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PERCEPTION OF TESTING PRACTICES AND STUDENTS ATTITUDE TOWARDS COMPUTER-ASSISTED ASSESSMENT: THE CASE OF THE UNIVERSITY OF YAOUNDE I.

A Dissertation submitted in partial fulfilment of the requirements for the award of a Masters' Degree in Education (M.Ed.)in Docimology

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June 2022

DECLARATION

I hereby declare that this dissertation is my original work and has never been submitted to any university or institution of higher learning for an academic award

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CERTIFICATION

This is to certify that this work entitled Perception Of Testing Practices And Students Attitude Towards Computer_Assisted Assessment:The Case Of The University Of Yaounde I, was carried out by Bih Neba Dorothy(registration number 15X3374) under the humble supervision of professor Eric LEN kibinkiri from the university of Yaounde 1.

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Date __ / __ / 2024

DEDICATION

To my lovely parents,

Late Mr Neba Noah Ngeh and Mrs Ngum Margaret Neba

AKNOWLEDGEMENTS

I owe a debt of gratitude to my supervisor, Prof. KIBINKIRI Eric LEN for his relentless efforts put in the guidance of this work as it evolved from manuscript through its final completion. He managed all efforts in shaping, correcting and reorienting my ideas for the production of this academic piece. Most importantly, he has made my transition from a graduate student to a researcher much easier.

Special thanks to all the lecturers of the Department of Curriculum and evaluation in the Faculty of Education of the University of Yaoundé I for the knowledge imparted in me in the course of my training.

My heartfelt gratitude goes to my beloved husband CHE Eric FUH who loves me unconditionally and encourages me when I am disheartened. He shares with me the ups and downs of this journey. He smiles and laughs with me whenever there are exciting new results coming out. His encouragement and sacrifices made this process an enjoyment.

My profonde gratitude also goes to my lovely children: Fuh Lemngwankhuh Afanwi, Fuh Che Neba, Ngum Nchaubea, Gharsinwingong Lucy Michelle, Anuyeyere Miracle, Ngum Tracy for their patience and sacrifice all through this season of training. They should find in this piece of work the fruit of their love and endurance.

I sincerely thank my my siblings, Neba Ngwa Akongnwi, Neba Manka, Neba Neh for their immense support. No word of thanks can express my feeling of sacrifice they made to my life.

My deepest gratitude goes to my pastor Mr. Emeka Prosper and the Arena of a Difference Assembly Family who gave me and may the almighty God bless you. Thanks for their endless love, encouragement and support.

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LIST OF ABREVIATIONS

CAA: Computer-Assisted Assessment

CBA: Computer-Based Assessment

DV : Dependent Variable

IV : Independent Variable

DF : Degree of Freedom

ANOVA : analysis of variances

SPSS: Statistical Package for Social Sciences

RH : Research hypothesis

GH : General hypothesis

RH : Hypothèse de recherche

TAM: Technology Acceptance Model

FALSH: Faculty of Arts, Letters, and Social Sciences

ICT: Information and Communication Technology

CBTS: Computer-Based Tests

TRA: Theory of Reasoned Action

TPB: Theory of Planned Behavior

EAS: Electronic Assessment System

COVID-19: Corona Virus Disease 2019

ABSTRACT

This study was designed to find out the extent to which perception of testing practices have an impact on students' attitude towards computer-assisted assessment in higher education institutions. Our purpose was to investigate the factors of perception of testing practices that significantly correlate with students' attitude towards computer-assisted assessment. The following question has guided our investigation: To what extent does students' perception of computer-assisted testing have an impact on their attitude towards acceptance of computer-assisted assessment? The answer to this question is our general hypothesis which declares that perceptions of testing practices significantly have an impact on students' attitude towards computer-assisted assessment. The operationalization of this general hypothesis has generated four research hypotheses:

The collection of data was done through a questionnaire administered to a sample of 360 students randomly selected from the FALSH of the University of Yaoundé I. The data were analysed using descriptive tools, the Pearson correlation coefficient and Stepwise multiple regression. After analysing data using Pearson's correlation coefficient, the results show that there is a positive correlation between perceived usefulness ($r=0.860$; $p< 0.001$), perceived ease of use ($r=0.360$; $p< 0.001$), Facilitating conditions ($r=0.166$; $p< 0.001$), and technology anxiety ($r=0.110$; $p< 0.001$) and students' attitude towards acceptance of computer-assisted assessment.

The results were interpreted using the technology acceptance model (Davis, 1989) which made us to understand that the majority of the students felt less anxious while taking electronic tests, preferred e-tests over paper-and-pencil tests, and thought e-tests were easier than paper-and-pencil tests. Many students, however, reported that they faced problems while taking e-tests which made them hesitant when it came to taking e-tests in all their university courses. The findings of this study led us to make recommendations that the state or education stakeholders should promote the positive usefulness of e-assessment the influence students' attitude towards acceptance of computer-assisted assessment.

The keywords include; perception which is the process of recognizing and interpreting sensory stimuli, testing; which refers to a tool technic ,or method that is intended to measure students knowledge or their ability to complete a particular task, attitude; is relatively enduring organization of beliefs feelings and behavioural tendencies towards socially significant objects, groups, events or symbols, computer_assisted assessment; is any assessment activity which involve the use of computers.

