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Students' perceptions of Computer-Based Assessment: A Case of UKZN

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DECLARATION

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ABSTRACT

Assessment may be defined as the process of measuring the skill, capability, understanding and knowledge of an individual. It may also be defined as the process that involves testing of students' knowledge about what they have been taught. Over the years, students have been undertaking assessments using pen, pencil and paper. Assessments administered in this mode are regarded as paper-based assessment (PBA). However, due to the ever-growing nature of technology, the use of information and communication technology (ICT) was introduced into the assessment process, and this has influenced the way assessments are being administered, especially in academic institutions. Due to this introduction, assessments are now administered using computers, and such assessments are regarded as computer-based assessments (CBA).

According to the literature, the use of CBA offers more advantages than the use of PBA. Hence, academic institutions now adopt the use of CBA over PBA. This adoption has led to certain controversial reactions among researchers. Notable among these reactions is that, when an identical assessment is administered as PBA and CBA, there are differences in the assessment results of students. These differences are said to have arisen from the different perceptions of students about CBA Studies have been conducted on students' acceptance and adoption of CBA, but few investigations have been carried out on the perceptions of students about CBA. Hence, this study was aimed at investigating the perceptions of students about CBA, by taking into account, students' preferred mode of assessment and the challenges they experience in the use of CBA. This study further proposed possible means of managing these challenges.

To achieve the objectives of this study, a descriptive design was used, and quantitative methodology was employed to collect and analyse data. Questionnaires were distributed to a total of 357 students and analysis was carried out on the collected data using the Statistical Package for the Social Sciences (SPSS). The results obtained from this study showed that students find it easy to undertake CBA, prefer CBA to PBA, and hence, intend to undertake CBA frequently or in the future. Also, the results of this study showed that the use of CBA often improves students' assessment performances and results. Furthermore, the results showed that, although students indicated that it is easy to undertake CBA, they still experience challenges. The challenges experienced by students in the use of CBA, and the possible means of managing these challenges, have been presented in this study.

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LIST OF ABBREVIATIONS

ANOVA – Analysis of Variance

APA – American Psychological Association

Asymp. Sig. – Asymptotic Significance

BI – Behavioural Intention

CAT – Computer Adaptive Test

CBA – Computer Based Assessment

CBAAM – Computer Based Assessment Acceptance Model

CBTI - Computer Based Test Interpretation

CNE - Certified Network Engineer

CSE – Computer Self Efficacy

DBMS – Database Management System

FC – Facilitating Condition

GMAT - Graduate Management Admission Test

GRE - Graduate Record Examinations

ICT – Information and Communication Technology

IS – Information Systems

JAMB - Joint Admissions and Matriculation Board

MCQ – Multiple Choice Question

OMR – Optical Mark Reader

PBA – Paper Based Assessment

PEOU – Perceived Ease of Use

PP – Perceived Playfulness

PU – Perceived Usefulness

Q (in Q1, Q2, Q3, Q4 Q5, Q6) - Question

SPSS – Statistical Package for the Social Sciences

TAM – Technology Acceptance Model

TOEFL – Test of English as a Foreign Language

TPB – Theory of Planned Behaviour

UTME - Unified Tertiary Matriculation Examination

USMLE - United States Medical Licensing Examination

UKZN - University of KwaZulu-Natal

UTAUT – Unified Theory of Acceptance and Use of Technology

VARK – Visual, Aural, Reading, Kinesthetics

CHAPTER 1: INTRODUCTION

1.1 Introduction

Assessment plays a very important role in education because it serves as an instrument used in evaluating students' knowledge (Nikou & Economides, 2013). It also motivates students to study and understand their course, because when students know they are going to be assessed in their courses, they are forced to put in effort to study for such courses (Cox *et al.*, 2014). Nikou and Economides (2013) defined assessment as the process that involves the use of instruments such as tests, assignments or examinations to evaluate the quality of teaching and learning. Assessments could either be formative or summative (Taras, 2005; Facdev, 2015). Formative assessment refers to a form of assessment in which feedback is provided during the teaching and learning process to the students being assessed (Taras, 2005). One of the importance of the feedback provided to students is that it enables them to know where they have erred in the assessment. Summative assessment on the other hand is a form of assessment administered to students at the end of a teaching and learning process, in order to assess their understanding of what they have learnt (Facdev, 2015). This type of assessment could be in the form of final examinations, term papers and final project presentations that usually take place at the end of a semester or academic session.

Assessments are being conducted by educational institutions through the use of paper, pen and pencil (Demirci, 2007). This form of conducting assessment is referred to as Paper-Based Assessment (PBA) (Rollings-Carter, 2010). PBA exists in different forms such as fill-in-the-blank questions, multiple choice questions and essay items (Demirci, 2007). The emergence and continuous advancements of information and communication technology (ICT) has brought about a different mode of conducting assessment, known as Computer-Based Assessment (CBA) (Bull & McKenna, 2000; Gipps, 2005). This mode of conducting assessment is implemented by using computers (Bull & McKenna, 2000). According to Parshall (2002), CBA refers to all kinds of computerized assessments including electronic page turners and computer adaptive tests. Also, it refers to any form of assessment in which the computer is integrally responsible for delivering questions, storing responses, marking responses and reporting results (Whittington *et al.*, 2000).

CBA has many advantages (Mills *et al.*, 2005; Lottridge *et al.*, 2008). For example, with CBA, assessment questions can contain multimedia and graphic items (Segall *et al.*, 2005).

Also, grading and reporting of assessments can be done immediately and automatically. This saves lecturers the time spent on marking, and in the computation of assessments marks (Nikou & Economides, 2013). The usage of CBA also enables academic institutions to reduce the expenses involved in conducting assessments, especially the expenses involved in the printing of question papers (Akdemir & Oguz, 2008). However, according to Pino-Silva (2008) and Jawaid *et al.* (2014), the advantages of CBA can only be appreciated if its administration does not disadvantage students. Hence, it is very important to take into consideration, the perceptions of students about the use of CBA for assessment. These perceptions are important in the acceptance and implementation of CBA (Jawaid *et al.*, 2014).

1.2 Background of CBA

A lot of technological potentials were predicted when the first computers were introduced (Greiff & Martin, 2015). One of the potentials was the possibility of using computers to generate new ways in which assessments would be designed and administered (Greiff & Martin, 2015). In the early 1970s, the United States military, together with some clinical psychologists in the United States, initiated the use of computers in assessments (Russell *et al.*, 2003). The psychologists were able to deliver assessments efficiently and eliminate any form of examiner bias, through the use of CBA (Russell *et al.*, 2003).

In 1985, the use of computers for assessments was introduced in a testing program known as ACCUPLACER (Luecht & Sireci, 2011). This program is a type of computer based assessment used for assessing the reading and writing skills of students in about 1000 high schools and colleges in the United States (Collegeboard, 2015). As of 1990, the use of CBA increased to such a point where the "Certified Network Engineer" (CNE) examination, usually conducted by the Novell Corporation, was firstly done as a CBA (Luecht & Sireci, 2011). Furthermore, in 1992, CBA was employed in the Graduate Record Examinations (GRE) conducted by the Education Testing Service in the United States (Eignor *et al.*, 1993; Mills & Stocking, 1996).

In 1997, CBA was implemented by the "Graduate Management Admission Council" in conducting the "Graduate Management Admission Test" (GMAT). In 1999, the United States Medical Licensing Examination (USMLE) was also delivered in the form of a CBA (Dillon *et al.*, 2002). In recent years, however, the use of CBA has increased and has become more prominent in other countries apart from the United States. For instance, in 2015, the Joint

Admissions and Matriculation Board (JAMB) in Nigeria, responsible for conducting the "Unified Tertiary Matriculation Examination" (UTME) for potential tertiary institution students in the country, fully transitioned from its 30-year use of PBA into CBA (Odunsi, 2014; Nkwocha Patricia *et al.*, 2015). The new mode of assessment, which seems to have saved the examination board a lot of worries about cheating and late release dates of results, still however, poses as a challenge to students, and has thus created diverse perceptions among students (Nkwocha Patricia *et al.*, 2015).

The possibility of using computers to deliver assessments made the implementation of CBA to become a trend among academic institutions and other certification bodies (Mills *et al.*, 2005). According to Sidhu (2008, p. 131), at the inception of CBAs, "Computer-based assessment system was mainly used for formative assessment (such as giving students feedback on performance during a course), however, it is now being used for summative assessments". Sidhu (2008) further stated that at the inception, CBA systems could only determine if answers were either right or wrong. But nowadays, CBA systems can be designed to perform other functions such as providing feedbacks and reports of assessment results in real-time.

The use of computers for assessment has been extensively reviewed by researchers. Notable among these reviews, is the review by Mazzeo and Harvey (1988). The authors' review was regarded as the first comprehensive review of research that was carried out on CBA (McFadden *et al.*, 2001). The results of this review showed that, scores on computer tests are affected by graphics and it is sometimes more difficult to read passages on computerised tests. Later in 1988, another review was carried out on CBA by Green (1988). The results of this review showed that it is impossible or difficult to change previous answers, printed papers are clearer than low-resolution graphics, and pressing a button or key (on a keyboard) saves more time than using pencil on an answer sheet. Over the last two decades, these results by Mazzeo and Harvey (1988) and Green (1988) have led to a series of research that have been conducted in order to justify CBA as a valid and reliable alternative to PBA as a means of conducting assessments (Csapó *et al.*, 2014).

1.3 Rationale

Students' perception about CBA influences their attitude towards CBA (Terzis & Economides, 2011a). The literature also shows that students experience challenges with CBA, and these challenges often lead to poor results in their assessment (Gipps, 2005). It is

therefore important to investigate students' perceptions about CBA, so as to understand the challenges associated with its use. If students have negative perceptions about CBA, they may in turn have negative attitudes towards CBA, and this could negatively affect their assessment results in CBA (Apostolou *et al.*, 2009; Gathuri *et al.*, 2014). The knowledge of students' perceptions about CBA could help the developers of CBA systems to improve on the CBA software they develop for academic institutions (Apostolou *et al.*, 2009). It could also help academic institutions to identify the areas that need to be improved upon, when planning to implement CBA.

In order to achieve these benefits of CBA and to effectively implement CBA in academic institutions, it is important to understand the perceptions of students about CBA (Alki, 2010; Deutsch *et al.*, 2012).

1.4 Research problem

The literature shows that quite a number of academic institutions globally administer CBAs. The literature also shows that when an identical assessment is administered as PBA and CBA, certain differences are noticed in the assessment results (Way *et al.*, 2006; Nikou & Economides, 2013; Hosseini *et al.*, 2014; Hensley, 2015; Oduntan *et al.*, 2015).

Some studies have shown that students' familiarity with computers, the mode of presentation of items on the computer, the ease-of-use of CBA, the facilitating conditions surrounding the administration of CBA, the computer self-efficacy of students, the difference in perceptions of students about CBA, students' preferred mode of assessment, the challenges students experience when taking CBA and the attitude of students towards the use of computers, are some of the factors responsible for the differences in assessment results between PBA and CBA (Sorensen, 2013; Jawaid *et al.*, 2014; Hensley, 2015).

According to the International Test Commission guidelines (Commission, 2006), the use of CBA should not lead to a difference in assessment results between CBA and PBA. The guidelines stated that, the use of CBA can only be considered valid and reliable if the assessment results of students in CBA are equivalent to their assessment results in PBA. That is, a student who takes an identical assessment in both modes (PBA and CBA) should obtain nearly identical assessment results. If, however, there are differences in assessment results obtained when an identical assessment is undertaken in both modes, then there could be a difference in students' perceptions about CBA.

In order to try to ensure equivalence of students' assessment results between PBA and CBA, it is important to understand the challenges that may possibly lead to differences in assessment results, and this can be best achieved through investigating the perceptions of students about CBA (Akdemir & Oguz, 2008; Chua & Don, 2013). It is also important to investigate the challenges faced by students in using CBA, in order to be able to propose possible solutions that might improve the administration of CBA in academic institutions.

1.5 Research questions

Based on the research problem, the following questions were used to guide the study in order to achieve the study's objectives:

1. What are the perceptions of students about computer-based assessment?
    a. What are the perceptions of students about the ease-of-use of CBA?
    b. What are the perceptions of students about facilitating conditions in the usage of CBA?
    c. What are the perceptions of students about the usefulness of CBA?
    d. What are the perceptions of students about computer self-efficacy in the usage of CBA?
    e. What are the perceptions of students about the playfulness of CBA?
2. Which mode of assessment do students prefer?
3. What are the challenges students experienced with using computer-based assessment?
4. How can the challenges experienced with using computer-based assessment be managed?

1.6 Research objectives

The following are the objectives of the study;

1. To investigate the perceptions of students about computer-based assessment
2. To determine students' preference between computer-based assessment and paper-based assessment
3. To investigate the challenges faced by students in the usage of CBA
4. To propose possible means of managing the challenges

1.7 Significance of the study

This study will contribute to the body of knowledge by providing enlightenment about how CBA can be administered. Furthermore, some of the findings obtained from this study could be useful to the developers of CBA, by providing them with some of the issues being experienced by students when undertaking CBA, and the technical requirements of students during a CBA (Alki, 2010). By investigating the perceptions of students about CBA, and by understanding the challenges experienced by students, there could be an improvement in the way CBA is implemented, and thus, encouraging institutions to accept the culture of CBA (Aly, 2011).

1.8 Methodology

To achieve the objectives of this study, a descriptive research design approach was employed. The descriptive research design was deductive in nature, and since a deductive research is aimed at testing an already-known theory using new empirical data collected from the units in a survey, a quantitative approach of data collection was used. As a result of the research design approach that was employed, this research was quantitative in nature. This is because the study aimed at using numeric scores and metrics, weighing specific variables and arriving at predictions grounded on accurate measurements. The study site was the University of KwaZulu-Natal, Pietermaritzburg campus. The target population contained about 5,452 students. This was the population of students who had undertaken CBA. Target population is a population obtained from the study site which contains the total number of people to be investigated (Bhattacherjee, 2012). The target population contains units, individuals or groups of people who meet a set of criteria beneficial to the study (Lavrakas, 2008). The target population of this study consisted of students who had once undertaken CBA in any of their modules. The students were selected within two colleges namely – "College of Agriculture, Engineering and Sciences" and "College of Law and Management Studies".

In order to select the sample required, a probability sampling technique was used. This is because probability sampling technique helps in eliminating sampling bias by giving every student in the target population a chance of being selected (Bhattacherjee, 2012). According to Krejcie and Morgan (1970)'s table, the sample size required for this study was 357. To recruit the 357 students that participated in the study, the systematic random sampling method was used. The systematic random sampling may be defined as the selection of a sample at regular intervals from the sampling frame (Saunders *et al.*, 2009). To implement this method, a starting point was chosen at random among the students in a classroom,

thereafter a uniform interval was calculated based on the number of respondents obtainable from that classroom. The uniform interval was then used to select all the other respondents that were required from the classroom. This method was carried out in all the classrooms where respondents were recruited for the study, until the sample size was obtained. Questionnaires were distributed by hand, and face-to-face to the respondents who were recruited for this study (Nulty, 2008). Before the respondents could fill a questionnaire, they were asked to offer their consent to participate in the study by filling a consent form.

The conceptual model (Computer Based Assessment Acceptance Model - CBAAM), proposed by Terzis and Economides (2011a), was adapted to this study. The model was developed based on other Information System theories and models. The CBAAM model has 9 constructs. The constructs are facilitating conditions, goal expectancy, social influence, perceived playfulness, perceived ease-of-use, perceived usefulness, computer self-efficacy, content and behavioural intention. Six of these constructs were adapted to this study. Three of the nine constructs were not used in this study, these are, content, goal expectancy and social influence. This is because, in the context of this study, the CBA undertaken by the students was compulsory. Therefore, regardless of social influence (which could be voluntary), students must undertake the CBA. Also, the "content" construct was left out because, according to the developers of the CBAAM model, content is determined by the teachers and not the students (Terzis & Economides, 2011a). Furthermore, since content determines goal expectancy, as stated by the developers of the CBAAM model, the "goal expectancy" construct was also left out.

1.9 Limitation

The University of KwaZulu-Natal has five campuses, but this study was carried out in one campus - the campus where the researcher was situated. Due to financial and time constraints, the researcher could not expand the study to the other four campuses of the university. Thus, this could affect the generalizability of the findings to the university.

1.10 Publications

The researcher conducted a preliminary study before this study in 2015, and the results of the preliminary study have been published in a journal and a conference. The publications are as follows:

- **Africa Education Review Journal, published on Taylor and Francis online:**
  Faniran V.T., & Ajayi N. A. (2017). Understanding Students' Perceptions and Challenges of Computer-Based Assessments: A Case of UKZN. Africa Education Review, 1-4. doi: 10.1080/18146627.2017.1292112
- **IST Africa Conference 2016, published on IEEE:**
  Faniran V., & Ajayi N. (2016). Students' perceptions of computer-based assessments: A case of UKZN. Paper presented at the IST-Africa Week Conference, 2016.

1.11 Overview of the dissertation

This dissertation contains six chapters. These chapters were arranged in the order in which the study was carried out. A brief explanation of these chapters is given below.

Chapter 1 contains the introduction to the study. The chapter presents a brief background of computer-based assessment and how it has developed since its inception. The chapter also presents the motivation for the study and the research problem that was investigated. The research questions and objectives of the study were stated in this chapter and the methodology used to achieve the study's objectives was also explained.

Chapter 2 contains the review of literature that has been carried out on CBA. Studies related to the comparability of CBA and PBA, performance differences between CBA and PBA and the factors influencing these differences, were reviewed in this chapter. Furthermore, previous studies on perceptions of students about CBA were also reviewed.

Chapter 3 contains the descriptions about the research methodology employed in the study. The chapter explains the type of research design, research approach, sampling and data collection techniques that were employed in this study, and the reasons why the researcher employed each of these designs or techniques. The chapter also explains the conceptual model that was used to guide this study.

Chapter 4 presents the results of the data analyses carried out in this study, and their interpretations.

Chapter 5 presents the discussion of the results obtained in this study in relation to the research objectives.

Chapter 6 contains the conclusions that were drawn from the study and also includes recommendations for future research in the area of computer-based assessment.

1.12 Conclusion

This chapter started by giving a brief explanation of assessments, importance of assessment, forms of assessment and modes of assessment. The two modes of assessment that were highlighted were PBA and CBA. This chapter introduced the concepts of PBA and CBA and showed a brief background of how CBA has evolved from its inception. The rationale behind carrying out this study and the research problem identified in this study were also explained in their respective sections. These sections were followed by the research questions guiding this study and the objectives that this study was aimed at achieving. The methodology section provided a brief description of how this study has been carried out. The section described the choice of research design approach and the conceptual model used to underpin the study. The next chapter presents a review of literature that has been conducted in relation to this study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The previous chapter presented a brief overview of this study. This chapter presents the review of the literature on assessments, types of assessment, characteristics of assessment and modes of assessment (PBA and CBA). The chapter also presents the relationship between types of assessments and the positive and negative effects of using technology for these types of assessment. Furthermore, this chapter presents the findings obtained from other studies, with regards to the perceptions of students about computer-based assessment.

2.2 Assessment

Assessment has been defined as the process of measuring the skill, capability, understanding and knowledge of an individual (Sorensen, 2013). Berry (2008) defined it as the process which involves collecting information from students in a planned or deliberate way, with the main aim of understanding the knowledge, skills, attitudes, abilities, values, strength and weaknesses of the students. Also, assessment refers to a process that involves testing of students' knowledge about what they have been taught (Sorensen, 2013). Depending on the context in which they are used, terms such as "measurement", "test", "examination" and "evaluation" have all been used within the applications of assessment (Berry, 2008). In the context of this study, the term "assessment" will be used as a general term referring to any or all of the aforementioned terms.

Traditionally, the technique in which assessments have been administered in a formal classroom has been through the use of pen, pencil and paper (Demirci, 2007). According to Hatfield and Gorman (2000), this technique dates back to the 1930s. The use of pen, pencil and paper for assessments has allowed teachers to administer assessment questions in different question types such as essays, constructed responses, fill-in-the-blank questions and multiple choice questions (MCQs) (Demirci, 2007). Of all these question types, MCQs are the most popular (Seidelman, 2014). MCQ assessments became popular because they help in decreasing the level of bias involved in evaluating assessments, due to the objectivity involved during marking (Mercedes *et al.*, 2012). Also, Seidelman (2014) stated that the use of MCQs helps in the elimination of subjectivity in the evaluation process. Therefore, in order to eliminate bias arising from the subjectivity of the examiner, CBAs can be

administered to contain MCQ question types. However, Heinrich and Wang (2003) stated that the MCQ question type as a technique, is not suitable enough to measure or evaluate the knowledge and thinking patterns of students in all subjects, especially in subjects like Mathematics.

2.3 Importance of assessment

Assessment is important to students and teachers. This is because it helps the teachers to determine the quality and success of their teaching and helps to determine if the learning objectives of a subject have been met by the students (Ridgway *et al.*, 2009; Study, 2017). Also, assessment helps to promote the learning process of students (Ridgway *et al.*, 2009), in that, the way an assessment is designed and administered to students can encourage students to participate in active learning. Active learning is a form of learning in which students engage in classroom activities (such as thinking, reading, writing, brainstorming, discussions, and problem-solving) that help to promote their learning in the classroom (CRLT, 2016). Group assessments (especially formative assessment) could enable students to collaborate together in brainstorming and discussions about the assessment.

Assessments are expected to produce results. These results provide useful feedback about the evaluation of the students, and this feedback has an influence on both the teacher(s) and the student(s) (Sorensen, 2013). The feedback helps to improve the learning process of students and hence improves their performance in their subjects (Nicol, 2007). The result of an assessment helps teachers or subject administrators in making good decisions in the areas of teaching, learning and assessment (Buzzetto-More & Alade, 2006). It also helps in determining if students advance to the next (higher) class or not (Edutopia, 2008). Furthermore, assessment helps teachers in reviewing and improving their curricula and teaching strategies, where and when necessary (Buzzetto-More & Alade, 2006). Edutopia (2008) stated that assessment could help teachers to self-evaluate themselves in order to check if the teaching approach(es) they are implementing contributes positively or negatively to the performance of students in a subject.

2.4 Characteristics of assessments

Assessments may be categorized according to three functions (processes) (Alki, 2010). These are formative, summative or diagnostic (Alki, 2010; Gathuri *et al.*, 2014).

2.4.1 Formative assessment

Formative assessment may be simply defined as the combination of judgement and immediate feedback of the outcome of an assessment (Deutsch *et al.*, 2012) . It is often referred to as assessment for learning (Imtiaz & Maarop, 2014). This is because, one of its aims is to determine, how well, students have achieved the learning objectives of a particular subject before the end of a learning process (Gathuri *et al.*, 2014). This form of assessment is administered so as to enable students gauge themselves on their level of performance in an assessment, in relation to the actual standard required by the teacher (Taras, 2005; Gikandi *et al.*, 2011). Examples of tools used for formative assessments include, self-assessment tests and quizzes; feedback from assignments or from peers and colleagues; mock tests; and dialogue with teachers and tutors (Gathuri *et al.*, 2014). Formative assessment is done while the teaching and learning process is still ongoing, thereby making it possible to track the progress of the students. The outcome of a formative assessment is a feedback that reveals the strengths, weaknesses and errors of students, thus presenting new opportunities to such students to improve their performances (Earl, 2012).

Studies have shown that students perceive formative assessments to be useful when implemented in their curricula (Cassady & Gridley, 2005). Students also believe that their performances are improved in the final assessment (summative assessment) when formative assessments are adequately implemented during the teaching and learning process (Ibabe & Jauregizar, 2010; Wilson *et al.*, 2011). In the University of KwaZulu-Natal (the study site of this research), formative assessments are administered to students in the form of self-assessment quizzes. These quizzes are usually uploaded online to the learning management system (in this case, Moodle) of the university and students are therefore expected to sign in into Moodle to take the assessment. Each quiz is usually based on a topic taught in a class and students are constantly urged to attempt all the questions in the quiz. At the end of each quiz, students are shown their quiz results on their own area of Moodle and a feedback is presented for both right and wrong answers selected. The self-assessment quizzes are usually aimed at preparing the students for upcoming summative assessments later in the semester.

2.4.2 Summative assessment

Summative assessment is a form of assessment that takes place at the end of the teaching and learning process and sums up the performance of students in their subjects at the end of an academic session (Berry, 2008; Ridgway *et al.*, 2009). Summative assessments may

sometimes be referred to as high stakes assessments (Rovai, 2000). High stakes assessments refer to assessments whose scores have important consequences for the individuals taking the assessments (van Lent & Global, 2009). Summative assessments are meant for certification purposes, accountability purposes, and importantly, students' promotion to the next class (Rovai, 2000). Therefore, when summative assessments are conducted at the end of an academic session, students are expected to put more efforts, unlike formative assessments, because the results of the summative assessment often influences their academic future (Gathuri *et al.*, 2014). Grades are the usual outcomes of summative assessments, and they (grades) present an overall information of the quality and success of the teaching and learning process, at the end of an academic session (Gathuri *et al.*, 2014). In the University of KwaZulu-Natal (the study site of this research), summative assessments are conducted as tests and as final examinations. Usually, one test (at least) is conducted during the course of a semester and a final exam is conducted at the end of a semester. These assessments determine the grades of a student in a course.

2.4.3 Diagnostic assessment

This classification of assessment sits between formative and summative assessment (Boston, 2002). Unlike formative and summative assessments, which are conducted during and after (respectively) the teaching and learning process, diagnostic assessment takes place at the start of the teaching and learning process (Thelwall, 2000; Boston, 2002; Alki, 2010). According to JISC (2007), diagnostic assessment is used to identify the prior skills and knowledge of a student about a subject, before the subject is taught. This form of assessment is conducted before a subject is taught so as to identify the possible difficulties that students may experience when the teaching and learning process commences (Gathuri *et al.*, 2014). The outcome of a diagnostic assessment is often a diagnosis that provides the teacher with the capabilities of the students, and influences the teaching strategies and learning activities that the teacher(s) will employ during the course of the teaching and learning process (Alki, 2010; Gathuri *et al.*, 2014).

2.5 Modes of assessment

Assessments can be delivered or administered in two modes, mainly, paper-based assessment and computer-based assessment (Clarke-Midura & Dede, 2010).

2.5.1 Paper-based assessment

The use of pen and/or pencil and paper, in taking assessments, is referred to as paper-based assessment (PBA) (Rollings-Carter, 2010; Clarke-Midura & Dede, 2010). PBAs are believed to have originated about 1000 years ago, during a promotion exercise for the imperial civil service in China (Stobart, 2008). Since then, they have been used as a means of administering assessments. The continued use of PBA has raised concerns among some researchers and practitioners because of its limitations. Clarke-Midura and Dede (2010) stated that PBAs are not adequate in measuring the knowledge and abilities required by some industries when recruiting an individual for a low-level role. Furthermore, the authors stated that PBAs have also become unable to adequately measure the sophisticated skills and knowledge needed by students in the 21st century. The authors argued that the dissemination of Information and Communication Technology (ICT) is slowly making paper-based assessment become ineffectual as a means of measuring or evaluating students' knowledge. Hence, according to Maqableh and Mohammed (2015, p. 558), " PBA is being dissociated gradually from learning practices, especially because of the continuous dissemination of ICT", although, it still offers some benefits which makes it relevant (Llamas-Nistal *et al.*, 2013).

2.5.2 Computer-based assessment

Information and communication technology has had an influence on teaching and learning. In classrooms, ICT is being used to serve different functions, such as, acting as a repository for more information, acting as a channel through which teaching instructions can be communicated and delivered to students, acting as a means of data collection and storage, and also acting as a means of administering assessments to students (Yuan-Hsuan *et al.*, 2013). The use of ICT through social networks, video games, smartphones and hand-held devices, has changed the ways teaching and learning is done (Halverson & Shapiro, 2012).

Hensley (2015) stated that since ICT is changing the way students are being taught in classrooms, then the ways students are being assessed should also change. The continuous evolution of ICT has influenced academic institutions to change their traditional formats of administering assessments (through PBA), into computerised formats (Pellegrino & Quellmalz, 2010). This influence of ICT in assessments is spreading across the globe, as many higher learning institutions are now replacing PBA with CBA (Ricketts & Wilks, 2002; Struyven *et al.*, 2006; Sieber & Young, 2008; Jimoh *et al.*, 2011; Gathuri *et al.*, 2014). Hensley (2015) believes that the use of CBA has, so far, shown more positive than negative

effects. Although, Bull (1999) stated that, institutions should be careful about the adoption of ICT because the use of ICT in assessments may lead to controversies in terms of the validity and reliability of CBA as a mode of assessment.

2.5.2.1 Concepts related to computer-based assessment

The extensive and diverse use of ICT for assessments has brought about different concepts and terminologies such as E-assessment, Computer Assisted Assessment, Online Assessment, Web-Based Assessment, Computerized Assessment and Computer Based Testing (Bull & McKenna, 2000; Jamil *et al.*, 2012). These concepts, which have similar definitions, have been used in the literature to refer to the use of computers for assessment purposes (JISC, 2007; Ridgway *et al.*, 2009). Hence, in the context of this study, concepts such as computer based test, e-assessment, online assessment, computerized assessment, computer adaptive test and web-based assessment will be referred to as CBA. This is because, apart from having almost the same meaning, they all refer to the method of administering assessments in which responses are recorded or assessed (or both) with the use of ICT (Bull & McKenna, 2000; Parshall, 2002).

2.5.2.2 Categories of CBA

Just like PBA, CBA can be diagnostic, formative, or summative in nature (Alki, 2010). Diagnostic CBA is an assessment administered to students on a computer system to test their knowledge, before the start of a learning process (Appleby *et al.*, 1997; Thelwall, 2000). Formative CBAs are administered using computer systems, to provide practice for students and to increase their understanding of a subject during the course of their learning process (Alki, 2010). An example is the use of online quizzes, where feedback is given to students on an on-going basis so as to enable them know where they have erred (Shudong *et al.*, 2008). Summative CBA is a form of assessment administered, using a computer system, at the end of a learning process. This enables the teachers to make judgements about the level of understanding of their students in a subject (Zakrzewski & Bull, 1998; Alki, 2010).

2.5.2.3 Types of CBA

CBA can be of two types - linear or adaptive (McFadden *et al.*, 2001; Nikou & Economides, 2013; Becker & Bergstrom, 2013). In a linear CBA, assessment questions are presented to all the students taking the CBA in the same order (Becker & Bergstrom, 2013). In this type of CBA, questions presented in a CBA can be answered in any order and at any time during the

assessment, and also, students can review their answers before they submit the assessment (Education, 2016).

Adaptive CBA is often called Computer Adaptive Test (CAT) (Nikou & Economides, 2013). CAT is a form of CBA in which the assessment questions, which are generated from a large pool of questions, differ, from one student to another, depending on each student's ability (McFadden *et al.*, 2001; Hong & Shin, 2010; Becker & Bergstrom, 2013). The answer of a student to a question determines the next question to be generated in the CBA. That is, if a student selects the right answer for a question, then the next question will be harder, but if a student selects the wrong answer for a question, then the subsequent question might be easier (McDonald, 2002; Hong & Shin, 2010). In this type of CBA, the order and type of questions presented to individual students may not be the same since the questions depend on the ability of each student (McFadden *et al.*, 2001). In a CAT, once an answer is selected, it cannot be changed, unlike the case of linear CBA where selected answers can be changed (Education, 2016).

2.5.2.4 Question types in CBA

Questions in a CBA can be presented in different types. Marriott and Teoh (2012) stated that most learning management systems, like Blackboard and WebCT, now have CBA functionalities which are capable of presenting assessments in various question types. Questions in CBAs can be presented in one or more of the following ways:

- **Point and click**: In this question type, students select the answer to a question, among a set of different options, by simply clicking on a button (or buttons) displayed on the computer screen (Sim *et al.*, 2004), unlike in a PBA where students might be required to select their answer(s) by shading the appropriate oval or circle in an answer sheet that corresponds to the selected option(s). A typical example of this question type can be found in a MCQ assessment, where each question has many options from which students can choose the correct answer (Sim *et al.*, 2004; Marriott & Teoh, 2012).

- **Move object**: In this question type, students are required to move objects on a computer screen from one position to another, in order to answer a question (Sim *et al.*, 2004). This question type can be found in assessment questions that require students to label a diagram. An example of this question type is what is known as matching (Marriott & Teoh, 2012), which enables students to drag and drop objects into where the objects fit. For instance, students may be asked to match question(s) on

the left-hand side of the computer screen to the appropriate answer(s) located at the right-hand side of the computer screen.

- **Numerical or text entry**: This consists of assessment questions where answers, in the form of figures or text, have to be entered by students into spaces or textboxes provided on a computer screen (Bull & McKenna, 2003; Marriott & Teoh, 2012).

- **Draw object**: This question type requires students to draw a line or any object on the computer screen (using a mouse or any other pointing device) as response to a question (Sim *et al.*, 2004). Plotting a graph on a computer screen is an example of a response to this question type.

- **Boolean type**: This is a question type in which students are asked to choose one option out of two options, usually "true or false" or "yes or no", as response to an assessment question (Marriott & Teoh, 2012).

2.6 Advantages of computer-based assessment

CBA is increasingly being widely adopted mainly because of its advantages over PBA (Csapó *et al.*, 2014; Hakami *et al.*, 2016). Some of these advantages include:

- **Effective administration to a large population:**

  The use of CBA enables institutions to administer assessments to a large number of students at the same time, without any delay (such as the manual distribution of question papers) that may be experienced with paper handling. CBA items that are stored online or on a local server may be shared among a large group of students at the same time. In a case where an online CBA is to be administered, the presence of the Internet now enables academic institutions to administer CBA to a large group of students, situated at different locations, at the same time (Walker, 2013). Also, when a large population of students is being assessed, the use of CBA is efficient in controlling the exact duration of the assessment (Noyes & Garland, 2008; Kalogeropoulos *et al.*, 2013).

- **Immediacy in marking and feedback:** The use of CBA has brought about an improvement in the way assessments are marked, scored and reported (Molnar *et al.*, 2011). With CBA, students' assessments can be immediately marked and the score of the assessments can be immediately reported to the teachers or subject administrators (Kapoor & Welch, 2011; Lissitz & Jiao, 2012; Kalogeropoulos *et al.*, 2013;

Mukandutiye *et al.*, 2014; Hensley, 2015). This is made possible through a technique called "latent semantic analysis". CBA systems make use of latent semantic analysis to automatically mark assessments, regardless of the question types presented (Quellmalz & Pellegrino, 2009). Also, with CBA, instant feedback can be produced and made available to a large number of students that are being assessed (Bridgeman, 2009; Molnar *et al.*, 2011; Broughton *et al.*, 2013; Seidelman, 2014; Hensley, 2015). The generation of instant feedback is beneficial to students because most students like to receive the feedback of their assessment as quickly as possible in order to avoid the distress involved in a delayed feedback (Pino-Silva, 2008).

- **Reduction of cheating*:*** The use of CBA reduces the chances of cheating among students (Bodmann & Robinson, 2004; Pino-Silva, 2008; Escudier *et al.*, 2011; Escudier *et al.*, 2014). In the studies by Pino-Silva (2008) and Apostolou *et al.* (2009), students were reported to believe that it is more difficult to cheat in CBA than in PBA.

  The use of "privacy screen filters", which prevents a student from clearly seeing another student's screen, could be a method helping to achieve reduction in students' cheating practices during CBA (Escudier *et al.*, 2011; Escudier *et al.*, 2014). In the study by Escudier *et al.* (2014), privacy screen filters were used during the administration of CBA. The results of the study indicated that most students found it difficult to cheat because the use of the privacy screen filters prevented them from clearly seeing their neighbouring students' screens.

  Furthermore, in the case of computer-adaptive tests, it is difficult for students to cheat, since the questions presented by the system to each student only depend on the correctness or incorrectness of each student's previous response (Buško, 2009; Bridgeman, 2009).

