment can be divided into two types that can be utilized in any type of learning namely formative assessment and summative assessment (Shelly, Gunter & Gunter, 2011, p. 320; Fautley & Savage., 2008, p. 10).

Summative assessment is when teachers assess learners at a specific time with the intention on promotion to another grade or level (Dreyer, 2008, p. 79; Shelly et al., 2011, p. 320). Formative assessment is when teachers assess learners throughout the year, providing the learners with feedback on their progressing (Heritage, 2010, p. 7; Fautley et al., 2008, p. 37). In Table 2.1 the research illustrates the assessment types and the terms used in the National Protocol for Assessment (Department of Basic Education, 2011b, p. 5) and the Curriculum assessment policy Statement (Department of Basic Education, 2011a, p. 24).

Informal assessment is used by teachers at any time during teaching without interfering with teaching norm time (Navarete, Wide, Nelson, Martinez & Hargett, 1990). This type of assessment can take place without learners been aware of it. Some methods of informal assessments are as follows (McAlpine, 2002, p. 7):

- Notes made by the teacher during a practical activity.
- During a class discussion on the content covered.
- Open-ended exercises, etc.

**Table 2.1: Terms used for the types of assessments**

Types of Assessment	Terms used by the Department of Education
Formative assessment (assessment for learning)	Informal assessment (assessment for learning)
Summative assessment (assessment of learning)	Formal assessment (assessment of learning)

These methods of informal assessment can be divided into two main types, namely unstructured methods (student work samples, journals) and structured methods (checklists, observations) (Navarete et al., 1990). The type of method used depends on the teachers' teaching plan.

According to McAlpine (2002) formal assessment is when learners are aware of the task/test that they are doing for promotion reasons. Examples of formal assessment are standardised tests, examinations and formal tasks that are completed during teaching time. These standardised tests, examinations or formal tasks are based on the completion of a term's or year's work (Valencia, 1997).

This research worked with the formal assessments of the participant teachers and the guidelines provided by the Department of Basic Education (Department of Basic Education, 2011a) for Computer Application Technology as well as the role of the teachers as assessors for formal assessment.

### **2.3.1 Department of Basic Educations' guidelines**

Every subject has its own guidelines on what assessment (programme of assessment) should be used and how different items should be weighted. For CAT teachers, these guidelines are stated in the CAPS document. They provide the teachers with a table showing the assessment

as well as the percentage as shown in Table 2.2 (Department of Basic Education, 2011a, p. 47).

**Table 2.2: Formal assessment requirements**

(a) Grade 10 and 11

Formal Assessments			
During the Year	End-of-Year Examination		
25%	75%		
SBA	Practical Assessment Task	End-of-Year Exam Papers (50%)	
25%	25%	25%	25%
5 tests 1 exam (mid-year)	<b>Project</b> Information management project based on providing a solution to a specific scenario by using the applications as indicated under Solution Development	<b>Written exam</b> 2-3 hours Theory aspects of all content, concepts and skills of all topics	<b>Practical exam</b> 3 hours Solution Development

(b) Grade 12

Formal Assessments			
During the Year	End-of-Year Examination		
25%	75%		
SBA	Practical Assessment Task	End-of-Year Exam Papers (50%)	
25%	25%	25%	25%
4 tests 2 exams (mid-year and trial)	<b>Project</b> Information management project based on providing a solution to a specific scenario by using the applications as indicated under Solution Development	<b>Written exam</b> 3 hours Theory aspects of all content, concepts and skills of all topics	<b>Practical exam</b> 3 hours Solution Development

The School based assessment component of 25% as well as the Practical assessment task component of 25% are assessments that are marked by teachers and feedback is then provided to the learners and thus have both summative and formative purposes. The end-of-year examination paper component of 50% are formed from the only assessments where there is no feedback to learners, and thus the written and practical end-of-year examinations are the only purely summative assessments. The results of the learners are used for promotion reasons as well as the learners' own development (Department of Basic Education, 2011a, p. 47).

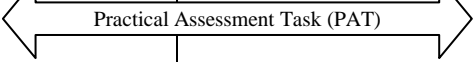
The current research was based entirely on the formal assessments set by teachers for the trial examinations described in Table 2.2 section (b) for Grade 12.

The problem area within the Department of Basic Education's guidelines of the type of formal assessment used for CAT lies in their making use of tests only as a tool of assessment

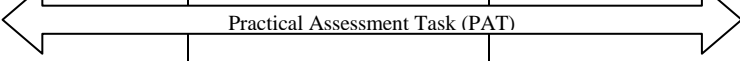
(Department of Basic Education, 2011a, p. 49). The nature of the assessments as tests is shown in Table 2.3 (Department of Basic Education, 2011a, p. 50). Tests, in the main, require memorisation and reproduction, even for the test set for the practical component. Therefore learners that struggle with factual knowledge, comprehension or recall skills will be disadvantaged during this type of assessment (Dreyer, 2008, p. 91). The only occasion where these types of learners can excel is with the Practical assessment task that counts only 25% of the promotion mark.

**Table 2.3: Programme of assessment per grade (still referred to by the acronym SBA for ‘School Based Assessment’)**

(a) Grade 10 and 11

SBA per Term			
<b>Term 1:</b> 1 Practical Test + 1 Theory Test	<b>Term 2:</b> 1 Test 1 Examination (2 Papers: 1 Theory + 1 Practical)	<b>Term 3:</b> 1 Practical Test + 1 Theory Test	<b>Term 4:</b> 1 Examination 2 Papers: 1 Theory + 1 Practical Plus PAT
			
<p><i>Term Mark (Terms 1 – 3): Each term, add raw marks and totals and convert to % for term mark.</i>  <i>Promotion Mark: Add raw marks and totals for assessment tasks from term 1 to term 3 and convert to 25%, Convert PAT mark to 25%, Convert Paper 1 to 25%, Convert Paper 2 to 25%</i></p>			

(b) Grade 12

SBA per Term			
<b>Term 1:</b> 1 Practical Test + 1 Theory Test	<b>Term 2:</b> 1 Test + 1 Examination (2 Papers: 1 Theory + 1 Practical)	<b>Term 3:</b> 1 Test + 1 Examination (2 Papers: 1 Theory + 1 Practical)	<b>Term 4:</b> 1 External Examination 2 Papers: 1 Theory + 1 Practical Plus Practical Assessment Task
			
<p><i>Term Mark (Terms 1 – 3): Each term, add raw marks and totals and convert to % for term mark.</i>  <i>SBA Mark: Add raw marks and totals for assessment tasks from term 1 to term 3 and convert to 25%.</i></p>			

The details for the tests are as follows (Department of Basic Education, 2011a, p. 49):

- It should not comprise a series of small tests;
- it should cover a substantial extent of the content covered per term;
- the duration should be 45 to 60 minutes; and
- it must reflect different cognitive levels, as shown in the Table 2.4, below to conform to the analysis grid of the Department of Basic Education (section 2.4.1).

With the previous syllabus Gauteng’s Department of Education provided the teachers with a package of formal assessment tasks and tests that was called the School Based Assessment

document (SBA). These tasks and tests were guidelines and teachers were given the opportunity to use them without change, or to develop their own. With the CAPS teachers now are required to develop their own tests/examinations which is be a new challenge for many teachers. This change establishes the need for training of teachers and is an opportunity for the Department to provide training on how to develop proper formal assessment (Kanjee & Sayed, 2008, p. 5).

The analysis of the current capacity and practices of Gauteng's teachers is the research focus of this study.

### **2.3.2 The role of the teacher as assessor**

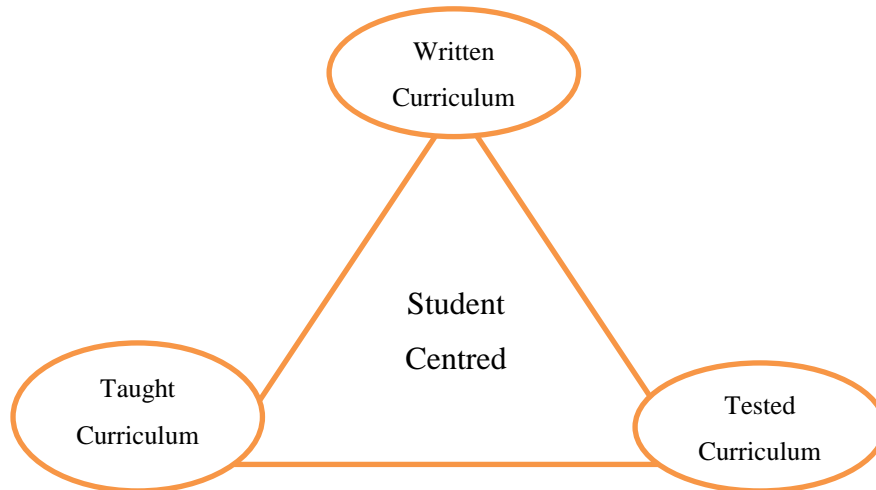
Since 2012 teachers have been required to set their own assessments in accordance with the CAPS (Department of Basic Education, 2011a, p. 47) and the teacher has become an assessor in addition to being a facilitator due to these changes. It is therefore important that teachers are equipped with guidance and knowledge on how to set formal and informal assessments (Birenbaum, et al., 2006, p. 4).

In setting both formative and summative assessments throughout the learning programme teachers must seek to assess the application of knowledge within the subject, both for formal as well as for informal purposes (SAQA, 2005, p. 12). This includes the need to implement minute-to-minute and day-by-day use of (particularly informal) assessment in his/her classroom (William, 2007, p. 188). These informal assessments do not need to be recorded and should form part of learning activities that take place during teaching (Department of Basic Education, 2011a, p. 47).

To assist teachers on how to implement this type of assessment, Tileston (2004, p. 3) provided them with four questions on assessment that they need to answer for themselves. The questions are as follows:

1. "What is important for learners to know and be able to do?"
2. "Is the knowledge or process critical to the discipline?"
3. "How will we know that learners understand the learning?"
4. "Is the assessment in alignment with the written and taught curriculum?"

Tileston (2004, p. 5) addresses the alignment of the curriculum with assessment by dividing the curriculum into three types of curriculum areas namely written curriculum, tested curriculum and taught curriculum as illustrated in Figure 2.1. This alignment guides teachers on developing formal assessment for learners.



**Figure 2.1: Aligned curriculum for assessment**

According to the Department of Basic Education (Department of Basic Education, 2011a, p 47) teachers should make use of informal assessment to have information on the learners' levels of achievement and, in doing so, make use of the information gained to improve the learners' learning. In many districts, the Department has added a prescriptive, daily, schedule for 'informal' assessments. This adds a further unwanted effect as described by Birenbaum et al. (2006), below.

In South Africa the publishers of textbooks have provided assistance for the implementation of regular informal assessments, by providing teachers with small informal assessment activities that they can use (Jacobs, Barnard, Brenkman, Gibson, Labuschagne, McMillan et al., 2012, p. 6; Dill, Francis & Nunkumar, 2011, p. 14; Johnstone, Llewellyn, Mathibela, Oelofsen, Rennie & van Kampen, 2011, p. 120). Unfortunately providing teachers with even these informal assessment activities has a side effect, namely, this allows teachers to avoid setting their own assessments (even at the informal level), and as a consequence of this avoidance they further compromise the skill to set their own formal assessments.

Even with answers to Tileston's (2004, p. 3) questions (listed above) Birenbaum et al. (2006) provides the reasons why scheduled assessment practices tend to fail teachers. These reasons are as follows:

1. “It forces teachers to teach for assessment instead of supporting teachers to develop ways to integrate assessment for learning as part of the curriculum.”
2. “It takes up valuable teaching and curriculum development time”; and
3. “It prevents teachers from developing teaching skills as part of their continuous professional development as assessment practices can develop into teaching ‘straight-jackets’”.

These challenges to the teacher as assessor predict a rise in a negative attitude towards assessment, where assessment is not always in the service of learning and the learner. Rather, formal assessments whose outcomes are recorded and form part of the learner’s continuous mark have a main focus on using assessment as a selection tool (SAQA, 2005, p. 3) to promote learners to the next level or grade.

For teachers to achieve high standard of formal assessment the research studied ways in which teachers can analyse their formal assessments to ensure that the standard is according to the requirements set out in the CAPS (Department of Basic Education, 2011a, p. 50).

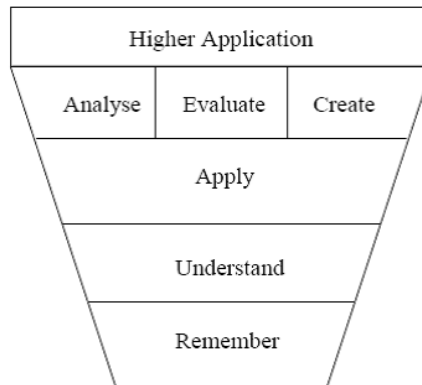
## **2.4 Taxonomies for analysing formal assessment**

The development of formal assessment at school level depends first and foremost on the behaviour and knowledge of the teacher in his/her subject area (Radhakrishna, Yoder, & Ewing, 2007). Therefore a number of variables are examined to describe the influence each has on developing assessments for Computing.

During their research (Johnson & Fuller, 2007, p. 120; Starr, Manaris & Stalvey, 2008, p. 262; Thompson, Luxton-Reilly, Whalley, Hu & Robbins, 2008, p. 160) considered whether Bloom’s Taxonomy (Bloom, 1956) is the most appropriate taxonomy to be used for Computer Science and Computer Science assessment. They concluded that Bloom’s taxonomy does provide insight into the cognitive processes that are required or developed by programming but that it needed refinement for the subject. Johnson, & Fuller (2007, p. 121) made a suggestion of adding another level to Bloom’s taxonomy as illustrated in Figure 2.2.



The new level of “Higher Application” represents the characteristic of programming that requires ‘Analysis’, ‘Evaluation’ and ‘Creativity’ as pre-cursors and inherently form part of the process of programming.



**Figure 2.2: Incorporating “higher application” into Bloom’s Taxonomy ( Johnson, & Fuller, 2007)**

That a skills-intensive subject like Computer Science is indeed in need of a revised used of a taxonomy likewise establishes the potential need for an enhanced and specialised taxonomy for Computer Applications Technology. The analysis grid developed by the Department of Education can be seen as a taxonomy that would benefit from a review. To this end, Krathwohl’s two-dimensional taxonomy was compared with the analysis grid of the Department of Education to establish a taxonomy that is more refined for CAT teachers.

#### **2.4.1 Department of Basic Educations’ analysis grid**

Teachers rely solely or primarily on the assessment results to make important decisions (Kubiszyn & Borich, 2007, p. 4), therefore the need for a workable analysis grid. At a training session for CAT teachers that was provided by the national Department of Basic Education (December, 2010 at the different districts), teachers were introduced to an electronic analysis grid that was designed by a national team (that consisted of different district/provincial officials) for CAT (see Appendix E). The essential format of the grid has been used across subjects in the national school leaving examinations (Matriculation) for many years. This is the first example of an electronic grid.

This analysis grid is a two-dimensional electronic grid (realised in a spreadsheet) where teachers can enter the topic, the question number and the cognitive level (according to three levels, low, middle and higher order) of the specific question. The grid then provides the teachers with the calculations according to the weighting that is stated in the CAPS, as shown in Table 2.4.

**Table 2.4: Cognitive levels and the weighting or assessments required at each level**

Low order (Knowledge/Remembering)	Middle order (Understanding/Applying)	Higher order (Analysing, Evaluating, Creating)
30%	40%	30%

It is to be noted that the purpose of the Department of Basic Education's grid is to ensure an equitable distribution of difficulty amongst the topics and across assessments set by different teachers across many schools and years. The focus therefore is not on the type of knowledge (or distinct cognitive level) gained from the question but rather the distribution of the perceived difficulty levels of the questions/topics as such. This nuance is evident when comparing the specification of Table 2.4 (which uses the terms applicable to cognitive levels of Bloom's taxonomy) and Table 2.5, the grid itself, which uses a subtly different terminology).

Table 2.5 below illustrates how to work with the analysis grid provided by the Department of Basic Education.

**Table 2.5: An example of the analysis grid from the Department of Basic Education**

Formal assessment											
Sec	Ques No.	Topic Areas						Cognitive Levels			
B (Short and long type questions)		System technologies (25)	Internet & Network technologies (15)	Information management (10)	Social implications (10)	Solution development (15)	Total	Conceptual Knowledge	Comprehension & Application building understanding	Analysis & problem-solving	Total
								Information gathering	Productive thinking	Level 3 (Higher)	
								Level 1 (Lower)	Level 2 (Middle)	Level 3 (Higher)	
B	1.1	2					2	1	1		2
	1.2		3				5		1	2	5
	1.3			1			6	1			6

Teachers need to indicate the marks allotted for each specific question number according to the topic addressed by the question and to indicate at which cognitive level (low, middle or

higher order) the question is set. The teachers will then be able to see if they are still within the limits set for each topic as well as whether they are following the correct weighting for the cognitive levels (or perceived difficulty).

This type of analysis is very similar to the way in which Krathwohl's two-dimensional table works as explained below, but the different focus of the Department of Education's grid is to be remembered.

#### **2.4.2 Krathwohl's taxonomy**

For this research Krathwohl's taxonomy of the cognitive process dimensions (Krathwohl, 2002, p. 214) was used to map out the cognitive complexity needed to set formal assessment (Heer, 2012, p. 3). Krathwohl identified nineteen cognitive processes that further clarify the scope of the six categories of lower order thinking skills towards higher order thinking skills generally characterising Bloom's taxonomy (Krathwohl, 2002, p. 214). Bloom's (1956) cognitive domain involves knowledge and the development of intellectual skills. Bloom established six major cognitive categories, namely Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. Krathwohl's categories are grouped as the cognitive process dimension. Krathwohl, in the revised taxonomy, has separated the taxonomy into two dimensions namely the knowledge dimension that contains four categories (Table 2.6) and the cognitive process dimension (Table 2.7) (Krathwohl, 2002, p. 214).

The levels of the knowledge dimension categories are accessed by nouns, while the process dimension and its levels are characterised by verbs. The reason for the revised taxonomy is the weakness that the original taxonomy had, where the cognitive processes are ordered only on a single dimension of a simple-to-complex behaviour (Amer, 2006), while the depth of the knowledge levels is lost in the one-dimensional taxonomy.

**Table 2.6: Structure of the knowledge dimension**

<p>A. Factual Knowledge: The basic elements that students must know to be acquainted with a discipline or solve problems in it.</p> <p>Aa. Knowledge of terminology</p> <p>Ab. Knowledge of specific details and elements</p>
<p>B. Conceptual Knowledge: The interrelationships among the basic elements within a larger structure that enable them to function together.</p> <p>Ba. Knowledge of classifications and categories</p> <p>Bb. Knowledge of principles and generalizations</p> <p>Bc. Knowledge of theories, models and structures</p>
<p>C. Procedural Knowledge: How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.</p> <p>Ca. Knowledge of subject-specific skills and algorithms</p> <p>Cb. Knowledge of subject-specific techniques and methods</p> <p>Cc. Knowledge of criteria for determining when to use appropriate procedures</p>
<p>D. Metacognitive Knowledge: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition.</p> <p>Da. Strategic knowledge</p> <p>Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge</p> <p>Dc. Self-knowledge</p>

**Table 2.7: Structure of the cognitive process dimension**

<p>1. Remember: Retrieving relevant knowledge from long-term memory.</p> <p>1.1 Recognizing</p> <p>1.2 Recalling</p>
<p>2. Understand: Determining the meaning of instructional messages. Including oral and graphic communication.</p> <p>2.1 Interpreting</p> <p>2.2 Exemplifying</p> <p>2.3 Classifying</p> <p>2.4 Summarizing</p> <p>2.5 Inferring</p> <p>2.6 Comparing</p> <p>2.7 Explaining</p>
<p>3. Apply: Carrying out or pursuing a procedure in a given situation.</p> <p>3.1 Executing</p> <p>3.2 Implementing</p>
<p>4. Analyze: Breaking material into constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.</p> <p>4.1 Differentiating</p> <p>4.2 Organizing</p> <p>4.3 Attributing</p>
<p>5. Evaluate: Making judgement based on criteria and standards.</p> <p>5.1 Checking</p> <p>5.2 Critiquing</p>
<p>6. Create: Putting elements together to form a novel, coherent whole or make an original product.</p> <p>6.1 Generating</p> <p>6.2 Planning</p> <p>6.3 Producing</p>

The combination of the knowledge dimension together with the different cognitive levels is then placed into one table. In Table 2.8 the knowledge dimension is displayed vertically and

the cognitive process dimension is displayed horizontally (Krathwohl, 2002, p. 215; Amer, 2006).