RESUME

Cette étude a été conçue pour déterminer dans quelle mesure la perception des pratiques de test a un impact sur l'attitude des étudiants envers l'évaluation assistée par ordinateur dans les établissements d'enseignement supérieur. Notre objectif était d'étudier les facteurs de la perception des pratiques de test qui ont une corrélation significative avec l'attitude des étudiants envers l'évaluation assistée par ordinateur. La question suivante a guidé notre enquête : Dans quelle mesure la perception des étudiants des tests assistés par ordinateur a-t-elle un impact sur leur attitude envers l'acceptation de l'évaluation assistée par ordinateur ? La réponse à cette question est notre hypothèse générale qui déclare que les perceptions des pratiques de test ont un impact significatif sur l'attitude des étudiants envers l'évaluation assistée par ordinateur. L'opérationnalisation de cette hypothèse générale a généré quatre hypothèses de recherche :

La collecte des données s'est faite par le biais d'un questionnaire administré à un échantillon de 360 étudiants choisis au hasard dans la FALSH de l'Université de Yaoundé I. Les données ont été analysées à l'aide d'outils descriptifs, du coefficient de corrélation de Pearson et de la régression multiple Stepwise. Après analyse des données à l'aide du coefficient de corrélation de Pearson, les résultats montrent qu'il existe une corrélation positive entre l'utilité perçue ($r=0.860$; $p< 0.001$), la facilité d'utilisation perçue ($r=0.360$; $p< 0.001$), les conditions facilitantes ($r=0.166$; $p< 0.001$), et l'anxiété technologique ($r=0.110$; $p< 0.001$) et l'attitude des étudiants envers l'acceptation de l'évaluation assistée par ordinateur.

Les résultats ont été interprétés à l'aide du modèle d'acceptation de la technologie (Davis, 1989) qui nous a permis de comprendre que la majorité des étudiants se sentaient moins anxieux lorsqu'ils passaient des tests électroniques, préféraient les tests électroniques aux tests papier-crayon et pensaient que les tests électroniques étaient plus faciles que les tests papier-crayon. Cependant, de nombreux étudiants ont déclaré avoir rencontré des problèmes lors de la passation des tests électroniques, ce qui les a fait hésiter lorsqu'il s'est agi de passer des tests électroniques dans tous leurs cours universitaires. Les résultats de cette étude nous ont conduit à formuler des recommandations selon lesquelles l'État ou les acteurs de l'éducation devraient promouvoir l'utilité positive de l'évaluation électronique afin d'influencer l'attitude des étudiants en vue de l'acceptation de l'évaluation assistée par ordinateur.

GENERAL INTRODUCTION

Assessment is of central importance in education, and yet there is a lack of commonality in the definition of the terminology relating to it. Development of both theoretical and practical applications will suffer unless there is coherence and agreement in the definition of the terms. Assessment for learning or formative assessment is increasingly being emphasized, yet its relationship to summative assessment has been little explored.

Since Scriven, there have been developments, both theoretical and practical in the area of assessment. However, the tenets which describe the basis of assessment remain essentially the same. Universities face an enormous challenge in terms of achieving effectiveness and at the same time acceptance of offered courses and activities by their students (Farzin & Mohamed Dahlan, 2016). Currently, universities look into information technology to resolve problems of security, cost and quality (Park, 2009). Introducing new technology has raised the need for the higher education sector to alter the learning methods and using e-learning as a primary tool to that end (Park, 2009). By simply preparing virtual classrooms and offering credible electronic activities to duplicate the traditional learning experience and, as a result, to satisfy student's demands may result to unforeseen failures (Tan, 2013).

The search for adequate and appropriate methods of conducting tests in schools has continued to pose challenges to stakeholders of the education sector. Conducting examinations in tertiary institutions of learning in the country has always been a major course for worry as the process is characterized with examination malpractices, poor time management by the examiners, inadequate invigilators, poor condition of examination venues, bias in marking examination scripts by the lecturers, delay in the release of results, problem of managing large number of students, among others. It is often observed that there are delays in the marking of students' scripts and submission of such results for processing. Cases of missing results are common in the tertiary institutions due to the method of assessment. These problems most times retard the students from graduating at the stipulated time thereby leading to educational wastages.

Student evaluation is the most important tool of ascertaining the achievement of the desired educational objectives. Assessment has been and remains a controversial issue in education. However, it is a fast-moving area in policy terms and receives much media attention (Pollard, 2003). Research indicates that the ways in which learners are assessed and evaluated powerfully affect the

ways they study and learn (Darge, 2001; Gullickson, 2000). And previous findings revealed that students' perceptions and attitudes about assessment significantly influence their approaches to learn and studying. Conversely, students' approaches to study influences the ways in which they perceive evaluation and assessment practices. And also, findings indicated that students' beliefs and attitudes influence their motivation to lean, their expectation, and their preferences of the kind of learning strategies they favor (Dunkin and Barnes, 1986; Vandeyar & Killen, 2004; Keller, 2001).

The main objective of this research is to study the influence of perception of testing practices on students' attitude towards computer-assisted assessment in higher education institutions. In order words, this work has as aim to present some ways through which students' perception can contribute in the attitude towards computer-assisted assessment in higher education institutions. To achieve this, we used the technology acceptance model (Davis, 1989). Based on previous empirical research, we generated a main research hypothesis and four research hypotheses. The general research hypothesis was formulated as follow: perceptions of testing practices significantly have an impact on students' attitude towards computer-assisted assessment in higher institutions. This study is divided into five chapters.

Chapter one presents the research problem, the research objectives, questions and hypotheses. It also includes the significance of research, delimitation of study and the definition of key concepts. Chapter two deals with the review of literature related to the problem under investigation and elaborate on the theoretical framework we used in this study. Chapter three is concerned with the methodology used in the research work. It presents the research design, population and sample of study, sampling techniques, instruments and data collection plan, data analysis method and a recapitulative table including variable and indicators of study. In chapter four we organize the data and presents our results and describes them. Chapter five deals interpretation of results and discussion of findings.

CHAPTER ONE
PROBLEM OF THE STUDY

INTRODUCTION

In today's era of digitalization, the term information and communication technology (ICT) has expanded to encompass many aspects of computing technology and is more recognizable than ever before. During the past few decades, there have been a phenomenal growth in communication technology, computer network and information technology. Development of new broadband communication services and convergence of telecommunication with computers have created numerous possibilities to use a variety of new technology tools for teaching and learning system. The integration of computers and communications offers unprecedented opportunities to the education systems with its capacity to integrate, enhance and interact with each other over a wide geographic distance in a meaningful way to achieve the learning objectives. This study looks at the impact of students' perceptions of computer assisted testing on the acceptance of summative e-assessment in higher institutions of learning. This chapter aims at examining the background of the study, the statement of the research problem and his significance.