- **Improved security:** Another advantage derived from the adoption of CBA is that it ensures the security of the assessment, and guarantees the integrity and confidentiality of the assessment questions (Bridgeman, 2009; Kalogeropoulos *et al.*, 2013). With CBA, all the assessment questions can be stored in an encrypted file on the computer system (Ogunlade & Oladimeji, 2014). This could reduce the chances of assessment questions being viewed by unauthorized parties (Blazer, 2010; Hensley, 2015). Furthermore, in the case of computer adaptive tests, it is difficult for questions to be

copied and distributed among students prior to the commencement of the assessment, because the students will be presented with different questions that are specific and tailored to their abilities (Moe, 2009; N. Thompson & Wiess, 2009; Buško, 2009; Bridgeman, 2009).

The University of KwaZulu-Natal (the study site of this research) mitigates the risks associated with security and identification of students for an assessment through a two-way student-authentication process. Firstly, the examinees (students) who are about to take a CBA would be required to come into the assessment venue with a student card which should show a picture of their face. Secondly, the examinees would be required to log-in into the CBA system using their unique student number (as displayed on their student card) and their password. On successful logging-in, the details of the examinee (as present on the student card) is presented on the screen. This helps the proctors around to easily ascertain the appropriate and correct examinee when the assessment is in progress.

- **Time-saving:** The use of CBA helps in saving the time required in administering assessments, especially in the marking and grading of assessments (Broughton *et al.*, 2012; Ogunlade & Oladimeji, 2014; Seidelman, 2014). Also, the amount of time required by teachers to process a lot of paper work is reduced when CBA is administered (Blazer, 2010). Furthermore, with CBA, the duration of an assessment can be easily managed, due to the time saved in collecting answer sheets from students at the end of an assessment, as in PBA.
- **Reduction in the use of paper and printing costs*:*** The adoption of CBA by academic institutions has helped reduce the use of papers, hence, leading to a reduction in the costs incurred in purchasing papers and printing assessment questions (Apostolou *et al.*, 2009; Blazer, 2010; Jeong, 2012; Kalogeropoulos *et al.*, 2013; Hensley, 2015). An example of cost reduction was noticed at a university in Florida. The university was able to save between $135,000 and $163,000 in finances after adopting the use of CBA (Mukandutiye *et al.*, 2014). The cost savings achieved by using CBA is mostly true for institutions that already have the facilities required to administer CBA. For those institutions that do not have the required facilities, start-up costs could be higher (Blazer, 2010).

- **Flexibility in the formats of questions presented*:*** With CBA, assessment questions do not have to be presented in a particular question type only, e.g. MCQs, because the use of CBA enables teachers to present assessment questions in a variety of formats which include graphing, online experiments, matching, moving objects and multimedia (Quellmalz & Pellegrino, 2009; Hensley, 2015). CBAs are also offered in multimedia formats such as simulations, video and animations, that are embedded into the CBA system for the students to interact with (Quellmalz & Pellegrino, 2009). Chua (2012) and Walker (2013) stated that the flexibility of different question formats, brought about by CBA, helps to stimulate the interest of students to undertake CBA, as students may derive fun and enjoyment when interacting with moving objects and multimedia.

- **Disability support*:*** The adoption of CBA has become useful especially when assessing students with disabilities (Singleton, 2001; Gamire & Pearson, 2006; Blazer, 2010). CBA technologies now bring about embedded assistive technologies that help disabled students or students with special needs when undertaking CBA (Singleton, 2001; Beller, 2013). Assistive technologies, such as text-to-speech and Braille, enables students with disabilities to respond to assessment questions without the assistance of anyone (Beller, 2013; Hensley, 2015; Hakkinen, 2015).

- **Tracking students' progress**

  Formative assessment has been known to be useful in the tracking/monitoring of the progress of students in a subject. This is because, the feedback obtained from the assessment enables the teachers/instructors to know the areas where their students still need to be taught and developed (Earl, 2012). However, it has been observed that conducting formative assessments using the PBA mode is burdensome and has some drawbacks (M. Lee & Kasloff, 2009). One of the drawbacks is the extended time it takes for a teacher to gather all the formative assessments completed by all students together and provide feedback in real-time. Another drawback is the inability to measure each student's response time or thinking pattern of a concept in the assessment. The use of digital technologies in assessments – formative CBA - has created opportunities for teachers to keep track of the progress of each student in an easier and more efficient way (M. Lee & Kasloff, 2009; West, 2011). Also, formative CBA allows a teacher to track the progress of a student remotely - outside the classroom environment (Leony *et al.*, 2013; Papamitsiou & Economides, 2016).

Formative CBA enables a teacher to know, in real-time, how much time each student spends on reading an instructional material, retaining the information and applying the information acquired (M. Lee & Kasloff, 2009; West, 2011). Using a formative CBA, teachers are able to know what concept(s) each student has been struggling with since the beginning of the teaching and learning process. This information helps the teacher to determine the appropriate learning needs for each student during the course of the teaching and learning process (M. Lee & Kasloff, 2009).

One example of a CBA tool used for formative assessment is the Diagnoser (EBC, 2004). The Diagnoser was a program developed at the university of Washington by Jim Minstrell and Earl Huntand. It was designed to give teachers an insight into how their students understand high school science. The program first tests the deep understanding of students by asking them (students) a series of questions. The aim of this test is not to obtain the correct answer(s) from the students, but just to understand how the students arrive at their chosen answer(s). The series of questions asked by the Designer program enables the teacher to know how the students understand the basic principles that made their select their choices of answers. The teacher is also able to know the different miscomprehensions and misconceptions of students about a particular concept, and this helps the teacher to redesign his or her instructional materials and plans midway through the semester (EBC, 2004). Conducting this type of formative CBA more often during the semester would enable the teacher to keep track of the instructional needs of the students and ensure students′ progress.

In addition to the advantages of using CBA, a CBA software could also be useful in providing teachers with information about the sections of an assessment where students may be struggling. This information can be obtained by using the CBA software to measure the students' response time to a question or section of an assessment (Korakakis *et al.*, 2009; Pellegrino & Quellmalz, 2010; Kalogeropoulos *et al.*, 2013; Hensley, 2015). In order to get the response time, the CBA software analyses the sections of the assessment where students spent more or less time (Pellegrino & Quellmalz, 2010). Knowing students' response time to certain sections of an assessment could help teachers readjust their teaching or assessment strategies in order to improve the understanding of students in those sections where they are struggling (Blazer, 2010).

2.7 Issues with CBA adoption

As plenteous as the advantages derived from the adoption of CBA are, some researchers have stated that there are still some issues inherent in its adoption.

- **Start-up costs:** Hardware and software infrastructures are required in order to implement CBA in any institution, and an Internet connection together with other computer peripherals may also be required (Walker, 2013). Some academic institutions often struggle with the initial costs required to provide these infrastructures (Blazer, 2010; Ogunlade & Oladimeji, 2014). This is because, some of the costs required include the cost of setting up item banks, training staff members and subscribing for Internet connectivity (Kikis-Papadakis & Kollias, 2009; Kozma, 2009; M.-K. Lee, 2009; Blazer, 2010). Due to the costs involved, academic institutions argue that, "the creation, validation and standardisation of any test in computer form is more expensive to develop than an equivalent test in conventional form" (Singleton, 2001, p. 13).

- **Hardware or software failure:** Another issue with CBA adoption is that, there is the probability that a hardware or software will fail at any time (Singleton, 2001; Blazer, 2010). Academic institutions are prone to Internet failure or downtime as a result of the concurrent usage of the network by a large number of students (Walker, 2013). If such failure occurs, all the assessment activities, including students' responses and login sessions, being performed at that time might be lost, and such failure could have an undesirable effect on assessment (Bridgeman, 2009).

- **Screen problems:** It is believed that for some people, it takes longer to read on computer screens compared to papers due to the visual stress involved in looking at a computer screen for so long (McFadden *et al.*, 2001; Apostolou *et al.*, 2009). Therefore, the use of CBA by academic institutions in delivering assessments that require long reading passages, might be a challenge, especially to students who have issues with reading on screens (Singleton, 2001).

- **Security:** Being mostly an Internet-enabled technology, the use of CBA might pose security concerns to academic institutions, especially in the transmission of assessment items over the Internet to different computers (Walker, 2013). This is because, the host system responsible for the generation of the CBA may be a target for potential cybercrime. If the host system is attacked by malicious users, sensitive

information (such as assessment questions) may be put at risk and exploited by unauthorized persons, and thus, puts the privacy and confidentiality of the assessment items at stake (Kozma, 2009; van Lent & Global, 2009; Walker, 2013).

Although there might be some issues or disadvantages that are inherent in the adoption and use of CBA, the advantages and potential benefits of CBA still far outweigh the issues or disadvantages involved (Singleton, 2001; Broughton *et al.*, 2012; Nikou & Economides, 2013).

2.8 Components of a CBA system

A CBA system, as identified in the study of Singleton (2001) and PTC (2002), often has the following components: assessment generation; assessment delivery; assessment scoring and interpretation; and storage, retrieval and transmission, as shown in the figure below (Fig 2-1).

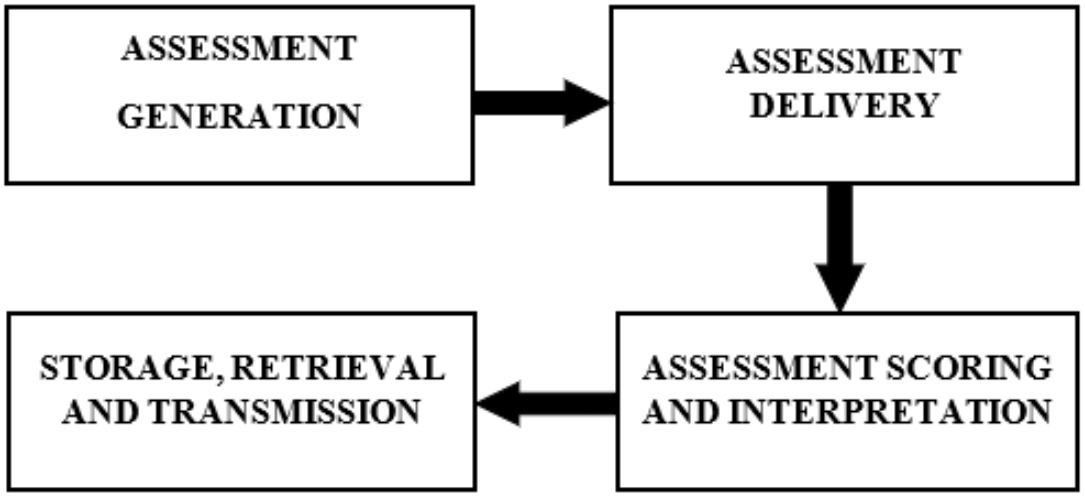

Figure 2-1: Components of a computer-based assessment system (PTC, 2002)

- **Assessment generation:** The assessment items used in a CBA are constructed and developed within the component of assessment generation (PTC, 2002). These items include the questions of the assessment and the tools used within the CBA system to receive responses from the students. Before the introduction of ICT into assessment, assessment items used to be constructed by humans (usually called human item writers). The use of human item writers often caused inaccuracies or errors in the assessment items that were constructed. However, the advent of CBA systems brought about the use of item engines (enhanced by artificial intelligence technologies) to construct and develop assessment items (PTC, 2002). The use of item engines has become efficient in the production of assessment items and helps to ensure the consistency and quality of assessment items produced. The item engine is mainly present in the assessment generation component of a CBA system.

- **Assessment delivery:** This deals with the administration and delivery of CBA to the students who are to be assessed (PTC, 2002). According to van Vuuren *et al.* (2013)**,** this component is built on a web-based technology, it involves the communication between a central server and several remote computers connected to a computer network, and it involves the delivery of assessments using webpage interfaces. This computerised delivery of assessments makes it possible for teachers and subject coordinators to conduct assessments for students irrespective of the students' locations (PTC, 2002).

- **Assessment scoring and interpretation:** The traditional ways of scoring or grading submitted assessments have been regarded as time-consuming and error-prone, especially when complex calculations are involved (PTC, 2002). The traditional ways make it difficult to obtain certain statistics that may be needed for decision-making purposes by the administrators of an assessment. However, the assessment scoring and interpretation component of a CBA system has been deemed to facilitate the ways in which submitted assessments are marked and how the scores are interpreted. Software packages such as a pattern recognition software and the Computer Based Test Interpretation (CBTI) software, are examples of software packages that can be used for assessment scoring and interpretation respectively in a CBA (PTC, 2002; van Vuuren *et al.*, 2013).

- **Storage, Retrieval and Transmission:** A CBA system consists of a database management system (DBMS) used for storage, retrieval and transmission of data (Wegener, 2007). The data is made up of assessment items that have been created,

delivered, scored and interpreted by the other components of the CBA system. The DBMS required by a CBA system often depends on the amount of data set available to be stored. That is, if a CBA system is designed to serve a large number of students, then a commercial database management system, like Oracle or MySQL, may be required (Wegener, 2007).

2.9 Comparability between PBA and CBA

Studies have been done to compare PBA and CBA since computers were firstly introduced into the assessment process (McFadden *et al.*, 2001). The studies about CBA continually grow due to the everyday use of ICT in academic institutions. Conducted studies have shown that there are certain areas that still need to be looked into regarding the introduction of computer technology into the assessment process. Most of these studies investigated whether the mode of assessment undertaken by students influences their assessment results or not (Clariana & Wallace, 2002; Ricketts & Wilks, 2002; Escudier *et al.*, 2011; Wilson *et al.*, 2011; Jeong, 2012; Nikou & Economides, 2013; Hosseini *et al.*, 2014). These studies have shown that an identical assessment, undertaken by students using the two modes of assessment (PBA and CBA), produces the same assessment results, thereby leading researchers to state that PBA is equivalent to CBA (Paek, 2005; TEA, 2008; Piaw, 2011; Gray, 2013; Csapó *et al.*, 2014). However, some studies have also shown that an identical assessment, undertaken by students using the two modes of assessment, does not produce the same assessment results, thereby leading some researchers to state that differences exist between PBA and CBA results (Özden, 2005; Demirci, 2007; Molnar *et al.*, 2011; Nikou & Economides, 2013).

2.9.1 Differences between PBA and CBA results

Studies showed that there are differences between students' PBA results and CBA results, when an identical assessment is undertaken. The differences shown by these studies are of two categories. One category of the studies showed that, when an assessment is administered as both PBA and CBA, students who take the assessment in the PBA mode tend to achieve better results than students who take the same assessment in the CBA mode (Way *et al.*, 2006). The other category of studies showed that students who take the assessment in CBA mode tend to achieve better assessment results than students who take the same assessment in PBA mode (Coniam, 2006).

2.9.1.1 PBA over CBA

A series of studies was carried out by Sandene *et al.* (2005) on students in their eighth grade. Two groups of students were formed and required to take a Mathematics assessment in both PBA and CBA mode. It was discovered that the group of students who took the assessment in the PBA mode had better assessment results than the group of students who took the same assessment in CBA mode. Similarly, Jeong (2012) investigated the results obtained by some Korean students who took identical assessments in Language Art and Science subjects, using the PBA and CBA mode. The results of the study showed that students achieved better assessment results when they took the PBA than when they took the CBA.

Hosseini *et al.* (2014) also carried out a study on English students in an Iranian university. The 106 students involved in the study were given two identical assessments on two separate occasions. In the first occasion, the students were required to undertake the assessment in PBA mode while in the second occasion, the students were required to undertake the same assessment in CBA mode. The results obtained by the authors showed that, on average, better results were achieved by students in the PBA than in the CBA. Furthermore, in a study conducted by Demirci (2007) on 103 students in the department of computer education in Turkey, homework assessments in PBA and CBA modes were administered to students. The results of the study showed statistically significant differences in the average homework results achieved by the students, with the students in the PBA mode obtaining higher results than the students in the CBA mode. Other studies by Bridgeman *et al.* (2003), Pommerich (2004), Way *et al.* (2006), Molnar *et al.* (2011) and Hensley (2015) also revealed that students achieved better results in PBA than their counterparts who took CBA.

2.9.1.2 CBA over PBA

In the study by Clariana and Wallace (2002), 105 undergraduate students in their first year, were randomly assigned to undertake an identical assessment in PBA mode and CBA mode. At the end of the study, the findings showed that there were significant differences between the results of the students who did the PBA and the students who did the CBA. The study showed that the CBA students achieved better results. In support of this finding, the study conducted by Nikou and Economides (2013) revealed a difference between assessment results obtained in an ICT subject by 203 undergraduate students of an Economics department in Greece. These students were given an identical assessment in both PBA and CBA mode. The authors observed that the students who did the CBA performed better than

those who did the PBA. Furthermore, in the studies by Gretes and Green (2000), InnChull *et al.* (2003), Coniam (2006) and Wilson *et al.* (2011), students had better results in CBA than other students who took PBA.

2.9.2 Factors influencing differences in performance

As observed from the literature, there are performance differences obtained by students when undertaking assessments in any of the two modes (Pommerich, 2004). It is important to note that, although different subjects were assessed altogether in the literature gathered, each study in the literature assessed the same set of subjects in order to compare performance differences. Also, no transfer of learning took place in all the studies in the literature gathered. The PBA and CBA assessments in the studies were conducted based on what the students had been taught within the context.

The factors that influence students' performance differences during assessments, thereby leading to different assessment results, are known as "test mode effects" (Clariana & Wallace, 2002; Choi & Tinkler, 2002; Pommerich, 2004; Nikou & Economides, 2013; Hosseini *et al.*, 2014; Hensley, 2015). These factors are mostly experienced when students undertake assessments in the CBA mode (Leeson, 2006; Noyes & Garland, 2008; Nikou & Economides, 2013; Hensley, 2015).

The factors responsible for performance differences can be categorised into two, namely;

- interface and technological issues, and
- personal features of the user.

2.9.2.1 Interface and technological issues

Students may encounter issues with the technology being used to deliver the CBA. Such issues may deal with how students review their answers and the mode of presentation of items. The issues related to the mode of presentation of items may include; the graphics used, the resolution and size of the screen and the size of the fonts used in the system (Vispoel, 2000; Clariana & Wallace, 2002; S. Thompson *et al.*, 2003; Leeson, 2006; Deutsch *et al.*, 2012). Students may also experience issues with the interface of a CBA, and this can negatively affect the performance, and hence the results, of students undertaking a CBA (Chris & Sally, 2001; Farrell & Leung, 2004).

- **Mode of presentation of items**

The study by Chris and Sally (2001) showed that the mode of presentation of items in a CBA is a technological factor that can have a significant influence on students' CBA results. The authors' study showed that students are more comfortable with screen presentations where all the assessment questions are broken down into pages, enabling students to view questions, one at a time. This mode of presentation enables the students to navigate to the following page for the subsequent questions. The authors' study showed that students are not comfortable with screen presentations in which all the assessment questions are displayed at once on a page, which thereby requires scrolling. Their study further presented findings that showed difference in students' assessment results when all questions were displayed at once (required scrolling) and when questions were broken down into a set of pages (no scrolling).

Also, Blazer (2010, p. 1) stated that, "students' performance may decline when they are required to scroll through information on the computer screen in order to respond to questions". Similarly, studies by Seung and Tom (2002), Bridgeman *et al.* (2003), Pommerich (2004) and O'Malley *et al.* (2005) showed that, students obtained lower assessment results in CBA because the items presented in the CBA required scrolling.

Furthermore, the study by Ricketts and Wilks (2002) showed that students who took an assessment in CBA mode were outperformed by other students who took the same assessment in PBA mode due to the mode of presentation of items on the screen. In support, the study by Nikou and Economides (2013) showed that a student's performance in CBA could be affected significantly by the type of colour used in presenting the assessment items on the screen, given that some students may have more visual problems than the others (Jeong, 2012).

- **Reviewing answers**

A CBA that is presented in such a way that students are unable to review their previous answers, can negatively influence the performance of students taking CBA, and hence lead to poor assessment results (Blazer, 2010; Nikou & Economides, 2013; Hosseini *et al.*, 2014). According to the American Psychological Association (APA) guidelines for developing CBA, students should be allowed to review their previous answers anytime they wish (Russell *et al.*, 2003). Also, since students are allowed to review their answers

in a PBA, preventing them from doing so in a CBA may seem unfair and may lead to a decline in their results (Russell *et al.*, 2003).

2.9.2.2 Personal features of the students

The characteristics of the student taking a CBA may also influence the results obtained between PBA and CBA. Such characteristics may include learning styles, computer familiarity and gender (Pommerich, 2004; Leeson, 2006; Wheadon, 2007; Noyes & Garland, 2008).

- **Learning styles**

  Different students learn in different styles, and since assessments are important in students' learning process, it is essential to determine if the learning styles, preferred by students, influence their assessment results (Hawk & Shah, 2007). Fleming (2006) defined learning style as the characteristics of an individual, and preference of how information is gathered, organized and thought about. Different researchers have come up with various learning styles in the past 25 years, and among these styles is the Visual, Aural, Reading, Kinesthetics (VARK) learning style developed by Fleming (2006). VARK is a learning style that is focused on the various ways through which information is absorbed and given out by people (Hawk & Shah, 2007).

  In order to determine the learning styles of students using VARK, Fleming (2006) discovered that students who preferred being taught using the aural style learnt more information through listening and discussion while the students who preferred being taught using the visual style learnt more information through the use of graphs, charts and pictures. Fleming's study further showed that students that preferred the kinesthetics style were more inclined to learning more information through behaviours such as feeling, touching and seeing, while the students that preferred the reading style learnt more information through the use of printed documents. If students are forced to learn a subject using a learning style that is not their preference, then they might be unable to learn substantial information needed to perform well when they are being assessed in that subject (Drago & Wagner, 2004; Fleming, 2006). Furthermore, if students are assessed using a style that does not conform with the learning style with which they have been taught, then their assessment performance may be affected.

- **Computer familiarity**

Students come from diverse technological backgrounds and hence have diverse exposure to computers and ICT. The degree to which students are familiar or experienced with computers therefore differs from one student to the other. This degree might have an influence on their performance and assessment results when they undertake CBA (McDonald, 2002; Pommerich, 2004; Wheadon, 2007).

A study was conducted by Douglas and Charles (1980) to investigate the effects of computer familiarity on a particular group of students' assessment results. The students in the study were required to take an assessment administered as a CBA. The students had no prior experience with using computers and were divided into two groups by the authors. The authors trained a group on the use of computers before the CBA was undertaken and did not train the other group. At the end of the study, it was discovered that the group of students that was trained on the use of computers before the CBA, obtained better assessment results than the other group of students that was not trained. Likewise, a study by Ann (1986) showed that some college students who took a Mathematics assessment administered as a CBA, obtained poorer assessment results than another group of students who took the same assessment in PBA mode, because they had no experience with computers. Furthermore, studies were conducted by Taylor *et al.* (1998) and Taylor *et al.* (1999) on some students who were taking a "Test of English as a Foreign Language" (TOEFL) assessment. This assessment was administered as a CBA to all the students. At the end of the study, it was found that the students who were familiar with computers before the assessment, had better assessment results than the students who were not familiar with computers before the assessment. In addition, TEA (2008) presented a study conducted on some students who were taking a CBA containing "constructed response" question types. It was observed that the students who had prior familiarity with typing text on computers obtained better assessment results than other students without such familiarity.

Contrarily, recent studies have shown that computer familiarity does not influence the performance and results of students in CBA. A study carried out by Eid (2005) among students who took a Mathematics assessment showed that students who had prior computer experience and students who did not have, both achieved similar assessment results in CBA. Similarly, the study by Jeong (2012) showed that prior familiarity with

computers may not boost students' performance and results in CBA. The author stated this because the result of his study, carried out on some students in Korea, showed that those students who had prior experience and interaction with computers achieved lower CBA results than those students who had no prior experience with computers. Furthermore, Hosseini *et al.* (2014) carried out a study to determine if computer familiarity had any effect on assessment results of students. One hundred and six English students of a university in Iran participated in the study and were required to undertake a PBA and CBA. The results of the study showed that there was no significant relationship between students' computer familiarity and students' results in the CBA.

It is pertinent to note that most of the studies, indicating that students who have no familiarity with computers achieved lower assessment results in CBA, were conducted when there was yet to be a widespread penetration of computers into schools and homes (Russell *et al.*, 2003). Studies conducted in recent years have shown that, nowadays, students seem to be more familiar with the use of computers and web-based technologies than in the past, and this tends to positively influence their (students') results in CBA (Link & Marz, 2006; Kennedy *et al.*, 2008; Gregor *et al.*, 2008; Deutsch *et al.*, 2012).

In addition, digital literacy is another personal feature of students that may affect their performance in an assessment. Digital literacy, which may also be referred to as computer literacy (Nelson *et al.*, 2011), was firstly defined by Gilster and Glister (1997) as the ability of someone to understand and make use of information presented in multiple formats and obtained from multiple sources, when such information is presented via computers. It has also been defined as "the ability to use technological applications and the ability to make use of these technologies for personal and collective occurrences" (Feola, 2016, p. 2175). A student is said to be digital/computer literate if s/he can understand and make use of information presented (from many sources) on a computer system. Also, a student familiar with a computer system would most probably be digital/computer literate. Therefore, the degree of digital/computer literacy of students may influence their assessment performance and result when they undertake CBA (Al-Amri, 2007; Hakami *et al.*, 2016).

- **Gender**

Studies have shown that the gender of a student taking CBA is a factor that might influence the performance of such student in the CBA (Leeson, 2006; Moe, 2009; Nikou & Economides, 2013; Hosseini *et al.*, 2014). Li and Kirkup (2007) and He and Freeman (2010) stated that the use of CBA usually favours males than females because it is believed that males have better ICT skills and more familiarity with computers. However, studies have also shown that female students may outperform male students in CBA (Terzis & Economides, 2011a; Csapó *et al.*, 2014). In the study by Jeong (2012), the results obtained by the male and female Korean students, who took part in the study, were compared. The study showed that the results obtained by female students were poorer than that of the male students. The author stated that females obtained poorer results because of their negative attitudes and discomfort with computers. Contrarily, a study was carried out by Csapó *et al.* (2014) on some students in Hungary. The students undertook a CBA in four subjects, and the results of the study showed that female students obtained higher results than male students. Furthermore, the study by Terzis and Economides (2011a) showed differences between the CBA performances and results of some male and female undergraduate students in Greece. In their study, females had better assessment results than males. Additionally, in the studies recorded in the Programme for International Student Assessment (usually being participated by students in Canada, Finland, Japan and Korea), it was shown that there were gender differences in the CBA results obtained by the students across these countries. Other studies by Seung and Tom (2002), Fitzpatrick and Triscari (2005) and Keng *et al.* (2008) also showed that the differences between CBA and PBA results among students can be attributed to their gender.

Some studies have however shown that the gender of students taking a CBA has no significant influence on the results obtained in the CBA. The results of the study conducted by Clariana and Wallace (2002) indicated that there was no significant difference found between the results of males and females in CBA. Also, the study by Hensley (2015) on 155 students in an elementary school showed that there was no significant relationship between the CBA results and the gender of the students who took the assessment. The results obtained in the studies by Eid (2005) and Molnar *et al.* (2011) also showed that there were no differences in the results achieved by males and females in the CBA they undertook. Furthermore, Akdemir and Oguz (2008) compared the

performance of some male and female Turkish undergraduate students in PBA and CBA. The results of their study showed no significant differences between the results of males and females in the CBA.

2.9.3 Equivalence between PBA and CBA results

The use of a CBA should only be considered valid and reliable if its results are equivalent to PBA results (APA, 1986). "CBA and PBA results are generally considered equivalent if they (their results) satisfy three criteria which are; having the same mean, the same standard deviation, and the same rankings of individual examinees" (Russell *et al.,* 2003, p. 6). In addition, Commission (2006) stated that CBA and PBA results can be considered equivalent if both the CBA and PBA; "have comparable reliabilities; correlate with each other; correlate similarly with an external criterion measure and generate comparable means and standard deviations" (Hensley, 2015, pp. 60, 61).

Chua (2012) stated that more studies need to be carried out to show that there is equivalence between PBA and CBA results, so as to encourage more academic institutions to administer CBA. TEA (2008) showed a summary of the results obtained by different studies that have investigated the comparability between PBA and CBA results. Most of the findings obtained in TEA (2008) showed that PBA results are equivalent to CBA results, especially when Mathematics assessments are administered.

Csapó *et al.* (2014) conducted a study on some young learners in an early childhood education. The authors' study was conducted on a sample of children in their first grade in a technology-based environment. An identical assessment, in both PBA and CBA mode, was administered to the students. The results of the authors' study showed that there were no differences between the results obtained in the two modes of assessment administered. Also, in the comparability study by Akdemir and Oguz (2008), an investigation was carried out to determine whether 47 students in a public university in Turkey, would have different assessment results if an identical assessment is administered in both PBA mode and CBA mode. The results of their study showed that no differences were present between the assessment results of these students in both PBA mode and CBA mode. This therefore made the authors state that CBA can be considered as a capable alternative to PBA as a mode of assessment for the students.

Furthermore, in the study carried out by Escudier *et al.* (2011) on 266 undergraduate students in a London college, students were asked to take an identical assessment delivered in both

PBA mode and CBA mode. The students were divided into two groups, A and B. Group A was asked to take the first half of the assessment in PBA mode and the remaining half in CBA mode, while group B was asked to take the first half of the assessment in CBA mode and the other half in PBA mode. The findings of the study showed that the PBA and CBA results obtained by the two groups (A and B) were equivalent. In another study, Gray (2013) investigated if there would be any difference between students' PBA and CBA results. The author's findings showed that there are no significant differences between the results of the two modes of assessment.

2.10 Transitioning from PBA to CBA

According to the "Standards for Educational and Psychological Testing", an academic institution planning to make a transition from the use of PBA to CBA must first provide empirical evidence that shows that the results of a CBA will be equivalent to that of a PBA (American Educational Research Association, 1999; Hensley, 2015). Also, the principles of instructional design mandates that paper-based and computer-based versions of an assessment must produce equivalent results, if truly the content of both modes of assessment are the same (Clark, 1994; Gagne *et al.*, 2005). Thus, if an academic institution decides to adopt the use of CBA, then experiments should be conducted, to ascertain that the results obtained from the CBA will be equivalent to the results obtained from the PBA for the same assessment, before going ahead with the full adoption (Rabinowitz & Brandt, 2001).

Academic institutions must put appropriate measures in place to ensure that there is a sort of equivalence between assessment results obtained in an identical assessment administered as PBA and CBA (Chua, 2012; Nikou & Economides, 2013). If the administration of CBA will lead to significant differences in the assessment results obtained in an identical assessment administered as PBA, then the validity and reliability of using CBA becomes questionable (Chua, 2012).

2.11 Studies on students' perceptions of CBA

The perception of students about CBA remains an issue among researchers in the field of CBA and among administrators of CBA. Studies have been conducted to investigate the different perceptions of students about the use of computers for assessment. It was observed from these studies that the differences in perceptions of students about CBA revolve around the ease-of-use of CBA, the usefulness of CBA, the playfulness of CBA, the computer self-efficacy of students, the facilitating conditions and the time taken to complete a CBA.

2.11.1 Perceived ease-of-use of CBA

A study was conducted by Jimoh *et al.* (2011) on some Computer science students. The results of the authors' study showed that students agreed that it is easy to undertake CBA. Also, in a study conducted by Mukandutiye *et al.* (2014), students regarded the CBA as a mode of assessment that is easy to undertake. Similarly, in the studies by Terzis and Economides (2011a) and Maqableh and Mohammed (2015), it was shown that the perceptions of students about the ease-of-use of CBA were positive.

In the studies by Jimoh *et al.* (2011), Terzis and Economides (2011a) and Maqableh and Mohammed (2015), it was shown that, the students who agreed that they find it easy to undertake CBA also expressed positive intentions to take CBA again. As a result of this, the authors stated that the perceived ease-of-use of CBA by students has an influence on students' behavioural intention to undertake CBA in future. Contrarily, the findings of the study carried out by Apostolou *et al.* (2009) on some students doing a CBA showed that students disagreed that it is easy to undertake CBA because of the difficulty involved in having to stare at a computer screen for a long time.

2.11.2 Perceptions about time saved

The results of the studies conducted by Pino-Silva (2008) and Sorensen (2013) showed that students spend less time when doing CBA compared to PBA. Similarly, the results of the study conducted by Jawaid *et al.* (2014) indicated that PBA takes a longer time to complete by students than CBA. This is because, a majority of students in the study indicated that they finished their CBA much earlier than they would have done if it was a PBA. Furthermore, the study by Piaw (2011) showed that students completed their CBA faster, especially in MCQ assessments. This was because of the time saved in selecting answers and the time saved in writing down or shading their responses in PBA. However, in the study by Young (2015), students indicated that it requires more time to undertake CBA, but the study did not provide reasons for this.

2.11.3 Perceived usefulness of CBA

Students agreed that the use of CBA as a mode of assessment has helped to improve their assessment performance and results (Ferrão, 2010; Jimoh *et al.*, 2012). As stated by Pino-Silva (2008), the use of CBA helps in reducing the mistakes occasionally made by students when trying to select an answer. The author stated that, in a case whereby ovals need to be

shaded in order to select an answer, as in PBA, several assessment marks may be lost due to errors arising from students, such errors include incomplete or unclear shading of the ovals. However, the one-time clicking or mouse-selection of an answer in CBA has helped to reduce such mistakes and hence improve students' CBA results. Moreover, the improvement in assessment results, and the time-saving benefits derived from the use of CBA, are important factors in students' perception about the usefulness of CBA (Schneberger *et al.*, 2007; Alki, 2010; Jimoh *et al.*, 2011).

Students who agreed that the use of the CBA has improved their assessment performances and results also agreed to undertake CBA in future assessments (Alki, 2010; Jimoh *et al.*, 2011). This therefore implies that students' perceived usefulness of CBA has a positive influence on their intentions to use CBA in the future, if the use of CBA is made optional (Schneberger *et al.*, 2007; Alki, 2010). It also implies that students have a tendency of preferring CBA to PBA (Blazer, 2010; Sorensen, 2013; Jawaid *et al.*, 2014; Young, 2015).

2.11.4 Perceived playfulness of CBA

Perceived playfulness of CBA may be defined as the extent to which students believe that undertaking CBA gives them fun, enjoyment or satisfaction (Terzis & Economides, 2011a). In the studies by Haahr and Hansen (2006), Piaw (2011) and Maqableh and Mohammed (2015), students indicated that they derive enjoyment, fun and satisfaction when undertaking CBA. The enjoyment and satisfaction derived by students when undertaking CBA may make them remain focused on the assessment being undertaken (Morgan & O'Reilly, 2001; Haahr & Hansen, 2006; Piaw, 2011). Also, the enjoyment derived by students when undertaking CBA makes them feel more motivated to continuously undertake CBA (Chua, 2012).

Furthermore, the findings by Moon and Kim (2001), Wang *et al.* (2009) and Maqableh and Mohammed (2015) showed that students' perceived playfulness of CBA has a direct influence on students' intentions to undertake CBA, in a case where CBA is voluntary. This implies that a CBA is more likely to be undertaken more often by students if students derive enjoyment, fun, and satisfaction when undertaking it (Terzis & Economides, 2011a).

2.11.5 Computer self-efficacy

Computer self-efficacy of students has been defined as the extent to which students believe they have the ability to make use of computers proficiently (Compeau *et al.*, 1999). Students' proficiency with the use of computers may affect their perceptions about the use of CBA

(Pomplun *et al.*, 2006; Bennett *et al.*, 2008; Alki, 2010; Yurdabakan & Uzunkavak, 2012). That is, students who believe they are able to make use of computers proficiently often believe that they will find it easy to undertake CBA, while students who believe they cannot make use of computers proficiently often believe they will find it difficult to undertake CBA (Terzis & Economides, 2011a; Maqableh & Mohammed, 2015). Since students' perceived ease-of-use of CBA influences their intention to take CBA (Terzis & Economides, 2011a), students who believe they can make use of computers proficiently may have positive intentions towards undertaking CBA while students who believe they cannot make use of computers proficiently may have negative intentions towards undertaking CBA (Hosseini *et al.*, 2014).

Furthermore, the gender differences in computer self-efficacy of students may also affect their perceptions about CBA. This is because, some studies showed that male students seem to have higher computer self-efficacy than female students (Isman & Celikli, 2009; He & Freeman, 2010; Terzis & Economides, 2011b; Tømte & Hatlevik, 2011; Deutsch *et al.*, 2012). This knowledge may make female students believe that the administration of CBA is in favour of male students (Alki, 2010).