**Table 2.8: Structure of a two-dimensional taxonomy table**

The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge						
B. Conceptual Knowledge						
C. Procedural Knowledge						
D. Metacognitive Knowledge						

In analysing an assessment or lesson design, the teacher can complete the two-dimensional table by indicating the type of knowledge dimension as well as the cognitive level of the specific assessment or lesson design. By entering the type of question of the assessment at knowledge dimension according to a cognitive level the teacher will have a two-dimensional idea of what has been done. The way in which to complete the two-dimensional table is shown in Table 2.9 below with an example:

**Table 2.9: Example on how to use the two-dimensional table of Table 2.8**

The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
A. Factual Knowledge	Ques 1 (1) Quest 3 (1)	Quest 1 (1)				
B. Conceptual Knowledge			Quest 2 (2)			
C. Procedural Knowledge				Quest 3 (2)		
D. Metacognitive Knowledge						

In the example given in Table 2.9, Question 1 counts two marks, but the first part of the question is based on common knowledge of the learners and then testing if the learner has understood the content. Question 2 tests the learners' knowledge on classifying content taught and to apply it. With Question 3, the learners' common knowledge on a specific problem is tested but then the learners need to show skills how to solve that specific problem.

In completing the above table the teachers are able to reflect on the blank areas of their assessment and can improve the assessments by changing the type of questions that were asked (Amer, 2006).

### 2.4.3 Adaptation of Krathwohl's taxonomy for Computing and made specific for CAT

Both of these taxonomies/grids are based on a two-dimensional table, but the Department of Education's analysis grid is focussed on the topics covered by the questions and the cognitive level (according to only three levels) of the questions with a major purpose to ensure a defined distribution of levels of difficulty, rather than cognitive levels to be reached. This is intended to ensure a sufficiently acceptable profile of learners passing the formal examinations. Where examinations require a passing score of only thirty percent this leads to teachers setting assessment predominantly according to the lower levels (Casey, 2013).

For the analysis grid to be more functional in order to adequately reflect the intended curriculum the Department of Education needs to re-evaluate the grid and expand the knowledge dimension and the cognitive levels in sufficient detail, and not only according to the difficulty level of the question.

In teaching a subject such as Computing that is very practical even when doing theory, using Bloom's taxonomy and Krathwohl's two dimensional taxonomy does not cover all the areas/content that are taught by the teachers (Johnson & Fuller, 2007). The content that needs to be covered in the practical sub-topic of CAT (the "Solution Development" theme) (namely the actions and process involved in developing a computer-based solution using end-user applications) lends itself towards a *high application level* which requires learners to move beyond creating and evaluating scenarios and to apply these skills and knowledge at a higher cognitive level (Department of Basic Education, 2011a, p. 12).

#### 2.4.3.1 "Higher Application" added to Krathwohl

Johnson & Fuller (2007, p. 121) added a further level to Bloom's Revised taxonomy. This level namely the "Higher Application" level is the next step when learners have analysed, evaluated and created a solution to a specific problem/scenario. We have added this further level to Krathwohl's two-dimensional taxonomy (Krathwohl, 2002, p. 214) to use a seven level taxonomy of cognitive evaluation of learners' knowledge of a specific topic/content.

**Table 2.10: “Higher Application” added to Krathwohl's two-dimensional taxonomy**

The Knowledge Dimension	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create	7. Higher Application
A. Factual Knowledge							
B. Conceptual Knowledge							
C. Procedural Knowledge							
D. Metacognitive Knowledge							

The addition of the seventh level allows teachers to analyse the learners’ application development (for the demands of the theme “Solution Development” of the CAT and IT curricula) on a higher level.

#### **2.4.3.2 The knowledge dimensions of Krathwohl made specific for CAT**

Krathwohl’s knowledge dimension together with the “Higher Application” cognitive level have been incorporated into the Department of Basic Education’s analysis grid to be used specifically for Computer Application Technology as illustrated in Table 2.11.

The adapted taxonomy is used in Section 4.4.1 to analyse the curriculum and teachers’ assessments according to the curriculum of the Grade 12 CAPS. The Table 2.11 has also been used in Section 4.3 with the analysis of the preliminary question papers that were set and supplied by the participant teachers.

The frameworks of formal and informal formative and summative assessment, the CAT curriculum needs and the Department of Basic Education’s specifications and grid, as well as the adapted form of Krathwohl’s two-dimensional taxonomy form the conceptual framework for this research. This is discussed in the next section.

**Table 2.11: Adapted Taxonomy used in the research**

Adapted Taxonomy		Cognitive Levels					
		Conceptual Knowledge Information gathering	Comprehension & Application building understanding		Analysis & problem-solving Productive thinking		Higher Application
		Level 1 (Lower)	Level 2 (Middle)		Level 3 (Higher)		Level 4 (Advance)
Topics	The Knowledge Dimension	Remembering	Understand	Apply	Analyse	Evaluate	Create
<b>System technologies (25)</b>	Factual Knowledge						
	Conceptual Knowledge						
	Procedural Knowledge						
	Metacognitive Knowledge						
<b>Internet &amp; Network technologies (15)</b>	Factual Knowledge						
	Conceptual Knowledge						
	Procedural Knowledge						
	Metacognitive Knowledge						
<b>Information management (10)</b>	Factual Knowledge						
	Conceptual Knowledge						
	Procedural Knowledge						
	Metacognitive Knowledge						
<b>Social implications (10)</b>	Factual Knowledge						
	Conceptual Knowledge						
	Procedural Knowledge						
	Metacognitive Knowledge						
<b>Solution development (15)</b>	Factual Knowledge						
	Conceptual Knowledge						
	Procedural Knowledge						
	Metacognitive Knowledge						

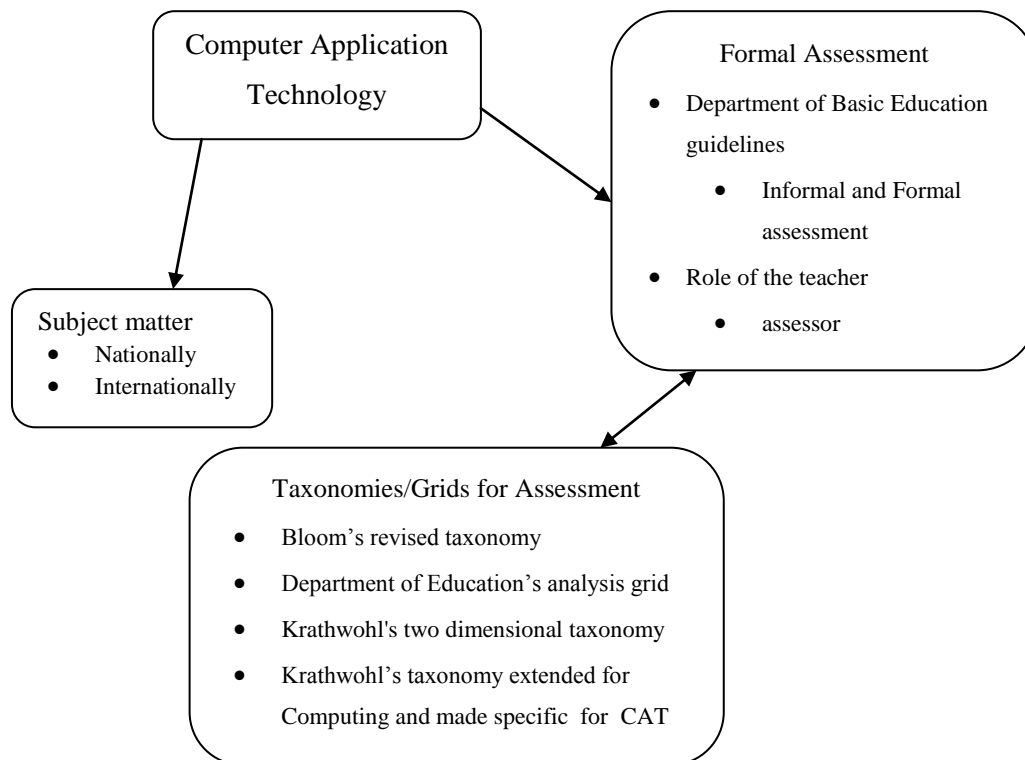
## 2.5 Conceptual framework

Within this study the conceptual framework design is based on the main aspects of the research showing the interrelationships or linkages between the literature, methodology and the research questions (Albon, Balmford, Brown, Church, Haines-Young, Pretty et al., 2010, p. 12). The conceptual framework serves to develop a common understanding of which literature should be addressed in the research. Figure 2.3 illustrates the conceptual framework for the research on formal assessment in Computer Application Technology.

The research is focussed on the teacher-developed formal assessment of the subject Computer Application Technology in the FET phase. In order to understand CAT, the various aspects of teaching computing were discussed from international and national perspectives and



determined the similarities between CAT and ICT. From there the research focussed on the formal assessment of the subject. For this two criteria were used namely the role of the teacher in using/setting the formal assessment and secondly the guidelines provided by the Department of Basic Education as well as the taxonomies used.



**Figure 2.3: Conceptual framework for investigation of formal assessment of Computer Application Technology**

The role of the teacher as assessor was investigated through teachers' practice of informal and formal assessment in the subject and their opinions and expertise in setting informal and formal assessment were examined. The conceptual framework assisted with developing Question 2, 3, 4 and 5 of the questionnaire (Appendix A) based on the teachers own feelings and opinions on formal assessment.

The guidelines of the Department of Education allowed the researcher to investigate the types of taxonomies/grids that are used. From the research two taxonomies/grids are applied.

These taxonomies/models are:

- The Departmental analysis grid for CAT (used by the DoE); and
- Krathwohl's two-dimensional table extended for Computing and made specific for the CAT curriculum and its examinations, respectively.

The diagram of Figure 2.3 indicates an iterative interaction between the setting (and analysis) of formal assessments and the taxonomies used with a bi-directional arrow. It is important to apply both the guidelines for formal assessments and a taxonomy that reflects the expectations of the curriculum where the learners' knowledge dimensions as well as cognitive levels are tested by the teachers (assessors).

## 2.6 Conclusion

In assessment good knowledge of the subject content, the practices of a teacher as the assessor setting these assessments, use of an applicable taxonomy to guide the assessment design and the requirement to remain within Departmental guidelines are continually engaged.

Each of these factors has been discussed in Chapter 2.

The conceptual framework illustrated in Figure 2.3 narrowed the research to set focus points, namely the role of the teacher in setting formal assessment and the type of taxonomy used to analyse the formal assessment. As discussed in Section 2.2.1 Computer Application Technology is different from other subjects through its scope of knowledge and skills required and requires its own taxonomy when analysing formal assessments. The subject is very practical yet its requirement for the design and development of complex solutions to needs leads to a higher cognitive level for which analysis, evaluation and creation are pre-requisite levels. Johnson & Fuller (2007) has named this level as "Higher application" which we have added to Krathwohl's (2002) two-dimensional taxonomy in the cognitive dimension. The adapted taxonomy is illustrated in Section 2.4.3.2 and is used in Section 4.3 for analysing the preliminary question papers of the teachers as well as the curriculum of the Grade 12 content.

Chapter 3 presents the research methodology for the study

## **Chapter 3: Research Methodology**

### **3.1 Introduction**

Chapter 3 provides a description of the research design that was used to assist with providing an answer to the main research question: “What are the practices, experiences, opinions and quality of the teachers’ formal assessment of CAT in the FET phase?”

This chapter presents the nature and role of purposeful and convenience sampling in the study, data collection strategies that included questionnaires and document analysis, the method of analysis and interpretation of the data and the ethical issues that guided the research as well as delimitations that take account of the researcher’s subjective and biased stance (Creswell, 2008, p. 46).

### **3.2 Research assumptions**

Qualitative researchers assume that there are multiple realities and that the world does not present a purely objective reality but are rather a function of personal interaction and perception (Merriam, 1988, p. 17). Doing qualitative research, the researcher is interested in “meaning” – how teachers make sense of formal assessment, what they have experienced in setting formal assessment and how they interpreted those experiences in making formal assessments (Merriam, 1988, p.19).

Starting this research, I approached it with a set of beliefs, assumptions, and perspectives of the nature of teacher’s skills/knowledge in CAT and the way in which teachers design formal assessments. As a facilitator and former teacher of CAT, setting up informal and formal assessments was done in a range of iterative steps ranging from finding resources related to the subject matter that learners were required to master, creating purpose-specific questions and activities to analysing these assessments according to the cognitive levels that mastery of the content could and should achieve. I was not provided with assessments from the publishers and began every assessment from scratch or worked with other teachers in creating

informal or formal assessments. These perspectives were emphasized by the following two statements:

- Teaching practices can and should be informed by and coincide with assessment practices and outcomes (Dunn & Mulvenon., 2009, p. 3).
- The teachers are the ones that will decide what status should be accorded to different types of knowledge/skills (Fautley et al., 2008, p. 6), therefore the need to understand and use taxonomies.

When starting a learning outcome my focus was on the type of formal assessments needed to achieve the aim of the learning outcome.

During the research the focus was on how formal assessments are constructed and implemented by today's teachers and whether they still work with taxonomies when designing formal assessments during teaching. Additionally with the CAPS the emphasis is once more on the cognitive levels of the formal assessment. The role taken by myself was to interpret the findings according to the adopted Krathwohl two-dimensional taxonomy, the curriculum specification of the CAPS document for CAT, and the Department of Basic Education's analysis grid.

### 3.3 Research paradigm

Maree (2010, p. 47) defines a paradigm as:

*“A set of assumptions or beliefs about fundamental aspects of reality which gives rise to a particular world-view – it addresses fundamental assumptions taken on faith, such as beliefs about the nature of reality (ontology), the relationship between knower and known (epistemology) and assumptions about methodologies.”*

Thomas (2009, p. 72) explains paradigm as the technical term used to describe the ways that we think about research. According to him a paradigm is the:

- “shared ideas in a particular community of inquiry”,
- “thinking habits of researchers”, and
- “rules of procedures.”

The research paradigm used for the research is constructivism. Using a constructivist approach the research is concerned with the uniqueness of each particular situation of the research (Maree, 2010, p. 51). The teachers' knowledge of the subject and how to design assessment by making use of their knowledge gain from experience led the researcher to change her perspective on how teachers teach in their classrooms (Christie, 2005, p. 4).

Constructivism implies multiple local and specific constructed realities where the researcher is a passionate participant within the world being investigated (Sobh & Perry, 2006, p. 1194). In researching the teachers' own opinions and formal assessment products and views of formal assessment the researcher enjoyed reading and analysing the responses and formal assessment as it forms part of her own passion for the subject Computer Application Technology and it has influenced her own view on how to set formal assessments according to the cognitive levels that define mastery by learners.

### **3.4 Philosophical assumptions**

Research assumptions help researchers to realise that knowledge is frail, and that claims to knowledge, in their own findings or those of others, should always be critically analysed (Thomas, 2009, p. 84). To assist the research to decide on what constitutes "valid" research (Maree, 2010, p. 52), I discuss two questions:

- "what is truth/reality (ontology)?"
- "how can we know (epistemology)?"

#### **3.4.1 Ontology**

Ontology aims at discovering a framework for understanding the disciplines that constitute the world's structure (De Gialdino, 2009, p. 1). The question the researcher is faced with "What is the truth/reality about formal assessments that have been set by CAT teachers?" In analysing the teacher's questionnaires, I was able to find differences between my realities towards formal assessment and their reality about formal assessment. Unfortunately the truth/reality of the research is that formal assessment is not a common language in the Computing curricula, as each teacher develops formal assessment in his/her own manner

(Kishore, Sharman & Ramesh, 2004, p. 158). Teachers would rather have other “people” set formal assessment as they themselves have stepped into the assessment regimes with which teachers were provided with formal assessment from publishers (Fautley et al., 2008, p. 129).

### **3.4.2 Epistemology**

As ontology is about the study of reality/the truth, epistemology is the study of our knowledge (how can we know and where is knowledge located) (Schraw & Olafson, 2008, p. 33). De Gialdino (2009, p. 2) mentions four questions that are raised by epistemology. These questions are as follows:

- “How reality can be known?”
- “The relationship between the knower and what is known
- “The characteristics, the principles, the assumptions that guide the process of knowing and the achievement of findings; and
- “The possibility of that process being shared and repeated by others in order to assess the quality of the research and the reliability of those findings.”

In this research the personal epistemologies of the teachers are characterised by a set of beliefs about learning and acquisition of knowledge that drives the setting of formal assessments (Schraw et al., 2008, p. 33). In understanding the research there was an interactive relationship between the researcher and the teachers in requesting them to provide their theory-focussed preliminary examinations as well as their analysis grids.

My epistemological assumption stance therefore is constructivism, as the researcher is value aware and needs to triangulate any perceptions that were collected (Sobh et al., 2006, p. 1195).

### **3.5 Methodology**

Silverman (2010, p. 110) refers to methodology as the choices we make about cases to study, methods of data gathering, forms of data analysis that we use as researchers in planning and executing a research. Because the research is based on the experiences, opinions and beliefs

of the teachers, a qualitative approach was used. Creswell (2008, p. 46) defines qualitative research as a type of educational research in which the researcher relies on the views of participants; asks broad, general questions; collects data consisting largely of words or text from participants.

### **3.5.1 Single case study design**

The research followed a single case study that was used to answer the three research sub-questions of the research. The single case study design is a systematic inquiry into a research or set of related researches which aim to describe and explain the phenomenon of the research (Maree, 2010, p. 75).

This research made use of single group of CAT teachers in which a specific situation (the setting of formal assessment and the use of taxonomies) was researched (Maree, 2010, p. 76 and Cohen, Manion & Morrison, 2007, p. 85).

The research has striven towards a comprehensive understanding of what the teachers' reaction and opinions with formal assessment are, and how they make meaning of the importance of formal assessment (Maree, 2010, p. 75). The aim of the research was to gain greater insight and understanding into the teachers' approach to and experiences of formal assessment.

### **3.5.2 Sampling**

The data that were collected for the research were obtained from a small sample (Davies, 2007, p. 139). The reason for such a small sample is that Johannesburg East district consists of thirty eight schools that offer CAT. Johannesburg East (12%) is the second biggest district in the province of Gauteng, with Tshwane South District (16%) been the biggest. Overall there are only fifteen districts in Gauteng. Qualitative methods do not make use of a majority of statistical demands and can therefore use a small sample of data. Even though the research made use of a questionnaire that is mainly used for quantitative methods, the way in which a questionnaire is structured can make it an instrument used in qualitative methods (Davies, 2007, p. 140).

Using content analysis during the data collection took the research close to the territory of the teachers in setting formal assessment (Davies, 2007, p. 181).

During a subject meeting at Johannesburg East district the questionnaires were distributed to the teachers (about 20 teachers out of 38 schools) that attended the meeting. The participants consisted of fifteen Grade 12 CAT teachers (40% of the teachers in Johannesburg East District) teaching at different schools. These fifteen teachers voluntarily completed the questionnaires but only four teachers provided their theory preliminary examinations. No teacher was able to provide me with an analysis grid.

### **3.5.3 Context**

The group of participant teachers are from different schools in the Johannesburg East District. Due to the fact that the researcher only worked with the teachers through emails and phone calls, it was not possible to identify the teachers' nationality or by age. Further the research did not seek correlations with regard to experience or qualification levels, and this information was thus not requested. This research did not interfere with the teacher's teaching and planning as the research made use of examinations that they had already set.

### **3.5.4 Data collection strategies**

Case study research offers the researcher a study involving a multi-perspective analysis in which the researcher considers the opinions, experiences and beliefs of a relevant group of CAT teachers (Maree, 2010, p. 75). The aim of the case study research design as used here was to gain a greater insight and understanding of the dynamics of formal assessment in CAT in the FET phase.

Therefore by using a small number of individuals for collecting information using a qualitative approach, the methods used to gather this information were questionnaires and document analysis (Creswell, 2008, p. 55). The use of multiple methods, namely questionnaires and documents as data collection techniques contributed to the improvement of the quality of the data available to the research and increased the trustworthiness of the study.