1.1. BACKGROUND TO THE STUDY

Education is a keystone to the development and social stability of a nation as it helps to develop crucial humanitarian values like equity, tolerance, and peace. These values lead to sustainable national development, environmental protection, and improved family health along with responsible participation in democratic, social, and political processes (Durodola & Olude, 2005). However, in order to achieve these goals, it depends on what is learned: knowledge, skills, values and attitude at different educational institutions and how well these are learned i.e., level of competence attained by students. Moreover, learners may not benefit much from a system of education unless there are assessments aimed at determining students' performance (Race et al., 2005; Pollard, 2003).

The system of evaluation is an integral part of the education system (Pollard, 2003). It is a broad term defined in different ways, has many forms, serves diverse purposes and involves a range of stakeholders who may hold quite different positions, expectations, and perspectives. According to Pollard (2003), assessment has the benefits of improving students learning; identifying institutional,

course, or assignment challenges; improving instruction by identifying what instructional adjustments might be needed; ensuring grading is reflective of students learning towards course objectives; and makes grading more systematic and objective.

The assessment of students' learning is not well understood and, in most disciplines, an under researched aspect of higher education (Fry et al., 2004). However, it indicated that investigating student assessment practices in higher education has various importance. First; assessment is an integral component of the teaching and learning system. It may be used to explicitly guide students in their study. But also, student perceptions of what is rewarded and what is ignored by more formal examination procedures will have a substantial importance upon their learning behavior and thus upon the outcomes of a course.

Second, for a variety of reasons, assessment needs to be accurate and if it is not itself examined, then we can't know how accurate it is. It needs to be accurate because it is pointless and unfair to students if it is otherwise. And also, assessment needs to be accurate for internal and external quality purposes; and needs it to be accurate to defend the increasingly likely legal challenges from disaffected students who feel they have been unfairly judged, classified or even excluded.

On the other hand, studies (Fry et al., 2004) proved that when student evaluations are not solid, educational programs suffer. Poor student evaluations victimize and harm students. When questionable evaluation practices are employed, the negative consequences are likely to draw attention. Hence, in addressing the effects of poorly conducted evaluation activities, educators need to be certain that they are conducting appropriate evaluations for each student and that their results given to the students and others are accurate. And if evaluations used by classroom teachers are conducted by outsiders, the teachers need to be good consumers and judges of these evaluators (Shepard, 1989).

In schools, test is used to measure what learners have learnt at the end of a unit. It is used to promote students, to ensure they have met the required standards on their way towards being certified for completing school or program of study, to enter certain occupations, or as a method for selecting students for entry into tertiary institutions. Test has to do with merit and worth of the data as applied to a specific use or context. Teachers and administrators need analysis skills to effectively interpret and make value judgments about tests' results.

Tests and testing practices are often based on provision of good quality tests to test takers in a cost-effective manner, with the help of test sponsor, test developer, and test administrator (Barbara,2013). Alabi, Issa and Oyekunle (2012) identified the paper-based test with many problems such as: tedious processes as the examination was conducted at various and distant centres simultaneously and marked manually; high risks of accidents during travels by both the staff involved and the prospective students for the paper examination; cost of conduct of the examination on the part of the examination bodies including honorarium for invigilators, coordinators, markers, collators and other allied staff; subjective scoring and plausible manipulation of results; late release of results and missing grades; bank draft method of payment by candidates riddled by fraud, loss of money, stress and trauma. The problems of paper-based test also involved heavy resources in terms of manpower and funding (Abubakar & Adebayo,2014). Davey (2011) concluded that a wide variety of options is now available for conducting test out of which technology is one of the most important. Zhang, Powers, Wright and Morgan (2003) asserted that technology is useful for constructing responses on screen, allows marking quality to be monitored in real time and potentially eliminating the need to gather examiners together.

In recent time, technology offers many new opportunities for innovation in educational assessment through potentially and powerful scoring, reporting and real-time feedback mechanisms. Universities have implemented numerous attempts and efforts to integrate information and communication technologies (ICT) into administration and instruction process by the creation of the management information system (MIS) unit (Mejabi & Raji, 2010). It is on this note that universities integrate part of information and technology for the purpose of testing the students. Therefore, computer and internet technologies have been useful for many purposes such as tracking and recording students' information, administration of personnel and accounting, and delivering course contents, announcements and assignments (Bennett, 2009). More so, computer and related technologies provide powerful tools to meet the new challenges of designing and implementing assessments methods that go beyond the conventional practices and facilitate to record a broader repertoire of cognitive skills and knowledge (Olumorin, Fakomogbon, Fasasi, Olawale, Olafare, 2013).

While traditional exams, using paper and pens, result in a heavy burden for learners and instructors, computer-assisted exams provide solutions for such issues (Sarrayrih & Ilyas, 2013). Instructors can

save time in grading and mark compilation, resulting in lower administrative costs, while students can receive immediate and detailed feedback, take their exams at a time and in a place that works best for them (Angus & Watson, 2009), and access self-assessment opportunities (Sorensen, 2013). However, computer-assisted exams present several challenges, including increased work in the preparation stage, the possibility of technical failures, security issues, and dealing with cheating (Alsadoon, 2017). The extra work refers to the additional time needed to create question banks for online exams. However, the reusability of questions in different exams turns this drawback into an advantage. As for the other challenges, researchers have been working for several years to find appropriate solutions.

As computer-assisted exams become an important assessment method, it is essential to analyze learners' perceptions (Dermo, 2009). This is especially true in developing countries like Cameroon where universities have only recently initiated the use of computer-assisted summative exams with large numbers of students. While some developed countries have had more experience and success related to the implementation of computer-assisted exams, learners in developing countries face many challenges due to limited access to ICT, lack of experience in online education or having a lower computer literacy level. Therefore, it is necessary to measure the readiness of such learners to accept electronic methods in the assessment of knowledge. In addition, the investigation of learners' perceptions could reveal factors that would make electronic examinations more accurate and effective.