2.11.6 Facilitating conditions

Facilitating conditions refer to those conditions and resources, that are available, to enhance the undertaking of a CBA (Bueno & Salmeron, 2008; Terzis & Economides, 2011a). The availability of the resources needed to administer a CBA to students is an important factor that could create diverse perceptions among students. These resources include technical resources (such as mouse, keyboard, reliable Internet connection and a help menu in the CBA) and human resources (e.g. staff members who are available to attend to any technical issues).

The availability of these resources to students undertaking a CBA influences their perceived ease-of-use of CBA (Terzis & Economides, 2011a). In the studies by Kingston (2008), Marriott and Teoh (2012) and Onyibe *et al.* (2015), for instance, it was stated that students perceived that the frequent interruption of power supply or Internet connection while undertaking a CBA could indirectly lead to poor assessment results. This perception may affect students' future intentions to undertake CBA.

It is believed that the availability of technical and human resources during CBA makes students feel comfortable and at ease when undertaking CBA (Hakami *et al.*, 2016), and if

students feel at ease with the CBA, this often influences their perceived usefulness of CBA and their future intentions to undertake it. Also, as shown in the study by Schneberger *et al.* (2007), if both technical and human resources are easily accessible by students when undertaking a CBA, then there is a probability that the students would find it easy to undertake that CBA. This in turn influences their perceived usefulness of CBA and their future intentions to undertake CBA.

2.12 Conclusion

This chapter presents the literature on different characteristics of assessment and the different modes of assessment. Notable among this review, and also relevant to this study, is that there are two modes of assessment (paper-based assessment and CBA). The chapter also showed that the use of CBA, brought about by the introduction of technology into assessment, has both benefits and issues. The chapter further presents studies that were carried out on the comparability between PBA and CBA. The findings of those studies showed that the assessment results obtained by students who took an identical assessment in both PBA and CBA mode could be either equivalent or different. The concluding part of the chapter presented a review of studies that have been conducted on students' perceptions of CBA. The next chapter describes the research methodology that was employed in order to meet the objectives of this study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Introduction

The previous chapter presented the literature on assessments and the influence on technology on assessments. The chapter showed how the introduction of technology into assessment has created diverse perceptions among students. It also presented studies that showed the factors causing different perceptions among students. This chapter describes the methodology used to carry out this study. It presents the types of methods and techniques employed to achieve the objectives of this study and presents the fit of the methodology to the study. It also presents the type of research design and research approach that have been used and how the target population of this study was selected. Furthermore, this chapter describes the sampling process that was used in this study and how data was collected. In addition, this chapter also explains the conceptual model that was employed and its relevance to the study.

3.2. Research design

In order for the objectives of this study to be achieved, a descriptive research design was adopted. The descriptive research design is useful when describing the characteristics of an already-known phenomenon (Bhattacherjee, 2012). As observed from the literature, CBA is a phenomenon that has already been known and studied. Therefore, the descriptive research design helps to shed more light on this phenomenon. Also, the descriptive research design focuses on answering the "what" questions associated with the characteristics of a phenomenon rather than "how" or "why" the characteristics of a phenomenon have occurred (Shields & Rangarajan, 2013). Furthermore, the descriptive design was adopted because of the need to obtain statistical results such as frequencies and percentages (Shields & Rangarajan, 2013).

3.3. Research approach

A quantitative research approach was employed in this study. This approach involves the collection of numerical data which can be useful in explaining a phenomenon (Skills, 2016). Also, "this approach is used to quantify attitudes, opinions, behaviours and other defined variables, and generalize results from a larger sample population" (Wyse, 2011, p. 1). The quantitative research approach was adopted because this study involves the investigation of relationships between independent and dependent variables (USC, 2016). The use of this approach would help in generalising the results of this study.

3.4. Target population

Target population refers to the total number of units, individuals or groups that researchers wish to generalise their results to (Explorable, 2009a). According to Bhattacherjee (2012), the target population is obtained from the study site and it contains the total number of people that could probably be surveyed. The target population has to contain units, individuals or groups of people who meet a set of criteria beneficial to the study (Lavrakas, 2008). The study site was the University of KwaZulu-Natal (UKZN), Pietermaritzburg campus. In this study, the criterion for selecting the target population was that, students must have undertaken CBA in any of their modules or subjects. Thus, the target population consisted of students at UKZN, Pietermaritzburg campus, who had undertaken a form of CBA in any of their subjects or modules.

More specifically, the target population consisted of students in the Disciplines of Information Systems and Technology, Chemistry, Accounting, Psychology and Computer science in Pietermaritzburg campus. Reason for choosing these five disciplines is because, a pilot investigation conducted before actual data collection commenced, showed that, out of all the disciplines in the study site, only the five aforementioned disciplines had administered CBA to their students at the time this study was being conducted. During the pilot investigation, the researcher visited all the disciplines in the College of Agriculture, Engineering and Science and the College of Law and Management studies, to make enquiries. Enquiries made by the researcher showed that the students within these two colleges have undertaken CBA in only the five aforementioned disciplines. The statistics obtained from the university's website showed that the aforementioned five disciplines in Pietermaritzburg campus had a total population of about 5,452 students. This population thus formed the target population of the study.

3.5. Sampling process

Sampling has been defined as the process through which the representative sample of a population is selected for a study (Latham, 2007). Bhattacherjee (2012) also defined sampling as the statistical process involved in the selection of the subsets of a population (also known as the sample) that enables a researcher to make observations and inferences based on the population of study. Likewise, a sample may be simply defined as a "subgroup" of a population (Botan *et al.*, 2000). The selection of a sample from a population of study, makes it possible for a researcher to be able to generalise the results obtained, mostly in a quantitative study, from the sample to the entire population of study (Trochim, 2006c).

3.6. Study's sample size

The sample size that was used in this study was selected in accordance with Krejcie and Morgan (1970)'s table. According to this table, the sample size required for a population size between 5000 and 5999 is 357. Given that the target population of this study contained 5,452 students, a sample size of 357 was used.

3.7. Sampling techniques

The sampling technique employed in a research depends on the research approach and the research objectives (Latham, 2007). There are two major categories of sampling techniques. They are; non-probability and probability sampling techniques. Probability sampling technique involves the selection of participants in a study based on the use of a random criterion which gives each unit in the study population an equal chance of being selected as participants while in a non-probability sampling technique, some units of a study population have no chance of being selected as participants, as a result of the non-random criteria used (Bhattacherjee, 2012).

Being a quantitative study, the probability sampling technique was used, so as to give every participant in the target population a chance of being selected to participate in the study (Latham, 2007; Bhattacherjee, 2012). The adoption of this technique also helped in eliminating any form of researcher bias that could have been encountered. By eliminating bias, the results of the study could be generalised from the sample to the population of study, since the sample depicts the population (Latham, 2007; Bhattacherjee, 2012).

There are different types of techniques that can be used to perform probability sampling. Notable among them are; simple random sampling, cluster sampling, systematic random sampling and stratified random sampling (Bhattacherjee, 2012).

3.7.1. Simple random sampling

This form of sampling is regarded as the most representative and reliable method when generalizing a sample to the entire population (Sekaran & Bougie, 2016). However, it is most effective when the target population in a study is small and when all the members of that population are known upfront (Ormrod & Leedy, 2010). Thus, for a population that is large, the use of simple random sampling may be impracticable.

3.7.2. Cluster sampling

Cluster sampling is used when the target population is distributed over a wide geographic region (Bhattacherjee, 2012). In this sampling method, the entire target population is sub-divided into smaller subsets (known as clusters), and afterwards, random samples are carried out on each of the clusters (Ormrod & Leedy, 2010).

3.7.3. Stratified random sampling

In stratified random sampling, the target population is divided into smaller subgroups called strata (Sekaran & Bougie, 2016). Afterwards, a simple random sampling method is performed on each of the strata in order to obtain equal sub-samples from each of the strata (Bhattacherjee, 2012).

3.7.4. Systematic random sampling

In this technique, the target population is sorted according to a particular order or criterion, and after that, the members of the population are selected using regular intervals (Sekaran & Bougie, 2016).

To carry out this technique, a sampling ratio is created. The sampling ratio is obtained by dividing the number of individuals in a target population by the size of sample that is desired (Trochim, 2006b; Bhattacherjee, 2012). The sampling ratio is then used to form regular intervals through which participants are selected. In order to select the participants in the study, a starting point within the target population is randomly chosen so as to avoid over-representation of certain demographical characteristics (Bhattacherjee, 2012).

Systematic random sampling technique was employed in this study because it has a low risk factor (Ross, 2015). That is, there is a low possibility that the techniques used to obtain the sample will contaminate the data to be collected. Also, this technique was employed because there is a low probability of obtaining a clustered selection among chosen samples, as usually experienced in simple random sampling (Ross, 2015). Furthermore, based on the sorting criterion of this technique, the sample obtained can be said to be representative of the target population (Explorable, 2009b)

3.8. Data collection

In a descriptive research, data can be collected by using four types of designs, namely; correlational study design, developmental research design, observational research design and survey research design (Ormrod & Leedy, 2010). A correlational study design involves the measurement of two different characteristics (or variables) in order to determine if they are related, and in what ways they are related. In order to measure these variables, a correlation coefficient, r, which usually ranges from -1 to 1.0, is used (Kim, 2016). "A correlation coefficient is a statistic used to measure the strength and direction of the linear relationship, or correlation, between two variables" (Sagepub, 2017, p. 240). In developmental research design, a researcher aims at collecting data related to specific characteristics such as children, adults, students or workers, from different groups of participants at intervals, over an extended period of time (Heffner, 2017). The observational research design is used when a behaviour or phenomena being studied needs to be objectively observed and quantified. In a survey research design, data is obtained by asking questions directly from the participants of a study. The answers to these questions are then presented in a form suitable for quantitative analysis (Ormrod & Leedy, 2010).

3.8.1. Survey research design:

"Survey research is a research method involving the use of standardized questionnaires or interviews to collect data about people and their preferences, thoughts, and behaviours in a systematic manner" (Bhattacherjee, 2012, p. 73). The aim of the survey design is to use a sample of a large population, to draw conclusions about that population. According to Blumberg *et al.* (2014), a survey research is a design that is commonly used in descriptive research. Survey research design is suitable for a study in which individual people serve as the unit of analysis (Bhattacherjee, 2012). Since the unit of the analysis in this study were individual students, this research design was employed. Also, this design was employed because this study was aimed at using a representative sample to draw conclusions about a target population.

Data can be collected in a survey research using two main categories of surveys, depending on the type of data that is required in the study. These categories are, interview surveys and questionnaire surveys (Bhattacherjee, 2012).

3.8.1.1 Interview survey

According to Bhattacherjee (2012, p. 78), "survey interviews are a more personalized form of data collection method than questionnaires, and are conducted by interviewers, using the same research protocol as questionnaire surveys (i.e., a standardized set of questions)". Interviews might be structured or unstructured and may be conducted as group interview (also called focus group), face-to-face interview or telephone interview (Barribeau *et al.*, 2012).

3.8.1.2 Questionnaire survey

A questionnaire survey mainly makes use of a questionnaire as the instrument for data collection. "A questionnaire is a research instrument consisting of a set of structured or unstructured questions (items) intended to capture responses from respondents in a standardized manner" (Bhattacherjee, 2012, p. 74). A structured-question questionnaire provides a list of choices that the respondents will choose from, thereby preventing the respondents from answering the questions in their own words, whereas an unstructured-question questionnaire enables the respondents to provide the answers to the questions in their own words. Questionnaire surveys can also be conducted as postal mail surveys, group-administered surveys or online surveys (Barribeau *et al.*, 2012; Bhattacherjee, 2012).

In postal mail surveys, the questionnaires in paper form are sent by postal mail to the respondents (Sekaran & Bougie, 2016). After completing the questionnaires, the respondents return them in postage-prepaid envelopes to the researcher (Bhattacherjee, 2012). In a group-administered survey, the researcher gathers all the respondents together in the same location at the same time, and asks each respondent to complete the questionnaires while in that location (Sekaran & Bougie, 2016). In an online survey, the questionnaires are delivered to the respondents in an electronic manner (Sekaran & Bougie, 2016). This could be done by sending the same questionnaire to a mailing list that contains the electronic mail (email) addresses of all the respondents present in the sample. Alternatively, respondents might be asked to follow a link in an email that is sent to them, that takes them to where the questionnaire would be filled (Bhattacherjee, 2012). Questionnaires in this format are filled electronically rather than on a paper.

In this study, the questionnaire survey was used as the survey research method for data collection. The questionnaire survey was conducted as a group-administered survey because of the assurance of a high response rate, as stated by Bhattacherjee (2012).

3.9. Questionnaire pretesting

Before the final questionnaires were handed to the participants, the questionnaire was subjected to a pretesting. Pretesting is an important step that should be carried out, because it helps in ensuring that all kinds of errors, that can be encountered during a survey research, are reduced (Grimm, 2010). It also helps in uncovering any lack of clarity, ambiguity or biases, that may be involved in the questionnaire (Bhattacherjee, 2012). The aim of the pretest carried out in this study was to check if the study's eventual respondents would have any difficulties in understanding and answering the questions in the questionnaire, and to check for the objectivity of the questionnaire (Hilton, 2015).

To carry out the pretest, the questionnaire was distributed to a group of seven students (Willis, 2004; Bullen, 2014), who were part of the target population. While filling the questionnaire, the group of students was asked to voice out any concerns they had about the questionnaire. These concerns were taken into consideration and were tailored to the design of the final questionnaire. The majority of the concerns involved the use of small fonts and the use of some unfamiliar terminologies. These changes were adjusted accordingly in the final questionnaire. The group of seven students who took part in the pretest were exempted from the sample of the study, as suggested by Bullen (2014). The data collected through the pretesting were separated from the data collected through the final questionnaire, and also exempted from the data analysis.

3.10. Distributing the final questionnaires

As stated earlier, the target population consisted of students in the Disciplines of Information Systems and Technology, Chemistry, Accounting, Psychology and Computer science. In order to recruit the participants for this study, an appointment was made with the lecturers in each of these disciplines so as to schedule a time of meeting with the students at their respective classrooms. Questionnaires were distributed to the students present in the classrooms using the systematic random sampling method. To use this method, a sampling ratio was created in each classroom by dividing the number of students in a classroom by the sample size needed from that classroom. The sample size required from each of the five classrooms (disciplines) was obtained by dividing the sample size needed for the study (357)

by the number of disciplines (5). Therefore, the sample size needed from each classroom (discipline) was 72. Afterwards, the sampling ratio was used to create a regular interval that was used to select the participants. In each of the classrooms, the first participant was selected at random, and all other participants were selected using the interval created. The questionnaires were distributed across the five disciplines present in the target population. The sampling method was repeated in all the classrooms until the sample size required (across all classrooms) for this study (357) was obtained. The questionnaires were distributed by hand and face-to-face to the students in order to obtain a high response rate (Nulty, 2008).

3.11. Questionnaire design

The questionnaire used in this study contained 43 questions. The questions were divided into nine (9) sections. These sections were labelled from letters A to I.

Section A: Demographic information

This section contained questions that were aimed at obtaining the demographic information of the participants. The demographic information obtained include the age, gender, ethnicity and academic level of the students.

Section B: Familiarity with Computers and Internet

This section contained questions that were aimed at obtaining information about the students' familiarity with computers and the Internet. The section was aimed at collecting information relating to the experience of students with regards to the use of computers and the Internet.

Section C: Information about Assessments

This section contained questions that were aimed at obtaining information from the participants about the two modes of assessments under investigation i.e. PBA and CBA. The section contained questions about the subjects or modules in which the participants have undertaken CBA and the challenges they faced, if any, when undertaking CBA. The section further examined the mode of assessment that the participants preferred, and the reasons for their preference. This section contained few sub-sections with open-ended questions, that enabled students to write out their responses in the spaces provided.

The remaining six (6) sections (Sections D to I) were designed based on the conceptual model that was adapted to this study. The 6 sections represented six of the nine constructs contained in the conceptual model that was used in this study. Some of the questions in the

sections were adapted from other studies such as Alki (2010) and Jamil *et al.* (2012), that had made use of similar constructs to investigate students' perceptions of CBA.

Section D: Computer Self-Efficacy

The aim of this section was to obtain information about the extent to which students believed that they could use computers and the Internet on their own with or without the assistance of someone. The section further examined the extent to which students believed that they could undertake CBA on their own without the assistance of someone.

Section E: Perceived Ease-Of-Use

This section was aimed at examining the extent to which the participants believe they find it easy to undertake CBA, in terms of the ease-of-use of the interface, reading questions, selecting answers, correcting mistakes and navigating within the pages.

Section F: Perceived Usefulness

This section was aimed at examining the extent to which the participants believe that the undertaking of CBA is useful to them, in terms of enhancing their performance and results in assessments.

Section G: Perceived Playfulness

This section was aimed at obtaining information from the participants about how they feel before and during the undertaking of CBA. The section examined the extent to which students were eager to undertake CBA, and the enjoyment and satisfaction they derive when undertaking CBA.

Section H: Facilitating Conditions

This section was aimed at obtaining information from students about their perceptions towards the availability of the resources necessary for accomplishing a CBA. The section was also aimed at examining the degree to which students believed that they were offered adequate support before and during the CBA. Furthermore, the section asked students about the extent to which they believed that there are staff and technical support or assistance available to them when undertaking computer-based assessment.

Section I: Behavioural Intention to Use: The aim of this section was to obtain information about the intentions of students to undertake CBA. The section asked students if they intend to undertake CBA in the future and if they intend to undertake CBA frequently.

3.12. Conceptual model

In Information Systems (IS) studies, either the Technology Acceptance Model (TAM) (Davis, 1989) or the Unified Theory of Acceptance and Usage of Technology (UTAUT) (Venkatesh *et al.,* 2003) has commonly been adopted in studies examining the acceptance of technology. However, studies related to the investigation of students' perceptions about CBA have often neglected these models (Jimoh *et al.,* 2011). This is because neither of these models contains sufficient constructs and variables needed for the investigation of students' perceptions about CBA. Hence, researchers have developed conceptual models that consist of the combination of constructs and variables from other IS models.

In the study by Alki (2010), a conceptual model was developed (by the researcher) by adding two constructs to TAM to form an extended TAM. The constructs added were computer anxiety and computer attitude, and they were used in conjunction with other variables in TAM to investigate students' acceptance of CBA. Similarly, the study by Jimoh *et al.* (2011) was conducted using a conceptual model called "modified TAM". The authors developed the conceptual model by adding a construct known as Perceived Fairness to the other TAM constructs to investigate the factors that may influence students to adopt and use CBA. Furthermore, a conceptual model called Computer Based Assessment Acceptance Model (CBAAM), developed by Terzis and Economides (2011a), was used by Maqableh and Mohammed (2015) to investigate the factors that influence the intentions of students to undertake CBA.

The CBAAM model was the conceptual model used to underpin this study. This model was used because it contains constructs that are deemed relevant in examining the perceptions of students about CBA. CBAAM was developed on the bases of three models, namely; TAM, UTAUT and Theory of Planned Behaviour (TPB). Seven constructs were derived from these three models (TPB, TAM and UTAUT). The seven constructs derived are Social Influence, Facilitating Conditions, Computer Self-Efficacy, Perceived Ease-of-Use, Perceived Usefulness, Perceived Playfulness and Behavioural Intention. Terzis and Economides (2011a) then added two constructs known as Goal Expectancy and Content, to the seven constructs derived from the three models, to form the CBAAM model.

Thus, the CBAAM model has nine constructs.

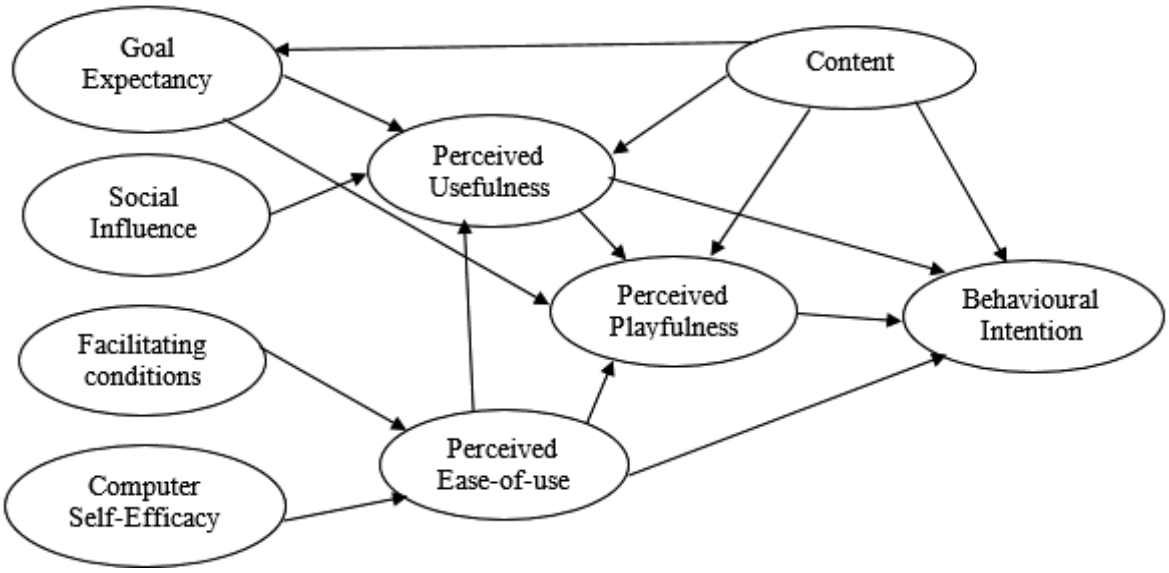

Figure 3-1: The CBAAM model (Terzis & Economides, 2011a, p. 1034)

In this study, three constructs were left out. These are; social influence, goal expectancy and content. The "social influence" construct was left out because the CBA undertaken by the students in the context of this study was compulsory. Hence, regardless of social influence, students would still have to undertake the assessment. Also, the researcher left out the "content" construct because the content of an assessment is managed and determined by the teachers and not the students (Terzis & Economides, 2011a). Furthermore, since "content" determines "goal expectancy", as stated by Terzis and Economides (2011a), the "goal expectancy" construct was also left out. Therefore, this study adopted six out of the nine constructs in the CBAAM model.

The six constructs are explained below;

Facilitating conditions (FC): FCs refer to those conditions, that a user believes are available, to enhance his/her undertaking of a CBA (Terzis & Economides, 2011a). In the context of this study, this construct was used to investigate if students feel that there are necessary resources and support (staff or technical) available to help them when undertaking a computer-based assessment.

Computer self-efficacy (CSE): This measures how an individual perceives his/her capabilities and competencies with regards to the efficient use of computers (Compeau *et al.*, 1999). In the context of this study, this construct was used to investigate if students feel that they can use computers on their own or with assistance.

Perceived Ease-of-Use (PEOU): This was defined by Davis (1989) as the extent to which a user believes that his/her use of a system would be effort-free. In the context of this study, this construct was used to investigate if students believe that undertaking a CBA is an easy task.

Perceived usefulness (PU): Davis, as cited in Terzis and Economides (2011a, p. 1034), defined perceived usefulness as "the degree to which a person believes that using a particular system will enhance his/her job performance". In the context of this study, this construct was used to investigate if students feel that undertaking computer-based assessment improves their assessment performance and result.

Perceived playfulness (PP): Perceived playfulness is defined as the extent to which students derive concentration, satisfaction, enjoyment and curiosity when interacting with computers (Malone, 1981b, 1981a; Moon & Kim, 2001). "Playfulness is considered as an intrinsic belief or motivation which is shaped from the individual's experiences with the environment" (Padilla-Meléndez *et al.*, 2013, p. 308). In the context of this study, this construct was used to investigate if students derive enjoyment, fun and satisfaction when undertaking CBA.

Behavioural intention (BI): This has been defined as the extent to which an individual has conscious plans to carry out or not carry out a specified task in the future (Davis, 1989). In the context of this study, this construct was used to investigate students' willingness to undertake computer-based assessment more frequently or in the future.

3.13. Handling non-response bias

As advantageous as survey research may seem it is often vulnerable to some systematic biases, one of which is the non-response bias (Bhattacherjee, 2012). Non-response bias arises when some respondents do not respond to the questionnaires given to them (Miller & Smith, 1983; Bhattacherjee, 2012). If there is a large number of non-respondents, the generalisability of the results of a study might be affected (Miller & Smith, 1983). It is pertinent to note that a high response rate was achieved in this study (as indicated in Chapter 4). This was made possible through the implementation of measures (explained below) that prevent non-response bias.

- **Relevance of content**

  As recommended by Bhattacherjee (2012), the questionnaire contained issues which were relevant to the respondents. Since the respondents were students, they were more willing

to respond to the questionnaire because it was related to assessments. This might have led to a high response rate.

- **Respondent-friendly questionnaire**

The questionnaire contained questions that were easy to understand, clear and as short as possible. This was done so as not to discourage the respondents from filling the questionnaire, and so as to reduce the average time required by a student to fill a questionnaire. According to Miller and Smith (1983) and Bhattacherjee (2012), questionnaires designed with this motive tend to improve the response rate.

- **Confidentiality and privacy**

Miller and Smith (1983) and Bhattacherjee (2012) stated that, assuring respondents of the confidentiality of their confidential data may help improve the response rate. In this study, an informed consent form was given to the respondents before they filled the questionnaires. In the informed consent form, the respondents were informed that their private data will be kept confidential and will be undisclosed to any third party throughout the research and afterwards.

3.14. Ethics

In order to ensure that the results of a research have not been subjectively achieved, it is important for researchers to conform to ethical principles. This helps to ensure that research results have not been manipulated to suit the researcher's personal agenda (Bhattacherjee, 2012). The following ethical principles in a social science research, as suggested by Bhattacherjee (2012) were upheld in this study:

- **Disclosure:** At the start of each data collection process, the researcher made a brief explanation of the objectives of the study, and also the relevance of the results. The terminologies, which the participants would come across in the questionnaire, were also explained. The researcher also revealed to the participants, the average number of minutes it would take them to complete the questionnaire. The average number of minutes was obtained from the pretesting that was carried out prior to the final data collection.
- **Voluntariness of participation:** Before questionnaires were distributed to the respondents in this study, the researcher informed them that participation in the study was optional. The students were informed that they could withdraw their participation

from the research at any point if they felt uncomfortable. They were also assured that non-participation in the research would not have a negative impact on their academic results. To further demonstrate the voluntariness of participating in this study, students who agreed to participate in the study were given an Informed Consent form to fill, to declare their willingness to participate in this study.

- **Anonymity and confidentiality:** In order to maintain the anonymity of the students, none of the information, revealing the students' identities, was revealed in the data analysis or the results interpretation section of this study. This makes it impossible for anyone to identify the students who participated in the study. In a case where the researcher couldn't guarantee anonymity, especially during the data coding processes, the confidentiality of the participants still remained guaranteed by ensuring that their identities will not be disclosed in any public medium.

To further uphold ethics in this research, Beauchamp and Childress (2001) stated that non-maleficence must be guaranteed. Non-maleficence ensures that participants in a research are prevented from any form of physical, social or psychological harm. In the context of this study, possible issues of maleficence in this research were addressed in an ethical clearance form submitted to the university. The researcher submitted an ethical clearance application form to the Research Ethics Committee of the university, and this was granted with full approval (Appendix A). Also, the researcher obtained a gatekeeper's letter from the office of the Registrar of the university in order to get the consent to conduct the research at the university (study site).

3.15. Conclusion

In this chapter, it was explained that the study followed a descriptive design and employed a quantitative approach in order to achieve its objectives. The chapter discussed the sampling process that was followed in this study. A probability sampling technique was employed, and this further informed the use of the systematic random sampling method to select the sample required for the study. Data in this study was collected through questionnaires. Pretesting of the questionnaires was done before the final questionnaires were distributed to the eventual respondents. This chapter further presented an overview of the questionnaire that was distributed to the respondents and how bias was handled. The concluding part of the chapter discussed how ethical principles were upheld in this study. The next chapter shows the results of the data analysis carried out in this study.

CHAPTER 4: FINDINGS AND ANALYSIS

4.1 Introduction

The previous chapter presented the methods that were employed in conducting this study. This chapter presents the responses obtained from the students and how they have been analysed. It reports how the questionnaire was tested for consistency and reliability and how the data obtained from the questionnaire was checked for any missing parts. Descriptive and inferential statistics of the data obtained are also presented in this chapter. It is important to note that his chapter only presents the results as obtained from the respondents, further interpretations and implications of the results are presented in chapter 5.

4.2 Response rate

A total number of 357 questionnaires were distributed to the sample population used in this study, but 350 valid questionnaires were returned, thereby giving an acceptable response rate of 98% (Biersdorff, 2009; Dillman, 2011). The questionnaires, which were distributed face-to-face to the respondents, contained questions that were very brief and quick to answer. This might have led to the high response rate achieved in this study (Nulty, 2008).

4.3 Handling missing data

Before conducting any form of statistical analysis, it is important to determine if there are any missing part of the data set (Alki, 2010). Usually, missing data occurs;

- when a respondent fails to answer some questions in the questionnaire because the respondent considers the responses confidential,
- when a respondent mistakenly omits a question or some questions due to the structure or arrangement of the questionnaire,
- when the researcher commits an error (error of omission) when entering the data into the statistical analysis software (Field, 2013).

In this study, some missing data were discovered. The missing data was as a result of students not responding to certain questions. Therefore, where data was missing, the researcher used “999” to code the blank cells in SPSS, and the code (999) was specified accordingly as “missing data” in the “variable view” of SPSS (Field, 2013). The missing data discovered in the data set was below 10% of the whole data set. In order to handle missing data that does not exceed 10% of a data set, Field (2013) recommended the use of the “replacing missing

score with mean" approach. This approach replaces the missing data in one category of a respondent's data set with the mean values of other respondents in that category. This approach was used to handle the missing data in this study. As shown in Appendix C, a mathematical function known as "series mean", present in SPSS, was used to compute the mean values that replaced all the missing data in the data set.

4.4 Consistency and reliability

In order to determine the degree of internal consistency of the responses provided by the respondents, a Cronbach alpha reliability test was conducted. This test was done to ascertain that the research instrument used (the questionnaire) was reliable and free from errors (Nunnally *et al.*, 1967; Sekaran & Bougie, 2016). A reliability test gives a Cronbach alpha whose value ranges from 0 to 1. The higher the value is to 1, the greater the internal consistency of the research instrument, and the greater the possibility of having highly reliable responses (Sekaran & Bougie, 2016). In order to consider a research instrument as reliable, its Cronbach's alpha must be a value greater than 0.7 (Nunnally *et al.*, 1967). The items in the questionnaire used in this study were run through a reliability test in SPSS and a Cronbach alpha of 0.756 was obtained (Table 4-1). This indicates that the items and responses in the questionnaire are consistent and reliable. Other results of the reliability test can be found in Appendix D.

Table 4-1: Result of reliability test

Cronbach's Alpha	No. of Items
.756	**47**

4.5 Test for normality

To determine the type of statistical analysis that will be performed on a data set, it is essential to know the nature of normality of the data (how the data is distributed). This can be done by conducting normality tests (like the Kolmogorov Smirnov and the Shapiro-Wilk tests) to determine how the data is distributed. If the data follows a normal distribution, it is appropriate to conduct parametric tests like the analysis of variance (ANOVA) and t-tests. However, if the data does not follow a normal distribution, then it is appropriate to conduct non-parametric tests such as the Chi-square test, the Kruskal-Wallis test or the Mann-Whitney U test (Laerd, 2013). In this study, the Kolmogorov Smirnov and the Shapiro-Wilk

tests in SPSS were used to test the normality of the data. The hypotheses used for the normality test are as follows:

H_0: The variables being tested follow a normal distribution

H_1: The variables being tested do not follow a normal distribution

(where **H_0** is the null hypothesis and **H_1** is the alternative hypothesis)

To determine if a data set is normally distributed, a significance value, which is greater than 0.05, must be obtained (Laerd, 2013; Pallant, 2013). In a case where the significance value obtained is less than 0.05, then such data is not normally distributed (Laerd, 2013; Pallant, 2013). With regards to the result of the normality test carried out in this study, the significance value obtained for all the variables in the data set was less than 0.05 (See Appendix E). This result therefore rejects the null hypothesis (H_0) and indicates that the data set used in this study does not follow a normal distribution or is not normally distributed. Hence, it is appropriate to conduct non-parametric statistical tests on the data set. In this study, chi-square tests were conducted.

4.6 Descriptive statistics of the study

4.6.1 Age of respondents

Out of the 350 respondents that participated in this study, 95.7% were between the ages of 18 and 24, 2.9% were between the ages of 25 and 30 and the remaining 1.4% were less than 18 years of age (See Figure 4-1 and Appendix F). None of the respondents was aged 31 or above.

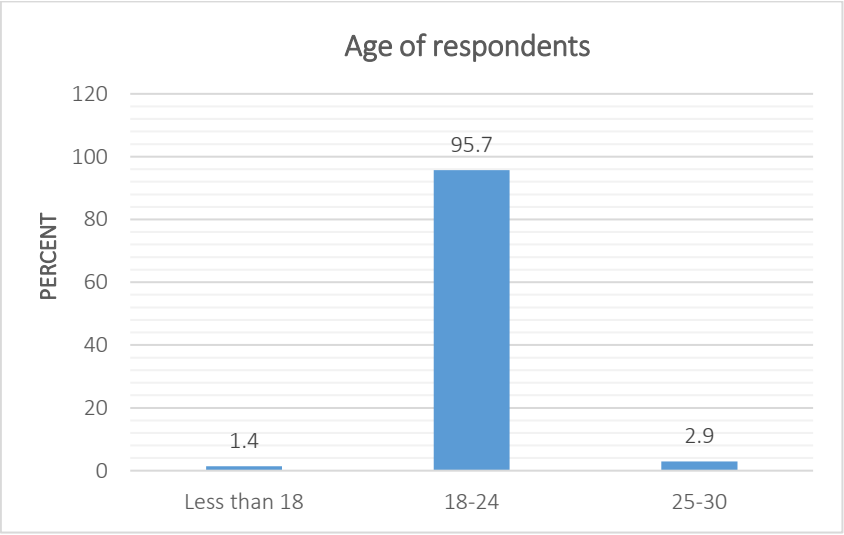

Figure 4-1: Age range of respondents

4.6.2 Gender of respondents

Out of the 350 respondents, 53.4% were female students while the remaining 46.6% of the respondents were male students, thereby indicating that the study had more representation of female students than male students (See Figure 4-2 and Appendix F). This is in contrast with the results obtained by Demirci (2007), (Al-Amri, 2007), Jimoh *et al.* (2012) and Jeong (2012), as regards gender representation in CBA studies. These authors' results showed that more male students participated in their studies about CBA than female students.

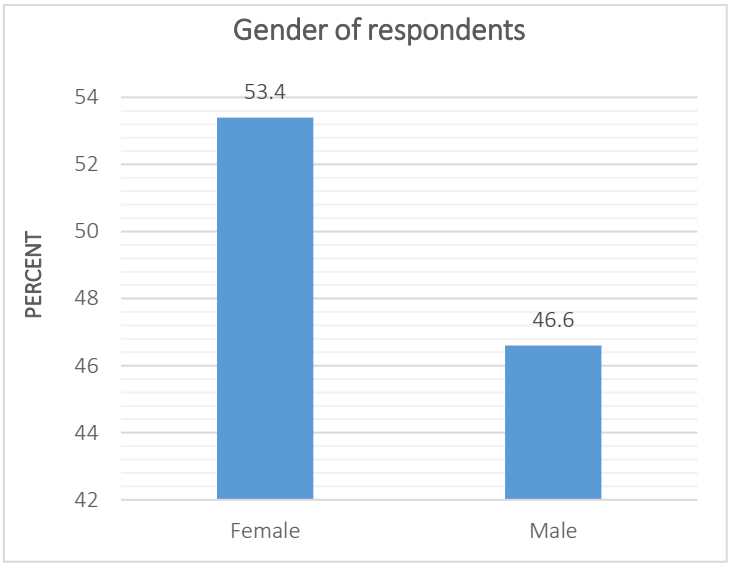

Figure 4-2: Gender split of respondents

4.6.3 Ethnicity of respondents

This study was conducted in South Africa. Being a country with people of different ethnic groups, the study consisted of respondents who belong to four ethnic groups. The ethnic groups are African, Indian, Coloured and White. Out of the 350 respondents, 74.3% belonged to the African ethnic group, 20.3% belonged to the Indian ethnic group, 1.7% belonged to the Coloured ethnic group and 3.7% belonged to the White ethnic group (Figure 4-3 and Appendix F).