### **3.5.4.1 Questionnaire**

The questionnaire was designed as six open-ended questions (Appendix A). The teachers completed the questionnaire voluntarily and returned the questionnaire to the researcher (Creswell, 2008, p. 394). Teachers could provide answers to the open-ended questions in their own time and according to their own personal beliefs and as such was a qualitative design instrument (Creswell, 2008, p. 395). The reason for using open questions in the questionnaire is to allow the teachers to provide detailed and honest answers, and the analysis of each individual teacher's answers yields interesting information and categories for further analysis during the research (Maree, 2010, p. 161).

The questionnaire was tested with an expert pilot group of teachers from Tshwane South district to ensure that the questions were not too vague or repeated. The researcher relied on the expert pilot groups' knowledge on setting formal assessments to critically assess the questionnaire during evaluation.

### **3.5.4.2 Document analysis**

The research used document analysis as an additional source of information to strengthen the qualitative research (Creswell, 2008, p. 230). The research analysed the formal assessments set by teachers as well as the curriculum documentation in order to compare the assessed and intended cognitive levels. Teachers did not supply their own analysis.

The researcher combined the knowledge dimensions of Krathwohl's two-dimensional table with the cognitive levels of the analysis grid of the Department of Education (Section 2.4.4), with the addition of the higher application level that is used by Johnson, & Fuller (2007) in their research. A detailed Krathwohl table was separately used for analysis and the resulted analysis was compared. The four preliminary examinations were analysed according to the combined taxonomies.

The document analysis assisted the research in understanding and organising the open questions on the questionnaire (Davies, 2007, p. 182) by providing a basis to compare the claims and beliefs expressed by teachers in the open ended question with the actual

assessment papers that they provided. The researcher kept an open mind when it came to the analysis of the teachers' own formal assessments (Merriam, 1997, p. 121).

### **3.5.5 Ethical issues**

Research in a particular education system necessitates a few ground rules. Permission from the following institutions was obtained:

- Gauteng Department of Education;
- Johannesburg East District;
- Johannesburg East District Subject Facilitator; and
- Participant teachers.

Each of these institutions formed part of the research in such a way that the analysis would be ethical and would not reflect a negative view on any of the above institutions (Denzin & Giardina, 2007).

During the research ethical issues could emerge with regard to the collection of data and the findings (Merriam, 1997, p. 213). Each participant teacher was provided with a letter of consent (Appendix B) in which the researcher gave a short background of the research and the items that would be used (Seale, 2007, p. 218). The letter also provides the teachers the opportunity to withdraw at any time of the study. The relationship between the researcher and the teachers is based purely on the research itself, and the researcher did not personally know of any of the teachers that voluntarily took part in the study (Seale, 2007, p. 222).

It is also the researcher that needs to behave in an ethical manner all the time during the research (Merriam, 1997, p. 218). Each questionnaire completed by the participant teachers was collected from the district facilitator. The district facilitator provided the researcher with the information on all the schools in his district without knowing which teachers had participated in the research. These participant teachers were then given a code in order to maintain the confidentiality and anonymity (Maree, 2010, p. 115) in the research. Further communication with the participants took place through e-mails where participants had voluntarily provided their e-mail addresses to allow further communication in order to provide the question papers they had used for the preliminary examinations.

### 3.5.6 Trustworthiness

In the research the researcher kept the procedures for ensuring the trustworthiness of data constantly in mind (Maree, 2010, p. 113). This means that the questionnaire used in the research was first tried out on a small group of five expert pilot teachers to test the trustworthiness of the questionnaire. These teachers were drawn from a district (Tshwane South) separate from the district (Johannesburg East) which was the context of the research. The researcher relied on the honesty of the participant teachers' responses on the questionnaires. Each questionnaire completed by the participant teachers was collected and numbered according to a code used during analysis by the researcher.

These participant teachers were then given a code in order to maintain confidentiality and anonymity (Maree, 2010, p. 115) in the research. With qualitative research just like in the case of quantitative research understanding the appropriate procedures during the research for insuring credibility or trustworthiness is a key issue (Molope, 2006, p. 45).

Therefore this research used Lincoln and Guba's (cited in Joniak, 2006, p. 7) assumptions of trustworthy qualitative research that proposed naturalistic research. Table 3.1 below shows the comparison of qualitative versus quantitative research (Finlay, 2006, p. 8).

**Table 3.1: Comparison between naturalistic terms and conventional terms**

Naturalistic Terms	Conventional Terms
Credibility	Internal Validity
Transferability	External Validity
Dependability	Reliability
Confirmability	Objectivity

- Credibility is used in qualitative research as an alternative to internal validity (Skenton, 2004, p. 64). This was achieved by providing five expert teachers in a pilot study with the questionnaire to test whether it achieves its intended purpose by being clear, unambiguous and able to elicit rich responses. With the sample group the analysis is described in detail and triangulation of data (Finlay, 2006, p. 7) with the actual papers provided by teachers was performed.
- Transferability is the alternative for external validity. To ensure a suitable ability to establish transferability this report provide readers with enough detail on the aim and

the purpose of the study through detailed information on the contexts, sampling and analysis that underlies the study.

- Dependability of the research is achieved by providing a detailed description of the contexts and circumstances that can alter the study. For example the fact that teachers did not provide their own analysis grids and that only five of the fifteen initial participants provided their preliminary examination question papers is described.
- Confirmability is the extent to which the research can be analysed. The research confirmability was addressed by using the techniques of triangulation (Burger, 2008, p. 72) of questionnaires and question papers.

### **3.5.7 Triangulation**

The technique of triangulation in research is to use multiple investigators, multiple sources of data or multiple methods to confirm the findings of the research studies (Merriam, 1988, p. 169).

In this research a questionnaire and exam question papers were used. Analysis grids created by participants were requested, but none were provided. Analysis was done by researcher on the question papers provided by teachers and compared to the intended curriculum specified in the CAPS document. This comparison was used in the interpretation of the examination papers and questionnaires provided by the teachers.

### **3.6 Conclusion**

In Chapter 3 the researcher used a qualitative approach based on a case study in which the researcher worked with the reality/truth (ontology) and knowledge (epistemology) of the participant teachers in formal assessment. The sample consisted of fifteen self-selected participant teachers from Johannesburg East District. The participant teachers completed an open-ended questionnaire and were asked to submit their preliminary theory examinations together with their analysis grids for document analysis. Document analysis was performed by using the Department of Education's analysis grid as adapted by adding Krathwohl's knowledge dimensions, and compared with an adapted form of Krathwohl's taxonomy.

To ensure that the research is ethical and trustworthy permission was obtained from all necessary institutions (section 3.5.6) and each of the participant teachers were given a code (section 3.5.7). The questionnaire was previously tried out by expert pilot teachers from Tshwane South District, who recommended no changes.

In using triangulation and a qualitative method in the research the items used were analysed separately and from these, items that had been repeated were grouped and findings were based on them.

The analysis and findings from these data sources are presented and discussed in Chapter 4.

## **Chapter 4: Data analysis and findings**

### **4.1 Introduction**

In this chapter the research reports on the results and findings obtained from the questionnaires, the evaluation of the documents (teachers' own tests/exam papers) and analysis grids. To analyse the teachers' feelings towards formal assessment, the research used the questionnaires to outline themes/variables that had been mentioned by the participant teachers.

### **4.2 Questionnaire analysis**

The questionnaire was tested on an expert pilot group of five experienced teachers from the Tshwane South district of Gauteng which is separate from the district used for the study itself. The reason for using an expert pilot group was to determine whether the questions were suitable for research and the responses would lead to variables to be used. The expert group did not recommend any changes to the questions, and the questionnaire was thus used for the sample of the study. The questionnaire is provided in Appendix A.

Fifteen teachers participated in the actual research. For the purpose maintaining anonymity within the analysis and reporting each teacher was given a code that served as reference for the rest of the research. The teachers were numbered from T1 to T15. The research is not based on age, gender or qualifications and therefore the teachers were not placed according to their age, gender or qualifications. The responses from the teachers who voluntarily completed the questionnaires are shown in Table 4.1. No grammar changes were made to the responses:

**Table 4.1: Responses to the questionnaire**

Question	How do you feel about the fact that the CAPS stated the type of assessment will only be tests/exams?
Responses	<p><i>"It is very good because learners are tested on learned topic."</i> (T1)</p> <p><i>"Somewhere it will be difficult, and challenging but it will improve our skills."</i> (T2)</p> <p><i>"I think it's a good idea for educators to set their own tests."</i> (T3)</p> <p><i>"Not a problem as it gives the teacher the opportunity to be creative as well. Only thing is it is time consuming"</i> (T4)</p> <p><i>"I am okay with that because we set according to what we have taught and have to include what is required in the work schedules"</i> (T5)</p> <p><i>"That it is good because you know exactly what you have taught."</i> (T6)</p> <p><i>"I think it is fine because it gives the teachers a choice to set what he/she has taught."</i> (T7)</p> <p><i>"I do not agree because when teachers set their own tests/exam they focus more on the topics they excel or like and they also know where their learners excel."</i> (T8)</p> <p><i>"I think it's ok because the teacher will be at liberty to set whatever they have taught, in accordance to the CAPS syllabus of course"</i> (T9)</p> <p><i>"I have no problem with setting my own tests and exams."</i> (T10)</p> <p><i>"Need to be standardised. Some teachers set too easy tests/tasks."</i> (T11)</p> <p><i>"It is a reasonable expectation for teachers to set their own tests and exam papers. Teachers will get practice in setting papers. So it is a good way of development for teachers."</i> (T12)</p> <p><i>"It has a positive expectation of educators but the outcomes might not all be fair for all the learners because of the different levels and experiences of each teacher."</i> (T13)</p> <p><i>"When papers are set at a central point – the standard is correct for everybody who uses it."</i> (T14)</p> <p><i>"Keeps us on our toes."</i> (T15)</p>
Question	When last have you set an exam question paper from scratch (1 year, 2 years, etc.)?
Responses	<p><i>"This year, 2012"</i> (T1)</p> <p><i>"This year, 2012"</i> (T2)</p> <p><i>"Since I started teaching CAT in 2010"</i> (T3)</p> <p><i>"One year"</i> (T4)</p> <p><i>"One year"</i> (T5)</p> <p><i>"Every year I set papers (my own)"</i> (T6)</p> <p><i>"Three weeks"</i> (T7)</p> <p><i>"I use questions from different past questions papers and compile a question paper, so I would not say I have set from scratch"</i> (T8)</p> <p><i>"This year"</i> (T9)</p> <p><i>"Every year"</i> (T10)</p> <p><i>"One year ago"</i> (T11)</p> <p><i>"A month ago (September control test)"</i> (T12)</p> <p><i>"Every year I set at least four exam papers from scratch"</i> (T13)</p> <p><i>"Eight years"</i> (T14)</p> <p><i>"For the end of 2012, grade 10 CAT P1, grade 11 CAT P1 &amp; P2, and grade 11 IT P2."</i> (T15)</p>

<b>Question</b>	<b>Do you prefer to buy a set question paper from the publisher? Motivate your answer.</b>
Responses	<p><i>“Yes, because it helps prepare learners for national exams.” (T1)</i></p> <p><i>“Yes, to increased/improve my knowledge and maybe to copy the style” (T2)</i></p> <p><i>“Yes, to check whether learners are at a particular standard with other learners in different schools.” (T3)</i></p> <p><i>“Sometimes, I find we as teachers are very busy so it helps to have set papers bought or setup by someone else.” (T4)</i></p> <p><i>“No, some of the questions are not included in our syllabus”. (T5)</i></p> <p><i>“If you buy you must have the option of changing it.” (T6)</i></p> <p><i>“Yes, for revision it is ok.” (T7)</i></p> <p><i>“No, the publishers set question papers based only on their textbooks.” (T8)</i></p> <p><i>“I do, mainly because I do not have to crack my head thinking about what to set, especially the practical one. It needs a lot of focus and concentration.” (T9)</i></p> <p><i>“Yes, weights knowledge better, as the examiner is not a teacher for those learners. Checks if content is covered thoroughly.” (T10)</i></p> <p><i>“Buy – time” (T11)</i></p> <p><i>“Occasionally, purchasing papers opens you up to more ideas which could assist you in preparing your own.” (T12)</i></p> <p><i>“Yes, I find the set question paper gives the learners a fairer opportunity by exposing them to different questioning methods which will benefit them in their finals. Each teacher has her/his own style.” (T13)</i></p> <p><i>“Yes, as no. I been answered.” (T14)</i></p> <p><i>“Not anymore! Now I can do my own scenarios, based on the experiences of the learners in front of me.” (T15)</i></p>
<b>Question</b>	<b>If you made use of an old National/Published exam paper do you make any changes to the scenarios? Motivate your answer.</b>
Responses	<p><i>“I make some few changes. Past exam papers are available from the department’s website so the changes help to assess understanding.” (T1)</i></p> <p><i>“Yes to suit learners environment, etc.” (T2)</i></p> <p><i>“Yes, I usually use names and surnames that are familiar to learners in the scenarios.” (T3)</i></p> <p><i>“No changes, I find the papers to be set adequately.” (T4)</i></p> <p><i>“No, they have been made clear for understanding.” (T5)</i></p> <p><i>“Yes, you cannot use an old paper as it is. They can find copies on the internet.” (T6)</i></p> <p><i>“It depends if the scenario is difficult to understand, yes.” (T7)</i></p> <p><i>“No because my focus is on the questions.” (T8)</i></p> <p><i>“I do not because it’s clearly set out and it applies to the current syllabus. They are very helpful of course.” (T9)</i></p> <p><i>“Yes, giving different scenarios minimises cram work.” (T10)</i></p> <p><i>“Yes, combine more than one.” (T11)</i></p> <p><i>“Yes, you cannot use an old paper as is, changes definitely has to be made.” (T12)</i></p> <p><i>“Yes, I make changes to the scenarios and questions that way if learners have been exposed to previous papers, it makes the paper fair.” (T13)</i></p> <p><i>“No, can just as well reset the paper if scenarios are changed.” (T14)</i></p> <p><i>“Try to ensure that the kids in my class understand the scenarios (their own life experiences.” (T15)</i></p>



Question	Do you feel that there must be training on how to set question papers for CAT teachers? Motivate your answer.
Responses	<p><i>“Yes, training is important in order for us to maintain national pass rate the setting of exams should be of high standard.”</i> (T1)</p> <p><i>“If you have previous question papers, I do not think it is necessary as the setting and format is the same”</i> (T2)</p> <p><i>“Only to those educators who have just introduced CAT as an examinable subject.”</i> (T3)</p> <p><i>“Any training will help. As it is good to get other input.”</i> (T4)</p> <p><i>“Yes, so as not to set out of context.”</i> (T5)</p> <p><i>“No, there are enough examples of papers on the various sites.”</i> (T6)</p> <p><i>“Yes, some teachers are failing difficulties”</i> (T7)</p> <p><i>“No, because as an experienced teacher one has come across different question papers and the format/structure is the same.”</i> (T8)</p> <p><i>“No because the papers are clear and straight forward.”</i> (T9)</p> <p><i>“Yes, since new concepts are introduced, style of setting proper assessment is desired.”</i> (T10)</p> <p><i>“No, enough experience.”</i> (T11)</p> <p><i>“Personally – NO, I feel that I had enough exposure in setting CAT papers.”</i> (T12)</p> <p><i>“Maybe for new teachers. I do feel that the longer one teaches CAT, the more one learns how to be a better examiner and teacher.”</i> (T13)</p> <p><i>“No, purchase from Study Opportunities.”</i> (T14)</p> <p><i>“Only for those inexperienced teachers.”</i> (T15)</p>
Question	Do you prefer formal tests/exams above tasks? Motivate your answer.
Responses	<p><i>“I prefer formal exams because they are done under controlled conditions.”</i> (T1)</p> <p><i>“Yes, the learners tend to know you and not study hard.”</i> (T2)</p> <p><i>“Yes, all learners will write tests at the same time and submit at the same time. With tasks some learners take longer to submit even if you have given them the submission date earlier.”</i> (T3)</p> <p><i>“With tasks the learners seem to be more interested and better results are achieved.”</i> (T4)</p> <p><i>“Yes, we get to test our students ability of understanding.”</i> (T5)</p> <p><i>“Prefer tasks on a regular basis. Learners will get more practises.”</i> (T6)</p> <p><i>“Yes, so that learners can get used to external exams.”</i> (T7)</p> <p><i>“Yes, I prefer formal tests/exam because everyone takes it seriously and learners put more effort on it.”</i> (T8)</p> <p><i>“I think formal tests because tasks are a problem in that students really struggle to submit them in.”</i> (T9)</p> <p><i>“Yes, they standardised the way learners are assessed.”</i> (T10)</p> <p><i>“Yes, learners too lazy to do tasks.”</i> (T11)</p> <p><i>“Yes, formal tests/exams forms part of our CASS programme.”</i> (T12)</p> <p><i>“A combination of the two is ideal. Some learners do not read well to tests/exams situations. Tasks give the learners a fair opportunity.”</i> (T13)</p> <p><i>“Yes, child needs to prepare.”</i> (T14)</p> <p><i>“I conduct both under exam conditions anyway – so I do not mind.”</i> (T15)</p>

From the responses of the teachers three main variables arose from the analysis. The three main variables are Time, Standardisation and Style/Format as illustrated in Table 4.2 below. Each of these is discussed separately.

**Table 4.2: Themes/variables from responses**

Themes/Variables	Questions	Responses
<i>Standardisation</i>		
Positive response to formal assessment – tests/examination	<i>Q1, Q3, Q5, Q6</i>	T1, T3, T4, T5, T6, T7, T9, T10, T14, T15
Improve teachers/learners skills (tests/examinations)		T2, T10, T11, T12
Negative response to formal assessment		T8, T13
Positive response to training in formal assessment – own		T1, T4, T5, T10
Positive response to training in formal assessment – other		T7, T13, T15
Negative response to training in formal assessment		T2, T3, T6, T8, T11, T12, T13, T14, T15
<i>Time</i>		
Time consuming in setting formal assessment	<i>Q1, Q2, Q3, Q6</i>	T4, T9, T11
Experience as senior teacher setting formal assessment		T3, T6, T10, T13, T14
New in setting formal assessment		T1, T2, T4, T5, T7, T9, T11, T12, T15
Learners submission of the use of formal assessment (tests)		T3, T9
<i>Style/Format of Previous/Published papers</i>		
No changes are made to previous/published papers	<i>Q3, Q4, Q5</i>	T4, T5, T8, T9, T14, T15
Changes are made to previous/published papers		T1, T2, T3, T7, T8, T10, T11, T12, T13
Negative opinion about using previous/published papers		T5, T6, T8
Acknowledgement of previous/published papers are available on the Internet		T1, T6, T12, T13

#### 4.2.1 Standardisation

Standardisation is explained in three subsections. The first section is based on the standard of formal assessment tests, and the content taught, secondly the use of the old papers and lastly training of teachers.

Throughout the questionnaire the responses were clear that in setting their own formal assessment, learners would be tested on the topics and content that was taught (T1, T5, T6, T7 and T9).

A negative aspect of formal assessment set according to content taught is that some teachers will only focus on what is inside the textbooks and what they themselves know (T8, T11 and T13). A solution to the above problem was provided by T14 suggesting that formal assessment needs to be set at a central point, implying that formal assessment should be provided either by an exam committee or publishers, and not set by teachers themselves.

The use of previous formal assessments from the Department of Education and publishers according to T1, T3, T13 and T14 are based on the correct standard and there is no need to make any changes or to adopt any levels. T5, T6 and T8 indicated that the types of formal assessment obtained from publishers were not necessarily according to the standard set by the Department of Education, and that these formal assessments were only according to the publishers' textbooks and that some questions that were asked were not in the syllabus. This points to the experiences of the teachers.

T1 strongly believes that training in formal assessment is important as it will assist teachers to maintain the national pass rate while keeping the standard high. T4 and T5 support T1's response and would prefer training on a continuous basis. T3, T13 and T15 believed that only new/inexperienced teachers need training in setting formal assessments according to the standard needed. The majority of the teachers (T6, T7, T8, T9, T11, T12 and T14) all have the same response that the longer one teaches CAT, the more experience one has and therefore as a teacher, one knows what is expected. They claim that there are enough previous formal assessment papers to use for guidance that make training unnecessary.