CBT in the conduct of assessment has other disadvantages which are expense in buying a computer; technical issues during examinations; too dependent on computers for test; cuts cost of paper and administration (Pinner, 2011). Also, human error can never be completely accounted for when using computers for test. The use of computer-based tests (CBTs) has increased significantly over the last few years. The face of examinations in Cameroun is gradually getting a new look due to the introduction of the computer-based test (CBT) system. CBT system is relatively new in Cameroon and it has been used by a number of Cameroonian universities to conduct their summative examination. It all started with the University of Yaoundé I and ICT university some years ago and was reinforced in the year 2020 with the outburst of COVID-19 global pandemic. The use of computer for test administration in university education is to change the state of test administration but the integration has not yet been fully utilized in Cameroonian universities.

Although there have been studies that investigated learners' perceptions of electronic assessment, there has not yet been such a study investigating the perceptions of learners and their attitude towards e-assessment in emerging countries like Cameroon. Most past studies on Computer-Based Test in universities have considered attitudes toward computer-based test and effectiveness of Computer-Based Test on students' academic performance but did not measure other constructs such as usefulness, ease of use and fairness of the CBT. However, only few researchers had determined User's perceptions of CBT but did not create valuable insights into the students' perceptions of CBT as related to their attitude towards E-assessment. This study therefore created valuable insights into perception and satisfaction of students on the computer-based test in Cameroonian University.

1.2. STATEMENT OF THE PROBLEM

In light of the contemporary world, we have witnessed a scientific and technical revolution, which has led to the e-learning expansion circle through global interactive educational platforms and channels. In addition, Distance learning was developed for teaching students synchronously or asynchronously at any time regardless of their different geographical locations. After the emergence of the Corona pandemic (COVID-19) in the world, the interest in remote learning has increased dramatically. The need for finding new valid electronic evaluation methods and ways to verify these types of education quality as well as its educational outcomes have expanded. Thus, the efficiency and effectiveness of the interactive educational program have been implemented in numerous courses.

With the beginning of the twenty-first century, interest in computerizing education and employing technology in various aspects of the educational, administrative, and teaching process, in addition to the communication processes concerned with educational institutions has increased. Despite all this interest in developing the educational process, evaluations and tests did not receive much attention and the problem remained. The biggest challenge for modern education is that the evaluation tools with which we try to measure students' skills today are the same as yesterday's tools. From this point, it was necessary to increase interest in the field of evaluating the educational process and developing it to keep pace with the requirements of our time by adapting to its changes that led to the electronic evaluation emergence (Hellystia, 2019).

Universities face an enormous challenge in terms of achieving effectiveness and at the same time acceptance of offered courses and activities by their students (Farzin & Mohamed Dahlan, 2016).

Currently, universities look into information technology to resolve problems of security, cost and quality (Park, 2009). Introducing new technology has raised the need for the higher education sector to alter the learning methods and using e-learning as a primary tool to that end (Park, 2009). By simply preparing virtual classrooms and offering credible electronic activities to duplicate the traditional learning experience and, as a result, to satisfy student's demands may result to unforeseen failures (Tan, 2013).

The search for adequate and appropriate methods of conducting tests in schools has continued to pose challenges to stakeholders of the education sector. Conducting examinations in tertiary institutions of learning in the country has always been a major course for worry as the process is characterized with examination malpractices, poor time management by the examiners, inadequate invigilators, poor condition of examination venues, bias in marking examination scripts by the lecturers, delay in the release of results, problem of managing large number of students, among others. It is often observed that there are delays in the marking of students' scripts and submission of such results for processing. Cases of missing results are common in the tertiary institutions due to the method of assessment. These problems most times retard the students from graduating at the stipulated time thereby leading to educational wastages.

Student evaluation is the most important tool of ascertaining the achievement of the desired educational objectives. Assessment has been and remains a controversial issue in education. However, it is a fast-moving area in policy terms and receives much media attention (Pollard, 2003). Research indicates that the ways in which learners are assessed and evaluated powerfully affect the ways they study and learn (Darge, 2001; Gullickson, 2000). And previous findings revealed that students' perceptions and attitudes about assessment significantly influence their approaches to learn and studying. Conversely, students' approaches to study influences the ways in which they perceive evaluation and assessment practices. And also, findings indicated that students' beliefs and attitudes influence their motivation to lean, their expectation, and their preferences of the kind of learning strategies they favor (Dunkin & Barnes, 1986; Vandeyar & Killen, 2004; Keller, 2001).

Even though there has been work done on assessment by government, educators and researchers, it appears that students' attitudes on the educational assessment practices in the Cameroonian HEIs have not been adequately investigated (Daniel, 2004; Girma, 2001; Abiyot, 2001; Shimeles, 2001). Yet, empirical studies in the areas of educational assessment practices of higher education showed

that practices are not effective. In addition, formal and informal observations show that very little conscious efforts have been made to consider quality student assessment methods in HEIs. Besides, assessment as I have noted is often traditional and narrow in form. So, investigating one's attitude is very essential to obtain how the students feel, perceive, and behave about the computer-based assessment practices.

1.3. OBJECTIVES OF THE STUDY

This study has a main objective as well as specific objectives to guide the focus of our investigation.

1.3.1. Main objective

The main purpose of this study is to examine perception of students on the computer-based test in the University of Yaoundé I and to examine ways in which this practice affects the attitude of student towards electronic assessment.

1.3.2. Specific objective

The operationalization of this main objective has yielded the following specific objectives:

- To examine how students' perceived usefulness of computer-based testing and how it affects their attitude towards the acceptance of electronic assessment at the university of Yaoundé I.
- To examine how students' perceived ease of use of computer-based testing and how it affects their attitude towards the acceptance of electronic assessment at the university of Yaoundé I.
- To examine how the facilitating conditions of computer-based testing affect their attitude towards the acceptance of electronic assessment at the university of Yaoundé I
- To examine how computer/technology anxiety affect their attitude towards the acceptance of electronic assessment at the university of Yaoundé I.

1.4. RESEARCH QUESTIONS

In order to guide the step of our research focus, the following research questions (main question and specific questions) was formulated.