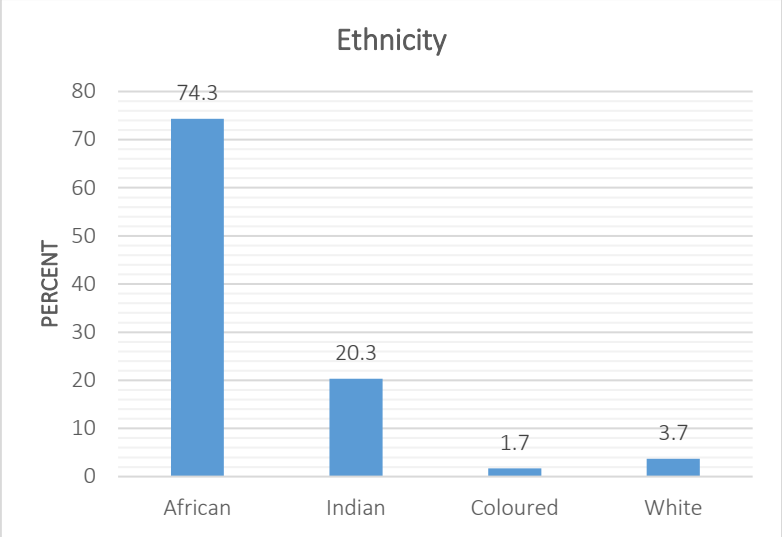

Figure 4-3: Ethnicity of respondents

4.6.4 Academic level of respondents

This study consisted of students in their First year, Second year, Third year, Honours and Masters academic level. The statistics obtained from this study showed that 41.4% of the respondents were in their first year, 18% were in their second year, 40% were in their third year, 0.6% were Honours students and 0% were Masters students (See Figure 4-4 and Appendix F). It is important to note that, although Masters students were considered as part of the target population, none of the respondents were Masters students.

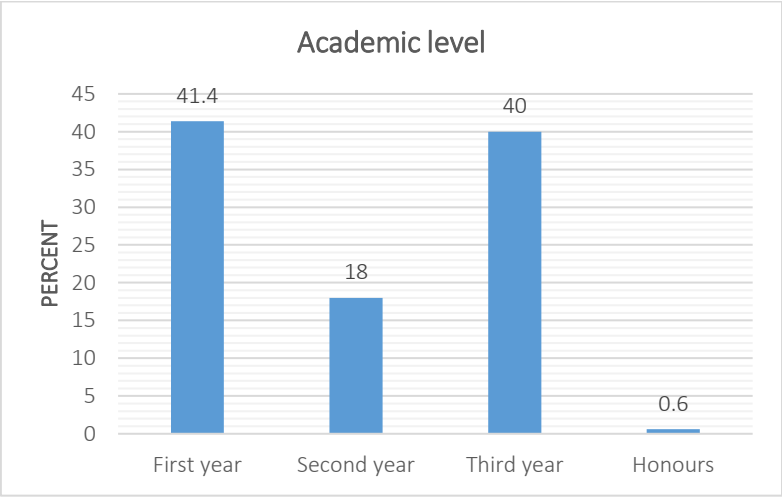

Figure 4-4: Academic level of respondents

4.6.5 Information about computer familiarity and Internet familiarity

The respondents were asked to indicate their responses (on a 5-point Likert scale) to questions relating to their familiarity with computers and the Internet. The Likert scale ranged from “Strongly Agree” (coded as 5) to “Strongly Disagree” (coded as 1), and the following responses were obtained from the respondents (as seen in Appendix G)

Most of the respondents (67.4%) indicated that they had been using computers since their high school days, while only about 24% indicated that they have not (A in Fig. 4-5). Further analysis of the responses indicated that most of the respondents had been using computers before they entered the UKZN. Also, a majority of the respondents (83.1%) indicated that they have been using the Internet since high school days, while only a few respondents (9.4%) indicated that they have not (B in Fig. 4-5). Furthermore, most of the respondents (79.4%) indicated that they were already familiar with using computers before taking CBA while 17.2% of the respondents indicated that they were not familiar with using computers before taking CBA (D in Fig. 4-5). Similarly, majority of the respondents (89.5%) indicated that they were familiar with using the Internet before taking CBA while only a few respondents (3.4%) indicated that they were not familiar with using the Internet before taking CBA (E in Fig. 4-5). Also, a large percentage of respondents (89.1%) indicated that they were familiar with reading from a computer screen before taking CBA while a small percentage (4.8%) of respondents indicated that they were not (F in Fig. 4-5).

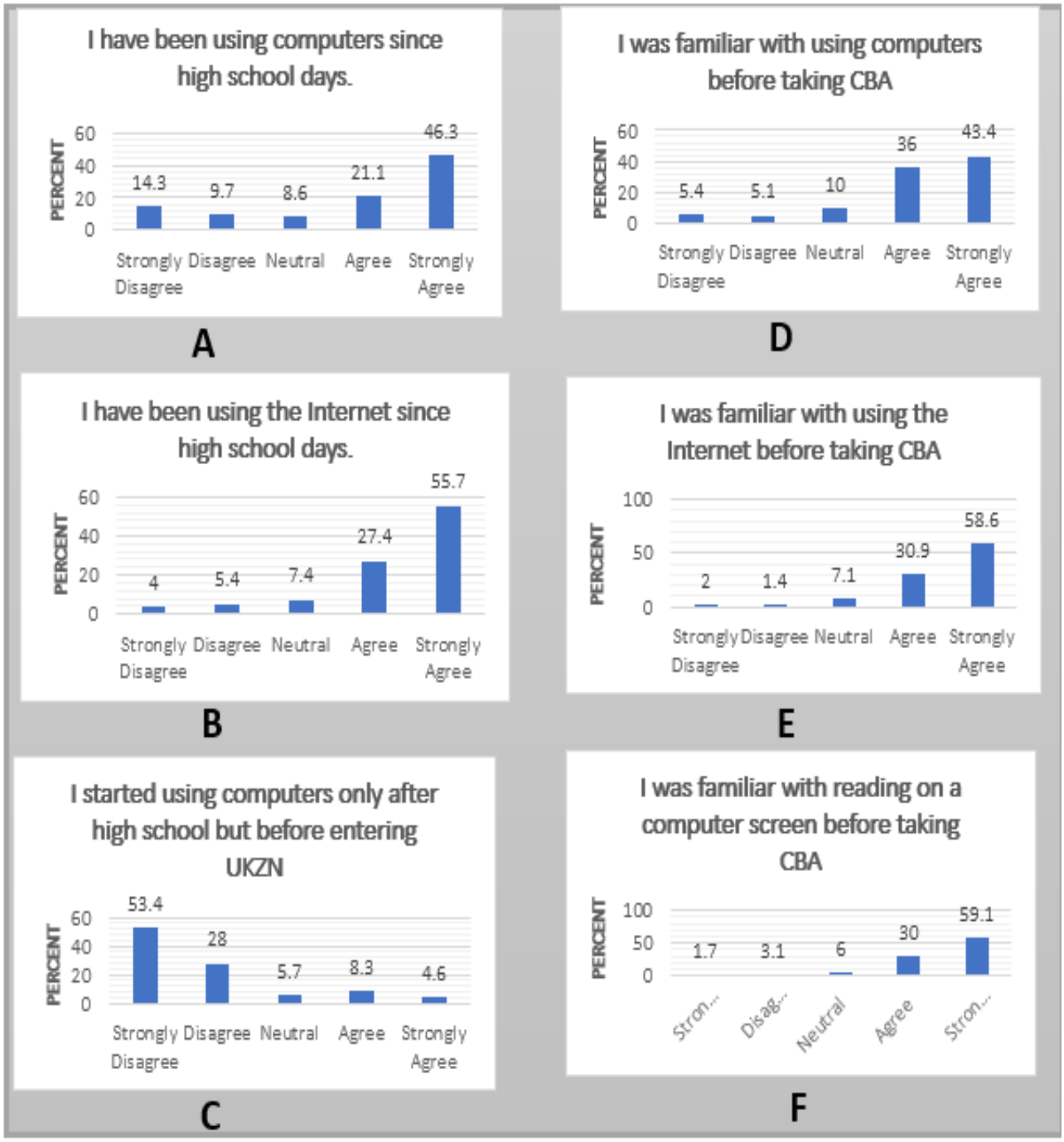

Figure 4-5: Information about computer and Internet familiarity

4.6.6 Information about assessments

The respondents were asked questions relating to the course(s) where they have done CBA. Out of the 350 respondents spread across the five disciplines surveyed, most of the respondents (38%) indicated that they did CBA in an Accounting course. 22% did CBA in a Computer science course, 16.9% did CBA in an Information Systems & Technology course,

13.7% did CBA in a Psychology course and 9.4% did CBA in a Chemistry course (Figure 4-6).

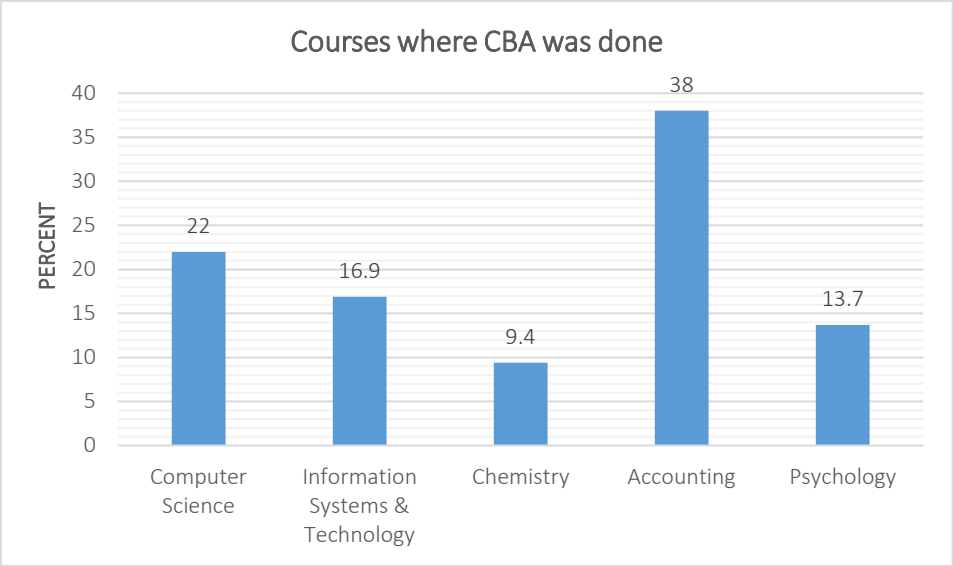

Figure 4-6: Courses where CBA was done

4.6.7 Constructs used in the study

The respondents were asked questions relating to the six constructs (adopted from the conceptual model) used in this study – Computer Self-Efficacy, Perceived Ease-of-Use, Perceived Usefulness, Perceived Playfulness, Facilitating Conditions and Behavioural Intention to use. On a Likert scale of "Strongly Agree" (coded as 5) to "Strongly Disagree" (coded as 1), the responses to each construct's questions are shown as follows (as also shown in Appendix G);

4.6.7.1 Computer Self-Efficacy

The analysis of the responses indicated that a larger percentage of the respondents (75.7%) can complete a computer task on their own without requiring the assistance of anyone while only a small percentage of the respondents (8%) require the assistance of someone in order to complete a computer task (See Appendix G). Similarly, a majority of the respondents (91.4%) indicated that they can navigate through the Internet on their own (without anyone's assistance) while a small percentage of the respondents (4.6%) indicated that they need someone's assistance. Furthermore, a majority of the respondents (78.6%) indicated that they can complete a CBA task on their own while a small percentage of respondents (8.3%) indicated that they require someone's assistance in order to complete a CBA task.

4.6.7.2 Perceived Ease-of-Use

Most of the respondents (66.6%) indicated that they find it easy to read questions that are presented in CBA while 8.9% indicated that they do not find it easy to read questions that are presented in CBA (See Appendix G). A majority of the respondents (80.3%) indicated that they find it easy to select their answers when undertaking CBA while a small percentage (4.8%) indicated that they do not find it easy to select their answers when undertaking CBA (See Appendix G). Most of the respondents (85.5%) indicated that they find it easy to navigate through the pages in CBA while only 3.7% indicated that they do not find it easy to navigate through the pages in CBA (See Appendix G). Also, a majority of the respondents (67.2%) indicated that they find it easy to correct their mistakes when undertaking CBA while 14.5% indicated that they do not find it easy to correct their mistakes when undertaking CBA (See Appendix G). Furthermore, most of the respondents (73.7%) indicated that the CBA interface is easy to use and user-friendly while only 5.8% disagreed with this notion (See Appendix G). The analysis of the responses indicated that most of the respondents (72.6%) find it easy to undertake CBA while only a few percentage of the respondents (5.4%) do not find it easy to undertake CBA (See Figure 4-7).

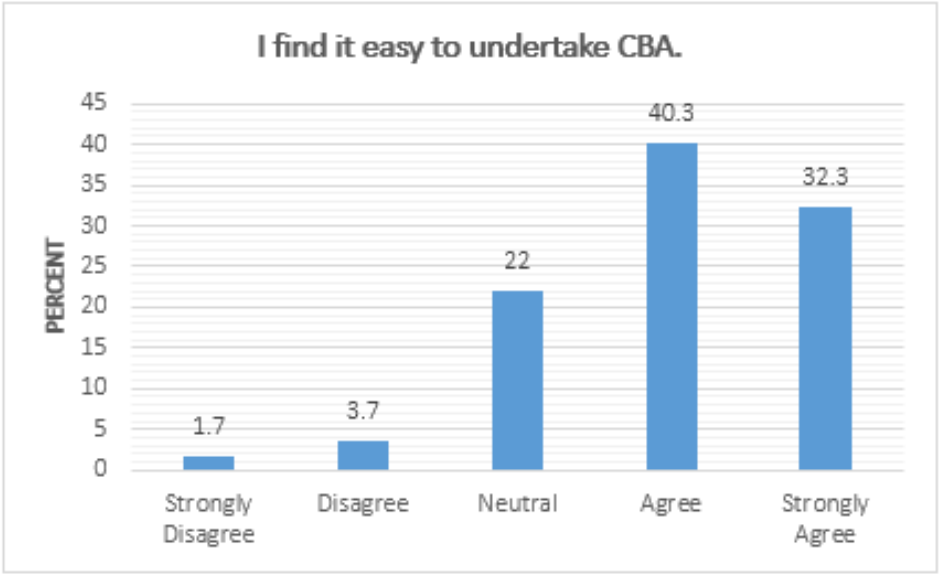

Figure 4-7: Perceived Ease-of-Use (Question 6)

4.6.7.3 Perceived Usefulness

Most of the respondents (58%) indicated that they spend less time selecting their answers when doing CBA while few of the respondents (15.4%) indicated that they do not spend less

time selecting answers when doing CBA. Similarly, a majority of the respondents (56%) indicated that they spend less time in changing their choice of answers when doing CBA while a small percentage (15.7%) indicated that they do not spend less time in changing their choice of answers when doing CBA. Furthermore, a majority of the respondents (61.4%) indicated that they save more time in completing assessments when doing CBA while a small percentage of respondents (12.6%) indicated that they do not save more time in completing assessments when doing CBA. In addition, more respondents indicated that their performance and results in assessments have been enhanced through the use of CBA while a lesser percentage of respondents indicated otherwise (See Appendix G).

4.6.7.4 Perceived Playfulness

The analysis of the responses showed that a majority of respondents (42.8%) are always eager to undertake CBA while only a small percentage of the respondents (18%) are not always eager to undertake CBA. Also, most of the respondents (64.3%) indicated that they are satisfied with their interaction with the CBA while a small percentage (6.5%) indicated that they are not satisfied with their interaction with it. Furthermore, most of the respondents (53.4%) indicated that they enjoy taking CBA while only a few respondents (12%) indicated that they do not enjoy taking CBA.

4.6.7.5 Facilitating Conditions

Most of the respondents (91.1%) indicated that the university provides the necessary resources (such as mouse, keyboard, Internet, etc.) that they need when undertaking CBA. However, a small percentage of the respondents (4.6%) indicated that the university does not provide these resources. Also, most of the respondents (56%) indicated that, while undertaking CBA, a staff member is always available to provide them with the necessary support they might need. A majority of the respondents (58.6%) indicated that there is a menu on the system that provides them with help when undertaking CBA while a small percentage of the respondents (15.1%) disagreed with this notion. Furthermore, most of the respondents (46%) indicated that, without administrative support, they can easily undertake CBA while a small percentage (28%) indicated that, without administrative support, they would have a hard time undertaking a CBA. Also, most of the respondents indicated that there are no trainings/tutorials on how to undertake a CBA prior to taking the actual CBA.

4.6.7.6 Behavioural Intention to Use

From the responses obtained, most of the respondents (53.7%) indicated that they would like to undertake CBA more frequently while only a few respondents (16.6%) indicated that they would not like to undertake CBA more frequently. Similarly, a majority of the respondents (56.8%) indicated that they intend to undertake CBA in the future, if made optional while only a small percentage of the respondents (17.7%) indicated that they do not intend to undertake CBA in the future.

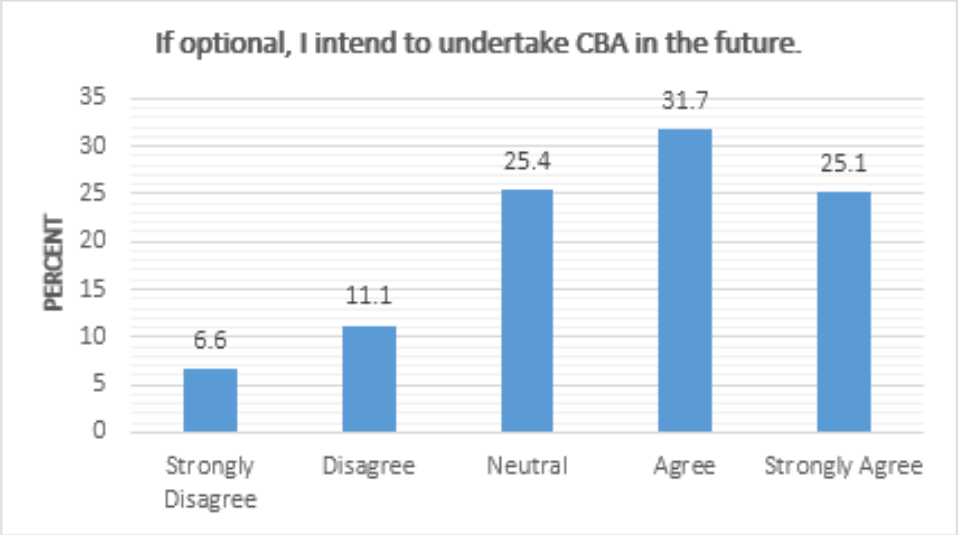

Figure 4-8: Behavioural Intention to Use (Question 2)

4.7 Cross tabulations and chi-square tests

Cross tabulations (crosstabs) were used in this study to determine if significant relationships exist between the categorical variables of the study. "A cross tabulation is a joint frequency distribution of cases based on two or more categorical variables" (Michael, 2001, p. 1). The categories of each variable are presented in the rows and columns of the crosstab respectively (Kent, 2017). Crosstabs also contain some tests (such as Chi-square tests) that can be used to compare two categorical variables and produce inferential statistics (Kent, 2017). In this study, the results of the Chi-square tests were used to make inferences or judgements about the variables tested to know whether the relationships are dependable or have been obtained by chance (Bryman, 2001; Trochim, 2006a). A chi-square test generates a "p" value (also known as the Asymptotic Significance or Asymp. Sig.). If the "p" value obtained from a chi-square test is greater than 0.05 (i.e. $p > 0.05$), then it indicates that there is no statistically significant relationship between the categorical variables being tested, however, if the "p"

value obtained from a chi-square test is less than 0.05 (i.e. $p < 0.05$), then it indicates that there is a statistically significant relationship between the categorical variables being tested (Bryman, 2001).

The categorical variables used in this study were cross tabulated, and the "p" values obtained from the chi-square tests conducted were observed. The results obtained from the chi-square tests conducted in this study showed that some pairs of categorical variables have significant relationships between them while others do not have any significant relationships.

4.7.1 Cross tabulations between Gender and Preferred mode of Assessment

Cross tabulation was carried out between the gender of respondents and their preferred mode of assessment. As shown in Table 4-2, a larger percentage of female respondents (55.1%) prefer PBA while a larger percentage of male respondents (56.4%) prefer CBA.

Table 4-2: Crosstabs between Gender and Assessment preference

			Preference: CBA or PBA?		
			PBA	CBA	Total
Gender	Female	Count	103	84	187
		% within Gender	55.1%	44.9%	100.0%
	Male	Count	71	92	163
		% within Gender	43.6%	56.4%	100.0%
Total		Count	174	176	350
		% within Gender	49.7%	50.3%	100.0%

The chi-square test conducted alongside the crosstab above, produced an Asymptotic Significance value (or "p" value) of 0.032 (i.e. $p < 0.05$), thereby indicating that there is a significant relationship between the gender of respondents and their preferred mode of assessment (See Appendix H). It can be inferred from this relationship that female students prefer PBA to CBA because they usually seem uninterested in computers (Anderson *et al.*, 2008).

4.7.2 Cross tabulations between Academic Level and Assessment Preference

Cross tabulation was done between the respondents' academic level and their preferred mode of assessment. As presented in Table 4-3, a larger percentage of respondents (53.8%) who were in their first year indicated that they prefer CBA, and likewise a larger percentage of respondents (61.9%) who were in their second year indicated that they prefer CBA. All the respondents who were in the Honours level also indicated that they prefer CBA. However, a larger percentage of respondents who were in their third year indicated that they prefer PBA.

Table 4-3: Crosstabs between Academic level and Assessment preference

			Preference: CBA or PBA?		
			PBA	CBA	Total
Academic Level	First year	Count	67	78	145
		% within Academic Level	46.2%	53.8%	100.0%
	Second year	Count	24	39	63
		% within Academic Level	38.1%	61.9%	100.0%
	Third year	Count	83	57	140
		% within Academic Level	59.3%	40.7%	100.0%
	Honours	Count	0	2	2
		% within Academic Level	0.0%	100.0%	100.0%
Total		Count	174	176	350
		% within Academic Level	49.7%	50.3%	100.0%

In the chi-square test conducted between these variables (academic level and assessment preference), the value of "p" obtained was 0.011 (i.e. $p < 0.05$), thereby indicating that there is a significant relationship between the academic level of students and their preferred mode of assessment (See Appendix H).

4.7.3 Cross tabulations between Academic level and Challenges

According to the crosstab obtained between the variables - "Academic level" and "Did you experience any challenges" - a larger percentage of the respondents (80%) that were in their first year indicated that they experience challenges when undertaking CBA (Table 4-4). A larger percentage of the respondents in their second year (69.8%) also indicated that they experience challenges when undertaking CBA. Similarly, a larger percentage of respondents in their third year (90%) indicated that they experience challenges when undertaking CBA while the respondents who were in Honours academic level also indicated that they experience challenges when undertaking CBA.

Table 4-4: Crosstabs between Academic level and Challenges

			Did you experience any challenges?		
			No	Yes	Total
Academic Level	First year	Count	29	116	145
		% within Academic Level	20.0%	80.0%	100.0%
	Second year	Count	19	44	63
		% within Academic Level	30.2%	69.8%	100.0%
	Third year	Count	14	126	140
		% within Academic Level	10.0%	90.0%	100.0%
	Honours	Count	0	2	2
		% within Academic Level	0.0%	100.0%	100.0%
Total		Count	62	288	350
		% within Academic Level	17.7%	82.3%	100.0%

The chi-square test conducted produced a p-value of 0.004 thereby indicating that there is a significant relationship between the variables. Thus, it can be implied that, regardless of the academic level of the respondents in this study, they still experience challenges when taking CBA. Some of these challenges, as indicated by the respondents, include; presentation of items on the screen, Internet connectivity, unfamiliarity with CBA terms and interruption of power supply.

4.7.4 Cross tabulations between Gender and Behavioural Intention to use

Gender and Behavioural Intention to use (BI) were cross tabulated. The BI construct is made up of two variables. These variables are represented by two statements, which are denoted by BI_1 and BI_2. The variables are:

BI_1: I would like to undertake CBA more frequently

BI_2: If optional, I intend to undertake CBA in the future (See Questionnaire in Appendix B).

The crosstab obtained between Gender and BI_1 showed that a reasonable percentage (female - 48.1%, male – 60.1%) of respondents indicated that they would like to undertake CBA more frequently (See Table 4-5).

Table 4-5: Crosstabs between Gender and Behavioural Intention to Use Q1 (BI_1)

			Behavioural Intention To Use Q1					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Female	Count	20	23	54	58	32	187
		% within Gender	10.7%	12.3%	28.9%	31.0%	17.1%	100.0%
	Male	Count	7	8	50	47	51	163
		% within Gender	4.3%	4.9%	30.7%	28.8%	31.3%	100.0%
Total		Count	27	31	104	105	83	350
		% within Gender	7.7%	8.9%	29.7%	30.0%	23.7%	100.0%

A chi-square test conducted between Gender and BI_1 produced a value of p = 0.001 (Table 4-7), which indicates that there is a significant relationship between the two variables. Thus, it can be inferred that, regardless of the gender of the students, they would like to undertake CBA more frequently.

Also, the crosstab obtained between Gender and BI_2 showed that a reasonable percentage (female – 51.4%, male – 63.2%) of respondents indicated that, if optional, they intend to undertake CBA in the future (See Table 4-6).

Table 4-6: Crosstabs between Gender and Behavioural Intention to Use Q2 (BI_2)

			Behavioural Intention To Use Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	15	28	48	59	37	187
		% within Gender	8.0%	15.0%	25.7%	31.6%	19.8%	100.0%
	Male	Count	8	11	41	52	51	163
		% within Gender	4.9%	6.7%	25.2%	31.9%	31.3%	100.0%
Total		Count	23	39	89	111	88	350
		% within Gender	6.6%	11.1%	25.4%	31.7%	25.1%	100.0%

A chi-square test conducted between Gender and BI_2 produced a value of p = 0.025 (Table 4-7), which indicates that there is a significant relationship between the two variables. Thus, it can be implied that, both male and female students intend to undertake CBA in the future.

Table 4-7: Chi-Square tests result between Gender and BI

		BI_1	BI_2
Gender	**Chi-square value**	17.610	11.167
	Asymp. Sig. (p-value)	*0.001	*0.025

* $p < 0.05$ = significant relationship

4.7.5 Cross tabulations between Academic level and Behavioural Intention to Use

Academic level was cross tabulated against the two variables (i.e. BI_1 and BI_2) in the BI construct. The crosstab obtained between Academic level and BI_1 showed that a reasonable percentage of respondents (first year – 64.2%, second year – 63.5%, third year – 37.9% and honours – 100%) indicated that they would like to undertake CBA more frequently (Table 4-8). A chi-square test conducted between Academic level and BI_1 produced a value of $p = 0.002$ (Table 4-10), which indicates that there is a significant relationship between the two variables. Thus, it can be inferred that, if optional, students would like to undertake CBA more frequently, regardless of the academic level.

Table 4-8: Crosstabs between Academic level and BI_1

			Behavioural Intention To Use Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	5	7	40	50	43	145
		% within Academic Level	3.4%	4.8%	27.6%	34.5%	29.7%	100.0%
	Second year	Count	5	4	14	22	18	63
		% within Academic Level	7.9%	6.3%	22.2%	34.9%	28.6%	100.0%
	Third year	Count	17	20	50	32	21	140
		% within Academic Level	12.1%	14.3%	35.7%	22.9%	15.0%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	27	31	104	105	83	350
		% within Academic Level	7.7%	8.9%	29.7%	30.0%	23.7%	100.0%

Also, the crosstab obtained between Academic level and BI_2 showed that a reasonable percentage of respondents (first year – 64.9%, second year – 66.6%, third year – 43.5% and honours – 100%) indicated that, if optional, they intend to undertake CBA in the future (Table 4-9).

Table 4-9: Crosstabs between Academic Level and BI_2

			Behavioural Intention To Use Q2					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Academic Level	First year	Count	6	11	34	53	41	145
		% within Academic Level	4.1%	7.6%	23.4%	36.6%	28.3%	100.0%
	Second year	Count	3	7	11	20	22	63
		% within Academic Level	4.8%	11.1%	17.5%	31.7%	34.9%	100.0%
	Third year	Count	14	21	44	38	23	140
		% within Academic Level	10.0%	15.0%	31.4%	27.1%	16.4%	100.0%
	Honours	Count	0	0	0	0	2	2
		% within Academic Level	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Total		Count	23	39	89	111	88	350
		% within Academic Level	6.6%	11.1%	25.4%	31.7%	25.1%	100.0%

A chi-square test conducted between Academic level and BI_2 produced a value of p = 0.009 (Table 4-10), which indicates that there is a significant relationship between the two variables. Thus, it can be inferred that, if optional, students would like to undertake CBA in the future, regardless of their academic level.

Table 4-10: Chi-Square tests result between Academic level and BI

		BI_1	BI_2
Academic level	**Chi-square value**	30.759	26.556
	Asymp. Sig. (p-value)	*0.002	*0.009

* $p < 0.05$ = significant relationship

4.7.6 Cross tabulations between Academic level and Perceived usefulness (PU)

Cross tabulations and chi-square tests were conducted between Academic level and Perceived Usefulness (PU). The PU construct is made up of five variables, denoted hereafter as PU_1, PU_2, PU_3, PU_4 and PU_5. The variables are;

PU_1: With CBA, I spend less time selecting my answers.

PU_2: With CBA, I save more time in completing assessments.

PU_3: With CBA, I spend less time changing my choice of answers.

PU_4: With CBA, my assessment performance improved.

PU_5: Using CBA has helped improve my assessment result.

The chi-square tests conducted between Academic level and the PU variables showed that only two of the five PU variables have significant relationships with Academic level (Table 4-11). These variables are PU_4 and PU_5. Therefore, crosstabs and inferences were made based on these two variables only.

Table 4-11: Chi-Square Test results between Academic Level and Perceived Usefulness

		PU_1	**PU_2**	**PU_3**	**PU_4**	**PU_5**
Academic level	**Chi-square value**	11.848	10.387	14.311	21.938	22.177
	Asymp. Sig. (p-value)	0.458	0.582	0.281	*0.038	*0.036

* $p < 0.05$ = significant relationship

The crosstabs between Academic level and PU_4 (Table 4-12) showed that more respondents in each of the academic levels (first year, second year, third year and honours) indicated that with CBA, their assessment performance improved. Also, the crosstabs between Academic level and PU_5 (Table 4-13) showed that more respondents in each of the academic levels indicated that using CBA has helped improve their assessment result. Therefore, it can be implied that, the use of CBA by students in any academic level will enhance students' assessment performance and result.

Table 4-12: Crosstabs between Academic Level and Perceived Usefulness Q4 (PU_4)

			Perceived Usefulness Q4					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Academic Level	First year	Count	2	11	75	39	18	145
		% within Academic Level	1.4%	7.6%	51.7%	26.9%	12.4%	100.0%
	Second year	Count	1	5	30	14	13	63
		% within Academic Level	1.6%	7.9%	47.6%	22.2%	20.6%	100.0%
	Third year	Count	5	30	62	27	16	140
		% within Academic Level	3.6%	21.4%	44.3%	19.3%	11.4%	100.0%
	Honours	Count	0	0	1	0	1	2
		% within Academic Level	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
Total		Count	8	46	168	80	48	350
		% within Academic Level	2.3%	13.1%	48.0%	22.9%	13.7%	100.0%

Table 4-13: Crosstabs between Academic Level and Perceived Usefulness Q5 (PU_5)

			Perceived Usefulness Q5					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Academic Level	First year	Count	4	10	68	42	21	145
		% within Academic Level	2.8%	6.9%	46.9%	29.0%	14.5%	100.0%
	Second year	Count	4	5	27	14	13	63
		% within Academic Level	6.3%	7.9%	42.9%	22.2%	20.6%	100.0%
	Third year	Count	9	28	61	25	17	140
		% within Academic Level	6.4%	20.0%	43.6%	17.9%	12.1%	100.0%
	Honours	Count	0	0	1	0	1	2
		% within Academic Level	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
Total		Count	17	43	157	81	52	350
		% within Academic Level	4.9%	12.3%	44.9%	23.1%	14.9%	100.0%

4.7.7 Cross tabulations between Gender and Perceived Ease-Of-Use (PEOU)

Cross tabulations and chi-square tests were conducted between Gender and Perceived Ease-of-Use (PEOU). The PEOU construct is made up of 6 variables, denoted hereafter as PEOU_1, PEOU_2, PEOU_3, PEOU_4, PEOU_5 and PEOU_6.

The variables are;

PEOU_1: I find it easy to read questions presented in CBA.

PEOU_2: I find it easy to select my answers while undertaking CBA.

PEOU_3: I find it easy to navigate (move from one page to another) in CBA.

PEOU_4: I find it easy to correct my mistakes while undertaking CBA.

PEOU_5: The CBA interface is user-friendly/easy to use.

PEOU_6: I find it easy to undertake CBA.

The chi-square tests conducted between Gender and the PEOU variables showed that only two of the six PEOU variables have significant relationships with Gender (Table 4-14). These variables are PEOU_2 and PEOU_4. Therefore, crosstabs and inferences were made based on these two variables only.

Table 4-14: Chi-Square test results between Gender and Perceived Ease-of-Use

		PEOU_1	**PEOU_2**	**PEOU_3**	**PEOU_4**	**PEOU_5**	**PEOU_6**
Gender	**Chi-square value**	0.428	13.559	4.238	12.195	2.190	4.414
	Asymp. Sig. (p-value)	0.980	*0.009	0.375	*0.016	0.701	0.353

* $p < 0.05$ = significant relationship

The crosstabs between Gender and PEOU_2 showed that a reasonable percentage of female respondents (78.7%) and male respondents (82.3%) indicated that they find it easy to select their answers when undertaking CBA. Also, the crosstabs between Gender and PEOU_4 showed that most female respondents (67.9%) and male respondents (66.3%) indicated that they find it easy to correct their mistakes while undertaking CBA. Thus, it can be implied that, the ease of selecting answers and correcting mistakes when doing CBA does not depend on the gender of students.

Table 4-15: Crosstabs between Gender and Perceived Ease-of-Use Q2 (PEOU_2)

			Perceived Ease-of-Use Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	1	12	27	85	62	187
		% within Gender	0.5%	6.4%	14.4%	45.5%	33.2%	100.0%
	Male	Count	4	0	25	71	63	163
		% within Gender	2.5%	0.0%	15.3%	43.6%	38.7%	100.0%
Total		Count	5	12	52	156	125	350
		% within Gender	1.4%	3.4%	14.9%	44.6%	35.7%	100.0%

Table 4-16: Crosstabs between Gender and Perceived Ease-of-Use Q4 (PEOU_4)

			Perceived Ease-of-Use Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	5	29	26	70	57	187
		% within Gender	2.7%	15.5%	13.9%	37.4%	30.5%	100.0%
	Male	Count	6	11	38	50	58	163
		% within Gender	3.7%	6.7%	23.3%	30.7%	35.6%	100.0%
Total		Count	11	40	64	120	115	350
		% within Gender	3.1%	11.4%	18.3%	34.3%	32.9%	100.0%

4.7.8 Cross tabulations between Gender and Perceived Playfulness (PP)

Cross tabulations and chi-square tests were conducted between Gender and Perceived Playfulness (PP). The PP construct is made up of 3 variables, denoted hereafter as PP_1, PP_2 and PP_3. The variables are;

PP_1: I am always eager to undertake CBA.

PP_2: I am satisfied with my interaction with the CBA system.