#### **4.2.2 Time**

With regard to the variable time the opinions of the teachers on the time for setting a formal assessment, the time experience from teachers according to when they started setting papers, and lastly the time element around learners and formal assessment were examined.

T4, T9 and T11 indicated that teachers are very busy and it is very time-consuming to set a formal assessment from scratch. Therefore for them it was better to have a formal assessment that was set by someone else. Another reason was that to set a formal assessment needs much focus and concentration and there is no time for this.

In Question 2 the focus was on the amount of years teachers have set their own formal assessments. Of the fifteen teachers only five teachers (T3, T6, T10, T13 and T14) have more than two years experience of setting their own formal assessments, which leaves ten teachers (T1, T2, T4, T5, T7, T9, T11, T12 and T15) that started setting their own formal assessment only in 2012. This is explained by the fact that in 2012 the publisher did not provide examination papers for Grade 12, forcing teachers to select or set their own.

Lastly, Question 6 focuses on whether formal assessment tasks or tests should be used. T3 and T9 prefer the use of formal assessment tests due to the fact that learners all write the tests on the same day and time. Learners then submit the test at the same time within a control condition. T11's response was that learners were too lazy to do tasks and formal assessment tests were better.

#### **4.2.3 Style/format**

The third variable is based on the formal assessment test layout and design. Firstly, the teachers (T2, T4, T5, T8, T9 and T14) make use of previous/published papers to give them guidance on the "style" and "format" that needs to be used. T1, T6, T12 and T13 do make changes and this also indicates that changes need to be made as previous/published formal assessments are available on the Internet. The other teachers made changes to previous/published formal assessment only to suit the learners environment or own life experiences. The variable style/format is further explained during the document analysis section in the research.

#### **4.2.4 Synthesis of questionnaire responses**

From the responses three variables were identified from analysing the questionnaires. These variables are standardisation, time and style/format.

The participant teachers are all concerned with the standardisation of the formal assessments that are set by teachers, as teachers might only set the formal assessment according to what was taught. This is the major reason given for using old papers or papers supplied by publishers, rather than setting their own.

Secondly, the participant teachers find that it is very time consuming to set their own formal assessments. Nevertheless they prefer tests as a type of formal assessment to tasks as learners then submit the tests at the same time.

Lastly, with style/format of formal assessment, the majority of the participant teachers use old papers or papers supplied by publishers as they are or apply only minimal changes such as changing only the style and format of the papers.

None of the responses mention anything about the cognitive levels used in the formal assessments that consist of old papers or those supplied by publishers.

### 4.3 Document analysis

The teachers were asked to provide the researcher with their preliminary examinations on theory as well as the completed analysis grid that they had used. Of the fifteen participant teachers, five teachers responded by sending their preliminary theory papers. The other ten teachers did not respond with any type of answer. One of the teachers did provide a preliminary theory paper, but misunderstood the request for the analysis grid and provided the researcher with a breakdown of the question percentage passes as shown below:

*“The analysis Question 1=100 % pass  
Q2=40 % pass  
Q3=30% pass  
Q4 & Q5 =20% pass  
Q6 & Q7 =20% pass” (T2)*

The responses from four participant teachers were as follows:

*“I can only help you with the paper but I can’t seem to find my analysis grid and I don’t think I can redo it, sorry. It was this year’s Feb-March 2012 theory paper; it’s there on the net” (T9)*

*“I have not got a prepared grid so I guess the one from the department you can use and manipulate accordingly.” (T4)*

*“Please find attached CAT prelim paper 2. I will e-mail the analysis as soon as it is scanned.” (T1)*

*“I will try to attach the paper for you, but I can tell you that I used the 2012 Feb rewrite for both P1 & P2. The analysis grid will come a little bit later, I am busy conducting practical grade 10 & 11 IT examinations.” (T15)*

Due to these responses, analysis of the CAT Grade 12 curriculum with the modified Krathwohl’s taxonomy were compared with an analysis of the individual participant teachers’ preliminary examinations done with the same modified Krathwohl’s taxonomy. The participant teachers’ preliminary examinations were also compared with old and publisher supplied papers to identify incidents of copying from previous or publisher supplied papers and the way in which these papers were moderated.

#### **4.3.1 Analysis of the CAT Grade 12 curriculum with the modified Krathwohl’s taxonomy**

For formal assessment of the theory component of the CAT curriculum the revised taxonomy set out by Krathwohl as the two-dimensional taxonomy which analyses the factual and process knowledge components of the curriculum and its assessment activities with all its verbs is more clear, easier to understand and adaptable to the needs of CAT.

The analysis grid supplied by the Department of Education currently is based on Bloom’s revised taxonomy in which the cognitive levels have been reduced by grouping to only three levels with a prime focus on the difficulty levels of the question, rather than reflecting detailed curricular knowledge and cognitive requirements. In using the department’s grid teachers tend to restrict the way that they state questions as they do not focus on the type of knowledge dimension being tested but rather on the difficulty level of the question. To work with a two-dimensional table that details the content and levels of the knowledge dimension of the curriculum will allow teachers to have a two-dimensional view of what is assessed, and ensure better assessment of the intended curriculum’s content and cognitive levels.

An example is based on the work schedule supplied by the Department of Basic Education (Department of Basic Education, 2011a):

- i. Factual Knowledge: will be taught during the first term's formal theory test that needs to be set. This test is normally based on previous year's knowledge. This content repeats and addresses the factual content of earlier years.
- ii. Conceptual Knowledge: will be addressed during the second term, when teachers are setting the formal June theory examination. During this examination factual and conceptual knowledge need to be tested, as new concepts have been added during the year. Teachers still need to continue with testing the factual knowledge.
- iii. Procedural Knowledge: will be emphasised during the third term. By now the learners have gained more knowledge and skills in the subject, and are here able to solve problems provided to them. Teachers still need to work with the factual and conceptual knowledge together with the procedural knowledge.
- iv. Metacognitive knowledge: will be required during the fourth term with the final formal examination in which learners are evaluated according to the whole year's knowledge as well as their own self-knowledge that was gained during this fourth term as an integrated scenario in the examination and a project during the term is required. This is here where teachers need to combine all four levels into a formal assessment of the theoretical component of CAT.

It is important to remember that during each section the earlier form of knowledge should also be assessed and integrated with the advanced knowledge form, but to a lesser and less explicit degree.

Table 4.3 shows a more detailed analysis of the combination of Krathwohl's knowledge dimension with the cognitive levels from the Department of Basic Education's analysis grid. In the table the content of the Grade 12 CAPS (Department of Basic Education, 2011a, p. 39 – 46) was placed according to the knowledge levels and the cognitive levels required by the topics. A short name for the topic and the school term in which a specific topic is taught were placed on the table.

An additional cognitive level was added to the taxonomy (and thus the department's grid), as the 'Higher Application' (Johnson & Fuller, 2007) level, due to the new content (HTML/Web

design) that has been introduced to the Grade 12 content (Department of Basic Education, 2011a, p. 12) where HTML is a mark-up language that requires introductory levels of programming.

The content in Table 4.3 nearly forms a rectangle that is an indication that during the Grade 12 curriculum all the cognitive levels and knowledge dimension are covered by the extent of the content. In each topic at least analysis and evaluation are assessed, with some creation in the integrative case study, but only with the topic “Solution development” are learners expected to demonstrate the skills of “Higher application”.

**Table 4.3: Analysis of CAPS Grade 12 content with a grouped grid**

Adapted Taxonomy Grade 12 Content		Cognitive Levels						
		Conceptual Knowledge Information gathering	Comprehension & Application building understanding		Analysis & problem-solving Productive thinking			Higher Application
		Level 1 (Lower)	Level 2 (Middle)		Level 3 (Higher)			Level 4 (Advance)
Topics	The Knowledge Dimension	Remembering	Understand	Apply	Analyse	Evaluate	Create	
<b>System technologies (25)</b>	Factual Knowledge	Term 1: General Concepts	Term 2: System software & communication					
	Conceptual Knowledge		Term 1: Hardware & software		Term 3: System software & computer management			
	Procedural Knowledge							
	Metacognitive Knowledge				Term 4: Case study			
<b>Internet &amp; Network technologies (15)</b>	Factual Knowledge	Term 2: Network Tech	Term 2: Network Tech					
	Conceptual Knowledge		Term 3: Communication					
	Procedural Knowledge				Term 3: Communication			
	Metacognitive Knowledge				Term 4: Case study			
<b>Information management (10)</b>	Factual Knowledge	Term 1	Term 1					
	Conceptual Knowledge		Term 2					
	Procedural Knowledge				Term 3			
	Metacognitive Knowledge				Term 4: Case study			
<b>Social implications (10)</b>	Factual Knowledge	Term 1	Term 2					
	Conceptual Knowledge			Term 3	Term 2			
	Procedural Knowledge							
	Metacognitive Knowledge				Term 4: Case study			
<b>Solution development (15)</b>	Factual Knowledge	Term 1: Database & Spreadsheet	Term 1: Database, Spreadsheet, Word		Term 2: HTML			
	Conceptual Knowledge		Term 2: Database, Spreadsheet & Word					Term 4
	Procedural Knowledge				Term 3: Database, Spreadsheet, Word			Term 3: HTML
	Metacognitive Knowledge				Term 4: Case study			
<b>Total (75)</b>		<b>(30%)</b>	<b>(40%)</b>		<b>(30%)</b>			



Table 4.3 shows the application of Krathwohl's two-dimensional taxonomy (with some opportunity to map onto the analysis grid of the Department of Basic Education) to analyse the curriculum's expectation of topics, knowledge and cognitive levels. This includes the value of the additional "Higher Application" level.

Table 4.3, together with Table 2.11 form an analysis tool with which the participant teachers' preliminary examinations could be critically analysed and compared to the intended curriculum map.

#### **4.3.2 Analysis of teachers' formal assessment with the adapted taxonomy**

The four preliminary examinations supplied by the participant teachers were analysed in terms of the adapted analysis grid of Table 2.11. The topic Information Management is removed from Table 2.11 in its application to the Teachers' tests because the Grade 12s of 2012 were still taught and assessed according to the previous curriculum (the 2003 form of the NCS, described in Section 2.1). The first group of Grade 12s that will write the full CAPS examination will be in 2014.

Each analysis is individually done according to the codes provided to the teachers. Table 4.4 to Table 4.7 is the analysis of T1's, T2's, T4's and T14's preliminary examination.

Short questions which consisted of multiple-choice format questions (generally set as Section A) were not analysed. These questions are generally of simple recall type.

##### ***Paper set by T1***

The paper set by T1 consisted of nine questions (Appendix F) and two sections. Section B, questions 3 – 9 are based on longer questions and assess four topics of the curriculum. As shown in Table 4.4 the majority of the questions are placed in the first two departmental groupings up to the "apply" cognitive level. The three low-scoring sub-questions that are placed in the department's upper group (level 3) are because it is new content to the learners and the questions are stated in a form that expects the learners to analyse and evaluate a scenario.

**Table 4.4: Analysis of T1's preliminary examination**

Adapted Taxonomy T1		Cognitive Levels					
		Conceptual Knowledge Information gathering	Comprehension & Application building understanding		Analysis & problem-solving Productive thinking		Higher Application
		Level 1 (Lower)	Level 2 (Middle)		Level 3 (Higher)		Level 4 (Advance)
Topics	The Knowledge Dimension	Remembering	Understand	Apply	Analyse	Evaluate	Create
System technologies (52)	Factual Knowledge	3.1(3); 3.1.1(2); 6.1(4); 8.1.1 (2); 8.3.1(1); 9.2.4(2)	3.1.2(2); 3.4.1(1); 5.2.3(2); 8.1.2(2)	5.3.2(2)	8.3.2(2)		
	Conceptual Knowledge	3.5.3(2); 3.5.5(2); 6.2(4); 8.3.3(2); 9.2.1(1); 9.2.2(1)	3.2(2); 3.3(2); 4.3.2(2); 9.2.3(1)	8.1.5(2)			
	Procedural Knowledge						
	Metacognitive Knowledge	5.3.3(2)		9.2.3(2)			
Internet & Network technologies (52)	Factual Knowledge	4.1.1(3); 6.3(3); 8.1.3(2); 8.1.4(2); 8.2.1(2); 8.2.2(2)	4.2.1(1); 4.2.1(1); 8.2.4(2)	7.2.1(2); 7.2.2(2)			
	Conceptual Knowledge	4.1.2(2); 5.1(9); 8.2.3(2)	4.1.4(2); 4.2.4(2); 4.1.3(2); 4.2.5(2)		4.1.5(2)		
	Procedural Knowledge	7.2.3(4)	4.1.6(2); 4.2.3(1)				
	Metacognitive Knowledge						
Social implications (12)	Factual Knowledge	3.5.1(2); 3.5.2(2); 9.1(3)	4.3.1(2)				
	Conceptual Knowledge		5.2.1(1); 5.2.2(2)				
	Procedural Knowledge						
	Metacognitive Knowledge						
Solution development (14)	Factual Knowledge	6.4.2(2)					
	Conceptual Knowledge	6.4.1(2)					
	Procedural Knowledge			7.1(8)		6.4.3(2)	
	Metacognitive Knowledge						
<b>Total (130)</b>		<b>70 (54%)</b>	<b>36 (28%)</b>	<b>18 (13%)</b>	<b>4 (3%)</b>	<b>2 (2%)</b>	

There is no higher application level because the teacher T1 did not incorporate all the content that needed to be covered as no database-related questions were asked. This analysis shows that the learners were not tested on all of the content set out in the National Curriculum Statement (Department of Education, 2003). The easier content (System Technologies, Internet and Network Technologies) formed the major pattern of the assessment, 104 of 130 marks. The more complex content (Social Implications and Solution Development) which lends itself to a higher cognitive skill was allocated only 26 of 130 marks.

The taxonomy also shows that the cognitive levels according to the distribution requested by the Department of Education in its specifications of percentages (Table 2.4) were also not applied in the setting of the question paper. Table 4.4 forms an upside-down triangle

indicating that easier content (System Technologies, Internet and Network Technologies) was addressed by the majority of questions asked by the teacher.

### *Paper set by T2*

The next preliminary examination that was analysed was that of T2. Here the content distribution (as shown in Table 4.5) forms two separated squares in which the easier content (System Technologies, Internet and Network Technologies) are all based on the remembering and understanding cognitive levels. The second square is based on the more complex content (Solution Development) that incorporates two levels up to “understand”. The teacher made no real attempt to incorporate the Social Implication content in the question paper. The Solution Development topic reaches the application level in the department’s second group.

T2’s paper consists of seven questions (Appendix G) and two sections. Section B, questions 3 – 7 are based on longer questions and consist of the four topics. In the question paper calculation errors were made at Question 3, as it only counts twelve marks and not twenty as stated.

In Table 4.5 the majority of the questions are placed in the first cognitive level of remember. Two questions (contributing 2% of the paper) are placed at the analysis cognitive level (in the department’s highest group) expects the learners to analyse and evaluate a scenario, but evaluation was not achieved.

There is little higher level assessment in that the teacher did not incorporate all the content that needed to be covered and no question was asked in the manner in which a learner was required to evaluate and/or create.

The easier content (System Technologies, Internet and Network Technologies) formed a grouped pattern of the assessment, 57 of 109 marks. The more complex content (Social Implications and Solution Development) which lends itself a higher cognitive skill was allocated 52 of 109 marks, but of the 52 of 109 marks the Social implication content was only allocated 2 marks.

**Table 4.5: Analysis of T2's preliminary examination**

Adapted Taxonomy T2		Cognitive Levels					
		Conceptual Knowledge Information gathering	Comprehension & Application building understanding		Analysis & problem-solving Productive thinking		Higher Application
		Level 1 (Lower)	Level 2 (Middle)		Level 3 (Higher)		Level 4 (Advance)
Topics	The Knowledge Dimension	Remembering	Understand	Apply	Analyse	Evaluate	Create
<b>System technologies (17)</b>	Factual Knowledge	3.3(1); 3.5(1); 3.7(2); 3.6.3(2); 5.5.1(1); 7.2(1)	3.1(2)				
	Conceptual Knowledge	3.2(1); 3.6.2(1); 3.6.1(2)	3.4(2)				
	Procedural Knowledge		5.8(2)				
	Metacognitive Knowledge						
<b>Internet &amp; Network technologies (40)</b>	Factual Knowledge	4.1(4); 4.3(2); 4.4(3); 5.4(2); 5.6(1)	4.2(3); 4.7(2); 5.1(2); 5.3(2)		4.6(2)		
	Conceptual Knowledge	4.5(4); 5.2(2); 5.5.2(1); 5.7(4)	5.10(2); 5.11(4)				
	Procedural Knowledge						
	Metacognitive Knowledge						
<b>Social implications (2)</b>	Factual Knowledge						
	Conceptual Knowledge		5.9(2)				
	Procedural Knowledge						
	Metacognitive Knowledge						
<b>Solution development (50)</b>	Factual Knowledge	6.4(10); 7.2(1); 7.4(2); 7.5(2)	7.6(2)	7.9(2)	7.3(1)		
	Conceptual Knowledge	6.3(2); 7.1(6); 7.7(2)	6.1(3)	6.2(15)			
	Procedural Knowledge		7.8(2)				
	Metacognitive Knowledge						
<b>Total (109)</b>		<b>59 (54%)</b>	<b>30 (28%)</b>	<b>17 (16%)</b>	<b>3 (2%)</b>		

This analysis shows that the learners were not tested on all the content in the curriculum as set out in the National Curriculum Statement (Department of Education, 2003) as only one question was based on “Social Implication”. The taxonomy further shows that the expected cognitive levels according to the percentages expected by the Department of Education were not applied in the setting of the question paper.

#### ***Paper set by T4***

The third paper for analysis is T4’s paper that consists of seven questions (Appendix H) and two sections. Section B, questions 3 – 7 are based on longer questions and consist of the four topics. This paper was drawn directly from a paper provided by a publisher without change. In Table 4.6 the majority of the questions are placed in the department’s second group, but at the lower part of the cognitive level, namely understanding.

The three questions that are placed in higher cognitive levels are on content new to the learners and the questions are stated in a way that places them in the higher cognitive level that expects the learners to analyse and evaluate a scenario.

**Table 4.6: Analysis of T4's preliminary examination**

Adapted Taxonomy T4		Cognitive Levels					
		Conceptual Knowledge Information gathering	Comprehension & Application building understanding		Analysis & problem-solving Productive thinking		Higher Application
		Level 1 (Lower)	Level 2 (Middle)		Level 3 (Higher)		Level 4 (Advance)
Topics	The Knowledge Dimension	Remembering	Understand	Apply	Analyse	Evaluate	Create
System technologies (47)	Factual Knowledge	3.1.3(1); 3.1.7(2); 3.1.4(1); 6.5(6)	3.1.2(2); 3.1.5(3); 3.1.9(2); 6.1(2)	3.1.1(4); 6.2(5)			
	Conceptual Knowledge	3.1.6(2); 3.1.10(1); 3.3(2); 6.4(2)	3.1.8(2); 6.3(5)	3.2(2)			
	Procedural Knowledge		3.1.11(3)				
	Metacognitive Knowledge						
Internet & Network technologies (41)	Factual Knowledge	5.2(4); 5.5(3)	4.1(3); 5.1(4); 5.6(3)	5.7(2)			
	Conceptual Knowledge	4.2(2); 4.3(3); 5.3(3)	4.4(7); 5.4(4)	5.8(3)			
	Procedural Knowledge						
	Metacognitive Knowledge						
Social implications (7)	Factual Knowledge		6.7(3)	6.6(4)			
	Conceptual Knowledge						
	Procedural Knowledge						
	Metacognitive Knowledge						
Solution development (35)	Factual Knowledge	7.1.1(1); 7.1.2(2); 7.1.3(2); 7.3.3(1); 7.3.4(1); 7.4.3(1)	7.1.4(2); 7.2(3); 7.4.2(2)	7.3.1(1)	7.3.2(4) ; 7.4.6(2)	7.4.7(3)	
	Conceptual Knowledge	7.4.1(2); 7.3.5(1)	7.3.6(1); 7.3.7(2); 7.4.4(2)	7.4.5(2)			
	Procedural Knowledge						
	Metacognitive Knowledge						
<b>Total (130)</b>		<b>43 (33%)</b>	<b>55 (42%)</b>	<b>23 (18%)</b>	<b>6 (5%)</b>	<b>3 (2%)</b>	

This analysis shows that the learners were tested on all the content in the curriculum as set out in the National Curriculum Statement (Department of Education, 2003) but the balance is still not correct. The taxonomy shows that although the cognitive levels expected by the Department of Education were addressed, their percentage distribution is very different. Although the lowest group (guide 30%, achieved 33%) matched the guide, the middle group accounted for the major portion of the paper (guide 40%, actual 60%). The upper group is weakly represented by 7% (guide 30%). The “Apply” level of the middle group of the department’s grid is often claimed by teachers to fall in the higher group, which contradicts

the Department of Education's guidelines. It is noted that this paper is derived from an older publisher-provided paper. The distribution in Table 4.6 forms a square in which remember, understand and apply are tested by three of the four topics but still leaves a gap with the more complex topic, Social Implication sparsely addressed.