1.4.1. Main research question

Our main research question is as follow: To what extent does student's perception of computer-assisted testing have on their attitude towards acceptance of e-assessment in the university of Yaoundé I.

1.4.2. Specific research questions

Our main research question was operationalized into the four following specific research questions:

- How students perceived usefulness of computer-based testing significantly affect their attitude towards the acceptance of electronic assessment at the university of Yaoundé I?

How students' perceived ease of use of computer-based testing significantly affect their attitude towards the acceptance of electronic assessment at the university of Yaoundé I?

- How the facilitating conditions of computer-based testing significantly affect their attitude towards the acceptance of electronic assessment at the university of Yaoundé I?
- How computer/technology anxiety significantly affect their attitude towards the acceptance of electronic assessment at the university of Yaoundé I?

1.5. JUSTIFICATION OF THE STUDY

Several factors underline the decision to study this topic. First, Parent contribution in the development of their children is especially important now (Epoch of globalisation), as the job market is more demanding in terms of productive skills. Parents can make a difference in a child's education. The conflict can come on how to create that contribution and whether parents feel the activities are worthwhile. Secondly, the study will also be important to parents who wish to make a positive and responsible contribution in the development of their teenagers. By raising awareness that aside the fact of their youngsters benefiting from their social capital in future, they can also contribute and encourage them to tap from their human capital as they grow. Thus, it might go a long way to help parents give attention and maximum support to the development of occupational life skills in children. They will also learn that it is advantageous to blend formal learning in school with non-formal learning/vocational education at home and during holidays.

It is believed that assessment when handled carefully would be a powerful catalyst for learning. It is also an essential ingredient to strong educational programs. It is probably the most common and

pervasive aspect of student instruction. It is the primary tool for guiding student development crossing all academic disciplines. Certainly, it occurs in classrooms and regularly confronts students and evaluators in a wide variety of decision situations that affect their educational development. Taking this into consideration, this study will be significant in showing the clear pictures of assessment practices at University Yaoundé I and would also serve as a starting point into the study of educational assessment of higher education institutions. It is also believed that the study will be important to fill a gap in knowledge about how higher education has been implementing assessments of their students. Furthermore, students, teachers, and concerned bodies will be beneficiaries of the study. And the information gained from the study will have the potential to result in improvements to teaching and learning in the aforementioned university in particular and in other HEIs in general. With improvements to teaching and learning come many things including greater understanding, better relationships, greater levels of satisfaction and enjoyment on the part of staff and students. Finally, it is also believed that this research will be critical to policy and staff development endeavors in the field of assessment as it will identify the beliefs, attitudes, and practices of student assessment and provide solid guidelines for improvements.

1.6. SCOPE AND LIMITATIONS OF THE STUDY

The study is restricted to perception of students on the computer-based test in the University of Yaoundé I.

1.6.1. Scope of the Study

In order to have more comprehensive information, it would have been good to take universities from all parts of the country and all stakeholders' views about the case. However, to make the study more manageable and to complete the study with in the specified time and available resources it is confined to one public university students' experiences to assessment practices. Moreover, in order to get more reliable information first year students were not the subject of the study because it is believed that these students have not much assessment experience and they will not be reliable respondents. Finally, to form a broad understanding of the practice, the study was made to focus on five factors of student assessment subscale: Department allocation, assessment tasks, exams, feedback, and grading practices.

1.6.2. Limitations of the Study

Although every effort was made to minimize the threats to the internal validity, this research includes a number of limitations. First, the study lacks previous research findings on the issues investigated for detailed comparisons. Lastly, threats to the external validity includes the limited geographic diversity of the student population (i.e., all participants lived in one institute), and the limited range of participants, though, this study included 360 participants. And the results of this investigation can't go beyond second- and third-year students learning in the University of Yaoundé I.

1.7. SIGNIFICANCE OF THE STUDY

1.7.1. Theoretical significance

The study will have a profound effect on universities, instructional designers, school administrators, curriculum developers, professional associations, students and lecturers on the areas of student's perception and view towards information and communication technology in education. The findings from this study would create awareness for the management of Cameroonian University to know student's perception on the use of computer-based test and improves on its present status. The findings of this study will trace out the point of concern are students" attitude about convenience and control, validity and general anxiety about computer itself, and more over about their level of experience in using of computer. The findings of this study will also provide information about the advantage of using computer technology for educational assessment in a worldwide sense have been recognized which among the time saving, less demand upon lecturers and lower administrative cost.

1.7.2. Pedagogic significance

This study will be relevant to stakeholders in the pedagogic sector such as teachers of science of education, counselors, social workers and parents in that it can orientate the formulation of best practices regarding parenting roles and the development of life skills among adolescent students. Policy makers can also find the findings of this study relevant in informing their decision-making practices related to parenting involvement and the development of life skills among adolescent students.

1.8. DEFINITION OF KEY TERMS

Perception: -is the process of recognizing and interpreting sensory stimuli

Testing: Simply put, a test refers to a tool, technique, or method that is intended to measure students' knowledge or their ability to complete a particular task. In this sense, testing can be considered as a form of assessment. Tests should meet some basic requirements, such as validity and reliability. Validity refers to the extent to which a test measures what it is supposed to measure. Reliability refers to the consistency of test scores when administered on different occasions.

Attitude: An attitude is "a relatively enduring organization of beliefs, feelings, and behavioral tendencies towards socially significant objects, groups, events or symbols" (Hogg & Vaughan 2005, p. 150). Also, it is "...a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1).