PP_3: I enjoy undertaking CBA.

The chi-square tests conducted between Gender and the PP variables showed that only one of the three PP variables have significant relationships with Gender, that is, PP_3 (as shown in Table 4-17).

Table 4-17: Chi-Square test results between Gender and Perceived Playfulness

		PP_1	PP_2	PP_3
Gender	**Chi-square value**	5.744	0.236	9.651
	Asymp. Sig. (p-value)	0.219	0.994	*0.047

* $p < 0.05$ = significant relationship

The crosstab between Gender and PP_3 showed that majority of female respondents (49.2%) and male respondents (58.3%) indicated that they enjoy undertaking CBA (Table 4-18). It can therefore be implied that both males and females enjoy doing CBA.

Table 4-18: Crosstabs between Gender and Perceived Playfulness Q3 (PP_3)

			Perceived Playfulness Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	12	17	66	68	24	187
		% within Gender	6.4%	9.1%	35.3%	36.4%	12.8%	100.0 %
	Male	Count	5	8	55	57	38	163
		% within Gender	3.1%	4.9%	33.7%	35.0%	23.3%	100.0 %
Total		Count	17	25	121	125	62	350
		% within Gender	4.9%	7.1%	34.6%	35.7%	17.7%	100.0 %

4.7.9 Cross tabulations between Gender and Perceived Usefulness (PU)

Cross tabulations and chi-square tests were conducted between Gender and Perceived Usefulness (PU). The following variables make up the PU construct:

PU_1: With CBA, I spend less time selecting my answers.

PU_2: With CBA, I save more time in completing assessments.

PU_3: With CBA, I spend less time changing my choice of answers.

PU_4: With CBA, my assessment performance improved.

PU_5: Using CBA has helped improve my assessment result.

The chi-square tests conducted between Gender and the PU variables showed that only two of the five PU variables have significant relationships with Gender (Table 4-19).

These variables are PU_1 and PU_4. Therefore, crosstabs and inferences were made based on these two variables only.

Table 4-19: Chi-Square test results between Gender and Perceived Usefulness

		PU_1	PU_2	PU_3	PU_4	PU_5
Gender	**Chi-square value**	10.219	3.860	6.426	16.583	8.366
	Asymp. Sig. (p-value)	*0.037	0.425	0.170	*0.002	0.079

* $p < 0.05$ = significant relationship

The crosstabs between Gender and PU_1 showed that a reasonable percentage of female respondents (52.4%) and male respondents (64.4%) indicated that, with CBA, they spend less time selecting their answers (Table 4-20). Also, the crosstabs between Gender and PU_4 showed that more female respondents and male respondents indicated that with CBA, their assessment performance improved (Table 4-21). Thus, it can be implied that female students spend as less time as male students when selecting their answers in a CBA. Also, it can be implied that both male and female students believe that the use of CBA enhances their assessment performance.

Table 4-20: Crosstabs between Gender and Perceived Usefulness Q1 (PU_1)

			Perceived Usefulness Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	6	29	54	65	33	187
		% within Gender	3.2%	15.5%	28.9%	34.8%	17.6%	100.0%
	Male	Count	6	13	39	57	48	163
		% within Gender	3.7%	8.0%	23.9%	35.0%	29.4%	100.0%
Total		Count	12	42	93	122	81	350
		% within Gender	3.4%	12.0%	26.6%	34.9%	23.1%	100.0%

Table 4-21: Crosstabs between Gender and Perceived Usefulness Q4 (PU_4)

			Perceived Usefulness Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	5	35	79	48	20	187
		% within Gender	2.7%	18.7%	42.2%	25.7%	10.7%	100.0%
	Male	Count	3	11	89	32	28	163
		% within Gender	1.8%	6.7%	54.6%	19.6%	17.2%	100.0%
Total		Count	8	46	168	80	48	350
		% within Gender	2.3%	13.1%	48.0%	22.9%	13.7%	100.0%

4.7.10 Cross tabulation between Academic level and Computer Self-Efficacy CSE)

Cross tabulations and chi-square tests were conducted between Academic level and Computer Self-Efficacy (CSE). The CSE construct is made up of 6 variables denoted as CSE_1, CSE_2, CSE_3, CSE_4, CSE_5 and CSE_6. The variables are;

CSE_1: I can complete a computer task only if someone assists me.

CSE_2: I can complete a computer task on my own without anyone's assistance.

CSE_3: I can navigate through the Internet only if someone assists me.

CSE_4: I can navigate through the Internet on my own without anyone's assistance.

CSE_5: I can complete a CBA task only if someone assists me.

CSE_6: I can complete a CBA task on my own without anyone's assistance.

The chi-square tests conducted between Academic level and the CSE variables showed that only two of the six CSE variables have significant relationships with Academic level (Table 4-22). These variables are CSE_2 and CSE_5. Therefore, crosstabs and inferences were made based on these two variables only.

Table 4-22: Chi-square test results between Academic level and Computer Self-Efficacy

		CSE_1	CSE_2	CSE_3	CSE_4	CSE_5	CSE_6
Academic Level	**Chi-square value**	16.309	23.104	13.154	14.406	22.372	16.291
	Asymp. Sig. (p-value)	0.177	*0.027	0.358	0.276	*0.034	0.178

* $p < 0.05$ = significant relationship

The crosstabs between Academic level and CSE_2 showed that most of the respondents in their first year (64.9%), second year (79.4%), third year (85%) and honours academic level (100%) indicated that they can complete a computer task on their own without anyone's assistance (Table 4-23). Also, the crosstabs between Academic level and CSE_5 showed that most of the respondents in each of the academic levels disagreed with the statement that they can complete a CBA task only if someone assists them (Table 4-24). This indicates that they do not need someone to assist them in order to complete a CBA task. Thus, it can be implied that, whether students are in their first year (new to CBA) or in the honours level, they are proficient enough to complete a computer task (including a CBA task) on their own without the assistance of anyone.

Table 4-23: Crosstabs between Academic Level and Computer Self-Efficacy Q2 (CSE_2)

			Computer Self-Efficacy Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	6	15	30	41	53	145
		% within Academic Level	4.1%	10.3%	20.7%	28.3%	36.6%	100.0%
	Second year	Count	1	1	11	27	23	63
		% within Academic Level	1.6%	1.6%	17.5%	42.9%	36.5%	100.0%
	Third year	Count	1	4	16	54	65	140
		% within Academic Level	0.7%	2.9%	11.4%	38.6%	46.4%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	8	20	57	123	142	350
		% within Academic Level	2.3%	5.7%	16.3%	35.1%	40.6%	100.0%

Table 4-24: Crosstabs between Academic Level and Computer Self-Efficacy Q5 (CSE_5)

			Computer Self-Efficacy Q5					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	52	37	31	12	13	145
		% within Academic Level	35.9%	25.5%	21.4%	8.3%	9.0%	100.0%
	Second year	Count	26	25	6	5	1	63
		% within Academic Level	41.3%	39.7%	9.5%	7.9%	1.6%	100.0%
	Third year	Count	57	51	18	12	2	140
		% within Academic Level	40.7%	36.4%	12.9%	8.6%	1.4%	100.0%
	Honours	Count	1	0	1	0	0	2
		% within Academic Level	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
Total		Count	136	113	56	29	16	350
		% within Academic Level	38.9%	32.3%	16.0%	8.3%	4.6%	100.0%

4.8 Chi-square tests between the constructs used in this study

Six constructs were used in this study to investigate the perceptions of students about CBA. They are Computer Self-Efficacy (CSE), Perceived Ease-of-Use (PEOU), Perceived Usefulness (PU), Perceived Playfulness (PP), Facilitating Conditions (FC) and Behavioural Intention to Use (BI). In order to check if significant relationships exist between these constructs, chi-square tests were conducted. The results of the chi-square tests (as shown in

the tables below) indicated that there are significant relationships (where $p < 0.05$) between some of the constructs.

The table below (Table 4-25) shows that all the six variables (PEOU_1, PEOU_2, PEOU_3, PEOU_4, PEOU_5 and PEOU_6) in the PEOU construct are significantly related to all the five variables (PU_1 to PU_5) in the PU construct. Thus, it can be implied that students' perceived usefulness of CBA is determined by their perceived ease-of-use of CBA.

Table 4-25: Chi-square test result between PEOU and PU

		PU_1	PU_2	PU_3	PU_4	PU_5
PEOU_1	Chi-square value	65.743	84.634	43.847	87.226	61.675
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000
PEOU_2	Chi-square value	71.423	106.545	70.748	96.923	49.247
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000
PEOU_3	Chi-square value	34.431	46.866	44.201	46.706	40.865
	Asymp. Sig. (p-value)	*0.005	*0.000	*0.000	*0.000	*0.001
PEOU_4	Chi-square value	50.182	57.615	74.136	30.455	32.276
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.016	*0.009
PEOU_5	Chi-square value	55.549	67.907	39.174	57.031	57.145
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.001	*0.000	*0.000
PEOU_6	Chi-square value	78.977	121.117	67.867	122.944	87.495
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000

* $p < 0.05$ = significant relationship

From the table below (Table 4-26), it can be inferred that all the variables in the PEOU construct have a significant relationship with all the variables in the CSE construct, and vice-versa. Thus, it can be implied that students' perceived ease-of-use of CBA is determined by their computer self-efficacy.

Table 4-26: Chi-square test result between PEOU and CSE

		CSE_1	CSE_2	CSE_3	CSE_4	CSE_5	CSE_6
PEOU_1	Chi-square value	39.168	46.636	43.722	61.462	69.940	74.136
	Asymp. Sig. (p-value)	*0.001	*0.000	*0.000	*0.000	*0.000	*0.000
PEOU_2	Chi-square value	62.926	90.970	68.048	49.559	95.930	91.568
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000	*0.000
PEOU_3	Chi-square value	44.285	60.053	62.437	61.735	56.329	61.481
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000	*0.000
PEOU_4	Chi-square value	36.496	47.323	73.412	35.950	73.193	60.380
	Asymp. Sig. (p-value)	*0.002	*0.000	*0.000	*0.003	*0.000	*0.000
PEOU_5	Chi-square value	68.983	57.859	68.502	70.821	66.907	88.301
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000	*0.000
PEOU_6	Chi-square value	87.456	110.272	68.484	87.100	103.707	93.411
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000	*0.000

* $p < 0.05$ = significant relationship

The chi-square test result presented in Table 4-27, shows that significant relationships exist between PEOU and PP.

Table 4-27: Chi-square test result between PEOU and PP

		PEOU_1	PEOU_2	PEOU_3	PEOU_4	PEOU_5	PEOU_6
PP_1	Chi-square value	78.219	35.821	24.459	38.877	86.512	98.816
	Asymp. Sig. (p-value)	*0.000	*0.003	0.080	*0.001	*0.000	*0.000
PP_2	Chi-square value	141.299	88.477	66.353	60.504	134.139	251.171
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000	*0.000
PP_3	Chi-square value	64.983	62.152	44.936	42.398	107.993	139.152
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000	*0.000

* $p < 0.05$ = significant relationship

It can be seen in Table 4-28 that all the variables in the PEOU construct have a significant relationship with all the variables in the BI construct. It can thus be implied that students' perceived ease-of-use of CBA determines their behavioural intention to use CBA.

Table 4-28: Chi-square test result between PEOU and BI

		PEOU_1	PEOU_2	PEOU_3	PEOU_4	PEOU_5	PEOU_6
BI_1	Chi-square value	75.514	61.169	59.895	38.086	83.871	93.560
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.001	*0.000	*0.000
BI_2	Chi-square value	61.381	60.968	57.655	43.927	44.226	85.943
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000	*0.000

* $p < 0.05$ = significant relationship

It can be seen in Table 4-29 that all the variables in the PP construct have a significant relationship with all the variables in the BI construct. Thus, it can be inferred that the perceived playfulness of CBA determines students' behavioural intention to use CBA.

Table 4-29: Chi-square test result between PP and BI

		PP_1	PP_2	PP_3
BI_1	Chi-square value	227.076	138.016	357.710
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000
BI_2	Chi-square value	175.925	143.078	279.773
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000

* $p < 0.05$ = significant relationship

Also, it can be inferred from Table 4-30 that the perceived usefulness of CBA determines students' behavioural intention to use CBA. This is because all the variables in the "perceived usefulness" construct have a significant relationship with all the variables in the "behavioural intention" construct.

Table 4-30: Chi-square test result between PU and BI

		PU_1	PU_2	PU_3	PU_4	PU_5
BI_1	Chi-square value	94.924	103.617	81.819	155.325	174.255
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000
BI_2	Chi-square value	48.647	93.008	66.354	125.633	120.093
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.000	*0.000	*0.000

* $p < 0.05$ = significant relationship

From the table below (Table 4-31), few variables in the PEOU construct do not have a significant relationship with a few variables in the FC construct. However, most variables in the PEOU construct have a significant relationship with most variables in the FC construct, hence, significant relationships exist between PEOU and FC.

Table 4-31: Chi-square test result between FC and PEOU

		PEOU_1	PEOU_2	PEOU_3	PEOU_4	PEOU_5	PEOU_6
FC_1	Chi-square value	33.847	37.689	37.206	28.552	47.108	40.625
	Asymp. Sig. (p-value)	*0.006	*0.002	*0.002	*0.027	*0.000	*0.001
FC_2	Chi-square value	20.155	27.178	28.184	34.889	30.480	22.249
	Asymp. Sig. (p-value)	0.213	*0.040	*0.030	*0.004	*0.016	0.135
FC_3	Chi-square value	23.407	30.353	37.937	39.045	35.969	44.521
	Asymp. Sig. (p-value)	0.103	*0.016	*0.002	*0.001	*0.003	*0.000
FC_4	Chi-square value	55.886	55.615	36.679	43.704	57.859	63.381
	Asymp. Sig. (p-value)	*0.000	*0.000	*0.002	*0.000	*0.000	*0.000
FC_5	Chi-square value	11.161	11.374	21.602	21.467	24.661	23.830
	Asymp. Sig. (p-value)	0.799	0.786	0.157	0.161	0.076	0.093

* $p < 0.05$ = significant relationship

Similarly, as seen in Table 4-32, few variables in the PU construct do not have a significant relationship with few variables in the CSE construct. However, most variables in the PU construct have a significant relationship with most variables in the CSE construct, hence, significant relationships exist between PU and CSE.

Table 4-32: Chi-square test result between PU and CSE

		CSE_1	CSE_2	CSE_3	CSE_4	CSE_5	CSE_6
PU_1	Chi-square value	22.576	24.481	20.455	31.003	18.408	28.011
	Asymp. Sig. (p-value)	0.126	0.080	0.200	*0.013	0.301	*0.032
PU_2	Chi-square value	24.741	50.417	26.641	33.035	33.171	49.843
	Asymp. Sig. (p-value)	0.075	*0.000	*0.046	*0.007	*0.007	*0.000
PU_3	Chi-square value	26.879	29.642	26.652	28.943	22.385	48.477
	Asymp. Sig. (p-value)	*0.043	*0.020	*0.046	*0.024	*0.131	*0.000
PU_4	Chi-square value	32.823	28.313	37.720	24.916	32.135	33.476
	Asymp. Sig. (p-value)	*0.008	*0.029	*0.002	*0.071	*0.010	*0.006
PU_5	Chi-square value	21.809	28.021	28.507	22.587	22.544	22.651
	Asymp. Sig. (p-value)	0.149	*0.031	*0.027	0.125	0.126	0.123

* $p < 0.05$ = significant relationship

Furthermore, it can be inferred from Table 4-33 that students' assessment preference determines their behavioural intention to use CBA. This is because all the variables in the "assessment preference" construct have a significant relationship with all the variables in the "behavioural intention" construct. Thus, if students prefer to undertake CBA, then they would most likely intend to undertake CBA frequently or in future.

Table 4-33: Chi-square test result between Assessment preference and BI

		BI_1	BI_2
Assessment preference	Chi-square value	101.072	104.784
	Asymp. Sig. (p-value)	*0.000	*0.000

* $p < 0.05$ = significant relationship

From the chi-square test result shown in Table 4-34, it can be seen that there is no significant relationship between all the variables in both the "academic level" and "perceived ease-of-use" constructs. It can thus be implied that the academic level of students does not significantly influence their perceived ease-of-use of CBA.

Table 4-34: Chi-square test result between Academic Level and PEOU

		PEOU_1	PEOU_2	PEOU_3	PEOU_4	PEOU_5	PEOU _6
Academic Level	**Chi-square value**	6.216	15.380	6.318	10.558	15.108	14.321
	Asymp. Sig. (p-value)	0.905	0.221	0.899	0.567	0.236	0.281

4.9 Conclusion

This chapter showed the results of the analysis of the data obtained from the respondents. The "series mean" method was used to replace the missing data found in the data obtained, and the Kolmogorov Smirnov and the Shapiro-Wilk tests were used to check for the normality of the data. Descriptive statistics were presented using tables and graphs and inferential statistics were presented using cross tabulations and chi-square tests. The inferences of these statistics are shown at the end of each section. The next chapter presents how the results obtained have been interpreted in order to achieve the research objectives.

CHAPTER 5: DISCUSSION OF RESULTS

5.1. Introduction

The previous chapter showed the analysis of responses, including the descriptive and inferential statistics obtained from the data. This chapter presents the discussion of the analysis in line with the research objectives of this study. It shows how the research objectives of this study have been achieved through the data analysed and in relation to the literature. The implications of the results obtained in this study are also presented in this chapter.

5.2. Alignment of results with research objectives

As stated in Chapter 1, the following are the research objectives of this study:

1. To investigate the perceptions of students about computer-based assessment
2. To determine students' preference between computer-based assessment and paper-based assessment
3. To investigate the challenges faced by students in the usage of CBA
4. To propose possible means of managing the challenges

5.2.1. Perceptions of students about CBA

This study investigated the perceptions of students about CBA. The perceptions investigated were based on five constructs present in the conceptual model (CBAAM) adopted in this study. The constructs are perceived ease-of-use, perceived usefulness, facilitating conditions, perceived playfulness and computer self-efficacy.

5.2.1.1 Perceptions of students about the ease-of-use of CBA

In this study, perceived ease-of-use refers to the extent to which the students believe that CBA is easy to use. The results obtained in this study indicate that students (72.6%) find it easy to undertake CBA. Studies by Moe (2009), Jimoh *et al.* (2011), Terzis and Economides (2011a), Jamil *et al.* (2012), Mukandutiye *et al.* (2014) and Maqableh and Mohammed (2015) also showed that students find it easy to undertake CBA. Further analysis of the responses showed that most students find it easy to undertake CBA due to the following reasons:

- **Ease in reading questions**

As obtained in this study, students (66.6%) indicated that they find it easy to read the assessment questions when undertaking CBA. Similar results were obtained in the studies carried out by Jimoh *et al.* (2011) and Hosseini *et al.* (2014), where students indicated that an attractive feature of CBA is the ability to read the assessment questions and passages very easily. According to Hosseini *et al.* (2014), students find it easy to read assessment questions and passages because of the clear display of the assessment questions on the screen in CBA.

- **Ease in selecting answers**

Most students (80.3%) in this study indicated that they find it easy to select their choice of answer(s) when undertaking CBA. With PBA, selecting answers might not be easy, especially in a multiple choice question type, because, students might be required to select their answer(s) by shading an oval on an optical mark recognition (OMR) sheet (Pino-Silva, 2008). In most cases, students are often prone to making mistakes. However, in CBA, it is easier for students to select their answer(s) by simply using the mouse or keyboard.

- **Ease in correcting mistakes**

The results of this study, as also obtained in the study by Hosseini *et al.* (2014), showed that students (67.2%) find it easy to correct their mistakes or change their choice of answers when undertaking CBA. This might be because, in order to correct a mistake in CBA, a mouse or keyboard may be used to simply select a radio button, checkbox, list box or any other tool designed to accept responses from the students. This makes it easy to change previously-selected answers as many times as possible without any fear of the answer sheet getting rough, as could happen in PBA. If students find it easy to change their choice of answers or correct their mistakes, it will be easier for the assessment to be marked without errors arising from the incomplete erasure of a previous answer (Pino-Silva, 2008).

- **Ease in navigating within pages**

In this study, most students (85.5%) indicated that they find it easy to navigate within the assessment pages when undertaking a CBA. This is in line with the results obtained by Hosseini *et al.* (2014) which showed that students find it easy to move from one page to

another when undertaking CBA. According to Harms and Adams (2008), students often find it easy to navigate within pages when undertaking CBA if conspicuous and ever-present navigation symbols are used in the CBA.

- **Ease in interacting with CBA interface**

Most students (73.7%) indicated that the interface of the CBA is easy to use and interact with. According to Chris and Sally (2001) and Farrell and Leung (2004), the ease involved in interacting with a CBA interface has a positive effect on the assessment performances of students when undertaking CBA. Thus, it is important for CBA interfaces to be designed intuitively and in a way that will be easy to use and understand by students.

A chi-square test conducted in this study (See Table 4-34) between perceived ease-of-use of CBA and academic level (producing $p > 0.05$) indicates that the ease-of-use of a CBA is not significantly determined by the academic level of students undertaking CBA, but by how well the CBA has been designed (Harms & Adams, 2008). This implies that, first year students who are new to CBA may find a CBA easy to use if it is well-designed, while third year students who are not new to CBA, may find a CBA difficult to use if it is not well-designed.

Also, a result of this study indicates that students' perceptions about the ease-of-use of CBA can determine their perceptions about the usefulness of CBA. Similar result was obtained in the studies by Davis (1989) and Terzis and Economides (2011a). This result means that if students find it easy to use a CBA software, then they regard such CBA as useful. Moreover, the chi-square test conducted in this study (Table 4-25) between perceived ease-of-use and perceived usefulness (producing $p < 0.05$) indicates that the easier it is for students to undertake CBA, the more useful they think CBA is.

Furthermore, the results of this study indicate that students' perceptions about the ease-of-use of a CBA can determine their intentions to undertake CBA frequently or in the future. Similar results were obtained in the studies by Schneberger *et al.* (2007), Jimoh *et al.* (2011), Terzis and Economides (2011a) and Maqableh and Mohammed (2015). A chi-square test conducted in this study (Table 4-28) between perceived ease-of-use and behavioural intention (producing $p < 0.05$) indicates that students are most likely to undertake CBA more frequently if they find it easy to use.

5.2.1.2 Perceptions of students about facilitating conditions in the usage of CBA

In this study, facilitating conditions refer to the human (e.g. support staff) or technical resources (e.g. mouse, keyboard and the Internet) that are available to help students undertake CBA. In this study, the majority of students (91.1%) indicated that the university provides them with human and technical resources when undertaking CBA. According to Bueno and Salmeron (2008) and Seidelman (2014), it is essential for an academic institution to provide students with one (or more) staff when undertaking CBA so as to offer help and support to the students. Furthermore, students indicated that CBA contains a help menu. This conforms with one of the principles of "a usable and easy-to-use CBA system" which state that there must be a help menu in a CBA (Harms & Adams, 2008). Also, with the presence of a help menu, students might not have a hard time interacting with the CBA even if there is no staff member present.

The results of this study, as well as the studies by Schneberger *et al.* (2007) and Terzis and Economides (2011a), showed that significant relationships exist ($p < 0.05$) between "facilitating conditions" and the "perceived ease-of-use of CBA" (Table 4-31). This relationship means that, the existence of facilitating conditions influences (positively) the perceptions of students about the ease of use of CBA. For instance, if there is a staff or a help menu in the CBA, then students would find it easy to understand how to carry out some basic tasks in the CBA.

Furthermore, the presence of CBA trainings/tutorials is another form of facilitating condition, because it helps students to easily understand how the CBA works before undertaking CBA (Fldoe, 2015). In this study, students indicated that there are no trainings/tutorials on how to undertake a CBA prior to the actual assessment. This result is contrary to one of the best practices for implementing CBA, as recommended by Fldoe (2015). The author recommends that, students undertaking CBA should be trained by the technical or support staff on how to interact with the CBA before undertaking the CBA. Also, students should be given a short tutorial on how to interact with the CBA in the assessment venue, just before the assessment starts.

5.2.1.3 Perceptions of students about the usefulness of CBA

In this study, perceived usefulness of CBA is the extent to which students believe that undertaking CBA will enhance their assessment performance and results. The results obtained indicate that students consider CBA as useful because the use of CBA has helped

improve their assessment performance and results. Similar results were also obtained in the studies by Jimoh *et al.* (2012) and Mukandutiye *et al.* (2014). Further analysis of the responses in this study shows the following reasons why CBA has been considered useful:

- **Less time in selecting answers**

In this study, students (58%) indicated that they spend less time in selecting their answer when doing CBA. A similar result was obtained in the study by Piaw (2011) where students indicated that the absence of "writing down responses" reduced the time spent in selecting their answers when doing CBA. In support of this result, Pino-Silva (2008) stated that, in a PBA where students may be required to shade an oval in order to select an answer, students may spend more time. However, in a CBA, which usually requires students to select their answers using the mouse or keyboard, students spend less time. This is because, selecting an answer in a CBA might require just the click of a mouse button or the pressing of a letter on the keyboard. Therefore, since clicking of a mouse button is usually faster than shading an oval (Singleton, 2001), less time is often when selecting answers in a CBA. Also, as presented in other results of this study, students might spend less time selecting their answers when doing CBA due to the ease-of-use of the CBA.

- **Less time in completing assessments**

The results of this study indicate that most students (61.4%) spend less time in completing assessments when CBA is administered, than when PBA is administered (See Table in Appendix G, under "Perceived Usefulness"). Similar result was obtained in the studies by Chua (2012), Jamil *et al.* (2012), Sorensen (2013), Jawaid *et al.* (2014) and Hosseini *et al.* (2014). According to TEA (2008), students often spend less time to complete CBA because of the "no-bubble" advantage of the CBA. The "no-bubble" advantage means that students do not have to ensure that they shade a "bubble" (circle or oval) in order to select an answer (TEA, 2008). This might benefit students who are running out of time during a CBA because it enables them to select answers (either right or wrong) faster by simply clicking the mouse button or the keyboard. Also, in the study by Jawaid *et al.* (2014), students indicated that they spend less time to complete a CBA because of the time saved in writing down responses. Contrarily, in the studies by Liu (2012) and Young (2015), students indicated that they spend more time to complete CBA than PBA.

Furthermore, a chi-square test conducted in this study (Table 4-30) between "perceived usefulness of CBA" and "behavioural intention to use CBA" (producing $p < 0.05$) indicates that students' perceived usefulness of CBA could determine their intentions to undertake CBA. This result is supported by the results of the studies by Schneberger *et al.* (2007), Alki (2010) and Jimoh *et al.* (2011) and Jawaid *et al.* (2014). In the study by Jawaid *et al.* (2014), students indicated that they would like to undertake CBA frequently or in the future because of its usefulness in saving time. However, the results of the study by Terzis and Economides (2011a) showed that perceived usefulness has no influence on the behavioural intentions of students to undertake CBA.

5.2.1.4 Perceptions of students about computer self-efficacy in the usage of CBA

In the context of this study, computer self-efficacy is the measure of how individuals perceive their capabilities and competencies with regards to using computers proficiently. The ability of students to use a computer proficiently may determine their performance and results in a CBA (Pomplun *et al.*, 2006; Bennett *et al.*, 2008; Yurdabakan & Uzunkavak, 2012).

A chi-square test was conducted in this study between two variables;

Variable 1: I can complete a computer task on my own without anyone's assistance

Variable 2: I can complete a CBA task on my own without anyone's assistance.

The result of the chi-square test between variable 1 and variable 2 (producing $p = 0.000$) shows that there is a significant relationship between the two variables. This relationship indicates that variable 1 could positively influence variable 2. That is, students who can make use of computers proficiently can undertake CBA on their own without any assistance. This implies that, without the presence of staff members to offer assistance, most students can still undertake CBA on their own. Although, this does not conform to the suggestion by Seidelman (2014), which was that, there should always be a staff present when students are undertaking CBA.

A chi-square test conducted in this study showed that there is a significant relationship ($p < 0.05$) between "computer self-efficacy" and "perceived ease-of-use". Similar results, showing the existence of a significant relationship between these two constructs, were also obtained in the studies by Teo (2009), Terzis and Economides (2011a), and Chow *et al.* (2012). This relationship indicates that computer self-efficacy can positively influence perceived ease-of-use. It can be inferred from this relationship that a student who is very

proficient with the use of computers will most probably find it easy to undertake a CBA without assistance from anyone, while a student who has low proficiency in the use of computers will most probably need assistance from someone in order to undertake a CBA (Terzis & Economides, 2011a).

The literature showed that a relationship exists between the gender of students and their level of computer self-efficacy (Vekiri & Chronaki, 2008; Isman & Celikli, 2009; He & Freeman, 2010; Tømte & Hatlevik, 2011; Terzis & Economides, 2011b). According to the literature, male students use computers more proficiently than female students. However, the results of a chi-square test conducted in this study between gender and computer self-efficacy (producing $p > 0.05$) showed that there is no significant relationship between the gender of students and their level of computer self-efficacy. This means that the gender of students does not significantly determine how proficient they are with the use of computers. Thus, it can be implied that female students can use computers as proficiently as male students. Besides, this study shows that more female students indicated that they can use computers proficiently than male students (See Appendix H).

Furthermore, the results of this study showed that there are significant relationships between the computer self-efficacy of students and their perceived usefulness of CBA (Table 4-32). This relationship could indicate that computer self-efficacy positively influences students' perceived usefulness of CBA. From this relationship, it can be implied that students who are very proficient in the use of computers will most likely indicate that they spend less time in completing CBA, while students with low proficiency in the use of computers will most likely indicate that they spend more time in completing CBA (Noyes & Garland, 2008).

5.2.1.5 Perceptions of students about the playfulness of CBA

In this study, perceived playfulness of CBA was used to determine if students enjoy undertaking CBA and if they are always eager and motivated to undertake it. If students are always eager and motivated to undertake a CBA and if students enjoy their interaction with the CBA when undertaking it, such CBA is said to be "playful" (Terzis & Economides, 2011a). The results of this study indicated that students consider CBA as playful due to the following reasons:

- **Eagerness to undertake CBA**

  In this study, students indicated that they are always eager to undertake assessments administered as CBA (See Table in Appendix G, under "Perceived Playfulness"). Similar results were obtained in the studies by Chua (2012) and Hensley (2015). According to Hensley (2015), one of the reasons students are eager to undertake CBA is because it involves the use of technology.

- **Enjoyment in undertaking CBA**

  The administration of CBA can offer an enjoyable testing experience to students (Jeong, 2012). A substantial percentage of students (53.4%) in this study indicated that they enjoy undertaking CBA. This is similar to the results of the studies by Singleton (2001), Haahr and Hansen (2006), (Al-Amri, 2007) and Ripley (2009), which showed that students find it enjoyable to undertake CBA. According to Bennett (2015), the presence of features such as highlighting, spell-check, text-to-speech, colour contrasts, etc., often create an enjoyable experience for the students when undertaking CBA. Also, the use of CBA can make assessments more interactive, interesting and immersive, through the use of simulation and audio-visual mediums (Imtiaz & Maarop, 2014).

Another result of this study showed that students' perceived playfulness of CBA has a significant relationship with their behavioural intention to use CBA (Table 4-29). Similar results were also obtained in the studies by Wang *et al.* (2009) and Maqableh and Mohammed (2015). This relationship indicates that students' perceived playfulness of CBA could positively influence their behavioural intention to use CBA. According to Terzis and Economides (2011a), students are more likely to undertake a CBA frequently or in the future if they enjoy their interaction with the CBA.

In this study, significant relationships were found between perceived playfulness of CBA and perceived ease-of-use of CBA (See Table 4-27). This relationship indicates that students' perceived ease-of-use of CBA could positively influence their perceived playfulness of CBA. Thus, it implies that, if students find it easy to undertake CBA, then they might likely enjoy undertaking CBA. However, if the students do not find the CBA easy to use, then they might not be able to derive enjoyment when undertaking CBA (Terzis & Economides, 2011a).

Furthermore, a chi-square test conducted in this study indicates that there exists a significant relationship ($p = 0.047$) between the gender of students and their perceived playfulness of

CBA. This relationship indicates that the gender of students could determine their perceptions about the playfulness of CBA. As seen in this study, male students enjoy undertaking CBA more than female students, despite the fact that female students were more than male students in this study. This could be attributed to the fact that most female students seem to find technology less appealing to them than males do (Anderson *et al.*, 2008; Meelissen & Drent, 2008).

5.2.2. Students' preference between CBA and PBA

The students in this study were asked to indicate the mode of assessment that they would prefer to undertake (if the university made it optional) between CBA and PBA. The results obtained indicate that students would prefer to undertake CBA (as shown in Table 5-1).

Table 5-1: Preferred mode of assessment (PBA or CBA?)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Paper-Based Assessment (PBA)**	174	49.7	49.7	49.7
	Computer-Based Assessment (CBA)	176	50.3	50.3	100.0
	Total	350	100.0	100.0	

Students' preference for CBA was also indicated in the studies by Alki (2010), Hochlehnert *et al.* (2011), Jeong (2012), Sorensen (2013), Hosseini *et al.* (2014), Jawaid *et al.* (2014), Maqableh and Mohammed (2015) and Faniran and Ajayi (2016). According to Ogunlade and Oladimeji (2014), the preference of CBA by students encourages academic institutions to administer CBA, and this subsequently promotes technological growth in academic institutions.

As indicated in this study, a larger percentage of students who preferred CBA were males (See Table 4-2). Also, the result of a chi-square test conducted in this study (producing $p=0.032$) between the gender of students and their preferred mode of assessment indicates that male students have a higher tendency of preferring CBA than female students. Similar results were also obtained in the studies by Meelissen and Drent (2008) and Anderson *et al.* (2008). More males seem to prefer CBA because, according to Meelissen and Drent (2008), male students seem to be more interested (than female students) in undertaking tasks relating with computer technology.

Furthermore, students who indicated that they prefer CBA also indicated that they would like to undertake CBA in future assessments. Similarly, the result of a chi-square test conducted in this study between students' preferred mode of assessment and their behavioural intention to undertake CBA (producing p = 0.000) implies that, if students prefer CBA to PBA, then they would most likely undertake CBA in future. This result is also in line with the results obtained in the studies by Ferrão (2010) and Jawaid *et al.* (2014).

5.2.2.1 Reasons for preferring CBA

In a case where students indicated that they prefer CBA to PBA, they were asked to provide reasons for their preference in an open-ended section of the questionnaire. The most common reason indicated by students was that, CBA is faster/quicker to complete than PBA (See Figure 5-1). This reason can be linked to a result obtained in this study where most students indicated that they spend less time to complete CBA. This reason is also in line with the results obtained in the studies by (Al-Amri, 2007), Hosseini *et al.* (2014) and Jawaid *et al.* (2014), where students indicated that they preferred CBA because PBA takes a longer time to complete.