Even with the published paper used by T4, the easier content (System Technologies, Internet and Network Technologies) formed the major pattern of the assessment with 88 of 130 marks. The more complex content (Social Implications and Solution Development) which lends itself relatively to the development of higher cognitive skills was allocated only 42 of 130 marks of which Social Implication are only allocated 7 marks.

### ***Paper set by T14***

The last paper for analysis is T14's paper that consists out of seven questions (Appendix I) and two sections. Some of these questions were taken from publisher provided papers (Study Opportunity) while the remaining questions were drawn from other older question papers. In Table 4.7 the majority of the questions are placed in the second grouping, but the lower cognitive level of "understand".

There are no questions listed in the departments third group (Level 3) as none of the questions in the question papers are based on problem solving techniques. This analysis shows that the learners were tested on all the content in the curriculum as set out in the National Curriculum Statement (Department of Education, 2003) but the balance far from correct as the majority of questions are from Internet and Network technologies and only one question was asked from the theme of Social Implications, for a minimal 2 marks.

The entries in Table 4.7 also form two separate rectangles (as also seen in Tables 4.5 and 4.6) where the Social Implication content was not covered, and only two departmental groupings (Level 1, low and level 2, middle) were addressed.

**Table 4.7: Analysis of T14's preliminary examination**

Adapted Taxonomy T14		Cognitive Levels						
		Conceptual Knowledge Information gathering	Comprehension & Application building understanding		Analysis & problem-solving Productive thinking			Higher Application
		Level 1 (Lower)	Level 2 (Middle)		Level 3 (Higher)			Level 4 (Advance)
Topics	The Knowledge Dimension	Remembering	Understand	Apply	Analyse	Evaluate	Create	
System technologies (47)	Factual Knowledge	3.1(1); 3.2(1); 4.1(3)	3.5.1(1); 3.5.2(1); 3.5.3(1); 4.4(2)	4.2(4)				
	Conceptual Knowledge	3.3(3); 3.4(2); 4.5(1)	3.7(5); 4.3(6)	4.6(2)				
	Procedural Knowledge	7.2(2)	3.8(12)					
	Metacognitive Knowledge							
Internet & Network technologies (61)	Factual Knowledge	5.3(2); 5.5(3); 5.6.1(1); 5.6.2(2)	3.5.4(3); 5.1(2); 5.4(2)	5.2(4); 5.9(7)				
	Conceptual Knowledge	5.7(2); 5.8(4); 5.10(3); 6.4(1)	3.6(3); 5.6.3(4); 6.5(2)	6.3(6)				
	Procedural Knowledge	6.1(2); 6.2(1); 6.6(5); 6.7(2)						
	Metacognitive Knowledge							
Social implications (2)	Factual Knowledge	4.3.4(2)						
	Conceptual Knowledge							
	Procedural Knowledge							
	Metacognitive Knowledge							
Solution development (20)	Factual Knowledge	3.9(1); 7.1.1(2); 7.1.2(1); 7.1.3(1)	7.1.4(2); 7.1.5(1); 7.1.7(1)	7.1.6(3)				
	Conceptual Knowledge		7.1.8(4)					
	Procedural Knowledge		7.3(4)					
	Metacognitive Knowledge							
<b>Total (130)</b>		<b>48 (37%)</b>	<b>56 (43%)</b>	<b>26 (20%)</b>				

The easier content (System Technologies, Internet and Network Technologies) formed the major pattern of the assessment namely 108 of 130 marks. The more complex content (Social Implications and Solution Development) which leads to development or demonstration of a higher cognitive skill was allocated only 22 of 130 marks. Again Social Implication is only allocated 2 of 22 marks from the more complex content.

The next set of analyses is based on how the teachers made use of the previous or published papers and how they have adapted them.

#### 4.3.3 Comparison of examination papers with previous papers

As indicated by T9 and T15 they used the February/March 2012 supplementary examination. Below are selected questions from the mentioned examination. The reason for using only

these selected questions is due to the fact that these questions were used without change in the preliminary examinations that T2 supplied.

**Table 4.8: Comparison 1**

<b>November 2008 Final examination</b>		
Question 5		
5.6	As one of the monitors was stolen a new monitor has to be bought.	
5.6.1	Give one reason of choosing a CRT monitor	(1)
Question 6		
6.6	Evaluate the following street pole advertisement for the concert and suggest <u>FOUR</u> ways in which the layout could be improved	(4)
<b>T1's Preliminary examination September 2012</b>		
Question 6		
6.2	As one of the monitors was stolen a new monitor has to be bought.	
6.2.1	Give one reason of choosing a CRT monitor	(2)
Question 7		
7.1	Evaluate the following street pole advertisement for the concert and suggest <u>FOUR</u> ways in which the layout could be improved	(8)

**Table 4.9: Comparison 2**

<b>February/March 2012 Supplementary examination</b>		
Question 5		
5.6	<u>Ms Khumalo</u> has heard that the new trend of cloud computing means that, amongst other things, you can store your files in the 'cloud' (the Internet). Name <u>ONE</u> potential disadvantage of saving copies of your data in the 'cloud'.	(1)
Question 6		
6.1.2	Which type of fraud is this e-mail an example of?	(1)
6.2	Explain to <u>Ms. Khumalo</u> why she should not write an e-mail using only capital letters.	(1)
Question 7		
7.4	<u>Ms. Khumalo</u> received a text file listing the names and addresses of various organisations that may donate money to her charity shop.	
7.4.1	Other than retyping it, name <u>ONE</u> way of inserting this list into a database program.	(1)
<b>T2's Preliminary examination September 2012</b>		
Question 4		
4.10	<u>Ms Ledwaba</u> has heard that the new trend of cloud computing means that, amongst other things, you can store your files in the 'cloud' (the Internet). Name <u>ONE</u> potential disadvantage of saving copies of your data in the 'cloud'.	(2)
Question 5		
5.1.2	Which type of fraud is this e-mail an example of?	(2)
5.2	Explain to <u>Ms. Ledwaba</u> why she should not write an e-mail using only capital letters.	(2)
Question 7		
7.4	<u>Ms. Ledwaba</u> received a text file listing the names and addresses of various organisations that may donate money to her charity shop.	
7.4.1	Other than retyping it, name <u>ONE</u> way of inserting this list into a database program.	(2)



With both comparisons (Tables 4.8 and 4.9) it is evident that the teachers' (T1 and T2) responses in the questionnaire are true as the only changes made to previous papers are the names and the mark allocation to suit the teachers mark totals. In both comparisons the teachers had made no effort to change the number of responses required in the question, but changed the mark allocation by doubling the marks.

In the other two preliminary papers that were provided (T4) made use of a previously published preliminary examination paper from the publishers Study Opportunity as indicated by T14 in the questionnaire. As these papers are only available by buying them from the publisher the researcher was only able to find an Afrikaans version of the 2010 preliminary examination paper. Nevertheless it was possible to see that no changes were made to the papers other than retyping them.

#### 4.3.4 Type of moderation done at school level

Teachers do not analyse the questions of the formal assessments (for the research – preliminary theory examination) according to the cognitive levels, but when moderating the focus of the moderation is only on the format and structure of the question paper as illustrated in the Figure 4.1 below. This paper was received from T14.

6.6	Some committee members have expressed that they get confused with the "To", "Cc" and "Bcc" at the top of an email. Explain to them what each one is used for.	(5)
6.7	The head of the Olympics committee asked you to inform the committee about email etiquettes they should be aware of when sending emails. Name any TWO such email etiquettes	(2)
		[19]

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**Comment [h10]:** This was asked in the Multiple Choice section so is a repeat of that option. Not good to ask the same thing twice - so maybe change the Multiple Choice question as this one is more of an application question.

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**QUESTION 7**

There is a list available from the Olympic committee of all Hotels etc. available for families coming to support their family members taking part in the Olympics.

7.1	You set up a database of all the hotels in the area, some of which are part of the accommodation for the Olympians. It contains the fields below.							
<table border="1" data-bbox="279 1809 821 1924"> <thead> <tr> <th>FIELD NAME</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>Hotel_Name</td> <td>Name of hotel</td> </tr> <tr> <td>Address</td> <td>Hotel's address</td> </tr> </tbody> </table>			FIELD NAME	DESCRIPTION	Hotel_Name	Name of hotel	Address	Hotel's address
FIELD NAME	DESCRIPTION							
Hotel_Name	Name of hotel							
Address	Hotel's address							

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**Figure 4.1: Moderation of formal assessment at school level**

At school level the formal assessment is moderated by the Head of Department or Subject Head before the formal assessment can be issued to the learners. Unfortunately some Heads of Department oversee more than one subject at a school and CAT may not be his/her main subject or expertise. This may explain why they only look at the style and format of the formal assessment.

#### **4.3.5 Synthesis of document analysis findings**

All four papers are an indication that teachers do not use a suitable analysis process when setting formal assessments for learners to ensure adequate coverage of the curriculum or the achievement of the cognitive skills levels the curriculum intends. None of the papers followed the cognitive levels for the Grade 12 standard even as crudely as expected by the Department of Education (Department of Basic Education, 2011a), or achieved the more detailed requirements of the curriculum when analysed according to Krathwohl's taxonomy as illustrated in Table 4.3.

From the responses and the analysis of the documents it is found that teachers do need training on how to make use of taxonomies when setting formal assessments. This is needed to assist teachers to move away from using previous or published papers and to be creative in setting their own formal assessment to a high standard and acceptable curriculum coverage. The combined taxonomy can also assist the Head of Department or Subject Head when they moderate the formal assessments of the teachers.

#### **4.4 Conclusion**

The research had fifteen participant teachers from Johannesburg East District that completed questionnaires based on the main research question as a single case study. The questionnaire was previously tested with an expert pilot group of five teachers from Tshwane South District. The participant teachers were requested to submit their Grade 12 Theory Preliminary examinations as well as the analysis grid used when setting formal assessments.

During analysis of the responses to the questionnaire similar responses were grouped according to common themes, and three themes namely standardisation, time and style/format were found. The summaries are as follows:

- i. Formal assessments must be based on the curriculum as all teachers have to follow the same teaching plan (as distributed in Table 4.3). The negative aspect of setting one's own formal assessment is that different standards that are set by each teacher, as every teacher sets the formal assessments according to what they have actually taught the learners and may avoid more challenging sections of the curriculum, and their higher cognitive demands as was seen in the analysed examination papers (Table 4.4 to Table 4.7).
- ii. Teachers prefer to buy question papers from publishers as these papers are (according to them) of a high standard, even though this statement was also shown to be not as accurate as expected (as shown in Table 4.6). It also helps them as teachers because it saves time, but by only copying or minimally changing some of the questions (as shown in Table 4.8 and Table 4.9). This has the consequence that the question papers are not according to the requirements of the Department of Education. In the end copying and changing previous/published question papers is more time consuming as teachers need to ensure that all the sections of the curriculum are covered and that the difficulty levels expected by the Department of Education and the cognitive levels envisaged in the curriculum are achieved.
- iii. Teachers prefer to use previous/published papers as the style/format of these papers is according to them of a good standard and no changes need to be made. It is found that even when teachers only make use of the style/format of previous/published papers (Table 4.8 and Table 4.9) the type of changes that they do make are not effectively moderated (Section 4.3.4) and that the moderator (in that case) worked only on the format of questions asked (as illustrated in Figure 4.1) and did not address content, difficulty or cognitive levels.

Unfortunately the research was not able to analyse the use of an analysis grid by the teachers themselves, as none of the teachers were able to provide any type of taxonomy at all. The explanations given by teachers indicate that they feel they did not have the time to evaluate the preliminary theory examination with a taxonomy, whether they used previous or published papers (papers purchased from publishers or downloaded from the Internet) and generally did not themselves design the papers.

The findings derived from the questionnaire and document analyses provide answers to the research questions. These answers are explained and discussed in Chapter 5.

## **Chapter 5: Summary, Recommendations and Conclusion**

### **5.1 Introduction**

In the previous chapter the teachers' experiences and opinions concerning formal assessment were discussed, and their preliminary formal assessments were analysed.

This chapter is presented:

- to identify answers to the sub-questions of the research;
- to explain the limitations of the research (Chapter 3);
- to discuss the implications for policy and practice of the study (Chapter 2); and
- to discuss any further research based on the findings (Chapter 4), methods and concepts (Chapter 3).

### **5.2 Findings pertaining to research sub-questions**

To be able to make a connection between the background of the study and the literature review, the research focussed on the three research sub-questions to lead to the solutions for the main question. The three research sub-questions guided the research during the literature review as well in the analysis of results to establish the findings.

#### **5.2.1 “What are teachers’ opinions and experiences of formal assessment?”**

The participant teachers are very positive about the CAPS document implementing the setting of formal assessment by teachers themselves.

A prime concern that was mentioned is the time factor, as some teachers believe that it is very time consuming to set a formal assessment from scratch. It was found that only five teachers of fifteen participants had more than two years experience of setting their own formal assessments. The remaining ten teachers only began to set their own formal assessments at

any grade (including Grades 10 and 11) due to the CAPS in 2012, once the publisher from whom they usually obtained papers had stopped supplying them.

Using only tests as formal assessment helps the teachers with the control of the learners' work as well. It was found that the teachers prefer tests above tasks set for learners because the learners complete the tests on the same day and time and there is no problem with submission.

Teachers expressed the concern that using an analytical tool such as a taxonomy, or even the limited grid supplied by the Department of Education, was time-consuming when explaining their failure to supply their analysis of the question papers they had set.

A secondary concern expressed by teachers was the standardisation of the questions across teachers and schools. The fear was expressed that teachers would set questions only on work actually covered by them. This appeared to be confirmed by the diverse coverage of the content and cognitive levels addressed by the supplied papers found during document analysis.

Some teachers linked the format and style of past papers or papers supplied by publishers to a perception of a high standard. This was also seen in the moderation of papers, where style and presentation were addressed by the moderator, but curriculum coverage in knowledge or cognitive levels or difficulty was not addressed.

It can be concluded that although teachers express the view that they support the setting of papers themselves, they do not in fact confidently set their own questions, and, in spite of experience or lack of experience, do not critically assess their own papers for coverage of the intended curriculum.

### **5.2.2 “To what extent do teachers know, understand or use taxonomies when setting formal assessments?”**

By analysing the questionnaires and the documents in Section 4.2 and Section 4.3 it was evident that teachers only focus on the style/format of formal assessment. Even though they strongly believe that it is important to have formal assessment of a good standard, their main

concern is that some teachers might only teach what they asked and what they asked might be too easy.

Unfortunately an investigation of teacher-supplied analysis grids or taxonomy tables was not possible as none of the participant teachers provided a grid. Teachers who explained their inability to provide such an analysis pleaded insufficient time to have done so. This leaves one with the suspicion that teachers did not use a grid or taxonomy or do not have the skill to draw one up.

Preliminary examination papers that were received were analysed with an adapted form of Krathwohl's taxonomy which included the Department of Basic Education's rather superficial grid. The analysis using the adapted taxonomy was also applied to the CAPS curriculum, in order to establish what a full coverage might have been able to achieve.

These results of the analysis with the combined taxonomy shows that none of the question papers followed the guidelines (of primarily a balance of difficulty) provided by the Department of Education (Department of Basic Education, 2011a), nor did they align the questions to a higher cognitive level to evaluate the learners ability to solve problems by making use of analysis, evaluation and creation. Low cognitive level questions dominated the papers. In the case where an unaltered publisher-supplied paper was used, broad thematic coverage was found, but even then the balance of cognitive levels possible in the intended curriculum was not achieved, and a critical analysis shows that this paper also failed to achieve the higher cognitive levels.

Although the suspicion is raised that the teachers do not use, or are not able to analyse their own question papers according to the simplified taxonomy of the Department of Basic Education, or a more advanced taxonomy that analyses the intended CAT curriculum, it is somewhat confirmed through the fact that the distributions of the papers supplied do not conform to either of the taxonomies.

In order to improve assessment consistency and standards training in assessment appears to be required by teachers, which leads to the third sub-question.

### 5.2.3 “What are the teachers’ views on training for formal assessments?”

In this case the views of the participant teachers were split into two groups according to positive or negative opinions and concerns.

Four of the participant teachers believe that training will be positive as training is important for keeping teachers aware of the new content. It will also help teachers to know what is expected from the learners at the end of the year for the final external examination. Training will also assist teachers with communication and sharing of ideas with other teachers.

Nine of the participant teachers believe that they are not in need of training because with the use of previous/published papers there is enough support and help on how to set a formal assessment examination.

Three of the participant teachers believe that training is only needed for new/inexperienced teachers just starting teaching the subject.

Although the evidence derives from only a single paper, it appears that teachers who moderate papers attend mainly to the style and format of the question paper and not to the cognitive levels or content coverage of the questions.

It may be concluded that while training is appreciated as useful, at least for less experienced teachers, there is little understanding of the need for training regarding assessment techniques, the demands of the curriculum and cognitive taxonomies amongst all CAT teachers. It appears all would benefit from further training in curriculum principles and assessment in particular.

## 5.3 Findings pertaining to the main research question

*“What are the practices, experiences and opinions on the assessment of CAT as implemented by teachers?”*



In answering the main research question each of the subsections of the question is examined, and the findings derived from the sub-questions are considered.

### ***Practices***

Firstly it was found the teachers preferred to use previous or published papers when setting their preliminary examination. This was done generally by copying and pasting the questions into their “own” question paper and only changing the numbering of the question and the mark allocation of the question. Rarely, the names of people or places mentioned in scenarios in the derived question were changed.

Secondly, teachers have a limited period of experience in setting formal assessment. Nine of the participant teachers began setting formal assessments as recently as in 2012 and one indicated that he/she has always used previous/published papers. Five teachers indicated that they were experienced in setting formal assessments but none provided question papers. One of the latter responded that they appreciated being able to set their own paper as then they could set the paper to exactly what they have taught.

Teachers generally have little experience in setting their own assessments, and yet do not in fact confidently set their own questions, and regardless of claimed experience do not critically assess their own papers for coverage of the intended curriculum.

Formal assessment for CAT is not adequately implemented by teachers as they appear to have only a vague concept of what is required in setting formal assessments, and do not apply formal analysis processes when setting their own assessments.

### ***Experiences***

It was found that the teachers prefer tests above tasks set for learners because the learners complete the tests on the same day and time and there is a reduced problem with submission of tasks by learners (whom a teacher described as “lazy to complete tasks”).

Teachers claimed that using an analytical tool such as a taxonomy, or even the limited grid supplied by the Department of Education, was time-consuming when explaining their failure to supply their analysis of the question papers they had set.

The fear was expressed that teachers would set questions only on work actually covered by them which seemed to be confirmed by the diversity of coverage of the content and cognitive levels addressed by the supplied papers which was found during document analysis, as well as the response by an experienced teacher that he was able to set the test to suit what he had taught.

### *Opinions*

The opinions on assessment by teachers themselves were positive towards making use of tests but generally negative towards setting their own because of it being considered time consuming. A positive opinion was essentially that self-setting allowed teachers to set the test to what they had taught, which raises concerns about the necessity of independent moderation and controls.

In order to improve assessment consistency and standards training in assessment appears to be required by teachers. It may be concluded that while training is appreciated as useful, there is little concept about training regarding assessment techniques, including the demands of the curriculum and cognitive taxonomies.