Computer-assisted assessment: Assessment is a broad term defined in different ways, has many forms, serves diverse purposes and involves a range of stakeholders. In connection to this, Anderson (2003) viewed assessment as a process of gathering information to make informed decisions. And Derbessa (2004) expressed assessment as a process of investigating the status of an individual or group usually with reference to expected outcomes. Furthermore, Dessalegn (2004) stated that assessment is a way of observing, collecting information and making decisions based on information gathered. Similarly, Nitko (1996) defined assessment as the process of collecting and interpreting information that can be used to inform students and their parents where applicable about the process, they are making toward attaining the knowledge, attitudes, and behaviors to be learned or acquired; and to inform various personnel who make educational decisions: instructional, diagnostic, placement, promotion, graduation, curriculum planning, program development, and policy about students. As to Erwin (1991), assessment means a systematic basis for making inferences about the learning and development of students. And is the process of defining, selecting, designing, collecting, analyzing, interpreting and using information to increase students' learning and development. Due to the dominant impact of technology, the assessment process is gradually shifting from the traditional pen and paper method to computer based or e-assessment (Dube, Zhao, and Ma, 2009). E-assessment, online assessment, computer assisted or aided assessment; computerized assessment or computer-based assessment is any assessment activity which involves the use of computers (Bull, 1999; Chalmers, McAusland, 2002; Elliot, 2003).

CHAPTER TWO
REVIEW OF LITERATURE

INTRODUCTION

This chapter aims at reviewing related literature on the phenomenon under study or investigation. It shall describe the body of knowledge surrounding the research topic as well as the theories that supports the research idea. This chapter is divided into three major sub-headings namely: the elaboration of the conceptual framework; theoretical framework and the review of literatures on students' perception of computer assisted testing factors as related to their attitude towards summative e-assessment.

2.1. CONCEPTUAL REVIEW

For this work to be unambiguous, it will be important to conceptualize some key words that will precise the practical and theoretical limit of our works. They are: Students' perception of computer-assisted testing, attitude towards e-assessment and e-assessment.

2.1.1. The concept of Assessment

2.1.1.1. 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.

2.1.1.2. 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.

2.1.2. Type 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).

2.1.2.1. 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 ICT University, for instance, 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.

2.1.2.2. 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 influence 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 ICT University, 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.

2.1.2.3. 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).

2.1.3. Modes of assessment

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

2.1.3.1. 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).

2.1.3.2. 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 (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.

2.1.4. Concepts of 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 (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).

2.1.4.1. Categories of computer-based assessment

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).

2.1.4.2. Types of computer-based assessment

Computer-based assessment 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.

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.

2.1.4.3. Question types in computer-based assessment

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).

2.1.5. Advantages of computer-based assessment

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

2.1.5.1. 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).

2.1.5.2. 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; 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).

2.1.5.3. Reduction of cheating

The use of CBA reduces the chances of cheating among students (Bodmann & Robinson, 2004; Pino-Silva, 2008). 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., 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 (Busko, 2009; Bridgeman, 2009).

2.1.5.4. 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; Busko, 2009; Bridgeman, 2009).

The University of Yaoundé I 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) are presented on the screen. This helps the proctors around to easily ascertain the appropriate and correct examinee when the assessment is in progress.

2.1.5.5. 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.

2.1.5.6. 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).

2.1.5.7. 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.

2.1.5.8. 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).

2.1.5.9. 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 (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 (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 (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 (Lee & Kasloff, 2009).

One example of a CBA tool used for formative assessment is the Diagnoser. 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. 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).

2.1.6. Computer-Based Assessment 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.

2.1.6.1. 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; Lee, 2009; Blazer, 2010). Due to the costs involved, academic institutions argue that, "the creation, validation and standardization of any test in computer form is more expensive to develop than an equivalent test in conventional form" (Singleton, 2001, p. 13).

2.1.6.2. 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).

2.1.6.3. 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).

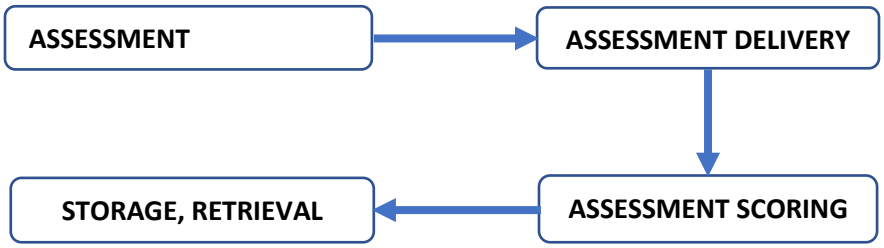
2.1.6.4. Security

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).

2.1.7. Components of a Computer-Based Assessment 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 (Figure 2.1).



2.1.7.1. Assessment generation

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

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.

2.1.7.2. 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 computerized delivery of assessments makes it possible for teachers and subject coordinators to conduct assessments for students irrespective of the students' locations (PTC, 2002).

2.1.7.3. 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).

2.1.7.4. 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).

2.1.8. Studies on students' perceptions of computer-based assessment

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 selfefficacy of students, the facilitating conditions and the time taken to complete a CBA.

2.1.8.1. Perceived ease-of-use of computer-based assessment

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 Nikou and Economides (2013) 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), Nikou and Economides (2013) 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.

In addition, 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.

2.1.8.2. Perceived usefulness of computer-based assessment

Students agreed that the use of CBA as a mode of assessment has helped to improve their assessment performance and results (Ferrao, 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).

2.1.8.3. 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 (Maqableh & Mohammed, 2015). Since students' perceived ease-of-use of CBA influences their intention to take CBA (Yurdabakan & Uzunkavak, 2012), 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; Deutsch et al., 2012). This knowledge may make female students believe that the administration of CBA is in favour of male students (Alki, 2010).

2.1.8.4. Facilitating conditions

Facilitating conditions refer to those conditions and resources, that are available, to enhance the undertaking of a CBA (Bueno & Salmeron, 2008). 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 (Bueno & Salmeron, 2008). 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.

2.1.8.5. Other factors influencing students' perception of computer-based assessment

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

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 (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 (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 (Csapo 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 Csapo 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.

2.1.9. Students' attitude towards electronic assessment (E-Assessment)

Scanlon (2003) conducted his study to investigate the students' attitudes towards electronic assessment, focusing on the feedback. The sample of the study consisted of (40) students from the University of Birjand. The results proved that students' attitudes were very contradicting in the instant feedback features of electronic tests. Students' perceptions about instant feedback were conflicting because some felt immediate feedback is stressful, while others considered it pleasing. Therefore, teachers should personalize e-test feedback according to students' preferences.