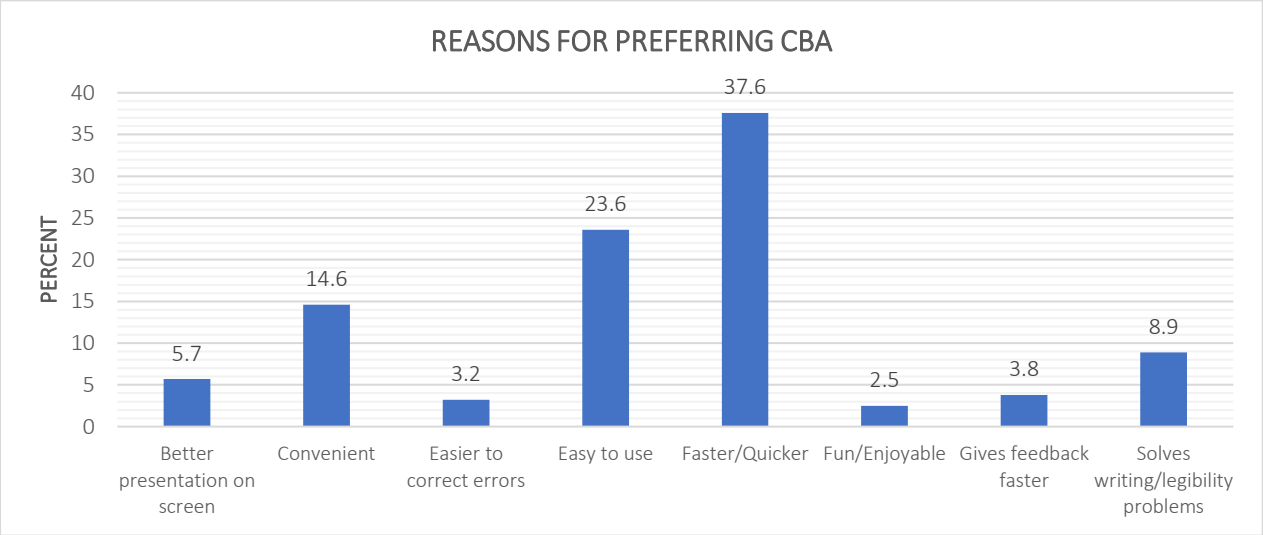

Figure 5-1: Students' reasons for preferring CBA to PBA

Also, students indicated that another reason CBA is preferred is because immediate feedback of assessment is possible with a CBA as compared to PBA. Similar results were obtained in the study by Mukandutiye *et al.* (2014). According to Pino-Silva (2008) and Seidelman (2014), the presence of an immediate feedback is an important factor that motivates students to undertake CBA. This is because immediate feedback helps to reduce the stress and anxiety

level of students, by preventing them from having to wait for a long time before they get their result (van der Kleij *et al.*, 2012).

Furthermore, students indicated that they prefer CBA because it is convenient and easy to undertake. The studies by Mukandutiye *et al.* (2014) and Hosseini *et al.* (2014) also obtained similar results. Students consider CBA as convenient and easy to undertake because of the efforts saved in writing down responses on paper (as in PBA). Students also indicated that the ease involved in correcting errors in CBA is another reason why they prefer CBA.

In this study, a low percentage (2.5%) of students indicated that the fun and enjoyment they derive when undertaking CBA is a reason for preferring CBA (See Figure 5-1). Similar result was also obtained in the studies by (Al-Amri, 2007), Chua (2012) and Hosseini *et al.* (2014). According to Chua (2012) and Walker (2013), if an assessment induces fun and enjoyment, students are more motivated to undertake it, especially one that contains multimedia items.

Additionally, students indicated that they prefer CBA because of the ways it presents the assessment items on the screen. This reason is in line with the results by Lim *et al.* (2006) which showed that CBA often produces better image and text quality than PBA, hence the reason students prefer CBA. Furthermore, another reason stated by students is that they can clearly read questions and select their answers neatly in CBA, thus eliminating the fear of roughening their answer sheet (as in PBA). Also, students prefer CBA because it disregards the handwriting skills or styles of a student but focuses more on the correctness of the students' answers (Brown *et al.*, 2004). This eliminates students' fear of getting marked wrongly due to poor and illegible handwriting.

Although majority of the students had their reasons for preferring CBA, some students still indicated that they prefer PBA. A common reason why some students in this study indicated that they prefer PBA is because they can make notes, underline text and highlight text much faster and easier while reading in PBA mode. The study by Apostolou *et al.* (2009) also showed that students' inability to make notes, underline text and highlight text as quickly as they can when doing CBA makes them (students) not to prefer CBA. Furthermore, some students indicated that they prefer PBA because staring at a PBA question paper for so long (while reading the questions) does not cause eye strain or fatigue, as often experienced with CBA (Jeong, 2012).

5.2.3. Challenges faced by students in the usage of CBA

The results obtained in this study showed that students do experience challenges when undertaking CBA (Table 5-2). It is important to note that most of the students who indicated that they experience challenges when undertaking CBA also indicated that they can make use of computers proficiently (computer self-efficacy). This implies that students with computer proficiency also experience challenges when undertaking CBA (Demirci, 2007). A chi-square test conducted in this study between "computer self-efficacy" and the question "Did you experience any challenges?" (producing $p = 0.341$ i.e. $p > 0.05$) further indicates that experiencing challenges when undertaking CBA is not dependent on students' level of computer self-efficacy.

Table 5-2: Table showing responses to "Did you experience any challenges?"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	62	17.7	17.7	17.7
	Yes	288	82.3	82.3	100.0
	Total	350	100.0	100.0	

A list of possible challenges that students might experience was presented in the questionnaire. Students were required to select the challenge(s) that they experienced (if any) when undertaking CBA. In a case where the challenge(s) being experienced by students was not among the list, students were required to write out the challenge(s) they experience in an open-ended section of the questionnaire. The following challenges were indicated and identified by students:

- **Internet Connectivity**

As obtained in this study, the most common challenge experienced by students when undertaking CBA is Internet connectivity. This challenge had the highest percentage (35.9%) among all the challenges that the students indicated (Figure 5-2). This result is in line with the results of the study by Marriott and Teoh (2012) which showed that students consider Internet connectivity as a common challenge experienced when undertaking CBA.

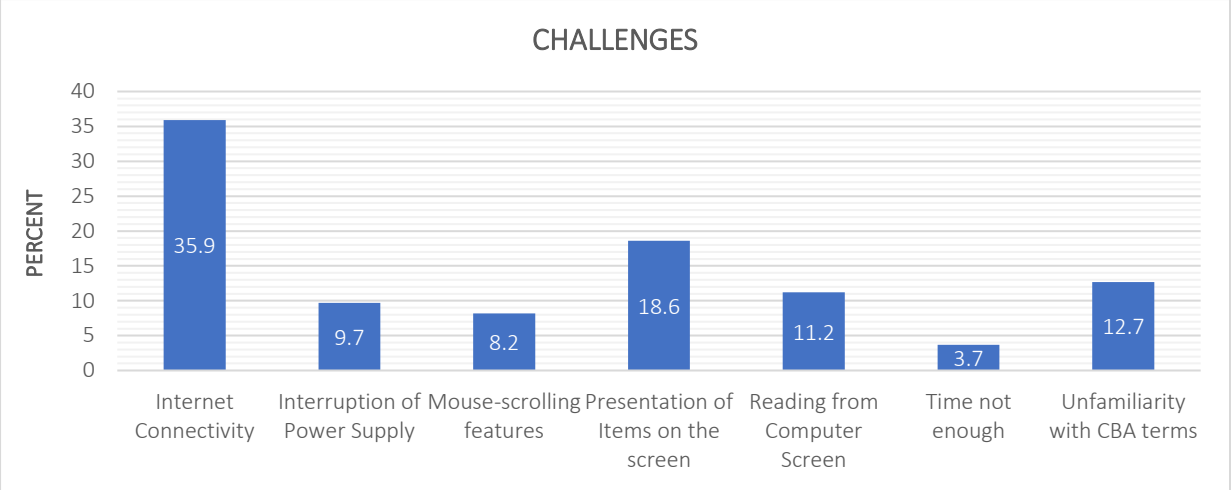

Figure 5-2: Challenges encountered by students when undertaking CBA

Students in this study indicated that the Internet connection could be down or slow. This could lead to slow-loading of the CBA pages and thereby affect students' progress (especially, time allocated) in the assessment. In a case where the Internet connection is slow, it could sometimes be difficult for students to quickly navigate to the next page of the CBA (Harms & Adams, 2008). In a case where the Internet connection is completely down, the whole assessment being undertaken by the students may be interrupted, and this might have adverse effects on the assessment performances and results of the students (Gipps, 2005). For instance, in the study by Kingston (2008), it was shown that students' performances in a CBA dropped due to a downtime in Internet connection caused by the absence of appropriate bandwidth required to transmit Internet connection signals.

The challenges experienced with Internet connectivity when undertaking CBA might not only be as a result of low bandwidths, they could as well be as a result of the concurrent usage of the Internet by a large group of students in the same institution (Walker, 2013). They could also be caused by an interruption which may be beyond the capabilities of the students and the institution administering the CBA (Ockey, 2009).

- **Presentation of items on the screen**

The results of this study, as also obtained in the studies by Russell *et al.* (2003) and S. Thompson *et al.* (2003), showed that, the presentation of items on the screen is a challenge experienced by students when undertaking CBA. This result supports the argument by Ricketts and Wilks (2002), Pino-Silva (2008) and Nikou and Economides (2013) that, the mode of presentation of items on a computer screen can be a challenge to students when

undertaking CBA. The items presented in a CBA could include texts, objects, graphics and multimedia. In this study, students indicated that texts displayed in small font sizes are often difficult to read. Also, students indicated that the way the computer screens are set sometimes makes it difficult for them to easily read the items that have been presented. According to Jeong (2012), screens that are too bright or too dim could affect students' readability of items presented on the screen, especially students who have sight problems.

- **Unfamiliarity with CBA terms**

Another challenge students experience when undertaking CBA is the use of unfamiliar terms, icons or symbols within a CBA. This challenge was also indicated by students in the study by Mukandutiye *et al.* (2014) and it is often experienced by students who were unfamiliar with computers before undertaking CBA. In this study, students indicated that, sometimes, it takes time for them to clearly understand what certain terms, icons or symbols represent when undertaking CBA. According to Harms and Adams (2008), terms or symbols used in CBA should be general user-interface terms and symbols that are common, so that students will be familiar with them. If unfamiliar terms are used, it might take some time for the students to understand the meaning of such terms and might even make them unsure of the next action to take when undertaking CBA (Bridgeman *et al.*, 2003).

- **Reading from computer screen**

In this study, reading from a computer screen was found to be one of the challenges that students experience when undertaking CBA (Figure 5-2). This challenge was also indicated in the studies by Pino-Silva (2008), Macedo-Rouet *et al.* (2009) and Moe (2009). According to what was stated in the studies by Pino-Silva (2008) and Apostolou *et al.* (2009), students find it challenging to read from a computer screen for a long duration because it usually leads to visual fatigue. For instance, in the study by Macedo-Rouet *et al.* (2009), students indicated that they got tired of reading from the computer screen during the CBA due to their prolonged eye exposure to the computer screen. Also, students may experience this challenge more often with a CBA that contains long paragraphs (Singleton, 2001; Macedo-Rouet *et al.*, 2009; Jeong, 2012).

- **Interruption of power supply**

One of the challenges that may be experienced when undertaking CBA is power supply, this is because CBA needs power supply for its functionality (Marriott & Teoh, 2012). In the

results of this study, as also obtained in the studies by Mukandutiye *et al.* (2014) and Onyibe *et al.* (2015), students indicated that they experienced interruption of power supply when undertaking CBA. The interruption of power supply seems to be only a minor challenge experienced by students in this study due to the low percentage (9.7%) of students that identified it as a challenge. Also, this challenge might have been experienced only on few occasions because of the predictable nature of power supply within the country where this study was carried out. However, the interruption of power supply when undertaking CBA might be a major challenge to students if the nature of power supply within the country where CBA is being administered is erratic.

For instance, in the studies conducted by Abubakar and Adebayo (2014) and Nkwocha Patricia *et al.* (2015), the interruption of power supply during CBA was indicated as a major challenge experienced by the students. The authors stated that the interruption of power supply was a common challenge because of the erratic nature of power supply in the country. According to Marriott and Teoh (2012), the interruption of power supply during a CBA could have a negative effect on the performance of students undertaking CBA, especially in situations where no power backup facilities are provided.

- **The use of mouse-scrolling features**

Students indicated that the use of mouse-scrolling features in CBA is a challenge to them because of the need to constantly scroll up and down a page to view the assessment items. This challenge was also experienced by students in the studies by Clariana and Wallace (2002) and Leeson (2006). Some studies have shown that the use of mouse-scrolling features often has a negative influence on the performance of students when undertaking a CBA because mouse-scrolling interferes with the test-taking behaviour of students. (Ricketts & Wilks, 2002; Bridgeman *et al.*, 2003; Way *et al.*, 2006; Pino-Silva, 2008; Blazer, 2010). A review of literature on CBA showed that CBA that requires students to use the mouse scroll always (on-screen scrolling) is usually difficult for students to undertake (TEA, 2008). Also, in the study by Pino-Silva (2008), it was shown that students experienced challenges when undertaking CBA because all the assessment questions were presented in such a way that students had to keep scrolling down the page to see the remaining questions.

- **Insufficient time allocated for CBA**

Students indicated that the time allocated for undertaking CBA is insufficient. Similarly, in the studies by Liu (2012) and Young (2015), students indicated that they need more time to

complete CBA. It is important to note that only a small percentage of the students (3.7%) in this study indicated that they need more time to complete CBA. This percentage often includes students who have low proficiency in the use of computers, because, students with low proficiency in the use of computers (low computer self-efficacy) often require more time when undertaking CBA (Noyes & Garland, 2008). Furthermore, Apostolou *et al.* (2009) stated that some students find it difficult to finish CBA within the time allocated to them because of their inability to preview all the assessment questions at once and manage their time accordingly. Also, if students experience other challenges with CBA that delay them, then they might require more time to complete the CBA.

5.2.4. Possible means of managing the challenges experienced by students

As advantageous as CBA may seem, the results of this study have shown that students experience some challenges when undertaking CBA. To ensure that CBA is administered in a valid and appropriate manner, these challenges should be addressed and managed properly (Chua, 2012; Nikou & Economides, 2013). If these challenges are not well-addressed, the performances and results of students in CBA may be negatively affected (Russell *et al.*, 2003; Way *et al.*, 2006; Blazer, 2010).

- **Internet Connectivity**

In this study, majority of the students indicated that they experience challenges with Internet connectivity when undertaking CBA. The presence of this challenge may vary across different countries due to the difference in Internet speeds and bandwidths in different countries (Gipps, 2005; Blazer, 2010; Csapó *et al.*, 2012). Institutions that are intending to administer CBA in countries where this challenge is experienced need to be well-prepared to offer robust and reliable measures, infrastructure and resources that will improve the efficiency and effectiveness of the Internet connectivity in their institutions (Bueno & Salmeron, 2008; Mukandutiye *et al.*, 2014). For instance, the measures to be adopted may ensure that when the Internet connection is interrupted or lost, students' work in the CBA must be saved, such that when the Internet connection is restored, students can continue from where they stopped (Commission, 2006; Pino-Silva, 2008). Furthermore, institutions administering CBA can limit web browsers to access only the Uniform Resource Locator (URL) address of the CBA when it is being undertaken. This will prevent students from opening other web applications or websites that could compete with the Internet resources

required for the CBA, thereby preventing a huge amount of unnecessary or irrelevant network traffic on the institution's Internet connection during CBA (Walker, 2013).

- **Presentation of items on the screen**

The way items are presented on the screen during CBA is an important factor that should be considered when designing CBA (Ricketts & Wilks, 2002; Farrell & Leung, 2004; Harms & Adams, 2008). This is because, a CBA that is designed badly could have a negative effect on the performance of the students that will use it (Jimoh *et al.*, 2011).

According to Walker (2013), the interface of a CBA should be intuitive, coherent and consistent always. The location, font face, font size and font colour of all items displayed on a CBA interface should always remain the same throughout the assessment. Options or items meant for navigation or progression in the CBA should be displayed in a conspicuous manner so as to ensure easy sighting. Also, bigger fonts could be used to make the assessment text items more readable (Al-Amri, 2009; Jimoh *et al.*, 2012). Another possible means of managing the challenge of presentation of items on the screen is by customising the resolution and font characteristics of the items displayed in the CBA, in order to suit the students (Blazer, 2010).

Furthermore, to improve the readability of items on the screen, the developers of the CBA software should ensure that text, graphics and all other items displayed on the screen are legible (PTC, 2002; Macedo-Rouet *et al.*, 2009). Also, while designing the CBA, it should be noted that students have different visual capabilities (Jeong, 2012). Hence, designs relating to the colours and brightness of the display should not disadvantage students with visual problems (PTC, 2002).

- **Unfamiliarity with CBA terms**

It is important to note that students who were unfamiliar with computers before undertaking CBA often experience challenges in identifying certain terms or icons or symbols used in the CBA (Escudier *et al.*, 2011). Therefore, it is essential that students are familiar with the computer and the CBA software to be used before the CBA is administered (Rabinowitz & Brandt, 2001; Schneberger *et al.*, 2007). One way of ensuring that students are familiar with the CBA software to be used is to administer tutorials and sample tests or pre-tests (non-graded tests) to the students using the CBA software, before the actual (graded) CBA is undertaken (Commission, 2006; Escudier *et al.*, 2011; Jimoh *et al.*, 2012).

According to Fldoe (2015), institutions administering CBAs can provide an awareness training about the CBA to be undertaken prior to the actual assessment activity. This can be done by setting aside a specific time to practically demonstrate to the students, in a computer laboratory environment, how the CBA software works. For instance, in the studies by Pino-Silva (2008) and Escudier *et al.* (2014), all the students had already been given an online training on computer tests before they were told to undertake the actual CBA. This enabled the students to know what to expect with regards to the functionality of the CBA, and it minimised the students' unfamiliarity with the CBA.

Furthermore, in the study by Jawaid *et al.* (2014), students were given a 5-minute demonstration of how the CBA software works because it was the first time that CBA would be administered to them. After the demonstration, the students took a practice assessment to show their understanding of how the CBA works, before the actual CBA was undertaken. At the end of the study, the students indicated that they became less nervous to undertake the CBA because of their prior familiarity with it during the 5-minute demonstration. Also, the "test drive" program, organised by Prometric (a testing and assessment provider in the United States), is a 30-minute program done to provide candidates with a real-world CBA practice before their scheduled assessment. This helps the candidates to familiarise themselves with the CBA software and its processes prior to the actual day of assessment (Prometric, 2017). According to Hochlehnert *et al.* (2011), if proper preparation and reliable information are provided to the students before they undertake CBA, CBA could be a fair and efficient way of assessing students.

- **Reading from computer screen**

The visual fatigue caused by staring at a computer screen for an extended period of time is one of the main issues experienced with reading from the computer screen (Pino-Silva, 2008). Staring on a computer screen for a long period of time affects some students, especially students with visual problems. Hence, Jeong (2012) suggested that passages or paragraphs that are too long should not be presented in a CBA. In a case where long-reading passages are necessary in a CBA, the font face and size of the text should be made bigger and more legible to read. Furthermore, Macedo-Rouet *et al.* (2009) suggested that if a CBA needs to contain passages, then high definition screens can be used to reduce eye strain which usually causes the visual fatigue experienced by students. Also, to facilitate reading from computer screen, appropriate colours should be used for presenting the assessment items, and

comfortable chairs should be used to ensure that the students maintain an appropriate posture while reading from the screen (Pino-Silva, 2008).

- **Interruption of power supply**

The interruption of power supply during a CBA activity can have an adverse effect on the whole CBA process. Therefore, it is important for institutions administering CBA to implement measures that will help to create a backup of all assessment activities while the students are undertaking CBA. According to Pino-Silva (2008), a CBA should be designed in such a way that even if there is power failure or interruption, the CBA is restored to the last time (duration) and page that the students were interacting with before the interruption occurred. Also, all the answers or tasks that had been completed by the students should remain intact. Furthermore, institutions administering CBA need to provide power recovery and battery backup systems to ensure that students' CBA data are not lost when there is a momentary interruption of power supply (Bridgeman, 2009). For a timed assessment, students who experience an interruption of power supply should be able to continue from where they stopped, with the remaining time and data of the CBA still intact.

- **Use of mouse-scrolling features**

As stated in the literature, the use of mouse-scrolling features in CBA could have a detrimental effect on students' assessment performances (Ricketts & Wilks, 2002; Bridgeman *et al.*, 2003; Way *et al.*, 2006; Pino-Silva, 2008; Blazer, 2010). Hence, the designers of a CBA software should try as much as possible to avoid the excessive use of mouse scrolls in CBA (Seung & Tom, 2002; Noyes & Garland, 2008). In the study by Ricketts and Wilks (2002), it was discovered that students were not comfortable with the CBA that required them to scroll through the assessment questions. The authors' study showed that when CBA was changed to the one that presents one question per page, students' assessment performances improved.

To eliminate the mouse-scrolling feature in a CBA, the CBA can be designed to present "page-up" and "page-down" buttons that would allow students to "click", instead of "scroll", when they want to view assessment items (Blazer, 2010). In addition to using "page-up" and "page-down" buttons, "next" buttons could also be used to mimic the forward and backward flipping of a paper, as in a PBA (Noyes & Garland, 2008). Contrarily, the studies by McDonald (2002) and Pino-Silva (2008) showed that the idea of eliminating the mouse-scrolling features might not suit some students. This is because some students still prefer to

see many assessment questions presented at once, so as to help them manage their time and generate a logic of answering the questions (McDonald, 2002; Pino-Silva, 2008). In order to cater for various types of students, the CBA can be designed in a way that will enable students to choose how they want the assessment questions to be presented. It can be designed to present questions in a PBA format – where many questions can be displayed at once on a page, or in a screen-by-screen format – where one question is displayed per page (Escudier *et al.*, 2011).

- **Insufficient time allocated for CBA**

The issue of insufficient time could arise from the personal characteristics of the students undertaking CBA and the interface/technological issues associated with CBA (Nikou & Economides, 2013). This means that, if some students have challenges with the presentation of items on the screen, Internet connectivity, interruption of power supply, unfamiliarity with CBA terms, reading from the screen and the use of mouse-scrolling features, then they will most likely require more time to complete CBA (Noyes & Garland, 2008). This is because these challenges could contribute to students' time wastage when undertaking CBA. For instance, students who find it difficult to read long passages presented on a computer screen in a CBA, due to their personal challenges (e.g. visual problems) or interface/technological issues, may need more time to complete the CBA (Singleton, 2001; McFadden *et al.*, 2001; Ricketts & Wilks, 2002; TEA, 2008; Macedo-Rouet *et al.*, 2009; Jeong, 2012). Also, if the Internet connectivity is slow thereby leading to slow-loading pages (especially when undertaking CBA with high-quality graphics), then the time allocated for the CBA may be negatively impacted, and this may make students require more time (Gipps, 2005; Blazer, 2010; Seidelman, 2014). Therefore, to resolve the issue of insufficient time, other challenges being faced by students when undertaking CBA, that could lead to insufficient time, need to be addressed (Blazer, 2010).

5.3. Conclusion

This chapter presented how the results obtained in this study have been used to achieve the research objectives. The four research objectives of this study were outlined and the results that correspond to each of them were presented. The main objective of this study was to investigate the perceptions of students about CBA. With regards to these perceptions, students indicated that they find it easy to use CBA and consider CBA to be playful, because they derive enjoyment and satisfaction from CBA when undertaking it. Students also

indicated that there is an availability of a staff member and a help menu that provides assistance whenever they are undertaking CBA. Furthermore, students indicated that the use of CBA enhances their assessment performance and results.

In this chapter, students' preference between CBA and PBA was investigated and the results showed that most students prefer CBA. The main reason for this preference is that CBA is faster/quicker to complete than PBA. Furthermore, it was discovered that students experience challenges when undertaking CBA, regardless of their proficiency in the use of computers. Challenges such as presentation of items on the screen, Internet connectivity, reading from computer screen and the use of mouse-scrolling features were experienced by students, and the possible means of managing these challenges were also presented in this chapter.

CHAPTER 6: CONCLUSION

6.1 Introduction

The previous chapter presented the results obtained in this study with reference to the research objectives. This chapter presents the conclusions of this study based on the results obtained and the discussions made. It gives a summary of the major results that have been obtained in this study and a summary of how the research objectives were achieved. This chapter further presents the recommendations to academic institutions and developers of CBA software. Also, suggestions for future research are presented in this chapter.

6.2 Summary of the study

Chapter 1 introduced the concept of assessment and the traditional ways in which assessments have been conducted (through PBA). The chapter further presented how the introduction of information and communication technology into the assessment process brought about another concept called CBA. The growth and development of CBA, from its inception in the 1970s, was highlighted in this chapter. This chapter also presented the research problem that this study was aimed at investigating. To investigate this problem, four research questions were formulated. These research questions, from which the objectives of this study were derived, were presented in this chapter. In addition, this chapter presented a brief description of the research methodology employed in carrying out this study, including the conceptual model that was adopted. Furthermore, this chapter presented the limitation to this study and a brief overview of the dissertation.

Chapter 2 presented a review of studies surrounding concepts such as assessment, PBA and CBA. The chapter presented studies on the characteristics of assessment, importance of assessment and the two modes of assessment (PBA and CBA), which this study focused on. Studies that have been conducted on the comparability between PBA and CBA were presented in this chapter. The studies on comparability showed that there are differences, as well as equivalences between the results obtained by students who take an identical assessment in both PBA and CBA. Where differences in assessment results were observed, some studies showed that there are certain factors that may influence these differences. To ensure that CBA is administered fairly in academic institutions, it is important to determine the validity and reliability of CBA before implementing it as a mode of assessment. This chapter presented studies that have been conducted to determine the validity and reliability of

CBA, given certain principles. Furthermore, this chapter presented a review of studies on the perceptions of students about CBA. From the review, it was observed that students' perceptions about CBA differ in the following areas; time-saving, perceived ease-of-use of CBA, perceived usefulness of CBA, perceived playfulness of CBA, computer self-efficacy and facilitating conditions.

Chapter 3 presented a detailed description of the research methods that were employed in this study. This study adopted a quantitative approach based on the nature of the statistics needed. Data was collected, through the use of questionnaires, from a sample of 357 students. The sample size (357) was selected using the Krejcie and Morgan's table, and the students who participated in the study were selected using the systematic random sampling technique. Pretesting was carried out before the actual data collection so as to correct any errors in the final questionnaire. Furthermore, the chapter presented a detailed description of the conceptual model that was used in this study. The conceptual model used is the CBAAM. Also, the chapter presented how non-response bias was handled in this study and how ethical principles were upheld.

Chapter 4 presented a detailed description of the data that was analysed in this study. Prior to this description, the chapter presented the results of the reliability test, the normality test and how missing data was handled. The normality test showed that the collected data did not follow a normal distribution. Hence, non-parametric tests were conducted. Crosstabulations and chi-square tests were conducted in this study to generate significant results from the collected data. This chapter also showed the interpretations of some of the results obtained.

Chapter 5 presented a detailed discussion of the results obtained from the analysis of the data with reference to the research objectives of this study. The chapter presented how the results obtained from this study aligned with the research objectives. It also presented the implications of the results with reference to the literature. From this study, it was found that most students prefer CBA to PBA. The reasons for this preference have been presented in this chapter.

The section below (6.3) presents the conclusion of this study based on the results obtained and the discussions made.

6.3 Conclusion of the study

The main objective of this study was to investigate the perceptions of students in the University of KwaZulu-Natal, South Africa, about CBA. A conceptual model known as

CBAAM was used to underpin this study and formed the basis of some of the research questions used in this study. To achieve the objectives of this study, four research questions were formulated. The first research question centred on the perceptions of students with regards to the ease-of-use of CBA, usefulness of CBA, computer self-efficacy, facilitating conditions and the playfulness of CBA. The second research question centred on the challenges experienced by students in the use of CBA. The literature shows that students performances and results in CBA may be negatively affected if they experience challenges in the use of CBA, hence the need to investigate the challenges faced by students. The third research question was aimed at seeking possible means of managing the challenges faced by students in the use of CBA. The fourth research question was aimed at determining the mode of assessment (PBA or CBA) preferred by students. Students' preference between CBA and PBA is believed to be largely influenced by their perceptions about the two modes of assessment (Alki, 2010; Terzis & Economides, 2011a; Aly, 2011).

This study employed a descriptive approach and questionnaires were used to collect quantitative data from the students. Data was analysed using SPSS and some descriptive and inferential results were obtained. Based on the results of this study, a large number of students are familiar with computers before entering the university. These students are not only familiar with computers but can use the computers on their own (computer self-efficacy) (Brosnan, 1998; Terzis & Economides, 2011a). Furthermore, it was discovered that students find it easy to interact with the interface of a CBA, correct their own mistakes, navigate within a CBA and select their choice of answers. It was also obtained in this study that students believe that CBA is easy to use. Chi-square test results conducted in this study showed that students' perceptions about the ease-of-use of CBA often determines their perceptions about the usefulness of CBA and their intentions to undertake CBA.

With regards to the perceptions of students about the facilitating conditions in the use of CBA, students indicated that the university provides them with the necessary resources to undertake CBA. Students indicated that there is always a staff member present during CBA and there is always a help menu present in the CBA. However, students indicated that there are usually no trainings and tutorials provided to them prior to undertaking CBA. A chi-square test conducted showed that the availability of facilitating conditions often influences the perceptions of students about the ease-of-use of CBA. Regarding the perceptions of students about the usefulness of CBA, students indicated that they spend less time in selecting their answer(s) and in completing CBA. Also, students indicated that the use of

CBA has improved their academic performances and results. A chi-square conducted showed that students perceptions about the usefulness of CBA can influence their perceptions about the ease-of-use of CBA.

Furthermore, it was seen from the results of this study that regardless of the ethnic group or academic level of students, most students can complete a computer task on their own without anyone's assistance. The results also showed that without the presence of staff members during CBA, most students can undertake CBA on their own. Also, a student who can make use of a computer proficiently will most probably find it easy to undertake CBA while a student with low computer proficiency might need assistance from someone. The students in this study (especially male students) also indicated that they enjoy undertaking CBA and are always eager to undertake CBA.

In this study, the challenges that are experienced by students during CBA were investigated and the following challenges were indicated by students; i) Internet connectivity, ii) presentation of items on the screen, iii) unfamiliarity with CBA terms, iv) reading from computer screen, v) interruption of power supply, vi) the use of mouse-scrolling features, and vii) insufficient time allocated for CBA. The possible means of managing these challenges (e.g. eliminating the use of mouse-scrolling features and making use of bigger fonts) were presented in chapter 5. The results of this study further showed that, if students were given an option to choose the mode of assessment they would prefer to undertake (between PBA and CBA), most students would prefer to undertake CBA. Some of the reasons stated by students are that CBA provides quicker feedback and is quicker to complete than PBA. Other reasons for this preference, have also been presented in chapter 5.

6.4 Recommendations

The results obtained in this study are useful to both the developers of CBA software and academic institutions. Based on the results of this study, the following recommendations have been made:

6.4.1 To academic institutions

The knowledge of students' perceptions about CBA by academic institutions has been regarded as one of the important factors to be considered before administering CBA. When academic institutions know what and how students feel about CBA, it enables them (academic institutions to know the right and fair way of administering CBA. As seen in the results of this study, the presence of facilitating conditions during the administration of CBA

often has an effect on the performance of students in a CBA. Thus, academic institutions are advised to provide both technical and human support to students at all times when CBA is being undertaken. Also, academic institutions should organise training and tutorial sessions for students before the commencement of a CBA. This would help students who are unfamiliar with computers. Furthermore, when academic institutions are faced with challenges affecting students during the implementation of CBA, the possible means of managing these challenges are suggested in the chapter 5 of this study.

6.4.2 To developers of CBA software

Some results obtained in this study can be beneficial to the developers of CBA software. There were some indications made by students regarding the presentation of items on screen, reading from computer screen and the use of mouse-scrolling features. The developers can use these indications to enhance or improve the design and development of future CBA software. For instance, students indicated that the use of mouse-scrolling features in CBA was a challenge to them, and the literature has also shown that the use of mouse-scrolling features could negatively impact the performance of students in a CBA. Therefore, this study recommends that CBAs should be developed in such a way that students would have a choice of selecting the way they want the assessment questions to be delivered/viewed, i.e. either involving scrolls or not. Furthermore, this study recommends that the developers of CBA abide by the standards guiding the design of user interfaces suitable for CBAs, for instance, the standards by Harms and Adams (2008).

6.5 Suggestions for future research

Trends in information technology change periodically and may thus affect the perceptions of students about CBA, hence, there is a high probability that future research will need to be conducted on the perceptions of students about CBA. For the purpose of future research on perceptions about CBA, the following suggestions are made:

- A further research study should be conducted to determine the influence of digital divide on the perceptions of students about CBA.
- A further study should be conducted to investigate the perceptions of both students and teachers about CBA, and thereafter (in the same study), a comparison between students' perceptions and teachers' perceptions can be made.

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APPENDICES

APPENDIX A – ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

16 August 2016

Mr Victor Temitayo Faniran 215078603
School of Management, IT and Governance
Pietermaritzburg Campus

Dear Mr Faniran

Protocol reference number: HSS/1232/016M
Project Title: Students' perceptions of computer-based assessment: A case of UKZN

Full Approval – Expedited Application

In response to your application received 11 August 2016, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: Mr Ajayi Nurudeen
Cc Academic Leader Research: Professor D Ellis
Cc School Administrator: Ms Debbie Cunynghame

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APPENDIX B - Questionnaire

QUESTIONNAIRE FOR STUDENTS

Students' Perceptions of Computer-Based Assessment: A Case of UKZN

Researcher: Victor Faniran

Supervisor: Nurudeen Ajayi

Discipline of Information Systems & Technology

College of Law and Management Studies

University of KwaZulu-Natal

ETHICAL CLEARANCE NO: HSS/1232/016M

- Please kindly complete this questionnaire.
- Please note that there is no correct/incorrect answer.
- Please note that participation in the study is voluntary.
- Please sign the letter of informed consent, giving me permission to use your responses for this research project.
- Please kindly take note of the instructions before answering any question(s).

GENERAL INSTRUCTION 1: In all the sections, kindly provide your response by making a tick ✓ ( ) in the appropriate box and fill in the gaps in the case of open-ended questions.

SECTION A: DEMOGRAPHIC INFORMATION

1.	**Age:**	☐ Less than 18	☐ 18 – 24	☐ 25 – 30	☐ 31 and above

2.	**Gender**:	☐ Female	☐ Male

3.	**Ethnicity:**	☐ African	☐ Indian	☐ Coloured	☐ White
		Others (please specify):			

4.	**Academic level:**	☐ First year	☐ Second year	☐ Third year	☐ Honors
		☐ Masters	Others (please specify):		

GENERAL INSTRUCTION 2:

NB: Computer-Based Assessment (CBA) refers to any assessment e.g. quizzes, tests, examination, undertaken with the use of computers (or done online), while **Paper-Based Assessment (PBA)** refers to any assessment (e.g. quizzes, tests, examination) undertaken with the use of pen, pencil and paper.

SECTION B: INFORMATION ABOUT INTERNET & COMPUTER FAMILIARITY

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1.	I have been using computers since high school days.					
2.	I started using computers only after high school but before entering UKZN.					
3.	I only started using computers when I entered UKZN.					
4.	I was familiar with using computer before taking CBA.					
5.	I have been using the Internet since high school days					
6.	I was familiar with using the Internet before taking CBA.					
7.	I was familiar with reading on a computer screen before taking CBA.					

SECTION C: INFORMATION ABOUT ASSESSMENTS

1.	In what module(s) / course(s) have you done CBA? **Please specify:**	1.)
		2.)
		3.)
		4.)
		5.)
2.	Which of the following challenges do you experience when doing CBA? **Please tick all that apply**	☐ Internet connectivity
		☐ Presentation of items on the screen (e.g. graphics)
		☐ Interruption of power supply
		☐ Unfamiliarity with CBA terminologies
		☐ Mouse e.g. Scrolling of the mouse
		☐ Reading from computer screen

3.	Other challenge(s)? **Please specify briefly**:

_____
_____
_____

4.	If made optional, which assessment would you prefer to undertake?	☐ Paper-Based Assessment (PBA)
		☐ Computer-Based Assessment (CBA)

5.	If you would prefer CBA, **please briefly state your reasons:**

_____
_____
_____

SECTION D: Computer Self-Efficacy

		(5) Strongly Agree	**(4) Agree**	**(3) Neutral**	**(2) Disagree**	**(1) Strongly Disagree**
1.	I can complete a computer task only if someone assists me.					
2.	I can complete a computer task on my own without anyone's assistance.					
3.	I can navigate through the Internet only if someone assists me.					
4.	I can navigate through the Internet on my own without anyone's assistance.					
5.	I can complete a CBA task only if someone assists me.					
6.	I can complete a CBA task on my own without anyone's assistance.					

SECTION E: Perceived Ease-Of-Use

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1.	I find it easy to read questions presented in CBA.					
2.	I find it easy to select my answers while undertaking CBA.					
3.	I find it easy to navigate (move from one page to another) in CBA.					
4.	I find it easy to correct my mistakes while undertaking CBA.					
5.	The CBA interface is user-friendly/easy to use.					
6.	I find it easy to undertake CBA.					