The practices of teachers indicate a predominant reliance on papers set by others with the expectation that these satisfy the requirements of the Department of Basic Education and the intentions of the curriculum. Teachers pointed out that the potential for abuse or inadequacy of a process in which teachers may set questions to suit what they have taught, rather than according to the requirements of the curriculum and this is to be noted as document analysis seemed to confirm the danger of selection of less challenging components of the content, which in the longer term may lead to a deterioration of teaching standards. This may require enhanced mechanisms for support and moderation and monitoring of teachers across schools. The need for training regarding curriculum and assessment is evident, but experienced teachers do not appear to be positive to this eventuality, while accepting the need for others.

## 5.4 Limitations of the research

A general limitation is the fact that the nature of the research and its limited case study design does not allow generalisation beyond the 15 participants who returned the questionnaire, of whom only four supplied their preliminary examination papers. Only a limited conclusion can be drawn regarding their representivity of CAT teachers beyond the district from which they came, although they are close to half the CAT teachers in that district.

There are further limitations that require significant caution when seeking to apply the conclusions of this research.

Firstly, none of the participant teachers provided the research with an analysis grid.

Secondly, and as a consequence of the absence of teacher supplied grids, analysis of question papers against the grid and specifications of a balance of difficulty supplied by the Department of Basic Education as well as the two-dimensional Krathwohl taxonomy relied on the limited number of question papers provided. A better understanding of the teachers' knowledge and appreciation of the cognitive levels, the content coverage and the balance of difficulty expected by the Department of Education guidelines, as well as how their use of a taxonomy during the setting of formal assessments might have been gained if a greater number of papers had been available. This improved understanding may have contributed to training interventions that are more able to address the teachers' needs.

Currently, we are able to conclude that the use of a grid by teachers is unlikely, that teachers generally appear to not use careful analysis of the curriculum, the guidelines and any other taxonomy when setting questions for formal assessments, rather they use previous or published papers as models and in many cases directly, and expect that these provide sufficient assurance of the requisite standard. However this cannot be claimed definitively, as teachers who did not supply either question papers or grids may have done so for other reasons which were not established, as follow-ups with teachers were of limited success.

Follow-up meetings and interviews with participant teachers were not held in order to establish further possible reasons or practices. This limitation was partly due to the promise of anonymity that was given to teachers in the case of the questionnaire.

A delimitation was the specific choice to address the theoretical component of the CAT curriculum only. A similar analysis of a practical component would be well served by direct classroom observation. Attending to theory only, obviated this need, but limits the view of formal assessment that could be gained.

It must also be noted that these limitations restrict the possibility of extending this limited picture of the training needs of the CAT teachers in the meaning and scope of curriculum and assessment design processes to those of other subjects.

The research performed here, which involved an analysis of the question papers supplied by teachers using the adapted Krathwohl taxonomy, involves the researcher's view and interpretation of the cognitive levels of the taxonomy. Someone else may have placed the items of the test differently, leading to the need for an "inter-observer" reliability measure. This is a source of bias, as potential inter-observer (or inter-researcher) consistency or reliability has not been established. However, this bias has been addressed to some extent in that the researcher also mapped the Grade 12 curriculum, and the analysis is based on a comparison between the coverage of the curriculum itself (as a map within the 2-dimensional taxonomy) and the coverage of the question papers. To support the findings, this relative difference between the coverage maps is required. A second person may perform their own mapping of the curriculum and of the question papers (as supplied in the appendices) and although obtaining different absolute maps, if the taxonomy is consistently applied, should still be able to establish the trend of the difference between the curriculum and the question paper maps, which should lead to similar conclusions as found here. None-the-less, this potential source of bias must be considered by the reader.

## 5.5 Further research

With the implementation of CAPS, formal assessments set by the teachers will determine learners' performances. Therefore further research is recommended to determine the influence of teacher-based formal assessment on learners' performance in CAT by 2014 (this is when the first group of Grade 12s will write their final examination based on CAPS) as well as the extent to which teachers conduct or analyse their own assessments, and the reasons some may not.

Greater emphasis is placed on higher cognitive levels in setting formal assessment. The demands of the CAT curriculum with regard to more practically oriented theme of Solutions Development with the CAPS curriculum as it is phased in during 2013 and 2014 raises the question of the extent to which the "Higher Application" cognitive level proposed by Johnson et al. (2007) is addressed in teaching, learning and assessment future.

It is recommended that further research be done on the use of an instructional design taxonomy in developing instruction and formal assessment based on skills and knowledge development in the practical component of the CAT curriculum. A framework for analysis of practical tasks may be that of Gagnè (Gagnè et al., 2005) and the psychomotor taxonomy (Kubiszyn & Borich, 2007, p. 99) may be added to a cognitive taxonomy for this case.

The research made use of a small sample of teachers from one district only because of this research was designed to be limited in scope and time period. A further recommendation is that a similar study is conducted in a wider sample of districts from Gauteng, with possible extension to the taxonomy to better establish the training needs of teachers.

## 5.6 Contributions of the research

This research is timeous during the establishment of the requirement for teachers to set their own formal assessments in the preliminary examinations for CAT in Gauteng.

The research has identified potential limitations when teachers set their own examinations. Teachers tend to rely on the use of examination papers set by others on the expectation that these satisfy the requirements of the Department of Basic Education regarding a balance of difficulty, provide appropriate coverage of the curriculum and satisfy the cognitive assessment expectations of the curriculum. The potential for abuse and inadequacy of assessments across schools was raised by teachers themselves. A need for training in principles of curriculum and assessment for both pre-service and in-service teachers has been identified, as well as the need for monitoring and moderation across schools.

The research used as an analytical tool of both the curriculum and the teacher-supplied question papers an adapted form of the two-dimensional taxonomy introduced by Krathwohl, as extended by the addition of the “Higher Application” level above those of analysis, evaluation and creation as suggested by Johnson et al. (2007) for the computing disciplines. This taxonomy has shown its efficacy through its use to map the potential cognitive demands of the CAT curriculum as well as the examination papers supplied by teachers to allow their comparison.

## **5.7 Conclusion**

The extent to which teachers align teaching and formal assessment of CAT is limited. Teachers rely on textbook publishers and old departmental papers to identify the gaps in teaching as well as providing feedback to the learners in order to affect the alignment. A greater focus needs to take place on teachers’ own formal assessments and their knowledge on the different cognitive levels in using taxonomies. Training programmes for both pre-service and particularly in-service teachers need to address the principles of curriculum, assessment and the analysis of assessments and curriculum in order to ensure a strong alignment between them is strongly advised.

The research has already proved to be invaluable to me as a researcher as I was able to alert the teachers in my district in curriculum forum meetings and during content training of the need to align curriculum, teaching, learning and assessment. The examples of how to use Krathwohl’s two-dimensional taxonomy table together with the analysis grid of the

Department of Basic Education has been presented to the Head Office coordinator and fellow subject advisors and has been favourably received.

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## Appendix A: Questionnaire

### Assessment in Computer Application Technology

1. How do you feel about the fact that the CAPS stated the type of assessment will only be in the form of tests/exams?

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2. When last did you set an exam question paper from scratch (1 year, 2 years, etc.)?

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3. Do you prefer to buy a set question paper from the publisher? Motivate your answer.

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4. If you make use of an Old National/Published exam paper do you make any changes to the scenarios? Motivate your answer.

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5. Do you feel that there must be training on how to set question papers for CAT teachers? Motivate your answer.

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6. Do you prefer formal tests/exams above tasks? Motivate your answer.

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## Appendix B: Letter of Informed Consent

**Faculty of Education  
Department Science, Mathematics and  
Technology Education**

Dear Participants

I, Magdalena P Brits (Ena), undertakes this research study. I am a part time student in my final year of my Masters degree in Computer Integrated Education at the University of Pretoria. My supervisor is M Mihai and my co-supervisor is Prof. M. Braun. My research topic for my final dissertation is about assessment techniques for Computer Application Technology teachers.

You are invited to participate in a research study. The following information regarding the research study is provided so that you are at liberty to decide if you would like to participate. Your participation is voluntary and you may withdraw your participation at any stage during the research process, prior to the reporting of the findings for the project. You will also have the opportunity to review the findings prior to publication and will be able to provide advice on the accuracy of this information.

The researcher guarantees that in this study, non-disclosure, no betrayal, informed consent and confidentiality agreements will be prioritized. The respondents, examination documents will not be identified by names and where pseudonyms are used they shall not link or identify the real and actual. Ethical procedures will be followed with the questionnaire that will be handed out during the curriculum forums. The research process includes questionnaire that are completed by you as CAT teacher as well as examination document analysis with the use of the national grid. All items in which you participate in will remain confidential and anonymous.

It is also my intention to discuss with you the findings before the research study is finalised.

The research results, in the form of a mini dissertation and will be used to meet the requirements for a Masters in Education degree in Computer Integrated Education, Department of Science, Mathematics and Technology Education at the Faculty of Education, University of Pretoria.



The dissertation will therefore become public domain for the scrutiny of examiners and the academic community. The findings may as such be used for publication in academic articles and for presentation at academic conferences.

As such, confidentiality and anonymity will be guaranteed. If you are willing to participate in this research, please sign below in the space provided by this letter as a declaration of your consent i.e. that you participate willingly and that you understand that you may withdraw from the study at any time prior to publication of findings.

**Participants Signature:**



**Researcher's Signature:**

**Date:** 25/09/2012

Should you have any queries about the research and/or the contents of this letter, please do not hesitate to contact me for further information or my supervisors.

**Yours faithfully**

**MEd Candidate and Researcher – Ena Brits - (cell: 082 494 4788)**

**Research Supervisor - Mrs. Maryke Mihai (Cell: 082 430 2928)**



## Appendix C: Letter of Informed Consent

**Faculty of Education  
Department Science, Mathematics and  
Technology Education**

Dear Subject Facilitator - CAT & IT

I, Magdalena P Brits (Ena), undertakes this research study. I am a part time student in my final year of my Masters degree in Computer Integrated Education at the University of Pretoria. My supervisor is M Mihai and my co-supervisor is Prof. M. Braun. My research topic for my final dissertation is about assessment techniques for Computer Application Technology teachers.

You are invited to participate in a research study. The following information regarding the research study is provided so that you are at liberty to decide if you would like to participate. Your participation is voluntary and you may withdraw your participation at any stage during the research process, prior to the reporting of the findings for the project. You will also have the opportunity to review the findings prior to publication and will be able to provide advice on the accuracy of this information.

The researcher guarantees that in this study, non-disclosure, no betrayal, informed consent and confidentiality agreements will be prioritized. The respondents, examination documents will not be identified by names and where pseudonyms are used they shall not link or identify the real and actual. Ethical procedures will be followed with the questionnaire that will be handed out during the curriculum forums. The research process includes questionnaire that are completed by you as CAT teacher as well as examination document analysis with the use of the national grid. All items in which you participate in will remain confidential and anonymous.

It is also my intention to discuss with you the findings before the research study is finalised.

The research results, in the form of a mini dissertation and will be used to meet the requirements for a Masters in Education degree in Computer Integrated Education, Department of Science, Mathematics and Technology Education at the Faculty of Education, University of Pretoria.



The dissertation will therefore become public domain for the scrutiny of examiners and the academic community. The findings may as such be used for publication in academic articles and for presentation at academic conferences.

As such, confidentiality and anonymity will be guaranteed. If you are willing to participate in this research, please sign below in the space provided by this letter as a declaration of your consent i.e. that you participate willingly and that you understand that you may withdraw from the study at any time prior to publication of findings.

**Participants Signature:**



**Researcher's Signature:**

**Date:** 01/09/2012

Should you have any queries about the research and/or the contents of this letter, please do not hesitate to contact me for further information or my supervisors.

**Yours faithfully**

**MEd Candidate and Researcher – Ena Brits - (cell: 082 494 4788)**

**Research Supervisor - Mrs. Maryke Mihai (Cell: 082 430 2928)**

## Appendix D: GDE research approval letter



**education**  
 Department: Education  
**GAUTENG PROVINCE**

<b>For administrative use:</b> <b>Reference no. D2012/135</b>
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### GDE RESEARCH APPROVAL LETTER

Date:	2 August 2011
Name of Researcher:	Brits M.P.
Address of Researcher:	P.O. Box 14944
	East Lynn
	Pretoria
	0039
Telephone Number:	012 800 2503 / 082 494 4788
Fax Number:	None
Email address:	enabrits@yahoo.com magdalena.brits@gauteng.gov.za
Research Topic:	A potential computer application technology teaching strategy for teachers in Gauteng High Schools
Number and type of schools:	THIRTY Secondary Schools
District/s/HO	Ekhuruleni South; Gauteng West; Johannesburg East; Sedibeng East

#### **Re: Approval in Respect of Request to Conduct Research**

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

1. The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.

1

*Making education a societal priority*

#### **Office of the Director: Knowledge Management and Research**

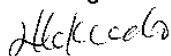
9<sup>th</sup> Floor, 111 Commissioner Street, Johannesburg, 2001  
 P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506  
 Email: David.Makhado@gauteng.gov.za  
 Website: www.education.gpg.gov.za

*He Keeso*

2. *The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.*
3. *A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.*
4. *A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.*
5. *The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.*
6. *Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.*
7. *Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year.*
8. *Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.*
9. *It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.*
10. *The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.*
11. *The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.*
12. *On completion of the study the researcher must supply the Director: Knowledge Management & Research with one Hard Cover bound and an electronic copy of the research.*
13. *The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.*
14. *Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.*

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards



Dr David Makhado

2011/08/02

Director: Knowledge Management and Research

**Office of the Director: Knowledge Management and Research**

9<sup>th</sup> Floor, 111 Commissioner Street, Johannesburg, 2001  
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506  
Email: David.Makhado@gauteng.gov.za  
Website: www.education.gpg.gov.za

## Appendix E: Analysis grid of the Department of Education

Suggested Question Analysis CAT Gr 12																	
FORMAL ASSESSMENT - PAPER 2 THEORY EXAMINATION																	
		TOPIC AREAS					COGNITIVE LEVELS					Section A			B	C	Total
		Systems technologies	Internet & Network tech	Information management	Social implications	Solution development	Total	Conceptual Knowledge Information-gathering	Comprehension & Application Building understanding	Analysis & Problem-solving Productive thinking	Total	Multiple choice	Modified True or false	Matching columns	Section B short & longer type questions	Section C Integrated scenario	
A	1.1					0				0							
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	2.1					0				0							
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	TOTAL (A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		25	15	10	10	15	75	Level 1 (Lower)	Level 2 (Middle)	Level 3 (Higher)	75				75		75
B	3.1					0				0							
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	4.1					0				0							
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	5.1					0				0							
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	6.1					0				0							
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	TOTAL (B)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
						50	Level 1 (Lower)	Level 2 (Middle)	Level 3 (Higher)	50				50		50	
C	7.1					0				0							
	TOTAL (C)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	GRAND TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

**FINAL ANALYSIS SECTION B**

	TOPIC AREAS					Total
	Systems technologies	Internet & Network tech	Information management	Social implications	Solution development	
<b>MIN Norm</b>	25	15	10	10	15	75
<b>CHECK</b>	-25	-15	-10	-10	-15	-75

**FINAL ANALYSIS**

	COGNITIVE LEVELS			Total
	Conceptual Knowledge Information gathering	Comprehension & Application Building understanding	Analysis & Problem-solving Productive thinking	
	Level 1 (Lower)	Level 2 (Middle)	Level 3 (Higher)	
	30%	40%	30%	100%

**FINAL ANALYSIS QUESTION TYPES**

Section A			Total
A	B	C	
25	75	50	150
-25	-75	-50	-150

**Spread for Section B - Read worksheet: Notes**

for 150 marks	25	15	10	10	15	75	Gr 12 June/Year End, Gr 11 Year End	3 hrs	1.2 marks per minute
for 125 marks	21	13	8	8	13	63	Gr 11 June	2½ hrs	1.44 marks per minute
for 120 marks	20	12	8	8	12	60	Gr 10 Year End	2 hrs	1.5 marks per minute
for 100 marks	19	11	0	9	11	50	Gr 10 June (Info Man/PAT done in Term 3)	1½ hrs	1.8 marks per minute
	Systems technologies	Internet & Network tech	Information management	Social implications	Solution development	TOTAL			

## Appendix F: Preliminary Examination of T1

### SECTION B

Read the scenario below carefully as the questions that follow are based on it.

#### SCENARIO

A group of Computer Applications Technology (CAT) learners ( Ben, Xolani , Tersia, Tasneem and Keshnee) set up a computer club with some new and old computers in a room at their school. Members of the club allow other learners to access the internet and play games, and also answer any computer – related queries for a small fee .Some of the old computers must either be upgraded or replaced

#### QUESTION 3

- 3.1 Give the Three main hardware components of a computer whose specifications you should know when purchasing a new computer (NOTE : This excludes any peripheral devices and a graphics card) (3)
- 3.1.1 The group is considering raising funds to purchase two laptop computers  
Name TWO possible advantages of a laptop compared to a desktop PC (2)
- 3.1.2 When buying a laptop , name TWO specifications and accessories that you will need to find out about that are specific to laptops as opposed to desktop computers.  
(2)
- 3.2 keshnee wants to remove a game she installed from her PC .Tasneem says she cannot simply delete the folder in which it has been stored ,as it can cause problems.  
Name ONE safe way of removing the game from the PC. (2)
- 3.3 Xolani cannot open a file called *Prices.docx* that he received as an attachment to an e-mail  
Name TWO ways in which he may be able to open the document (2)
- 3.4 Ben bought a ‘home’ edition of a popular photo editing program  
What is the difference between *home editions* and *professional editions* of a software ,other than costs?
- 3.5 Users often tend to overlook the importance of using a good quality mouse and keyboard .Ergonomics considerations also need to be taken into account
- 3.5.1 Briefly explain what is meant by the term *ergonomics*. (2)
- 3.5.2 Name TWO features of an ergonomically designed keyboard (2)

3.5.3 How does a cordless mouse communicate with a PC? (2)

3.5.5 Name TWO possible disadvantages of using a cordless mouse (2)

#### QUESTION 4

4.1 The team feels that it is important to connect their computers and computer equipment in a LAN or Local area network. A new computer has been bought to act as a file server for the network.