According to Peytcheva-Forsyth, Yovkova, & Aleksieva (2018) believe the attitudes of students toward online learning and distance education has a major role in developing and implementing pedagogically effective online curricula. This would also assist the process of accrediting more distance education courses at Sofia University (Bulgaria). The paper studied the attitudes of (590) undergraduate students of Sofia University towards online learning and distance education. The main purpose of the study is to find out the influence and dependencies of different factors on these students. The results indicated a positive attitude towards online courses as well as the demographic factors that affect students.

Vasilevska, Rivza & Bogdan (2017) conducted a study to assess the readiness for distance learning in European Universities, the aim was to discuss the most important challenges facing e-learning, especially electronic assessment and its relationship to students' readiness in terms of knowledge, skills, and abilities to deal with Technology. This study was conducted in several European countries (Latvia, Lithuania, Serbia, Poland, Belarus, and Romania). Two groups were taken, a group studying through e-learning and the second group in the traditional way. The study tool was distributed to them to decide the readiness of each of them for distance education, and the study concluded that not all students are equally ready when it comes to e-learning, and there are no approved standards developed to evaluate students.

Gaining knowledge in a global environment is becoming a widespread trend due to the ease of access and variety of online content encourage students to get involved in learning from digital resources (Jović, Stankovic & Neskovic, 2017). Their study attempted to determine which factors affect students' attitudes towards e-learning. The questionnaire was given to (286) students. The results revealed that three factors were very important: e-learning usefulness, ease of use, and

content design. All these factors in addition to regression had a significant influence on attitude towards e-learning. The online courses had a strong impact on students' e-learning intention.

As for the study of Al-Omari & Eyadat (2016), it aimed to reveal the perceptions of faculty members and students about the use of computerized tests in education at Yarmouk University. The study sample consisted of (120) faculty members, and of (380) students at Yarmouk University in Jordan, who were selected by random stratification. The study concluded that the perceptions of the faculty members and students were of a moderate degree. The results also indicated that there were statistically significant differences between the responses of faculty members and students due to the status variable in favour of students, and to the faculty variable in favour of humanitarian faculties.

Mulvaney (2011) investigated in his study the effect of computerized tests on learning and retention of information by middle school students. Also, the study sought to know the extent of their accuracy in measuring student learning. The questionnaire was used to collect data from faculty members, and students of the sixth, seventh, and eighth grades in middle schools in rural areas in the American Midwest. The results of the study concluded that the opinion of teachers and students in those schools was highly positive about the concept of using computerized tests, that there is an ease in students' access to the computer, ease in dealing with computerized testing. Moreover, it saves the teacher's time and effort, and that the learners became more familiar while using this type of test with a positive attitude. Surprisingly, students expected to score higher on this type of test.

In the same vein, Stowell & Bennett (2010) illustrated the effect of electronic tests on reducing the level of test anxiety, which reflected positively on achievement. This study was applied to (69) university students who took two tests: paper and electronic tests. The results showed that students who suffered from test anxiety during traditional tests, their anxiety rate decreased significantly when they underwent the electronic test. On the other hand, it was noticed that an increase in test anxiety among students who do not suffer from anxiety in traditional tests. The relationship between test anxiety and performance in traditional test is weaker than in electronic tests.

Altmann (2008) analyzed the concept of attitudes of nurses toward advancing formal education. The findings showed that the term 'attitude' was either not defined or vaguely defined. The cognitive, affective, and behavioural components are the vital attributes of an "attitude"; it is bipolar, and it is a response to a stimulus. These attributes interrelate to all aspects of intellect and behaviour. Thus, it is a controversial concept.

Foder (2003) conducted a study aimed at developing a measure of attitudes towards online assessment. The sample of the study consisted of (231) faculty members at the University of Ankara in Turkey, an exploratory and confirmatory factor analysis was used to verify the validity of the scale construction. The results indicated that the scale consists of (3) factors with (26) items, and the loading of the factors ranged between (0.45) and (0.78), and the values of the items correlations coefficients ranged from (0.20) to (0.76), while the values of stability coefficients ranged from (0.62) to (0.91). The outcomes of the exploratory factor analysis were also done by extracting the confirmatory factor analysis, and the results showed that the measure of attitudes towards online tests was valid and reliable.

Previous studies dealt with various variables related to the subject of e-learning, such as students' readiness to deal with it and evaluation criteria of the electronic test performance similar to the study of (Vasilevska, Rivza & Bogdan, 2017).

Some studies indicated the positive effect of electronic tests in reducing the level of test anxiety among students and its impact on achievement, such as the study of Stowell & Bennett (2010). Some of them also dealt with the positive effect of electronic tests in improving students' ability to retain information and its contribution to their learning, such as (Mulvaney, 2011).

Earlier studies were related to identifying aspects of the theoretical framework and examined different variables. The current study differs from other studies in that it dealt with verifying the psychometric properties of the scale for assessing the quality of electronic tests presented to students, and identifying the strengths and weaknesses in them from the students' point of view, as this was not discussed in previous studies, according to the researchers' knowledge.

2.2. THEORETICAL REVIEW – TECHNOLOGY ACCEPTANCE MODEL (TAM)

Theories are formulated to explain, predict and understand phenomena and in many cases to

challenge and extend existing knowledge within the limits of critical bounding assumptions. (Swanson & Chermack, 2013). A theory is a proposition or set of propositions offered as a conjectured explanation for an observed phenomenon or event, (Colman, 2003). Theoretical perspectives provide the basis for this study and inspire researchers to go further in the social sciences. This section delineates one major theory related to the acceptance of technology. Many researchers and practitioners have attempted to explain and introduce theoretical perspectives for

user's acceptance and adoption of ICT (Information Communication Technology). Among the examples are: the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), Theory of Planned Behaviour (TPB) (Ajzen, 1985), and Technology Acceptance Model (TAM) (Davis, 1985). All these theories focus on individual behaviour, because a user's acceptance is affected by particular factors which influence individual behaviour.