SECTION F: Perceived Usefulness

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1.	With CBA, I spend less time selecting my answers.					
2.	With CBA, I save more time in completing assessments.					
3.	With CBA, I spend less time changing my choice of answers.					
4.	With CBA, my assessment performance improved.					
5.	Using CBA has helped improve my assessment result.					

SECTION G: Perceived Playfulness

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1.	I am always eager to undertake CBA.					
2.	I am satisfied with my interaction with the CBA system.					
3.	I enjoy undertaking CBA.					

SECTION H: Facilitating Conditions

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1.	The school provides the necessary resources (e.g. mouse, keyboard, internet, etc.) I need when undertaking CBA.					
2.	While undertaking CBA, a staff is available to provide me with the necessary support I might need.					
3.	There is a menu on the system that provides me with help when I am undertaking CBA.					
4.	I would have a hard time operating CBA without administrative support.					
5.	Before taking CBA, there are trainings/tutorials on how to use a CBA system.					

SECTION I: Behavioural Intention to Use

		(5) Strongly Agree	(4) Agree	(3) Neutral	(2) Disagree	(1) Strongly Disagree
1.	I would like to undertake CBA more frequently.					
2.	If optional, I intend to undertake CBA in the future.					

THANKS SO MUCH FOR YOUR TIME!

☺

APPENDIX C - REPLACING MISSING VALUES

Result Variables

	Result Variable	No. of Replaced Missing Values	Case Number of Non-Missing Values		No. of Valid Cases	Creating Function
			First	Last		
1	Age_1	0	1	350	350	SMEAN(Age)
2	Gender_1	2	1	350	350	SMEAN(Gender)
3	Ethnicity_1	1	1	350	350	SMEAN(Ethnicity)
4	Academic_Level_1	1	1	350	350	SMEAN(Academic_Level)
5	Comp_Familiarity_1_1	0	1	350	350	SMEAN(Comp_Familiarity_1)
6	Comp_Familiarity_2_1	11	1	350	350	SMEAN(Comp_Familiarity_2)
7	Comp_Familiarity_3_1	20	1	350	350	SMEAN(Comp_Familiarity_3)
8	Comp_Familiarity_4_1	9	1	350	350	SMEAN(Comp_Familiarity_4)
9	Comp_Familiarity_5_1	12	1	350	350	SMEAN(Comp_Familiarity_5)
10	Comp_Familiarity_6_1	9	1	350	350	SMEAN(Comp_Familiarity_6)
11	Comp_Familiarity_7_1	5	1	350	350	SMEAN(Comp_Familiarity_7)
12	Subject_of_CBA_1	0	1	350	350	SMEAN(Subject_of_CBA)
13	Any_Challenges_1	0	1	350	350	SMEAN(Any_Challenges)
14	Internet_Connectivity_1	0	1	350	350	SMEAN(Internet_Connectivity)
15	Presentation_of_Items_on_screen_1	0	1	350	350	SMEAN(Presentation_of_Items_on_screen)
16	Interruption_of_Power_Supply_1	0	1	350	350	SMEAN(Interruption_of_Power_Supply)
17	Unfamiliarity_with_CBA_terms_1	0	1	350	350	SMEAN(Unfamiliarity_with_CBA_terms)
18	Mouse_1	0	1	350	350	SMEAN(Mouse)
19	Reading_from_computer_screen_1	0	1	350	350	SMEAN(Reading_from_computer_screen)
20	Preferred_Assessment_1	4	1	350	350	SMEAN(Preferred_Assessment)
21	Comp_Self_Efficacy_1_1	0	1	350	350	SMEAN(Comp_Self_Efficacy_1)
22	Comp_Self_Efficacy_2_1	1	1	350	350	SMEAN(Comp_Self_Efficacy_2)
23	Comp_Self_Efficacy_3_1	1	1	350	350	SMEAN(Comp_Self_Efficacy_3)
24	Comp_Self_Efficacy_4_1	2	1	350	350	SMEAN(Comp_Self_Efficacy_4)
25	Comp_Self_Efficacy_5_1	1	1	350	350	SMEAN(Comp_Self_Efficacy_5)
26	Comp_Self_Efficacy_6_1	2	1	350	350	SMEAN(Comp_Self_Efficacy_6)
27	PEOU_1_1	3	1	350	350	SMEAN(PEOU_1)
28	PEOU_2_1	3	1	350	350	SMEAN(PEOU_2)
29	PEOU_3_1	5	1	350	350	SMEAN(PEOU_3)
30	PEOU_4_1	2	1	350	350	SMEAN(PEOU_4)
31	PEOU_5_1	5	1	350	350	SMEAN(PEOU_5)
32	PEOU_6_1	1	1	350	350	SMEAN(PEOU_6)
33	PU_1_1	0	1	350	350	SMEAN(PU_1)
34	PU_2_1	0	1	350	350	SMEAN(PU_2)

35	PU_3_1	1	1	350	350	SMEAN(PU_3)
36	PU_4_1	2	1	350	350	SMEAN(PU_4)
37	PU_5_1	2	1	350	350	SMEAN(PU_5)
38	PP_1_1	0	1	350	350	SMEAN(PP_1)
39	PP_2_1	0	1	350	350	SMEAN(PP_2)
40	PP_3_1	0	1	350	350	SMEAN(PP_3)
41	FC_1_1	0	1	350	350	SMEAN(FC_1)
42	FC_2_1	0	1	350	350	SMEAN(FC_2)
43	FC_3_1	2	1	350	350	SMEAN(FC_3)
44	FC_4_1	0	1	350	350	SMEAN(FC_4)
45	FC_5_1	1	1	350	350	SMEAN(FC_5)
46	BI_1_1	0	1	350	350	SMEAN(BI_1)
47	BI_2_1	2	1	350	350	SMEAN(BI_2)

APPENDIX D - RELIABILITY TEST

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Age	131.100	166.812	-.060	.758
Gender	131.649	164.905	.108	.756
Ethnicity	131.766	167.257	-.067	.761
Academic Level	131.117	169.806	-.172	.767
Computer and Internet familiarity Q1	129.360	159.360	.135	.759
Computer and Internet familiarity Q2	131.289	166.607	-.047	.765
Computer and Internet familiarity Q3	131.197	175.706	-.303	.782
Computer and Internet familiarity Q4	129.046	159.390	.212	.753
Computer and Internet familiarity Q5	128.860	160.436	.183	.754
Computer and Internet familiarity Q6	128.689	160.301	.258	.751
Computer and Internet familiarity Q7	128.697	159.495	.285	.750
Subject where CBA was done	130.069	170.270	-.156	.775
Did you experience any challenges?	132.291	168.282	-.191	.760
Internet Connectivity	132.660	168.259	-.152	.761
Presentation of Items on the screen	132.883	167.468	-.101	.759
Interruption of Power Supply	132.986	166.925	-.058	.758
Unfamiliarity with CBA terms	132.946	167.112	-.074	.759
Mouse e.g Scrolling	133.006	166.774	-.041	.758
Reading from Computer Screen	132.974	167.916	-.167	.760
Preference: CBA or PBA?	131.611	160.622	.446	.749
Computer Self-Efficacy Q1	130.911	172.660	-.245	.774
Computer Self-Efficacy Q2	129.054	159.874	.224	.752
Computer Self-Efficacy Q3	131.311	170.181	-.179	.768
Computer Self-Efficacy Q4	128.689	161.929	.183	.754
Computer Self-Efficacy Q5	131.040	171.179	-.200	.772
Computer Self-Efficacy Q6	128.954	160.342	.203	.753
Perceived Ease-of-Use Q1	129.274	152.251	.540	.739
Perceived Ease-of-Use Q2	129.017	155.455	.473	.743
Perceived Ease-of-Use Q3	128.920	156.744	.446	.745
Perceived Ease-of-Use Q4	129.291	155.416	.359	.746
Perceived Ease-of-Use Q5	129.137	154.720	.501	.742
Perceived Ease-of-Use Q6	129.137	152.113	.598	.737
Perceived Usefulness Q1	129.491	153.838	.435	.743
Perceived Usefulness Q2	129.411	151.005	.571	.737
Perceived Usefulness Q3	129.540	154.862	.395	.744
Perceived Usefulness Q4	129.789	151.554	.604	.737
Perceived Usefulness Q5	129.806	150.014	.616	.735
Perceived Playfulness Q1	129.797	152.179	.544	.738

Perceived Playfulness Q2	129.403	154.327	.565	.740
Perceived Playfulness Q3	129.571	149.501	.642	.734
Facilitating Conditions Q1	128.734	161.153	.220	.752
Facilitation Conditions Q2	129.614	153.888	.322	.747
Facilitation Conditions Q3	129.491	156.279	.338	.747
Facilitation Conditions Q4	130.349	162.503	.087	.759
Facilitation Conditions Q5	130.209	153.489	.356	.745
Behavioural Intention To Use Q1	129.583	147.252	.631	.732
Behavioural Intention To Use Q2	129.537	148.994	.566	.735

APPENDIX E – Tests of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**Df**	**** Sig.**	**Statistic**	**df**	**** Sig.**
Age	.499	350	.000	.243	350	.000
Gender	.359	350	.000	.635	350	.000
Ethnicity	.434	350	.000	.545	350	.000
Academic Level	.276	350	.000	.753	350	.000
Computer and Internet familiarity Q1	.264	350	.000	.774	350	.000
Computer and Internet familiarity Q2	.299	350	.000	.723	350	.000
Computer and Internet familiarity Q3	.321	350	.000	.671	350	.000
Computer and Internet familiarity Q4	.270	350	.000	.770	350	.000
Computer and Internet familiarity Q5	.314	350	.000	.709	350	.000
Computer and Internet familiarity Q6	.337	350	.000	.681	350	.000
Computer and Internet familiarity Q7	.340	350	.000	.680	350	.000
Subject where CBA was done	.268	350	.000	.852	350	.000
Did you experience any challenges?	.501	350	.000	.463	350	.000
Internet Connectivity	.365	350	.000	.633	350	.000
Presentation of Items on the screen	.477	350	.000	.522	350	.000
Interruption of Power Supply	.521	350	.000	.393	350	.000
Unfamiliarity with CBA terms	.505	350	.000	.452	350	.000
Mouse e.g Scrolling	.528	350	.000	.358	350	.000
Reading from Computer Screen	.516	350	.000	.411	350	.000
Preference: CBA or PBA?	.342	350	.000	.636	350	.000
Computer Self-Efficacy Q1	.224	350	.000	.855	350	.000
Computer Self-Efficacy Q2	.233	350	.000	.817	350	.000
Computer Self-Efficacy Q3	.264	350	.000	.747	350	.000
Computer Self-Efficacy Q4	.327	350	.000	.673	350	.000
Computer Self-Efficacy Q5	.238	350	.000	.826	350	.000
Computer Self-Efficacy Q6	.275	350	.000	.782	350	.000
Perceived Ease-of-Use Q1	.229	350	.000	.864	350	.000
Perceived Ease-of-Use Q2	.259	350	.000	.814	350	.000
Perceived Ease-of-Use Q3	.260	350	.000	.786	350	.000
Perceived Ease-of-Use Q4	.235	350	.000	.857	350	.000
Perceived Ease-of-Use Q5	.247	350	.000	.849	350	.000
Perceived Ease-of-Use Q6	.236	350	.000	.844	350	.000
Perceived Usefulness Q1	.218	350	.000	.890	350	.000
Perceived Usefulness Q2	.228	350	.000	.882	350	.000
Perceived Usefulness Q3	.215	350	.000	.894	350	.000
Perceived Usefulness Q4	.269	350	.000	.881	350	.000
Perceived Usefulness Q5	.238	350	.000	.893	350	.000

Perceived Playfulness Q1	.196	350	.000	.902	350	.000
Perceived Playfulness Q2	.280	350	.000	.856	350	.000
Perceived Playfulness Q3	.207	350	.000	.885	350	.000
Facilitating Conditions Q1	.302	350	.000	.695	350	.000
Facilitation Conditions Q2	.204	350	.000	.867	350	.000
Facilitation Conditions Q3	.223	350	.000	.888	350	.000
Facilitation Conditions Q4	.201	350	.000	.908	350	.000
Facilitation Conditions Q5	.173	350	.000	.905	350	.000
Behavioural Intention To Use Q1	.193	350	.000	.887	350	.000
Behavioural Intention To Use Q2	.210	350	.000	.886	350	.000

a. Lilliefors Significance Correction

** Signifiance Value

APPENDIX F – Demographics statistics

Age

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 18	5	1.4	1.4	1.4
	18-24	335	95.7	95.7	97.1
	25-30	10	2.9	2.9	100.0
	Total	350	100.0	100.0	

Gender

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	187	53.4	53.4	53.4
	Male	163	46.6	46.6	100.0
	Total	350	100.0	100.0	

Ethnicity

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	African	260	74.3	74.3	74.3
	Indian	71	20.3	20.3	94.6
	Coloured	6	1.7	1.7	96.3
	White	13	3.7	3.7	100.0
	Total	350	100.0	100.0	

Academic Level

Academic Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First year	145	41.4	41.4	41.4
	Second year	63	18.0	18.0	59.4
	Third year	140	40.0	40.0	99.4
	Honours	2	.6	.6	100.0
	Total	350	100.0	100.0	

APPENDIX G - Descriptive Statistics of Constructs Used

Information about Computer and Internet familiarity

Computer and Internet familiarity Q1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	50	14.3	14.3	14.3
	Disagree	34	9.7	9.7	24.0
	Neutral	30	8.6	8.6	32.6
	Agree	74	21.1	21.1	53.7
	Strongly Agree	162	46.3	46.3	100.0
	Total	350	100.0	100.0	

Computer and Internet familiarity Q2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	187	53.4	53.4	53.4
	Disagree	98	28.0	28.0	81.4
	Neutral	20	5.7	5.7	87.1
	Agree	29	8.3	8.3	95.4
	Strongly Agree	16	4.6	4.6	100.0
	Total	350	100.0	100.0	

Computer and Internet familiarity Q3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	201	57.4	57.4	57.4
	Disagree	80	22.9	22.9	80.3
	Neutral	9	2.6	2.6	82.9
	Agree	17	4.9	4.9	87.7
	Strongly Agree	43	12.3	12.3	100.0
	Total	350	100.0	100.0	

Computer and Internet familiarity Q4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	19	5.4	5.4	5.4
	Disagree	18	5.1	5.1	10.6
	Neutral	35	10.0	10.0	20.6
	Agree	126	36.0	36.0	56.6
	Strongly Agree	152	43.4	43.4	100.0
	Total	350	100.0	100.0	

Computer and Internet familiarity Q5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	4.0	4.0	4.0
	Disagree	19	5.4	5.4	9.4
	Neutral	26	7.4	7.4	16.9
	Agree	96	27.4	27.4	44.3
	Strongly Agree	195	55.7	55.7	100.0
	Total	350	100.0	100.0	

Computer and Internet familiarity Q6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	2.0	2.0	2.0
	Disagree	5	1.4	1.4	3.4
	Neutral	25	7.1	7.1	10.6
	Agree	108	30.9	30.9	41.4
	Strongly Agree	205	58.6	58.6	100.0
	Total	350	100.0	100.0	

Computer and Internet familiarity Q7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	11	3.1	3.1	4.9
	Neutral	21	6.0	6.0	10.9
	Agree	105	30.0	30.0	40.9
	Strongly Agree	207	59.1	59.1	100.0
	Total	350	100.0	100.0	

Computer Self-Efficacy

Computer Self-Efficacy Q1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	120	34.3	34.3	34.3
	Disagree	109	31.1	31.1	65.4
	Neutral	67	19.1	19.1	84.6
	Agree	38	10.9	10.9	95.4
	Strongly Agree	16	4.6	4.6	100.0
	Total	350	100.0	100.0	

Computer Self-Efficacy Q2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	2.3	2.3	2.3
	Disagree	20	5.7	5.7	8.0
	Neutral	57	16.3	16.3	24.3
	Agree	123	35.1	35.1	59.4
	Strongly Agree	142	40.6	40.6	100.0
	Total	350	100.0	100.0	

Computer Self-Efficacy Q3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	163	46.6	46.6	46.6
	Disagree	132	37.7	37.7	84.3
	Neutral	28	8.0	8.0	92.3
	Agree	15	4.3	4.3	96.6
	Strongly Agree	12	3.4	3.4	100.0
	Total	350	100.0	100.0	

Computer Self-Efficacy Q4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	10	2.9	2.9	4.6
	Neutral	14	4.0	4.0	8.6
	Agree	119	34.0	34.0	42.6
	Strongly Agree	201	57.4	57.4	100.0
	Total	350	100.0	100.0	

Computer Self-Efficacy Q5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	136	38.9	38.9	38.9
	Disagree	113	32.3	32.3	71.1
	Neutral	56	16.0	16.0	87.1
	Agree	29	8.3	8.3	95.4
	Strongly Agree	16	4.6	4.6	100.0
	Total	350	100.0	100.0	

Computer Self-Efficacy Q6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	2.0	2.0	2.0
	Disagree	22	6.3	6.3	8.3
	Neutral	46	13.1	13.1	21.4
	Agree	108	30.9	30.9	52.3
	Strongly Agree	167	47.7	47.7	100.0
	Total	350	100.0	100.0	

Perceived Ease-of-Use

Perceived Ease-of-Use Q1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.6	2.6	2.6
	Disagree	22	6.3	6.3	8.9
	Neutral	86	24.6	24.6	33.4
	Agree	132	37.7	37.7	71.1
	Strongly Agree	101	28.9	28.9	100.0
	Total	350	100.0	100.0	

Perceived Ease-of-Use Q2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	1.4	1.4	1.4
	Disagree	12	3.4	3.4	4.9
	Neutral	52	14.9	14.9	19.7
	Agree	156	44.6	44.6	64.3
	Strongly Agree	125	35.7	35.7	100.0
	Total	350	100.0	100.0	

Perceived Ease-of-Use Q3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	1.1	1.1	1.1
	Disagree	9	2.6	2.6	3.7
	Neutral	38	10.9	10.9	14.6
	Agree	163	46.6	46.6	61.1
	Strongly Agree	136	38.9	38.9	100.0
	Total	350	100.0	100.0	

Perceived Ease-of-Use Q4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	3.1	3.1	3.1
	Disagree	40	11.4	11.4	14.6
	Neutral	64	18.3	18.3	32.9
	Agree	120	34.3	34.3	67.1
	Strongly Agree	115	32.9	32.9	100.0
	Total	350	100.0	100.0	

Perceived Ease-of-Use Q5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	.9	.9	.9
	Disagree	17	4.9	4.9	5.7
	Neutral	72	20.6	20.6	26.3
	Agree	151	43.1	43.1	69.4
	Strongly Agree	107	30.6	30.6	100.0
	Total	350	100.0	100.0	

Perceived Ease-of-Use Q6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	13	3.7	3.7	5.4
	Neutral	77	22.0	22.0	27.4
	Agree	141	40.3	40.3	67.7
	Strongly Agree	113	32.3	32.3	100.0
	Total	350	100.0	100.0	

Perceived Usefulness

Perceived Usefulness Q1 – With CBA, I spend less time selecting my answers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	3.4	3.4	3.4
	Disagree	42	12.0	12.0	15.4
	Neutral	93	26.6	26.6	42.0
	Agree	122	34.9	34.9	76.9
	Strongly Agree	81	23.1	23.1	100.0
	Total	350	100.0	100.0	

Perceived Usefulness Q2 – With CBA, I save more time in completing assessments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	10	2.9	2.9	2.9
	Disagree	34	9.7	9.7	12.6
	Neutral	91	26.0	26.0	38.6
	Agree	130	37.1	37.1	75.7
	Strongly Agree	85	24.3	24.3	100.0
	Total	350	100.0	100.0	

Perceived Usefulness Q3 – With CBA, I spend less time changing my choice of answers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	4.0	4.0	4.0
	Disagree	41	11.7	11.7	15.7
	Neutral	99	28.3	28.3	44.0
	Agree	122	34.9	34.9	78.9
	Strongly Agree	74	21.1	21.1	100.0
	Total	350	100.0	100.0	

Perceived Usefulness Q4 – With CBA, my assessment performance improved.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	2.3	2.3	2.3
	Disagree	46	13.1	13.1	15.4
	Neutral	168	48.0	48.0	63.4
	Agree	80	22.9	22.9	86.3
	Strongly Agree	48	13.7	13.7	100.0
	Total	350	100.0	100.0	

Perceived Usefulness Q5 – Using CBA has helped improve my assessment result

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	17	4.9	4.9	4.9
	Disagree	43	12.3	12.3	17.1
	Neutral	157	44.9	44.9	62.0
	Agree	81	23.1	23.1	85.1
	Strongly Agree	52	14.9	14.9	100.0
	Total	350	100.0	100.0	

Perceived Playfulness

Perceived Playfulness Q1 – I am always eager to undertake CBA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	16	4.6	4.6	4.6
	Disagree	47	13.4	13.4	18.0
	Neutral	137	39.1	39.1	57.1
	Agree	110	31.4	31.4	88.6
	Strongly Agree	40	11.4	11.4	100.0
	Total	350	100.0	100.0	

Perceived Playfulness Q2 – I am satisfied with my interaction with the CBA system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	1.1	1.1	1.1
	Disagree	19	5.4	5.4	6.6
	Neutral	102	29.1	29.1	35.7
	Agree	174	49.7	49.7	85.4
	Strongly Agree	51	14.6	14.6	100.0
	Total	350	100.0	100.0	

Perceived Playfulness Q3 – I enjoy undertaking CBA.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	17	4.9	4.9	4.9
	Disagree	25	7.1	7.1	12.0
	Neutral	121	34.6	34.6	46.6
	Agree	125	35.7	35.7	82.3
	Strongly Agree	62	17.7	17.7	100.0
	Total	350	100.0	100.0	

Facilitating Conditions

Facilitating Conditions Q1 – The school provides the necessary resources (e.g. mouse, keyboard, Internet, etc.) I need when undertaking CBA.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	10	2.9	2.9	4.6
	Neutral	15	4.3	4.3	8.9
	Agree	133	38.0	38.0	46.9
	Strongly Agree	186	53.1	53.1	100.0
	Total	350	100.0	100.0	

Facilitation Conditions Q2 – While undertaking CBA, a staff is available to provide me with the necessary support I might need.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	37	10.6	10.6	10.6
	Disagree	56	16.0	16.0	26.6
	Neutral	61	17.4	17.4	44.0
	Agree	87	24.9	24.9	68.9
	Strongly Agree	109	31.1	31.1	100.0
	Total	350	100.0	100.0	

Facilitation Conditions Q3 – There is a menu on the system that provides me with help when I am undertaking CBA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	4.0	4.0	4.0
	Disagree	39	11.1	11.1	15.1
	Neutral	92	26.3	26.3	41.4
	Agree	125	35.7	35.7	77.1
	Strongly Agree	80	22.9	22.9	100.0
	Total	350	100.0	100.0	

Facilitation Conditions Q4 – I would have a hard time operating CBA without administrative support

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	51	14.6	14.6	14.6
	Disagree	110	31.4	31.4	46.0
	Neutral	91	26.0	26.0	72.0
	Agree	66	18.9	18.9	90.9
	Strongly Agree	32	9.1	9.1	100.0
	Total	350	100.0	100.0	

Facilitation Conditions Q5 – Before taking CBA, there are trainings/tutorials on how to use a CBA system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	55	15.7	15.7	15.7
	Disagree	90	25.7	25.7	41.4
	Neutral	91	26.0	26.0	67.4
	Agree	61	17.4	17.4	84.9
	Strongly Agree	53	15.1	15.1	100.0
	Total	350	100.0	100.0	

Behavioural Intention to Use

Behavioural Intention To Use Q1 – I would like to undertake CBA more frequently

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	27	7.7	7.7	7.7
	Disagree	31	8.9	8.9	16.6
	Neutral	104	29.7	29.7	46.3
	Agree	105	30.0	30.0	76.3
	Strongly Agree	83	23.7	23.7	100.0
	Total	350	100.0	100.0	

Behavioural Intention To Use Q2 – If optional, I intend to undertake CBA in the future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	23	6.6	6.6	6.6
	Disagree	39	11.1	11.1	17.7
	Neutral	89	25.4	25.4	43.1
	Agree	111	31.7	31.7	74.9
	Strongly Agree	88	25.1	25.1	100.0
	Total	350	100.0	100.0	

APPENDIX H

CROSS-TABULATIONS AND CHI-SQUARE TESTS

Gender and Assessment Preference

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.625[a]	1	.032		
Continuity Correction[b]	4.175	1	.041		
Likelihood Ratio	4.635	1	.031		
Fisher's Exact Test				.033	.020
Linear-by-Linear Association	4.612	1	.032		
N of Valid Cases	350				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 81.03.

b. Computed only for a 2x2 table

Academic level and Assessment Preference

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.223[a]	3	.011
Likelihood Ratio	12.059	3	.007
Linear-by-Linear Association	3.705	1	.054
N of Valid Cases	350		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .99.

Academic level and Challenges

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.359[a]	3	.004
Likelihood Ratio	13.646	3	.003
Linear-by-Linear Association	5.130	1	.024
N of Valid Cases	350		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .35.

GENDER AND BEHAVIOURAL INTENTION TO USE

Gender * Behavioural Intention To Use Q1

Crosstab

			Behavioural Intention To Use Q1					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Female	Count	20	23	54	58	32	187
		% within Gender	10.7%	12.3%	28.9%	31.0%	17.1%	100.0%
	Male	Count	7	8	50	47	51	163
		% within Gender	4.3%	4.9%	30.7%	28.8%	31.3%	100.0%
Total		Count	27	31	104	105	83	350
		% within Gender	7.7%	8.9%	29.7%	30.0%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	17.610[a]	4	.001
Likelihood Ratio	18.148	4	.001
Linear-by-Linear Association	13.692	1	.000
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.57.

Gender * Behavioural Intention To Use Q2

Crosstab

			Behavioural Intention To Use Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	15	28	48	59	37	187
		% within Gender	8.0%	15.0%	25.7%	31.6%	19.8%	100.0%
	Male	Count	8	11	41	52	51	163
		% within Gender	4.9%	6.7%	25.2%	31.9%	31.3%	100.0%
Total		Count	23	39	89	111	88	350
		% within Gender	6.6%	11.1%	25.4%	31.7%	25.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.167[a]	4	.025
Likelihood Ratio	11.412	4	.022
Linear-by-Linear Association	9.100	1	.003
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.71.

ETHNICITY VS BI

Crosstab

			Behavioural Intention To Use Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	17	20	73	80	70	260
		% within Ethnicity	6.5%	7.7%	28.1%	30.8%	26.9%	100.0%
	Indian	Count	7	7	27	21	9	71
		% within Ethnicity	9.9%	9.9%	38.0%	29.6%	12.7%	100.0%
	Coloured	Count	0	1	2	1	2	6
		% within Ethnicity	0.0%	16.7%	33.3%	16.7%	33.3%	100.0%
	White	Count	3	3	2	3	2	13
		% within Ethnicity	23.1%	23.1%	15.4%	23.1%	15.4%	100.0%
Total		Count	27	31	104	105	83	350
		% within Ethnicity	7.7%	8.9%	29.7%	30.0%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.010[a]	12	.115
Likelihood Ratio	16.959	12	.151
Linear-by-Linear Association	8.675	1	.003
N of Valid Cases	350		

a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .46.

ETHNICITY * BEHAVIOURAL INTENTION TO USE Q2 (BI_2)

Crosstab

			Behavioural Intention To Use Q2					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Ethnicity	African	Count	12	24	62	88	74	260
		% within Ethnicity	4.6%	9.2%	23.8%	33.8%	28.5%	100.0%
	Indian	Count	8	11	22	20	10	71
		% within Ethnicity	11.3%	15.5%	31.0%	28.2%	14.1%	100.0%
	Coloured	Count	0	1	2	0	3	6
		% within Ethnicity	0.0%	16.7%	33.3%	0.0%	50.0%	100.0%
	White	Count	3	3	3	3	1	13
		% within Ethnicity	23.1%	23.1%	23.1%	23.1%	7.7%	100.0%
Total		Count	23	39	89	111	88	350
		% within Ethnicity	6.6%	11.1%	25.4%	31.7%	25.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	25.363[a]	12	.013
Likelihood Ratio	25.618	12	.012
Linear-by-Linear Association	15.225	1	.000
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .39.

ETHNICITY VS COMPUTER AND INTERNET FAMILIARITY

Ethnicity * Computer and Internet familiarity Q1

Crosstab

			Computer and Internet familiarity Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	50	33	29	53	95	260
		% within Ethnicity	19.2%	12.7%	11.2%	20.4%	36.5%	100.0%
	Indian	Count	0	1	0	18	52	71
		% within Ethnicity	0.0%	1.4%	0.0%	25.4%	73.2%	100.0%
	Coloured	Count	0	0	0	2	4	6
		% within Ethnicity	0.0%	0.0%	0.0%	33.3%	66.7%	100.0%
	White	Count	0	0	1	1	11	13
		% within Ethnicity	0.0%	0.0%	7.7%	7.7%	84.6%	100.0%
Total		Count	50	34	30	74	162	350
		% within Ethnicity	14.3%	9.7%	8.6%	21.1%	46.3%	100.0%

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	58.550[a]	12	.000
Likelihood Ratio	80.021	12	.000
Linear-by-Linear Association	37.870	1	.000
N of Valid Cases	350		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .51.

Ethnicity * Computer and Internet familiarity Q2

Crosstab

			Computer and Internet familiarity Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	126	76	18	26	14	260
		% within Ethnicity	48.5%	29.2%	6.9%	10.0%	5.4%	100.0%
	Indian	Count	49	17	2	3	0	71
		% within Ethnicity	69.0%	23.9%	2.8%	4.2%	0.0%	100.0%
	Coloured	Count	4	1	0	0	1	6
		% within Ethnicity	66.7%	16.7%	0.0%	0.0%	16.7%	100.0%
	White	Count	8	4	0	0	1	13
		% within Ethnicity	61.5%	30.8%	0.0%	0.0%	7.7%	100.0%
Total		Count	187	98	20	29	16	350
		% within Ethnicity	53.4%	28.0%	5.7%	8.3%	4.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.176[a]	12	.110
Likelihood Ratio	23.491	12	.024
Linear-by-Linear Association	6.090	1	.014
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .27.

Ethnicity * Computer and Internet familiarity Q3

Crosstab

			Computer and Internet familiarity Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	133	62	6	16	43	260
		% within Ethnicity	51.2%	23.8%	2.3%	6.2%	16.5%	100.0%
	Indian	Count	55	13	2	1	0	71
		% within Ethnicity	77.5%	18.3%	2.8%	1.4%	0.0%	100.0%
	Coloured	Count	4	1	1	0	0	6
		% within Ethnicity	66.7%	16.7%	16.7%	0.0%	0.0%	100.0%
	White	Count	9	4	0	0	0	13
		% within Ethnicity	69.2%	30.8%	0.0%	0.0%	0.0%	100.0%
Total		Count	201	80	9	17	43	350
		% within Ethnicity	57.4%	22.9%	2.6%	4.9%	12.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	31.864[a]	12	.001
Likelihood Ratio	41.396	12	.000
Linear-by-Linear Association	16.969	1	.000
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .15.

Ethnicity * Computer and Internet familiarity Q4

Crosstab

			Computer and Internet familiarity Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	15	17	32	99	97	260
		% within Ethnicity	5.8%	6.5%	12.3%	38.1%	37.3%	100.0 %
	Indian	Count	3	1	3	24	40	71
		% within Ethnicity	4.2%	1.4%	4.2%	33.8%	56.3%	100.0 %
	Coloured	Count	0	0	0	1	5	6
		% within Ethnicity	0.0%	0.0%	0.0%	16.7%	83.3%	100.0 %
	White	Count	1	0	0	2	10	13
		% within Ethnicity	7.7%	0.0%	0.0%	15.4%	76.9%	100.0 %
Total		Count	19	18	35	126	152	350
		% within Ethnicity	5.4%	5.1%	10.0%	36.0%	43.4%	100.0 %

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.323[a]	12	.025
Likelihood Ratio	27.154	12	.007
Linear-by-Linear Association	11.371	1	.001
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .31.

Ethnicity * Computer and Internet familiarity Q5

Crosstab

			Computer and Internet familiarity Q5					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Ethnicity	African	Count	13	19	24	74	130	260
		% within Ethnicity	5.0%	7.3%	9.2%	28.5%	50.0%	100.0%
	Indian	Count	1	0	2	18	50	71
		% within Ethnicity	1.4%	0.0%	2.8%	25.4%	70.4%	100.0%
	Coloured	Count	0	0	0	2	4	6
		% within Ethnicity	0.0%	0.0%	0.0%	33.3%	66.7%	100.0%
	White	Count	0	0	0	2	11	13
		% within Ethnicity	0.0%	0.0%	0.0%	15.4%	84.6%	100.0%
Total		Count	14	19	26	96	195	350
		% within Ethnicity	4.0%	5.4%	7.4%	27.4%	55.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.095[a]	12	.049
Likelihood Ratio	28.582	12	.005
Linear-by-Linear Association	15.546	1	.000
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .24.

Ethnicity * Computer and Internet familiarity Q6

Crosstab

			Computer and Internet familiarity Q6					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	7	5	23	93	132	260
		% within Ethnicity	2.7%	1.9%	8.8%	35.8%	50.8%	100.0%
	Indian	Count	0	0	2	12	57	71
		% within Ethnicity	0.0%	0.0%	2.8%	16.9%	80.3%	100.0%
	Coloured	Count	0	0	0	2	4	6
		% within Ethnicity	0.0%	0.0%	0.0%	33.3%	66.7%	100.0%
	White	Count	0	0	0	1	12	13
		% within Ethnicity	0.0%	0.0%	0.0%	7.7%	92.3%	100.0%
Total		Count	7	5	25	108	205	350
		% within Ethnicity	2.0%	1.4%	7.1%	30.9%	58.6%	100.0%

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	28.223[a]	12	.005
Likelihood Ratio	33.965	12	.001
Linear-by-Linear Association	18.276	1	.000
N of Valid Cases	350		

a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .09.

Ethnicity * Computer and Internet familiarity Q7

Crosstab

			Computer and Internet familiarity Q7					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	6	11	20	89	134	260
		% within Ethnicity	2.3%	4.2%	7.7%	34.2%	51.5%	100.0%
	Indian	Count	0	0	1	13	57	71
		% within Ethnicity	0.0%	0.0%	1.4%	18.3%	80.3%	100.0%
	Coloured	Count	0	0	0	2	4	6
		% within Ethnicity	0.0%	0.0%	0.0%	33.3%	66.7%	100.0%
	White	Count	0	0	0	1	12	13
		% within Ethnicity	0.0%	0.0%	0.0%	7.7%	92.3%	100.0%
Total		Count	6	11	21	105	207	350
		% within Ethnicity	1.7%	3.1%	6.0%	30.0%	59.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	28.106[a]	12	.005
Likelihood Ratio	35.086	12	.000
Linear-by-Linear Association	18.734	1	.000
N of Valid Cases	350		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .10.

ETHNICITY VS CSE

Ethnicity * Computer Self-Efficacy Q1

Crosstab

			Computer Self-Efficacy Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	74	86	53	33	14	260
		% within Ethnicity	28.5%	33.1%	20.4%	12.7%	5.4%	100.0%
	Indian	Count	32	22	12	4	1	71
		% within Ethnicity	45.1%	31.0%	16.9%	5.6%	1.4%	100.0%
	Coloured	Count	3	0	2	1	0	6
		% within Ethnicity	50.0%	0.0%	33.3%	16.7%	0.0%	100.0%
	White	Count	11	1	0	0	1	13
		% within Ethnicity	84.6%	7.7%	0.0%	0.0%	7.7%	100.0%
Total		Count	120	109	67	38	16	350
		% within Ethnicity	34.3%	31.1%	19.1%	10.9%	4.6%	100.0%

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	29.680[a]	12	.003
Likelihood Ratio	34.511	12	.001
Linear-by-Linear Association	13.658	1	.000
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .27.