4.1.1 Name THREE broad advantages of using a LAN, other than computer games (3)

4.1.2 Name TWO possible disadvantages of using a LAN, NOTE: This excludes any problems related to the internet connectivity. (2)

4.1.3 Name TWO possible advantages of connecting the computers using wireless technology (2)

4.1.4 Name ONE possible disadvantage of connecting the computers using wireless technology. (2)

4.1.5 Name ONE possible hardware specification where a file server may differ from a normal computer by briefly referring to the of a file server in a network. (2)

4.1.6 Backing up the entire file server takes a long time.

Name TWO practical ways in which the number and size of files that have to be backed up each time can possibly be reduced. (2)

4.2 Upon investigation, the team discovers that many schools ban the use of websites, such as Face Book and YouTube.

4.2.1 Briefly describe the function or purpose of the YouTube website. (1)

4.2.1 Briefly explain how the schools may prevent the learners from accessing these websites. (1)

4.2.3 Give a technical reason why schools may choose to ban sites, such as Face Book and YouTube.

4.2.4 Give TWO other reasons (other than the answer you gave in the previous question) why schools may choose to ban sites, such as Face Book and YouTube. (2)

4.2.5 Explain how the history teacher can make content from the YouTube website accessible for all her learners if the school does not allow learners access to the site. (2)



- 4.3 Some learners downloaded photographs of the volcano in the Iceland from the internet for a Geography project .
- 4.3.1 Are learners allowed to use these photographs as is ,if they ‘came from Google’ ?  
Briefly motivate your answer. (2)
- 4.3.2 Zinhle noticed that the resolution of the downloaded photographs was much lower than those taken by digital cameras.  
Give TWO reasons why this may be the case (2)

## QUESTION 5

5.1 The school secretary received the following-mail

*Dear Standard Bank Customer*

*We are sending this e-mail to inform you that we have had a major server update without prior notice*

*Therefore you will need to login to your online bank account and some information to continue using this service*

*We are sorry for any inconvenience cause but we are dedicated to bring you the best possible service we can and this means keeping you safe*

*Please click the following link to update your account*

<https://www.standardbank.co.za/updates/internet-banking/>

*Sincerely : Standard Bank*

- 5.5.1 The web address given in the e-mail starts with **https**. Briefly explain what the **https** Usually refers to or signified, The actual meaning of the acronym /abbreviations is NOT required (1)
- 5.1.2 Give TWO reasons that will make you cautious or suspicious of this e-mail (2)
- 5.1.3 Name TWO ways in which you can confirm that this e- mail is fraudulent (not- ‘genuine’) (2)
- 5.1.4 What is the generic or general name given to this type of activity (2)
- 5.1.5 Name TWO ways you can make sure you do not become a victim of this type of activity. (2)
- 5.2 While doing some research on the internet on the impact on rural communities .Mpho came across an article in which the following was stated :

‘ Africa is a continent with a large gap between communities who have access to and can make effective use of ICT technologies such as smart phones , and those that do not ‘

- 5.2.1 While phrase is often used to describe this ever-widening gap between communities that have access to technology and those that do not? (1)
- 5.2.2 Name TWO practical ways, other than providing additional funding to make this gap smaller (2)
- 5.2.3 What is the main or essential difference between a smart phone and a normal Cell phone (2)
- 5.3 Mpho suggested to his uncle ,who is a manager on a local game farm looking after wild animals ,that they use Google Earth to determine the GPS coordinates of the game farm and on the website of the game farm.
- 5.3.1 What type of communication technology or medium do GPS system use ? (2)
- 5.3.2 Why would it be a good idea to place GPS coordinates of the game farm on the website ? (2)
- 5.3.3 Give ONE more application of GPS technology that the game farm can make use of (other than your answer on QUESTION 5.3.3) (2)

## QUESTION 6

- 6.1 Jabu struggles to control the mouse as he finds the movement to be erratic Suggest how his problem can be solved if .
- 6.1.1 The mouse is a mechanical mouse with the ball inside. (2)
- 6.1.2 The mouse is an optical mouse. (2)
- 6.2 As one of the monitors was stolen a new monitor has to be bought
- 6.2.1 Give one reason of choosing a CRT monitor. (2)
- 6.2.2 Give two reasons of choosing a flat panel monitor. (2)

6.3 The computers are linked in a network. List THREE devices or peripherals that you need to connect computers in a network. (3)

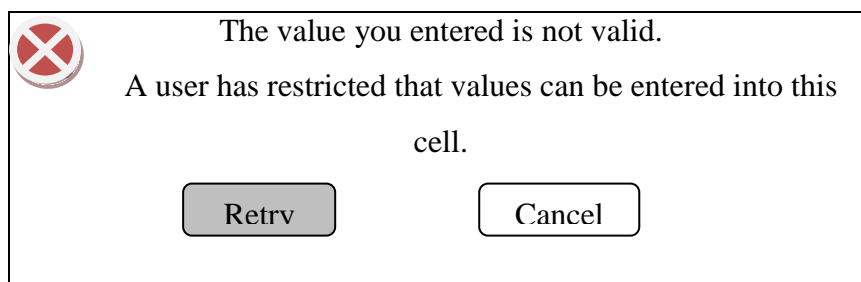
6.4 Sam had to keep a running total of all the expenses and hours worked.

	A	B
1	<b>RUNNING EXPENSES</b>	
2	PAPER	R 75.00
3	COLOURED CARD	R 12.95
4	SCISSORS	R 11.99
5	ENVELOPES	R 20.00
6	<b>TOTAL</b>	#####
7		
8	<b>HOURS WORKED</b>	
9	JOHN	5,5
10	PETER	4.5
11	SALLY	2.5
12	WILLIAM	5.0
13	WARREN	6,5
14		
15	<b>TOTAL</b>	<b>12.0</b>

6.4.1 The total in cell B6 displays ##### .Give a solution to this problem. (2)

6.4.2 When the total for the hours worked, was checked and it was found that it was wrong  
Give ONE reason why this total is wrong (2)

6.4.3 When Sam entered an amount in the expenses column, the following message appeared on the screen :



Give ONE reason for this message appearing (2)

## QUESTION 7

7.1 Evaluate the following street pole advertisement for the concert and suggest FOUR ways in which the layout could be improved. (8)

## **VARIETY CONCERT!!!!!!!!!!!!!!**

### **DATE**

**16 DECEMBER 2011**

### **COME AND ENJOY**

### **VENUE**

**HIGH SCHOOL**

**SKYVIEW**

**0 8:00 – 15:00**

### **PERFORMING ARTISTS**

**LOLO AND THE POPS**

**THE QUEENS**

**GROTEGESIGTE**

**TEEN ROCKETTES**

**NORTH ROAD CHOIR**

**TINCAN JALOPPIES**

### **TIME**

7.2 The team members debate the topic of internet banking.

7.2.1 Identify TWO possible benefits of the internet banking for the school.

(2)

7.2.2 Identify TWO benefits to the bank if more people were to use the internet banking to do their banking.

(2)

7.2.3 State TWO security measures that will help prevent unauthorized access to the bank account of the school, from the bank or user's side.

(4)

### **QUESTION 8**

8.1 You open your e-mail and notice that you have an e-mail from one of the guest artists.

The e-mail contains an attachment called gucx .exe. You are warned that the attachment might contain a virus .

8.1 .1 Define the term *computer virus*.

(2)

8.1,2 GIVE TWO reasons why you would NOT want a computer virus on your computer.

(2)

8.1.3 Describe how you would check that the attachment is safe to open. (2)

8.1.4 Discuss ONE action you would take if the attachment you have checked contains a virus. (2)

8.1.5 Apart from the possibility of downloading a virus.name TWO other problems associated with using e-mails. (2)

8.2 Your team wishes to use internet for up-to-date information about artists .You tell them to use a search engine .

8.2.1 What is a *search engine*? (2)

8.2.2 Name TWO ways in which search engine could be narrowed or limited to produce more relevant results. (2)

8.2.3 Discuss TWO ways to decide whether the information on the website that you access is accurate and reliable, or not. (2)

8.2.4 You find some surprising information about the artists on a blog

Explain what a *blog* is. (2)

8.3 Your team wishes to develop an information sheet about the concert . The team would like to place it on the schools website. You decide to use the pdf format to do this.

8.3.1 Give ONE reason for using a pdf format. (1)

8.3.2 Predict whether people will be able to open this pdf document on their computers AND suggest a solution to assist those who have a problem in this regard.

(2)

8.3.3 Suggest another suitable format to which you can convert the document before placing it on the web. (2)

## QUESTION 9

9.1 Brian`s computer is very old and will be of no use to anybody else .

9.1.1 Suggest ONE way eco-friendly way of disposing of the computer (1)

9.1.2 Name ONE way in which he should NOT dispose his old computer (2)

9.2 Mpho has uploaded a folder that contains all the files pertaining to the project on the network. The contents of the folder, called *Mpho's files*, are as follow.

Microsoft users:	Open Office users:
Internet Budget.xis Face Book tips.ppt MXit Tutorial.ppt YouTube advantages .doc How to Surf.ppt Most Popular sites.mdb Brochure.pdf Parent Communications.dot Time logger.xis Irshaad on MXit.jpg School Logo.bmp	Internet Budget.xis FaceBooktips.txt YouTube advantages.doc How to Surf.odt Most popular sites.odt Brochure.pdf Parent communication.ott Time Logger.xis Irshaad on MXit.jpg School logo.bmp

- 9.2.1 Identify the database file in the folder. (1)
- 9.2.2 Name ONE program which can open a ,txt. file. (1)
- 9.2.3 Without seeing the sizes of, which of the image files is likely to be the largest ?  
Substantiate your answer. (2)
- 9.2.4 What does the .dot/.ott file extension indicate? (2)
- 9.2.5 Explain ONE advantage of using a ,dot/.ott file (1)

TOTAL SECTION B :130

GRAND TOTAL : 150

## Appendix G: Preliminary Examination of T2

### QUESTION 3

Ms Ledwaba wishes to upgrade an old computer by installing the latest Windows operating system.

1. Give TWO possible reasons why it may not be possible to install or run the new operating system on the old computer. (2)
  2. Write down the general name for the group of software that viruses, worms and spyware belong to. (1)
  3. Users are generally required to accept a license agreement when they install a program. Name the crime you would be guilty of if you ignore or violate the terms of the license agreement. (1)
  4. Ms Ledwaba has activated the firewall on her computer. What is the function of the firewall? (2)
  5. What do we call the process whereby disk access is speeded up by rearranging the files on the hard? (1)
  6. The operating system offers a backup utility program. You always need to make backups of your data files so that you can restore them if necessary.
  7. Give TWO reasons why you might have to restore files from backups. (2)
  8. Name ONE other electronic device containing data/information that should be backed up. (1)
  9. Also give ONE example of the data/information that may be contained on this device. (2)
- [25]

### QUESTION 4

Ms Ledwaba wishes to set up a network in the charity shop.

1. Name TWO devices or hardware she may have to buy to set up a network, besides any computers. (2)
  2. Name ONE advantage of using a network. (1)
  3. Name ONE advantage of setting up a wireless network (WLAN) in the charity shop. (1)
  4. Ms Ledwaba considers a peer-to-peer network in the charity shop.
  5. Name TWO advantages of using a peer-to-peer network. (2)
  6. Name ONE disadvantage of using a peer-to-peer network. (1)
  7. Give TWO specific reasons why the charity shop would benefit from being connected to the Internet. (2)
  8. List THREE communication devices that are commonly used to connect a computer to the Internet. (3)
  9. Ms Ledwaba has been advised to get a broadband ADSL connection to the Internet.
  10. Why have many users changed over to a broadband connection to the Internet? (2)
  11. Name TWO monthly expenses or costs that you will have to pay when using an ADSL connection. This excludes any extra cap that you may need to purchase. (2)
  12. Ms Ledwaba has heard that the new trend of cloud computing means that, amongst other things, you can store your files in the 'cloud' (the Internet). Name ONE potential disadvantage of saving copies of your data in the 'cloud'. (2)
  13. Ms Ledwaba writes a blog on her experiences in the charity shop. Define the term blog. (2)
- [20]

### QUESTION 5

Ms Ledwaba frequently uses e-mail to communicate. She has received an e-mail that appears

to be from her bank, asking for personal details such as her pin and account numbers.

1. How should Ms Ledwaba react to this e-mail? Motivate your answer by referring to the aim of this e-mail. (2)
2. Which type of fraud is this e-mail an example of? (2)
3. Explain to Ms Ledwaba why she should not write an e-mail using only capital letters. (2)
4. State TWO other guidelines one should follow when composing and sending e-mail, besides use of CAPS. (2)
5. Ms Ledwaba received an e-mail with an attachment called Checkthisout.exe.
6. What type of file has an .exe file extension? (1)
7. Why would you suggest that Ms Ledwaba NOT open the attachment? (1)
8. Many of the learners who help out at the charity shop have web-based e-mail accounts. Name ONE potential disadvantage of having a web-based e-mail account. (1)
9. Some of the learners working at the charity shop communicate via Facebook instead of using e-mail.
10. State TWO functions that Facebook offers other than sending messages. (2)
11. Suggest TWO ways in which young people can protect themselves when using a website such as Facebook. (2)
12. As many learners who work at her shop use MXit, Ms Ledwaba wishes to use it to contact them.
13. What is the main benefit of Ms Ledwaba using MXit rather than sending an SMS to each learner? (1)
14. Give ONE reason why it may NOT be a good idea to use MXit instead of SMSs. (1)
15. Some schools ban the use of cellphones during the school day as they may disturb. Other than the reason above, give an instance plus motivation never appropriate to use cellphones in the school environment. (2)
16. When Ms Ledwaba asked the learners for information, they said, 'Google it.' Explain what they meant. (2)
17. Ms Ledwaba was told to try and find the information in Encarta and on Wikipedia. Explain what a wiki is. (2)
18. Which ONE of these two sources is likely to be the more reliable source of information in terms of the accuracy of the information? Briefly explain your answer. (2)

[25]

#### Question 6

Give the output of the following commands in MS-Excel : (3)

MID (“RANU PRIYA”, 3,4)

LEFT (“TECHNOLOGY”, 4)

LEFT (“CYBER LAW”, 3)

Discuss the following and draw instances for each in a table. You may use pencil (15)

Count

CountA

CountIF

Nested If statement

Concatenate

How important is a primary key in a database? (2)

Label the following Access design table accordingly. (10)

N

Field Name

Data type



Input Mask  
 Validation Rule  
 Validation Text  
 \*Example\*

1	Image	A	B	Sbu.jpg	
2	Colour	Text	L >	Please enter vehicle colour	Black
3	Cellphone No	C	D	D	E
4		0891100505			
Vehicle Reg No	F	G	H	I	
NXK693GP		5	Type	J	
	“SUV” or “Sedan”		Sedan		

[30]

### QUESTION 7

Below is a menu for the fund-raising dinner to be held by the charity shop.

Ms Ledwaba used a word processor to create the menu.

MENU: Fund-raising Dinner

Biscuits and Pate

Fruit Cocktail

Beef Stroganoff

Chicken à la King

Carrots

Beans

Choice of Potatoes or Rice

Blue Cheese Salad

Ice Cream and Chocolate Sauce

Banana Custard

The menu can be made much more attractive by changing the font size and type, font colour or font style, such as bold, italics or underline.

1. Other than the options given above, list **THREE** other improvements that could be made (besides changes to the actual content) to improve the appearance of the menu. (6)
2. Suggest a suitable file format in which the menu can be saved, so that the menu can be viewed and printed, but where no changes to the menu can be made. (1)
3. Ms Ledwaba needs to write a comprehensive report about the activities and finances of the charity shop. She wishes to clarify the terms used on each page in her report by adding a short reference and explanation at the bottom of the pages that the terms appear on. Name the feature of a word processing program that she can use to do this. (1)
4. Ms Ledwaba wants to ensure that all headings and subheadings, as well as any others she

will add at a later date, have the same formatting.

5. What is the most appropriate feature in the word processing program to do the formatting? (2)
6. Name the feature of the word processing program that will allow you to move directly to a specific place in a document. (2)
7. Ms Ledwaba made a mistake with the name of Mr Wu in her report where she referred to him as Mr Lu. She used the Find and Replace function to correct her error, but now she has words like 'pwug-and-play' instead of 'plug-and-play' in her document. Explain how she could have prevented this error. (2)
8. Ms Ledwaba received a text file listing the names and addresses of various organisations that may donate money to her charity shop. Other than retyping it, name ONE way of inserting this list into a database program. (2)
9. Give TWO reasons why a database is better than a spreadsheet to hold the details of the possible donors to the charity shop. (2)
10. Which feature of the database can be used to make sure that only digits (numbers) are entered into the Cell Number field? Provide an example. (2).

[20]

## Appendix H: Preliminary Examination of T4

### SECTION B

#### SCENARIO:

*Sarie and Paul, your aunt and uncle, are the owners of a guesthouse called Sunny Shores Guesthouse in a small coastal town. You have been invited to spend the school holidays with them and to help them with organising their business from a computer perspective.*

#### QUESTION 3

*The first task is to purchase the necessary hardware and software for the business. They want to purchase two computers to use for managing the business as well as a few computers to put in a conference centre for the guests to use.*

Study the two adverts below and answer the questions that follow:

<b>Computer 1: Desktop</b>	<b>Computer 2: Laptop</b>
Intel Core i3-540, 3.06GHz, 4MB Cache, 1333MHz, FSB 2 GB DDR3 RAM 250 GB SATA HDD Multi SATA Drive (Upgradeable to Blu-Ray Drive) Gigabit LAN, PCI Express x16 slot Encarta Premium Suite Wireless Mouse and Keyboard Optional Monitor NOT Included 1 Year on-site Warranty Genuine Windows 7 Ultimate Microsoft Office 2010	Intel Core 2 Duo Ultra Low Voltage SU4100 1.3GHz, 2MB Cache, 800MHz FSB 2 GB DDR3 RAM 320 GB SATA HDD 1.3M Pixel Web Camera 802.11 b/g/Draft-N Wireless LAN 7-in-1 Card Reader Bluetooth 14" HD Ready TFT display 1 Year collect, repair and return Warranty Free bag and USB hub Ubuntu Linux Mozilla Firefox Open Office

3.1.1 Paul remarks that 2 GB RAM seems a small amount of *storage* for Computer 1.

Is Paul correct? Motivate your answer by clearly explaining the difference between *memory* and *storage*. Refer to the specifications for these two items from the advert for *Computer 1* in your explanation.

(4)

- 3.1.2 The advert for Computer 1 does not have a monitor included.  
Give TWO reasons why you would choose an LCD monitor instead of a CRT monitor. (2)
- 3.1.3 Write down an example of *open source system software* from either advert. (1)
- 3.1.4 Write down an example of *application software* from either advert. (1)
- 3.1.5 A USB hub is mentioned in the advert for Computer 2.
- a) Explain clearly what USB is. (No marks will be given for just expanding the abbreviation.) (2)
- b) Why would one use a USB hub? (1)
- 3.1.6 Give TWO advantages of purchasing a desktop rather than a laptop for this scenario. (2)
- 3.1.7 Clearly explain what the *14" specification* of Computer 2 refers to. (2)
- 3.1.8 Discuss the differences between the two warranty options for each computer. (2)
- 3.1.9 Give TWO disadvantages of a wireless mouse or keyboard. (2)
- 3.1.10 What is the function or purpose of the card reader listed in the advert for Computer 2? (1)
- 3.1.11 A 1.3 mega-pixel web camera is included with the laptop computer.
- Name the specification of the camera that the term *mega-pixel* refers to.
  - Describe how this specification affects the quality of the pictures taken and the space needed to store them. (3)
- 3.2 They decide to buy two printers for the business. Suggest a suitable type of printer for each of the scenarios below:
- 3.2.1 Paul and Sarie need a printer in the office that will print high volumes of black and white copies. (1)
- 3.2.2 The guests might need to print photographs for which the guesthouse will charge a fee, as well as a low volume of e-mails and documents. (1)
- 3.3 Paul wants to buy one Office Suite package and load it on all the computers.
- 3.3.1 What is an Office Suite? (1)
- 3.3.2 Give the name of the crime that Paul would be guilty of if he loads the same software on all the computers without the necessary licences. (1)

[27]

#### QUESTION 4

*Five computers are to be installed in a conference room for the guests to use. They need Internet access, and the computers will also be networked with the two computers in the office.*

- 4.1 Discuss THREE advantages of having a network for this scenario. (3)
- 4.2 Would the network in the guesthouse be a WAN? Motivate your answer. (2)
- 4.3 Paul has heard about *Skype* and thinks it would be worthwhile for his guests to use.
- 4.3.1 What is *Skype* and what is it used for? (2)
- 4.3.2 Why would *Skype* be worthwhile for their guests?  
(Your answer must *exclude* any answer you gave in 4.3.1.) (1)
- 4.4 They need to select an ISP and choose between ADSL and 3G as the method for connecting to the Internet.
- 4.4.1 Describe clearly what a broadband connection is. (2)
- 4.4.2 Explain what the function of an ISP is. (No mark will be given for just giving the meaning of the abbreviation.) (1)
- 4.4.3 Discuss TWO disadvantages of 3G over ADSL. (2)
- 4.4.4 One of the Internet packages refers to an *uncapped* connection.  
Explain what this means by referring to the concept of an Internet *cap*. (2)

[15]

#### QUESTION 5

*Sarie has taken on the task of managing the guest reservations. She mainly uses e-mail to communicate with guests. She has also decided to set up a website to market their guesthouse and intends to use online banking for the business.*

- 5.1 Whilst looking at other guesthouse websites for ideas for their website, Sarie comes across the following URL:

[http://www.finlay\\_lodge.co.uk](http://www.finlay_lodge.co.uk)

- 5.1.1 Clearly explain what each of the sections *co* and *uk* of the URL represent.  
(No marks will be given for just expanding the abbreviations). (2)
- 5.1.2 Give a suitable example of an e-mail address for the domain or website above. (1)
- 5.1.3 Some URLs begin with the prefix *HTTPS* instead of *HTTP*.  
What is the significance of the *HTTPS*? (1)

- 5.2 Sarie asks you to help her send an e-mail. She is not sure of some of the terminology.
- 5.2.1 Explain to her the difference between typing an e-mail address in the *Cc* and *Bcc* fields. (2)
- 5.2.2 She needs to reply to a message that was sent to her by a guest and is not sure whether she should use *Reply* or *Reply to all*. Clearly explain to her the difference between the two. (2)
- 5.3 Sarie has heard of the terms *search engine* and *web browser*.
- 5.3.1 Clearly explain the difference between these two terms. (2)
- 5.3.2 Give an example of a web browser other than Internet Explorer. (1)
- 5.4 Paul has heard of the term *phishing*.
- 5.4.1 Explain to Paul the meaning of the term. (2)
- 5.4.2 Give TWO measures Paul can take to protect their business against phishing. (2)
- 5.5 List THREE measures that *users* can take or can use to protect themselves when banking online. (3)
- 5.6 Social networking has become a very popular concept.
- 5.6.1 Name ONE other social networking site besides Facebook. (1)
- 5.6.2 Give ONE advantage of using Facebook to communicate with clients instead of using an e-mail distribution list. (1)
- 5.6.3 Give ONE disadvantage of using Facebook to communicate with clients instead of using an e-mail distribution list. (1)
- 5.7 Give TWO benefits of marketing and advertising the guesthouse online as opposed to using traditional print media such as magazines. (2)
- 5.8 The booking or reservation system which was previously done manually ('by hand') has been computerised and clients can now even book their stay online. Give THREE benefits to the guesthouse of having a computerised system to record and process bookings as opposed to doing it manually. (3)

[26]

## QUESTION 6

*Paul and Sarie would like to ensure that their computer systems run efficiently. They need to look at basic computer housekeeping procedures and different ways of keeping their data secure.*

- 6.1 Paul thinks that his computer may have been infected by spyware.  
Explain to Paul what spyware is. (2)
- 6.2 They need to backup their data in case their computers are damaged or stolen.
- 6.2.1 Discuss TWO procedures that they should consider when drawing up a backup policy.  
This **excludes** the *media* that they are going to use to backup their data and measures that they can take to *reduce the size of the data* that needs to be backed up. (2)
- 6.2.2 Sarie found that the quickest way to backup her data from her internal hard drive is to copy the data to a separate folder on the same hard drive.  
Explain to her why this is not a good idea. (2)
- 6.2.3 Suggest a suitable device or media that Sarie can use for her backup if the size of the data to be backed up is more than 15 GB. (1)
- 6.3 Part of their computer housekeeping routine is to defragment the hard drives of the computers.
- 6.3.1 Explain what disk fragmentation is and why a hard drive becomes fragmented. (2)
- 6.3.2 What effect does defragmenting a hard drive have on the performance of a computer? (1)
- 6.3.3 Sarie decides to defragment her computer's hard drive every day when she boots up her computer to start working on it.  
Give TWO criticisms of this practice. (2)
- 6.4 After a while Paul finds that one of the computers seems to be running out of disk space. Outline TWO ways to free up disk space besides buying any additional hardware. (2)
- 6.5 Many guests will be using the computers and Paul is concerned that the computers might become infected with viruses.
- 6.5.1 What is a computer virus? (2)
- 6.5.2 Discuss TWO ways in which a computer can become infected with a virus. (2)
- 6.5.3 Why does one need to update anti-virus software? (1)
- 6.5.4 Give the name of one popular anti-virus software package. (1)
- 6.6 Sarie is expecting to have to work long hours in front of the computer in order to get everything up and running.

Identify TWO possible health risks she could encounter and for each health risk suggest a suitable way in which she could prevent illness or injury. (4)

6.7 Sarie and Paul are keen to contribute to the environment by practicing 'green computing'. Explain THREE ways in which they can do this in their business. (3)

[27]

## QUESTION 7

*Sarie's duties include all the secretarial work for the business and she has learned to use applications such as a word processor, spreadsheet and database.*

7.1 Sarie types a letter using a word processor to be sent to prospective guests explaining different aspects of the guesthouse as well as to market the guesthouse.

7.1.1 When she has finished the letter, she realises that she has used the word *hotel* rather than the word *guesthouse* throughout the letter. Name the feature of the word processor that she can use to automatically change the word *hotel* to the word *guesthouse* throughout the document. (1)

7.1.2 Name TWO features of a word processor that will allow her to quickly format various headings throughout the document so that they have the same font size, colour and type. (2)

7.1.3 When typing the letter, Sarie notices that some of the words are underlined with a red line. Explain to her the problem and how she can fix it. (2)

7.1.4 Sarie added an automatically generated table of contents on the first page of the document. She notices, however, that one of the headings in the document does not appear in the table of contents. Explain clearly to her how to add this heading to the table of contents. (2)

7.2 Sarie decides to use a spreadsheet to keep track of the details of their guests and she has already typed in all the information.

7.2.1 Discuss TWO reasons why a database would be better for this purpose than a spreadsheet. (2)

7.2.2 Sarie is upset as she thinks she will have to retype all the information. Explain to her how she can solve this problem without having to retype everything. (1)

7.3 Below is an example of the spreadsheet that Sarie is going to create to keep track of the reservation income:

	A	B	C	D	E	F	G
1	<b>Sunny Shores Guest House</b>						



2	<b>Daily Rate per person</b>		<b>R220.00</b>				
3	<b>Guest name</b>	<b>Arrival date</b>	<b>Departure date</b>	<b>Number of days</b>	<b>Month</b>	<b>Number of</b>	<b>Total</b>
4	Mr & Mrs Young	1/11/2010	5/11/2010	4	November	4	R3,520.00
5	Mr & Mrs Smith	4/11/2010	10/11/2010	6	November	2	R2,640.00
6	Mr Radebe	5/11/2010	7/11/2010	2	November	1	R440.00
7	Mrs Mumba	17/11/2010	25/11/2010	8	November	4	R7,040.00
8	Mrs Steyn	1/12/2010	4/12/2010	3	December	1	R660.00
9	Mr & Ms Jones	11/12/2010	20/12/2010	9	December	3	R5,940.00
10	Mr & Mrs Lowers	12/12/2010	24/12/2010	12	December	2	R5,280.00
11	Mr & Mrs Singh	14/12/2010	16/12/2010	2	December	4	R1,760.00
12							
13	<b>VAT</b>						#Name?
14	<b>Total</b>						R15,525.00
15	<b>Summary of earnings</b>						
16	November						
17	December						

- 7.3.1 Whenever the number of guests in a group is 4 or more, Sarie would like it automatically to appear in a bold, red font. What feature of a spreadsheet can she use for this purpose? (1)
- 7.3.2 The formula used to determine the total cost in cell G4 is =D4\*F4\*\$C\$2. There are *relative* and *absolute* cell addresses in this formula. Give an example of each type of addressing from the formula and explain the difference between these two types of cell addressing. (4)
- 7.3.3 A SUM formula was used in cell G14 but the total seems to be incorrect. Give ONE possible reason why this value could be incorrect. (1)
- 7.3.4 What kind of formatting (besides bold and centering) has been used in row 1? (1)
- 7.3.5 What is causing the error message in cell G13? (1)
- 7.3.6 Give the name of the spreadsheet function Sarie could use to summarise the total earnings for each month at the bottom of the spreadsheet (B16:B17). (1)

7.3.7 Write down the actual formula that would have been used to calculate the length of the stay in days in cell D4. (2)

7.4 Below is a description of the fields in the database that Sarie has created to keep a record of their guests.

Field Name	Example of data	Data Type
Guest_ID	Smi0001	Text
Surname	Smith	Text
Name	James	Text
Contact_Number	0847454111	Number
Address	PO Box 1234	Text
Breakfast_Included	Yes	
Date_of_Visit	2010/09/25	Date/Time

7.4.1 Sarie chose the *Surname* field for the primary key.

Would you agree with her choice? Motivate your answer by explaining what a primary key is. (2)

7.4.2 Is the data type for the *Contact\_Number* field correct? Motivate your answer. (2)

7.4.3 What data type would be most appropriate for the *Breakfast\_Included* field? (1)

7.4.4 Explain why it would NOT be a good idea to use an input mask for the *Address* field by clearly explaining the purpose of an input mask. (2)

7.4.5 Why would it NOT be appropriate to have a default value for the *Surname* field? Motivate your answer by explaining what a default value is. (2)

7.4.6 Explain clearly what would happen (if anything) to the data in the *Guest\_ID* field if the field size were to be changed from 7 characters to 5 characters. (2)

7.4.7 Describe in broad but clear terms what Paul would have to do to generate a report in the database showing the number of guests who want to have breakfast for the month of *September* only. (3)

[35]

## Appendix I: Preliminary Examination of T14

### SECTION B

The scenario below sets the scene for all the questions that follow.

#### SCENARIO

One of your friends (John), who is living in London for his gap year, has started a small internet café for all the tourists during the Olympic Games. He needs your advice so that he can be more knowledgeable when tourists ask him questions about finding information and about e-communication.

#### QUESTION 3

John has seen the advertisements below in a computer magazine. He needs to make an informed decision about these computers.


##### COMPUTER A- BARGAIN!

ATX CASE 4 Bay  
 450W POWER SUPPLY  
 2 x 512 MB MEMORY  
 ASUS INTEL G31  
 MOTHERBOARD  
 SAMSUNG DVD WRITER 22X  
 SEAGATE 320 GIG HARD  
 DRIVE 720RPM  
 INTEL DUAL CORE ES300  
 2.6GHz CPU  
 LG 19" LCD MONITOR  
 PS2 KEYBOARD  
 PS2 OPTICAL MOUSE  
 SPEAKERS

##### COMPUTER B – CARRY-IN WARRANTEE

AMD ATHLON DUAL CORE  
 2.1 GHz CPU  
 3 GIG MEMORY  
 160 GIG HARD DRIVE  
 MODEM  
 WIRELESS LAN  
 15.6" SCREEN  
 INTEGRATED WEBCAM  
 WINDOWS 7 BASIC  
 WIRELESS MOUSE (optional)  
 OFFICE 2007 HOME  
 250 GIG EXTERNAL HARD  
 DRIVE 2.5 INCH USB  
 POWERED

3.1	When looking at the RAM of these two computers, which one will be the fastest?	(1)
3.2	Which other component could they upgrade to have an effect on the speed of the computer?	(1)
3.3	They would be interested in buying a laptop. Which one of these two computers is a laptop? Support your answer with TWO reasons.	(3)
3.4	State TWO advantages of purchasing a laptop computer rather than a desktop computer.	(2)
3.5	The advertisement for Computer B has an integrated webcam.	
3.5.1	Briefly explain what the term <i>integrated</i> means in this advertisement.	(1)
3.5.2	John still has family and friends in South Africa. Which program can he download freely that allows for voice and video communication via the internet?	(1)
3.5.3	What is the name of the technology that will be used in the software mentioned above?	(1)

	3.5.4	John has a landline and decides to get an ADSL line. Explain to him what he will be paying for each month.	(3)
3.6	In an advertisement for the ADSL contract John sees the picture below:   <b>A</b> <b>B</b>		
	3.6.1	Refer to the unit A and B are each measured in and explain to John what they indicate.	(1)
	3.6.2	What does each number in A and B represent?	(2)
3.7	The Computer in advert A is selling at a bargain price whereas Computer B is a little more expensive but has a carry-in warranty.		
	3.7.1	Why should John beware of this <i>bargain</i> price Computer A is selling for?	(2)
	3.7.2	Explain to him what a <i>carry-in warranty</i> means.	(2)
	3.7.3	Which other warranty might save him a bit of time and hassle?	(1)
3.8	John's computer at home is giving him a few problems and he needs your help.		
	3.8.1	How can he determine if it is a real problem? Give him two solutions.	(2)
	3.8.2	He is also having a problem with his external drive that he has plugged into his USB hub. What could be wrong?	(2)
	3.8.3	Why would he need to use a USB hub?	(1)
	3.8.4	John tries to print but even though the printer is in a working condition, has paper, is switched on and connected to the power socket in the wall, the printout does not go through. Give John THREE checks that he could do to work out what the problem is.	(3)
	3.8.5	The sound clip he is trying to play does not produce any sound in his speakers. The speakers are working, have power and the volume on the speakers has been turned up. What else could be wrong?	(2)
	3.8.6	John has removed all the files and programs from his computer that he does not need, but he is still lacking disk space. Name TWO utilities or features of the operating system that can be used to increase the disk space.	(2)
3.9	When John tries to save an MS Word document the software immediately takes him to the "Save As" option. Which setting has been changed to accomplish this?		(1)
			<b>[34]</b>

#### QUESTION 4

4.1	John will need MS Word, MS Excel and MS Outlook for the computers.		
	4.1.1	What will be the best software package available to suit his needs?	(1)
	4.1.2	State TWO advantages of using this type of software.	(2)

4.2	John wants to remove programs from his computer.		
	4.2.1	Would it be best to click on the icon and then push delete on his keyboard? Motivate your answer.	(2)
	4.2.2	Give him TWO steps that he should follow when he wants to remove software from his computer.	(2)
4.3	John is concerned about viruses on the computers of the internet café.		
	4.3.1	He has an anti-virus program installed on all the computers but his computers are still being affected by viruses. What advice could you give him?	(2)
	4.3.2	Explain TWO possible ways in which his computers can be infected by a virus.	(2)
	4.3.3	Other than the anti-virus notifying him, name TWO ways in which he will know his computers might have been affected.	(2)
	4.3.4	In the case of a virus / fire / theft what should John have in place? Motivate your answer.	(2)
4.4	John will also need anti-spyware software installed. Explain to him what Spyware is.		(2)
4.5	Give John one function of a firewall that will benefit him in the Internet Café.		(1)
4.6	John tries to open an attachment named <i>readthis.pdf</i> . He double clicks on the file but the contents do not make sense. Name TWO ways in which he may be able to open this document.		(2)
			<b>[20]</b>

### QUESTION 5 – NETWORK, INTERNET, BROADBANDS, CLOUD COMPUTING

The Olympics Committee think that it will be a good idea to use the Internet for marketing, entries, and notification of results. They decide against a dial-up connection and investigate broadband options.

5.1	Give one advantage and one disadvantage of using a 3G or iBurst connection over an ADSL connection.	(2)
5.2	One of the committee members wants to know what the terminologies Bandwidth and Broadband are. Briefly explain these terms.	(4)
5.3	Give two factors (besides cost) that you would need to take into account when choosing a broadband Internet connection.	(2)
5.4	Explain how dial-up connections differ when compared to broadband connections in terms of how the user is charged or ‘billed’ for them.	(2)
5.5	Name three (3) advantages of ADSL.	(3)
5.6	The organising committee opened a bank account and now want to make use of online banking. They	

	are worried about security issues such as identity theft, phishing and spyware.	
5.6.1	Why should you update your anti-spyware regularly?	(1)
5.6.2	Give two potential warning signs that you have spyware on your computer.	(2)
5.6.3	Explain what phishing is.	(4)
5.7	The Olympic Committee's Inbox is suddenly filled with spam. Give two measures they can take to help reduce the amount of spam received.	(2)
5.8	The organising committee decided to permit entries on a web page they created for the 2012 Olympics. Prospective participants can enter online or can download a PDF file and then fax it to the Olympics committee.	
5.8.1	Give one potential benefit and one potential drawback in terms of getting the participants to enter directly on-line.	(2)
5.8.2	Give two reasons why the organisers would use a PDF format instead of just posting a <i>Word</i> document on the website.	(2)
5.9	One of the committee members has heard of Cloud computing and is trying to get the committee to make use of it. What is Cloud computing, where does the name come from and name two benefits?	(7)
5.10	Name any 3 types of cloud models.	(3)
		[35]

### QUESTION 6 – EMAIL, SOCIAL NETWORKING, ETC.

6.1	Peter, one of the Olympics committee members, mentioned at the previous meeting that blogs are becoming very popular and asked whether the committee shouldn't create a blog instead of a website to showcase the Olympics. Why do people create a blog rather than a website?	(2)
6.2	Name ONE very common or popular site where you can create a blog for free.	(1)
6.3	Sarah, a member of the committee has heard of Twitter and Pintrest. Advise what each one is and which one would be more beneficial for the Olympics, and why.	(6)
6.4	Damian, another member of the committee, wants to send his photos of the athletics meet to the rest of the committee members. Matilda complained about the amount of 'cap' that will be used to download it. What does the term 'cap' refer to?	(1)
6.5	Damian has a high resolution camera and he might have a problem if he wants to email his photos. Describe two methods of how he can reduce the size of his attachments that he wants to email?	(2)
6.6	Some committee members have expressed that they get confused with the "To", "Cc" and "Bcc" at the top of an email. Explain to them what each one is used for.	(5)

6.7	The head of the Olympics committee asked you to inform the committee about email etiquettes they should be aware of when sending emails. Name any TWO such email etiquettes	(2)
		[19]

### QUESTION 7

There is a list available from the Olympic committee of all Hotels etc. available for families coming to support their family members taking part in the Olympics.

7.1	You set up a database of all the hotels in the area, some of which are part of the accommodation for the Olympians. It contains the fields below.																		
	<table border="1"> <thead> <tr> <th>FIELD NAME</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>Hotel_Name</td> <td>Name of hotel</td> </tr> <tr> <td>Address</td> <td>Hotel's address</td> </tr> <tr> <td>Tel_Number</td> <td>Hotel's telephone number</td> </tr> <tr> <td>e-mail_Address</td> <td>Hotel's e-mail address</td> </tr> <tr> <td>Hotel_Manager</td> <td>Name of hotel manager</td> </tr> <tr> <td>Part_of_Project</td> <td>Whether hotel is part of the project or not</td> </tr> <tr> <td>Units_Contributed</td> <td>Number of recyclable units contributed</td> </tr> </tbody> </table>		FIELD NAME	DESCRIPTION	Hotel_Name	Name of hotel	Address	Hotel's address	Tel_Number	Hotel's telephone number	e-mail_Address	Hotel's e-mail address	Hotel_Manager	Name of hotel manager	Part_of_Project	Whether hotel is part of the project or not	Units_Contributed	Number of recyclable units contributed	
FIELD NAME	DESCRIPTION																		
Hotel_Name	Name of hotel																		
Address	Hotel's address																		
Tel_Number	Hotel's telephone number																		
e-mail_Address	Hotel's e-mail address																		
Hotel_Manager	Name of hotel manager																		
Part_of_Project	Whether hotel is part of the project or not																		
Units_Contributed	Number of recyclable units contributed																		
	7.1.1	Name the field that is most appropriate as a primary key and state why you have chosen this field.	(2)																
	7.1.2	State the most appropriate field type for the <b>Units_Contributed</b> field.	(1)																
	7.1.3	State the most appropriate field type for the <b>Part_of_Project</b> field.	(1)																
	7.1.4	Someone suggested that you use an input mask for the <b>Hotel_Name</b> field. Give TWO reasons why this is not a practical suggestion.	(2)																
	7.1.5	What feature of a database would you use to generate a list of hotels that are NOT part of the project?	(1)																
	7.1.6	The following function was placed in the report footer of a report: =Count(*)																	
		a) Explain what this function will display	(2)																
		b) Explain what the difference will be if the same function is placed in a group footer as opposed to the report footer.	(1)																
	7.1.7	Your supervisor has suggested that you use mail merge to send out letters to hotels,	(1)																

		asking them to be part of the group of hotels specified for the Olympic families. Give ONE reason why you agree to use mail merge.	
	7.1.8	The Tourist Information Bureau gives you a list of the guest houses in the area. Choose TWO appropriate file formats (from the list below), in which you could request this file. Indicate how each should be formatted so that you can directly import the data into your database: <ul style="list-style-type: none"> <li>• Portable document file (pdf).</li> <li>• Text file (txt).</li> <li>• Word processing file.</li> <li>• Spreadsheet file.</li> <li>• Web page/html file.</li> </ul>	(4)
7.2		A transport company has offered to collect the recycling material on a weekly basis from the hotels and guest houses.	
	7.2.1	What electronic device or system would be able to assist them to physically locate these hotels and guest houses quickly and easily? (Do NOT give a product or brand name.)	(1)
	7.2.2	How does this electronic device manage to locate actual physical locations of the hotels or guest houses?	(1)
7.3		Spreadsheet applications have a wide variety of functions which can be used. Write down the name of the spreadsheet function that you will use for each of the examples below: <ul style="list-style-type: none"> <li>A. Add up a series of numbers in a range</li> <li>B. Determine how many cells in a range have a value of 100 or more</li> <li>C. Extract the first two characters from a cell containing text</li> <li>D. Find the most frequently occurring value in a range of values</li> </ul>	(4)
			<b>[21]</b>