Ethnicity * Computer Self-Efficacy Q2

Crosstab

			Computer Self-Efficacy Q2					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Ethnicity	African	Count	7	19	46	96	92	260
		% within Ethnicity	2.7%	7.3%	17.7%	36.9%	35.4%	100.0%
	Indian	Count	1	1	11	22	36	71
		% within Ethnicity	1.4%	1.4%	15.5%	31.0%	50.7%	100.0%
	Coloured	Count	0	0	0	3	3	6
		% within Ethnicity	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
	White	Count	0	0	0	2	11	13
		% within Ethnicity	0.0%	0.0%	0.0%	15.4%	84.6%	100.0%
Total		Count	8	20	57	123	142	350
		% within Ethnicity	2.3%	5.7%	16.3%	35.1%	40.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.116[a]	12	.049
Likelihood Ratio	25.461	12	.013
Linear-by-Linear Association	15.726	1	.000
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .14.

Ethnicity * Computer Self-Efficacy Q3

Crosstab

			Computer Self-Efficacy Q3					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Ethnicity	African	Count	106	103	26	14	11	260
		% within Ethnicity	40.8%	39.6%	10.0%	5.4%	4.2%	100.0%
	Indian	Count	43	26	1	1	0	71
		% within Ethnicity	60.6%	36.6%	1.4%	1.4%	0.0%	100.0%
	Coloured	Count	3	1	1	0	1	6
		% within Ethnicity	50.0%	16.7%	16.7%	0.0%	16.7%	100.0%
	White	Count	11	2	0	0	0	13
		% within Ethnicity	84.6%	15.4%	0.0%	0.0%	0.0%	100.0%
Total		Count	163	132	28	15	12	350
		% within Ethnicity	46.6%	37.7%	8.0%	4.3%	3.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.727[a]	12	.006
Likelihood Ratio	32.877	12	.001
Linear-by-Linear Association	13.142	1	.000
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .21.

Ethnicity * Computer Self-Efficacy Q4

Crosstab

			Computer Self-Efficacy Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	6	8	13	94	139	260
		% within Ethnicity	2.3%	3.1%	5.0%	36.2%	53.5%	100.0%
	Indian	Count	0	1	1	21	48	71
		% within Ethnicity	0.0%	1.4%	1.4%	29.6%	67.6%	100.0%
	Coloured	Count	0	1	0	2	3	6
		% within Ethnicity	0.0%	16.7%	0.0%	33.3%	50.0%	100.0%
	White	Count	0	0	0	2	11	13
		% within Ethnicity	0.0%	0.0%	0.0%	15.4%	84.6%	100.0%
Total		Count	6	10	14	119	201	350
		% within Ethnicity	1.7%	2.9%	4.0%	34.0%	57.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.433[a]	12	.219
Likelihood Ratio	16.482	12	.170
Linear-by-Linear Association	6.604	1	.010
N of Valid Cases	350		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .10.

Ethnicity * Computer Self-Efficacy Q5

Crosstab

			Computer Self-Efficacy Q5					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	83	84	51	26	16	260
		% within Ethnicity	31.9%	32.3%	19.6%	10.0%	6.2%	100.0%
	Indian	Count	39	26	5	1	0	71
		% within Ethnicity	54.9%	36.6%	7.0%	1.4%	0.0%	100.0%
	Coloured	Count	3	1	0	2	0	6
		% within Ethnicity	50.0%	16.7%	0.0%	33.3%	0.0%	100.0%
	White	Count	11	2	0	0	0	13
		% within Ethnicity	84.6%	15.4%	0.0%	0.0%	0.0%	100.0%
Total		Count	136	113	56	29	16	350
		% within Ethnicity	38.9%	32.3%	16.0%	8.3%	4.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	42.009[a]	12	.000
Likelihood Ratio	49.270	12	.000
Linear-by-Linear Association	23.761	1	.000
N of Valid Cases	350		

a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .27.

Ethnicity * Computer Self-Efficacy Q6

Crosstab

			Computer Self-Efficacy Q6					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Ethnicity	African	Count	7	17	42	84	110	260
		% within Ethnicity	2.7%	6.5%	16.2%	32.3%	42.3%	100.0%
	Indian	Count	0	3	4	21	43	71
		% within Ethnicity	0.0%	4.2%	5.6%	29.6%	60.6%	100.0%
	Coloured	Count	0	1	0	2	3	6
		% within Ethnicity	0.0%	16.7%	0.0%	33.3%	50.0%	100.0%
	White	Count	0	1	0	1	11	13
		% within Ethnicity	0.0%	7.7%	0.0%	7.7%	84.6%	100.0%
Total		Count	7	22	46	108	167	350
		% within Ethnicity	2.0%	6.3%	13.1%	30.9%	47.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.589[a]	12	.042
Likelihood Ratio	26.427	12	.009
Linear-by-Linear Association	10.467	1	.001
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .12.

Academic level and Behavioural Intention to Use

Academic Level * Behavioural Intention To Use Q1

Crosstab

			Behavioural Intention To Use Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	5	7	40	50	43	145
		% within Academic Level	3.4%	4.8%	27.6%	34.5%	29.7%	100.0%
	Second year	Count	5	4	14	22	18	63
		% within Academic Level	7.9%	6.3%	22.2%	34.9%	28.6%	100.0%
	Third year	Count	17	20	50	32	21	140
		% within Academic Level	12.1%	14.3%	35.7%	22.9%	15.0%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	27	31	104	105	83	350
		% within Academic Level	7.7%	8.9%	29.7%	30.0%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	30.759[a]	12	.002
Likelihood Ratio	32.347	12	.001
Linear-by-Linear Association	21.345	1	.000
N of Valid Cases	350		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .15.

Academic Level * Behavioural Intention To Use Q2

Crosstab

			Behavioural Intention To Use Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	6	11	34	53	41	145
		% within Academic Level	4.1%	7.6%	23.4%	36.6%	28.3%	100.0%
	Second year	Count	3	7	11	20	22	63
		% within Academic Level	4.8%	11.1%	17.5%	31.7%	34.9%	100.0%
	Third year	Count	14	21	44	38	23	140
		% within Academic Level	10.0%	15.0%	31.4%	27.1%	16.4%	100.0%
	Honours	Count	0	0	0	0	2	2
		% within Academic Level	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Total		Count	23	39	89	111	88	350
		% within Academic Level	6.6%	11.1%	25.4%	31.7%	25.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.556[a]	12	.009
Likelihood Ratio	26.407	12	.009
Linear-by-Linear Association	11.681	1	.001
N of Valid Cases	350		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .13.

ACADEMIC LEVEL vs PU

Academic Level * Perceived Usefulness Q1

Crosstab

			Perceived Usefulness Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	5	13	44	51	32	145
		% within Academic Level	3.4%	9.0%	30.3%	35.2%	22.1%	100.0%
	Second year	Count	2	7	9	27	18	63
		% within Academic Level	3.2%	11.1%	14.3%	42.9%	28.6%	100.0%
	Third year	Count	5	22	40	43	30	140
		% within Academic Level	3.6%	15.7%	28.6%	30.7%	21.4%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	12	42	93	122	81	350
		% within Academic Level	3.4%	12.0%	26.6%	34.9%	23.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.848[a]	12	.458
Likelihood Ratio	13.070	12	.364
Linear-by-Linear Association	.615	1	.433
N of Valid Cases	350		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .07.

Academic Level * Perceived Usefulness Q2

Crosstab

			Perceived Usefulness Q2					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Academic Level	First year	Count	3	12	38	54	38	145
		% within Academic Level	2.1%	8.3%	26.2%	37.2%	26.2%	100.0%
	Second year	Count	2	3	13	30	15	63
		% within Academic Level	3.2%	4.8%	20.6%	47.6%	23.8%	100.0%
	Third year	Count	5	19	40	45	31	140
		% within Academic Level	3.6%	13.6%	28.6%	32.1%	22.1%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	10	34	91	130	85	350
		% within Academic Level	2.9%	9.7%	26.0%	37.1%	24.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.387[a]	12	.582
Likelihood Ratio	11.122	12	.518
Linear-by-Linear Association	2.392	1	.122
N of Valid Cases	350		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .06.

Academic Level * Perceived Usefulness Q3

Crosstab

			Perceived Usefulness Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	5	15	46	50	29	145
		% within Academic Level	3.4%	10.3%	31.7%	34.5%	20.0%	100.0%
	Second year	Count	3	2	15	24	19	63
		% within Academic Level	4.8%	3.2%	23.8%	38.1%	30.2%	100.0%
	Third year	Count	6	24	38	47	25	140
		% within Academic Level	4.3%	17.1%	27.1%	33.6%	17.9%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	14	41	99	122	74	350
		% within Academic Level	4.0%	11.7%	28.3%	34.9%	21.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.311[a]	12	.281
Likelihood Ratio	15.889	12	.196
Linear-by-Linear Association	.709	1	.400
N of Valid Cases	350		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .08.

Academic Level * Perceived Usefulness Q4

Crosstab

			Perceived Usefulness Q4					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Academic Level	First year	Count	2	11	75	39	18	145
		% within Academic Level	1.4%	7.6%	51.7%	26.9%	12.4%	100.0%
	Second year	Count	1	5	30	14	13	63
		% within Academic Level	1.6%	7.9%	47.6%	22.2%	20.6%	100.0%
	Third year	Count	5	30	62	27	16	140
		% within Academic Level	3.6%	21.4%	44.3%	19.3%	11.4%	100.0%
	Honours	Count	0	0	1	0	1	2
		% within Academic Level	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
Total		Count	8	46	168	80	48	350
		% within Academic Level	2.3%	13.1%	48.0%	22.9%	13.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.938[a]	12	.038
Likelihood Ratio	21.254	12	.047
Linear-by-Linear Association	5.121	1	.024
N of Valid Cases	350		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .05.

Academic Level * Perceived Usefulness Q5

Crosstab

			Perceived Usefulness Q5					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Academic Level	First year	Count	4	10	68	42	21	145
		% within Academic Level	2.8%	6.9%	46.9%	29.0%	14.5%	100.0%
	Second year	Count	4	5	27	14	13	63
		% within Academic Level	6.3%	7.9%	42.9%	22.2%	20.6%	100.0%
	Third year	Count	9	28	61	25	17	140
		% within Academic Level	6.4%	20.0%	43.6%	17.9%	12.1%	100.0%
	Honours	Count	0	0	1	0	1	2
		% within Academic Level	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
Total		Count	17	43	157	81	52	350
		% within Academic Level	4.9%	12.3%	44.9%	23.1%	14.9%	100.0%

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	22.177[a]	12	.036
Likelihood Ratio	22.074	12	.037
Linear-by-Linear Association	7.702	1	.006
N of Valid Cases	350		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .10.

GENDER vs PEOU

Gender * Perceived Ease-of-Use Q1

Crosstab

			Perceived Ease-of-Use Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	5	12	44	73	53	187
		% within Gender	2.7%	6.4%	23.5%	39.0%	28.3%	100.0%
	Male	Count	4	10	42	59	48	163
		% within Gender	2.5%	6.1%	25.8%	36.2%	29.4%	100.0%
Total		Count	9	22	86	132	101	350
		% within Gender	2.6%	6.3%	24.6%	37.7%	28.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.428[a]	4	.980
Likelihood Ratio	.428	4	.980
Linear-by-Linear Association	.000	1	.993
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 4.19.

Gender * Perceived Ease-of-Use Q2

Crosstab

			Perceived Ease-of-Use Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	1	12	27	85	62	187
		% within Gender	0.5%	6.4%	14.4%	45.5%	33.2%	100.0%
	Male	Count	4	0	25	71	63	163
		% within Gender	2.5%	0.0%	15.3%	43.6%	38.7%	100.0%
Total		Count	5	12	52	156	125	350
		% within Gender	1.4%	3.4%	14.9%	44.6%	35.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.559[a]	4	.009
Likelihood Ratio	18.259	4	.001
Linear-by-Linear Association	1.553	1	.213
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.33.

Gender * Perceived Ease-of-Use Q3

Crosstab

			Perceived Ease-of-Use Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	1	6	19	94	67	187
		% within Gender	0.5%	3.2%	10.2%	50.3%	35.8%	100.0%
	Male	Count	3	3	19	69	69	163
		% within Gender	1.8%	1.8%	11.7%	42.3%	42.3%	100.0%
Total		Count	4	9	38	163	136	350
		% within Gender	1.1%	2.6%	10.9%	46.6%	38.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.238[a]	4	.375
Likelihood Ratio	4.298	4	.367
Linear-by-Linear Association	.191	1	.662
N of Valid Cases	350		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 1.86.

Gender * Perceived Ease-of-Use Q4

			Perceived Ease-of-Use Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	5	29	26	70	57	187
		% within Gender	2.7%	15.5%	13.9%	37.4%	30.5%	100.0%
	Male	Count	6	11	38	50	58	163
		% within Gender	3.7%	6.7%	23.3%	30.7%	35.6%	100.0%
Total		Count	11	40	64	120	115	350
		% within Gender	3.1%	11.4%	18.3%	34.3%	32.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.195[a]	4	.016
Likelihood Ratio	12.463	4	.014
Linear-by-Linear Association	.739	1	.390
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.12.

Gender * Perceived Ease-of-Use Q5

Crosstab

			Perceived Ease-of-Use Q5					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	1	10	41	83	52	187
		% within Gender	0.5%	5.3%	21.9%	44.4%	27.8%	100.0%
	Male	Count	2	7	31	68	55	163
		% within Gender	1.2%	4.3%	19.0%	41.7%	33.7%	100.0%
Total		Count	3	17	72	151	107	350
		% within Gender	0.9%	4.9%	20.6%	43.1%	30.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.190[a]	4	.701
Likelihood Ratio	2.195	4	.700
Linear-by-Linear Association	.874	1	.350
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.40.

Gender * Perceived Ease-of-Use Q6

Crosstab

			Perceived Ease-of-Use Q6					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	4	10	41	77	55	187
		% within Gender	2.1%	5.3%	21.9%	41.2%	29.4%	100.0%
	Male	Count	2	3	36	64	58	163
		% within Gender	1.2%	1.8%	22.1%	39.3%	35.6%	100.0%
Total		Count	6	13	77	141	113	350
		% within Gender	1.7%	3.7%	22.0%	40.3%	32.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.414[a]	4	.353
Likelihood Ratio	4.614	4	.329
Linear-by-Linear Association	2.552	1	.110
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.79.

GENDER vs PP

Gender * Perceived Playfulness Q1

Crosstab

			Perceived Playfulness Q1					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Female	Count	9	25	82	55	16	187
		% within Gender	4.8%	13.4%	43.9%	29.4%	8.6%	100.0%
	Male	Count	7	22	55	55	24	163
		% within Gender	4.3%	13.5%	33.7%	33.7%	14.7%	100.0%
Total		Count	16	47	137	110	40	350
		% within Gender	4.6%	13.4%	39.1%	31.4%	11.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.744[a]	4	.219
Likelihood Ratio	5.762	4	.218
Linear-by-Linear Association	2.715	1	.099
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.45.

Gender * Perceived Playfulness Q2

Crosstab

			Perceived Playfulness Q2					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Female	Count	2	10	56	93	26	187
		% within Gender	1.1%	5.3%	29.9%	49.7%	13.9%	100.0%
	Male	Count	2	9	46	81	25	163
		% within Gender	1.2%	5.5%	28.2%	49.7%	15.3%	100.0%
Total		Count	4	19	102	174	51	350
		% within Gender	1.1%	5.4%	29.1%	49.7%	14.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.236[a]	4	.994
Likelihood Ratio	.235	4	.994
Linear-by-Linear Association	.071	1	.791
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.86.

Gender * Perceived Playfulness Q3

Crosstab

			Perceived Playfulness Q3					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Female	Count	12	17	66	68	24	187
		% within Gender	6.4%	9.1%	35.3%	36.4%	12.8%	100.0%
	Male	Count	5	8	55	57	38	163
		% within Gender	3.1%	4.9%	33.7%	35.0%	23.3%	100.0%
Total		Count	17	25	121	125	62	350
		% within Gender	4.9%	7.1%	34.6%	35.7%	17.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.651[a]	4	.047
Likelihood Ratio	9.796	4	.044
Linear-by-Linear Association	7.764	1	.005
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.92.

GENDER vs PU

Gender * Perceived Usefulness Q1

Crosstab

			Perceived Usefulness Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	6	29	54	65	33	187
		% within Gender	3.2%	15.5%	28.9%	34.8%	17.6%	100.0%
	Male	Count	6	13	39	57	48	163
		% within Gender	3.7%	8.0%	23.9%	35.0%	29.4%	100.0%
Total		Count	12	42	93	122	81	350
		% within Gender	3.4%	12.0%	26.6%	34.9%	23.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.219[a]	4	.037
Likelihood Ratio	10.354	4	.035
Linear-by-Linear Association	7.018	1	.008
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.59.

Gender * Perceived Usefulness Q2

Crosstab

			Perceived Usefulness Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	6	20	54	68	39	187
		% within Gender	3.2%	10.7%	28.9%	36.4%	20.9%	100.0%
	Male	Count	4	14	37	62	46	163
		% within Gender	2.5%	8.6%	22.7%	38.0%	28.2%	100.0%
Total		Count	10	34	91	130	85	350
		% within Gender	2.9%	9.7%	26.0%	37.1%	24.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.860[a]	4	.425
Likelihood Ratio	3.869	4	.424
Linear-by-Linear Association	3.282	1	.070
N of Valid Cases	350		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.66.

Gender * Perceived Usefulness Q3

Crosstab

			Perceived Usefulness Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	7	27	57	64	32	187
		% within Gender	3.7%	14.4%	30.5%	34.2%	17.1%	100.0%
	Male	Count	7	14	42	58	42	163
		% within Gender	4.3%	8.6%	25.8%	35.6%	25.8%	100.0%
Total		Count	14	41	99	122	74	350
		% within Gender	4.0%	11.7%	28.3%	34.9%	21.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.426[a]	4	.170
Likelihood Ratio	6.479	4	.166
Linear-by-Linear Association	4.170	1	.041
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.52.

Gender * Perceived Usefulness Q4

Crosstab

			Perceived Usefulness Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	5	35	79	48	20	187
		% within Gender	2.7%	18.7%	42.2%	25.7%	10.7%	100.0%
	Male	Count	3	11	89	32	28	163
		% within Gender	1.8%	6.7%	54.6%	19.6%	17.2%	100.0%
Total		Count	8	46	168	80	48	350
		% within Gender	2.3%	13.1%	48.0%	22.9%	13.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.583[a]	4	.002
Likelihood Ratio	17.178	4	.002
Linear-by-Linear Association	4.108	1	.043
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.73.

Gender * Perceived Usefulness Q5

Crosstab

			Perceived Usefulness Q5					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	13	26	79	47	22	187
		% within Gender	7.0%	13.9%	42.2%	25.1%	11.8%	100.0%
	Male	Count	4	17	78	34	30	163
		% within Gender	2.5%	10.4%	47.9%	20.9%	18.4%	100.0%
Total		Count	17	43	157	81	52	350
		% within Gender	4.9%	12.3%	44.9%	23.1%	14.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.366[a]	4	.079
Likelihood Ratio	8.605	4	.072
Linear-by-Linear Association	3.823	1	.051
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.92.

ACADEMIC LEVEL vs CSE

Academic Level * Computer Self-Efficacy Q1

Crosstab

			Computer Self-Efficacy Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	45	34	35	23	8	145
		% within Academic Level	31.0%	23.4%	24.1%	15.9%	5.5%	100.0%
	Second year	Count	22	22	11	6	2	63
		% within Academic Level	34.9%	34.9%	17.5%	9.5%	3.2%	100.0%
	Third year	Count	52	52	21	9	6	140
		% within Academic Level	37.1%	37.1%	15.0%	6.4%	4.3%	100.0%
	Honours	Count	1	1	0	0	0	2
		% within Academic Level	50.0%	50.0%	0.0%	0.0%	0.0%	100.0%
Total		Count	120	109	67	38	16	350
		% within Academic Level	34.3%	31.1%	19.1%	10.9%	4.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.309[a]	12	.177
Likelihood Ratio	17.102	12	.146
Linear-by-Linear Association	8.200	1	.004
N of Valid Cases	350		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .09.

Academic Level * Computer Self-Efficacy Q2

Crosstab

			Computer Self-Efficacy Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	6	15	30	41	53	145
		% within Academic Level	4.1%	10.3%	20.7%	28.3%	36.6%	100.0%
	Second year	Count	1	1	11	27	23	63
		% within Academic Level	1.6%	1.6%	17.5%	42.9%	36.5%	100.0%
	Third year	Count	1	4	16	54	65	140
		% within Academic Level	0.7%	2.9%	11.4%	38.6%	46.4%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	8	20	57	123	142	350
		% within Academic Level	2.3%	5.7%	16.3%	35.1%	40.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	23.104[a]	12	.027
Likelihood Ratio	24.006	12	.020
Linear-by-Linear Association	14.416	1	.000
N of Valid Cases	350		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .05.

Academic Level * Computer Self-Efficacy Q3

Crosstab

			Computer Self-Efficacy Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	62	53	18	6	6	145
		% within Academic Level	42.8%	36.6%	12.4%	4.1%	4.1%	100.0%
	Second year	Count	29	23	3	5	3	63
		% within Academic Level	46.0%	36.5%	4.8%	7.9%	4.8%	100.0%
	Third year	Count	70	56	7	4	3	140
		% within Academic Level	50.0%	40.0%	5.0%	2.9%	2.1%	100.0%
	Honours	Count	2	0	0	0	0	2
		% within Academic Level	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Total		Count	163	132	28	15	12	350
		% within Academic Level	46.6%	37.7%	8.0%	4.3%	3.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.154[a]	12	.358
Likelihood Ratio	13.539	12	.331
Linear-by-Linear Association	4.518	1	.034
N of Valid Cases	350		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .07.

Academic Level * Computer Self-Efficacy Q4

Crosstab

			Computer Self-Efficacy Q4					
			Strongly Disagree	Disagre e	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	3	3	9	51	79	145
		% within Academic Level	2.1%	2.1%	6.2%	35.2%	54.5%	100.0%
	Second year	Count	3	0	2	22	36	63
		% within Academic Level	4.8%	0.0%	3.2%	34.9%	57.1%	100.0%
	Third year	Count	0	7	3	45	85	140
		% within Academic Level	0.0%	5.0%	2.1%	32.1%	60.7%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	6	10	14	119	201	350
		% within Academic Level	1.7%	2.9%	4.0%	34.0%	57.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.406[a]	12	.276
Likelihood Ratio	17.247	12	.141
Linear-by-Linear Association	1.154	1	.283
N of Valid Cases	350		

a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .03.

Academic Level * Computer Self-Efficacy Q5

Crosstab

			Computer Self-Efficacy Q5					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	52	37	31	12	13	145
		% within Academic Level	35.9%	25.5%	21.4%	8.3%	9.0%	100.0%
	Second year	Count	26	25	6	5	1	63
		% within Academic Level	41.3%	39.7%	9.5%	7.9%	1.6%	100.0%
	Third year	Count	57	51	18	12	2	140
		% within Academic Level	40.7%	36.4%	12.9%	8.6%	1.4%	100.0%
	Honours	Count	1	0	1	0	0	2
		% within Academic Level	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
Total		Count	136	113	56	29	16	350
		% within Academic Level	38.9%	32.3%	16.0%	8.3%	4.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	22.372[a]	12	.034
Likelihood Ratio	23.085	12	.027
Linear-by-Linear Association	6.864	1	.009
N of Valid Cases	350		

a. 6 cells (30.0%) have expected count less than 5. The minimum expected count is .09.

Academic Level * Computer Self-Efficacy Q6

Crosstab

			Computer Self-Efficacy Q6					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	5	10	27	36	67	145
		% within Academic Level	3.4%	6.9%	18.6%	24.8%	46.2%	100.0%
	Second year	Count	1	5	5	24	28	63
		% within Academic Level	1.6%	7.9%	7.9%	38.1%	44.4%	100.0%
	Third year	Count	1	7	13	48	71	140
		% within Academic Level	0.7%	5.0%	9.3%	34.3%	50.7%	100.0%
	Honours	Count	0	0	1	0	1	2
		% within Academic Level	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
Total		Count	7	22	46	108	167	350
		% within Academic Level	2.0%	6.3%	13.1%	30.9%	47.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.291[a]	12	.178
Likelihood Ratio	16.369	12	.175
Linear-by-Linear Association	4.387	1	.036
N of Valid Cases	350		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .04.

Computer self-efficacy vs Did you experience any challenges?

Computer Self-Efficacy Q2 * Did you experience any challenges? Crosstabulation

			Did you experience any challenges?		
			No	Yes	Total
Computer Self-Efficacy Q2	Strongly Disagree	Count	0	8	8
		% within Computer Self-Efficacy Q2	0.0%	100.0%	100.0%
	Disagree	Count	2	18	20
		% within Computer Self-Efficacy Q2	10.0%	90.0%	100.0%
	Neutral	Count	9	48	57
		% within Computer Self-Efficacy Q2	15.8%	84.2%	100.0%
	Agree	Count	20	103	123
		% within Computer Self-Efficacy Q2	16.3%	83.7%	100.0%
	Strongly Agree	Count	31	111	142
		% within Computer Self-Efficacy Q2	21.8%	78.2%	100.0%
Total		Count	62	288	350
		% within Computer Self-Efficacy Q2	17.7%	82.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.513[a]	4	.341
Likelihood Ratio	5.952	4	.203
Linear-by-Linear Association	3.989	1	.046
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.42.

Assessment preference vs Behavioural Intention To Use CBA

Preference: CBA or PBA? * Behavioural Intention To Use Q1

Crosstab

			Behavioural Intention To Use Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Preference: CBA or PBA?	Paper-Based Assessment	Count	25	29	70	35	15	174
		% within Preference: CBA or PBA?	14.4%	16.7%	40.2%	20.1%	8.6%	100.0 %
	Computer-Based Assessment	Count	2	2	34	70	68	176
		% within Preference: CBA or PBA?	1.1%	1.1%	19.3%	39.8%	38.6%	100.0 %
Total		Count	27	31	104	105	83	350
		% within Preference: CBA or PBA?	7.7%	8.9%	29.7%	30.0%	23.7%	100.0 %

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	101.072[a]	4	.000
Likelihood Ratio	112.549	4	.000
Linear-by-Linear Association	94.758	1	.000
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.42.

Preference: CBA or PBA? * Behavioural Intention To Use Q2

Crosstab

			Behavioural Intention To Use Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Preference: CBA or PBA?	Paper-Based Assessment	Count	22	33	65	39	15	174
		% within Preference: CBA or PBA?	12.6%	19.0%	37.4%	22.4%	8.6%	100.0%
	Computer-Based Assessment	Count	1	6	24	72	73	176
		% within Preference: CBA or PBA?	0.6%	3.4%	13.6%	40.9%	41.5%	100.0%
Total		Count	23	39	89	111	88	350
		% within Preference: CBA or PBA?	6.6%	11.1%	25.4%	31.7%	25.1%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	104.784[a]	4	.000
Likelihood Ratio	115.437	4	.000
Linear-by-Linear Association	98.214	1	.000
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.43.

Gender * Computer Self-Efficacy Q1

Crosstab

			Computer Self-Efficacy Q1					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Gender	Female	Count	64	63	36	15	9	187
		% within Gender	34.2%	33.7%	19.3%	8.0%	4.8%	100.0%
		% within Computer Self-Efficacy Q1	53.3%	57.8%	53.7%	39.5%	56.3%	53.4%
		% of Total	18.3%	18.0%	10.3%	4.3%	2.6%	53.4%
	Male	Count	56	46	31	23	7	163
		% within Gender	34.4%	28.2%	19.0%	14.1%	4.3%	100.0%
		% within Computer Self-Efficacy Q1	46.7%	42.2%	46.3%	60.5%	43.8%	46.6%
		% of Total	16.0%	13.1%	8.9%	6.6%	2.0%	46.6%
Total		Count	120	109	67	38	16	350
		% within Gender	34.3%	31.1%	19.1%	10.9%	4.6%	100.0%
		% within Computer Self-Efficacy Q1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	34.3%	31.1%	19.1%	10.9%	4.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.865[a]	4	.425
Likelihood Ratio	3.870	4	.424
Linear-by-Linear Association	.683	1	.409
N of Valid Cases	350		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.45.

Gender * Computer Self-Efficacy Q2

Crosstab

			Computer Self-Efficacy Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	5	8	28	68	78	187
		% within Gender	2.7%	4.3%	15.0%	36.4%	41.7%	100.0%
	Male	Count	3	12	29	55	64	163
		% within Gender	1.8%	7.4%	17.8%	33.7%	39.3%	100.0%
Total		Count	8	20	57	123	142	350
		% within Gender	2.3%	5.7%	16.3%	35.1%	40.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.438[a]	4	.656
Likelihood Ratio	2.440	4	.655
Linear-by-Linear Association	.694	1	.405
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.73.

Gender * Computer Self-Efficacy Q3

Crosstab

			Computer Self-Efficacy Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	90	73	13	5	6	187
		% within Gender	48.1%	39.0%	7.0%	2.7%	3.2%	100.0%
	Male	Count	73	59	15	10	6	163
		% within Gender	44.8%	36.2%	9.2%	6.1%	3.7%	100.0%
Total		Count	163	132	28	15	12	350
		% within Gender	46.6%	37.7%	8.0%	4.3%	3.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.438[a]	4	.487
Likelihood Ratio	3.459	4	.484
Linear-by-Linear Association	1.708	1	.191
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.59.

Gender * Computer Self-Efficacy Q4

Crosstab

			Computer Self-Efficacy Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	3	7	4	66	107	187
		% within Gender	1.6%	3.7%	2.1%	35.3%	57.2%	100.0%
	Male	Count	3	3	10	53	94	163
		% within Gender	1.8%	1.8%	6.1%	32.5%	57.7%	100.0%
Total		Count	6	10	14	119	201	350
		% within Gender	1.7%	2.9%	4.0%	34.0%	57.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.809[a]	4	.307
Likelihood Ratio	4.920	4	.296
Linear-by-Linear Association	.003	1	.960
N of Valid Cases	350		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 2.79.

Gender * Computer Self-Efficacy Q5

Crosstab

			Computer Self-Efficacy Q5					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	75	67	24	11	10	187
		% within Gender	40.1%	35.8%	12.8%	5.9%	5.3%	100.0%
	Male	Count	61	46	32	18	6	163
		% within Gender	37.4%	28.2%	19.6%	11.0%	3.7%	100.0%
Total		Count	136	113	56	29	16	350
		% within Gender	38.9%	32.3%	16.0%	8.3%	4.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.566[a]	4	.109
Likelihood Ratio	7.586	4	.108
Linear-by-Linear Association	1.480	1	.224
N of Valid Cases	350		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.45.

Gender * Computer Self-Efficacy Q6

Crosstab

			Computer Self-Efficacy Q6					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Gender	Female	Count	5	9	22	61	90	187
		% within Gender	2.7%	4.8%	11.8%	32.6%	48.1%	100.0%
	Male	Count	2	13	24	47	77	163
		% within Gender	1.2%	8.0%	14.7%	28.8%	47.2%	100.0%
Total		Count	7	22	46	108	167	350
		% within Gender	2.0%	6.3%	13.1%	30.9%	47.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.297[a]	4	.509
Likelihood Ratio	3.333	4	.504
Linear-by-Linear Association	.291	1	.589
N of Valid Cases	350		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 3.26.

Academic Level * Perceived Ease-of-Use Q1

Crosstab

			Perceived Ease-of-Use Q1					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	3	10	36	53	43	145
		% within Academic Level	2.1%	6.9%	24.8%	36.6%	29.7%	100.0%
	Second year	Count	1	1	17	25	19	63
		% within Academic Level	1.6%	1.6%	27.0%	39.7%	30.2%	100.0%
	Third year	Count	5	11	32	54	38	140
		% within Academic Level	3.6%	7.9%	22.9%	38.6%	27.1%	100.0%
	Honours	Count	0	0	1	0	1	2
		% within Academic Level	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
Total		Count	9	22	86	132	101	350
		% within Academic Level	2.6%	6.3%	24.6%	37.7%	28.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.216[a]	12	.905
Likelihood Ratio	7.870	12	.795
Linear-by-Linear Association	.288	1	.592
N of Valid Cases	350		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .05.

Academic Level * Perceived Ease-of-Use Q2

Crosstab

			Perceived Ease-of-Use Q2					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	4	6	28	56	51	145
		% within Academic Level	2.8%	4.1%	19.3%	38.6%	35.2%	100.0%
	Second year	Count	0	3	5	28	27	63
		% within Academic Level	0.0%	4.8%	7.9%	44.4%	42.9%	100.0%
	Third year	Count	1	3	18	72	46	140
		% within Academic Level	0.7%	2.1%	12.9%	51.4%	32.9%	100.0%
	Honours	Count	0	0	1	0	1	2
		% within Academic Level	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
Total		Count	5	12	52	156	125	350
		% within Academic Level	1.4%	3.4%	14.9%	44.6%	35.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.380[a]	12	.221
Likelihood Ratio	16.603	12	.165
Linear-by-Linear Association	1.804	1	.179
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .03.

Academic Level * Perceived Ease-of-Use Q3

Crosstab

			Perceived Ease-of-Use Q3					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	1	5	15	65	59	145
		% within Academic Level	0.7%	3.4%	10.3%	44.8%	40.7%	100.0%
	Second year	Count	1	0	5	28	29	63
		% within Academic Level	1.6%	0.0%	7.9%	44.4%	46.0%	100.0%
	Third year	Count	2	4	18	69	47	140
		% within Academic Level	1.4%	2.9%	12.9%	49.3%	33.6%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	4	9	38	163	136	350
		% within Academic Level	1.1%	2.6%	10.9%	46.6%	38.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.318[a]	12	.899
Likelihood Ratio	8.225	12	.767
Linear-by-Linear Association	.975	1	.323
N of Valid Cases	350		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .02.

Academic Level * Perceived Ease-of-Use Q4

Crosstab

			Perceived Ease-of-Use Q4					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	6	16	25	45	53	145
		% within Academic Level	4.1%	11.0%	17.2%	31.0%	36.6%	100.0%
	Second year	Count	0	3	14	25	21	63
		% within Academic Level	0.0%	4.8%	22.2%	39.7%	33.3%	100.0%
	Third year	Count	5	21	25	49	40	140
		% within Academic Level	3.6%	15.0%	17.9%	35.0%	28.6%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	11	40	64	120	115	350
		% within Academic Level	3.1%	11.4%	18.3%	34.3%	32.9%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.558[a]	12	.567
Likelihood Ratio	13.634	12	.325
Linear-by-Linear Association	.922	1	.337
N of Valid Cases	350		

a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is .06.

Academic Level * Perceived Ease-of-Use Q5

Crosstab

			Perceived Ease-of-Use Q5					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	0	5	30	64	46	145
		% within Academic Level	0.0%	3.4%	20.7%	44.1%	31.7%	100.0%
	Second year	Count	0	5	6	28	24	63
		% within Academic Level	0.0%	7.9%	9.5%	44.4%	38.1%	100.0%
	Third year	Count	3	7	36	58	36	140
		% within Academic Level	2.1%	5.0%	25.7%	41.4%	25.7%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	3	17	72	151	107	350
		% within Academic Level	0.9%	4.9%	20.6%	43.1%	30.6%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.108[a]	12	.236
Likelihood Ratio	17.225	12	.141
Linear-by-Linear Association	3.177	1	.075
N of Valid Cases	350		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .02.

Academic Level * Perceived Ease-of-Use Q6

Crosstab

			Perceived Ease-of-Use Q6					
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Academic Level	First year	Count	1	6	37	51	50	145
		% within Academic Level	0.7%	4.1%	25.5%	35.2%	34.5%	100.0%
	Second year	Count	0	1	9	27	26	63
		% within Academic Level	0.0%	1.6%	14.3%	42.9%	41.3%	100.0%
	Third year	Count	5	6	31	62	36	140
		% within Academic Level	3.6%	4.3%	22.1%	44.3%	25.7%	100.0%
	Honours	Count	0	0	0	1	1	2
		% within Academic Level	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
Total		Count	6	13	77	141	113	350
		% within Academic Level	1.7%	3.7%	22.0%	40.3%	32.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.321[a]	12	.281
Likelihood Ratio	15.942	12	.194
Linear-by-Linear Association	1.308	1	.253
N of Valid Cases	350		

a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is .03.