2.2.1. Theory of Reasoned Action (TRA)

Fishbein introduced Theory of Reasoned Action (TRA), which is based on the behavioural intention of the individual (Fishbein & Ajzen, 1975). This model aims to clarify why an individual chooses to perform or not perform particular behaviour (Ejaz, 2014). According to TRA, individual behavioural intention consists of two constructs: attitude towards the behaviour and the subjective norm (Figure 2.2). Attitude towards the behaviour means feeling positively or negatively towards performing certain behaviour, while the subjective norm is the individual's view towards performing or not to performing specific behaviour (Fishbein & Ajzen, 1975). Many researchers have used this theory in a wide range of domains (Davis et al., 1989). However, some authors criticise this model because it proposes just two determinations to measure behavioural intention, while other studies have added other determinations such as self-identity (Conner & Armitage, 1998).

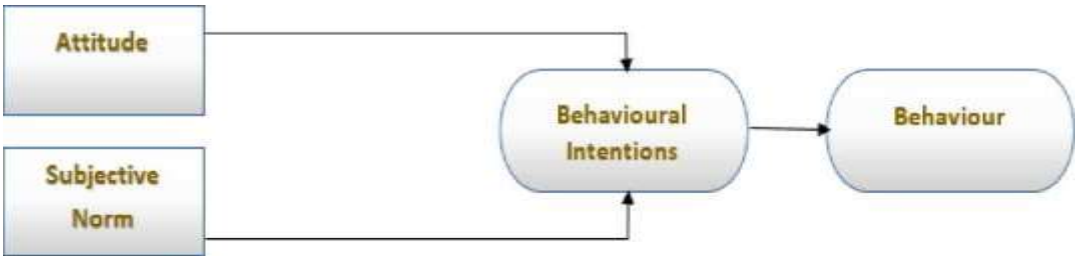


Figure 2. 2: Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975)

2.2.2. Theory of Planned Behaviour (TPB)

Ajzen (1991) developed the Theory of Planned Behaviour, which is an extension of TRA, to address the limitations of TRA. He added "perceived behavioural control" as another predictor of behavioural intention (Figure 3-2). This predictor identifies human perception of how easy or difficult it is to perform certain behaviour. In other words, it is "*the sense of self-efficacy or ability to perform the behaviour of interest*" (Ajzen, 2011a). This theory attracted much research and it became one of the most citied models for identifying human behaviour (Ajzen, 2011). However,

some researchers have criticized TPB model, such as Taylor and Todd (1995), who indicated that the model does not explain how the individual can decide to engage in particular behaviour.

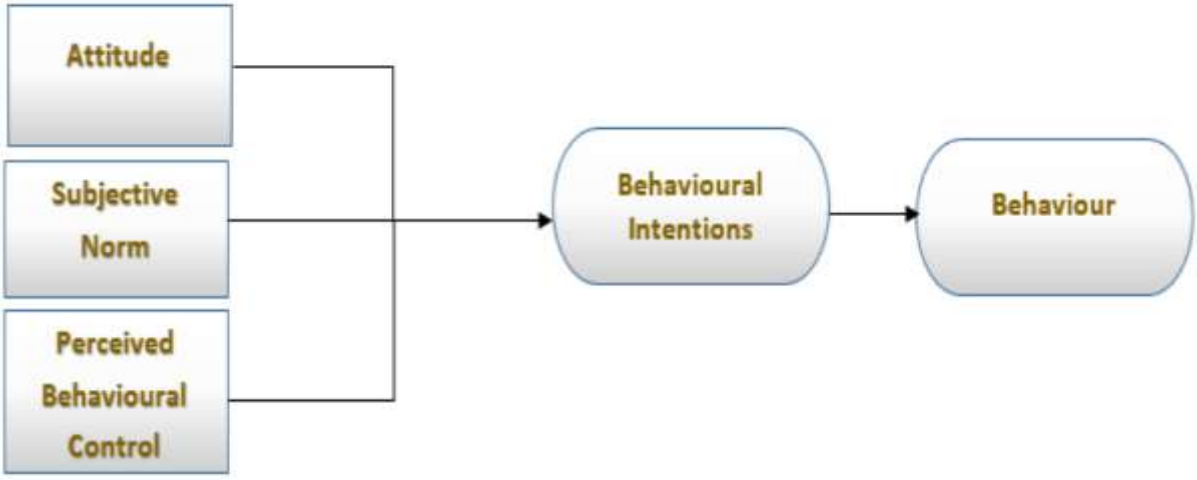


Figure 2. 3 : Theory of Planned Behaviour (TPB) (Ajzen, 1991)

2.2.3. Technology Acceptance Model (TAM)

The TAM model is adopted from TRA and developed by Davis (1989) to predict human acceptance and behaviour of information technology. TAM, like TRA, attempts to determine individual behavioural intention, but it does not include subjective norms as a prediction of behavioural intention (Ejaz, 2014). Davis (1989) suggested that TRA has theoretical problems in conceptualising subjective norms and that extra research was required to clarify its effect on usage behaviour. Moreover, Davis developed TAM model to identify user acceptance of ICT with the impact of other indirect variables. In this model, the behavioural intention depends on individual attitude, which is based on two determinations: 'perceived usefulness' and 'perceived ease of use' (Davis, 1989) (Figure 2.3). Perceived usefulness means the degree to which the individual believes that using a certain system will enhance his/her work performance (Davis, 1989), and perceived ease of use is defined as the degree to which the individual believes that using a specific system will not require additional effort (Davis, 1989).

A large number of studies have used TAM to predict and explain user behaviour towards using technology (Ejaz, 2014), such as using mobile learning in university (Park et al., 2012), and it has been the most used technology acceptance model in E-learning studies (Sumak et al., 2011). However, Legris et al. (2003) criticize the model, on the grounds that the factors in TAM are

insufficient to predict students' attitude towards accepting technology. For example, Venkatesh et al. (2000) developed TAM2 from TAM by adding social factors.

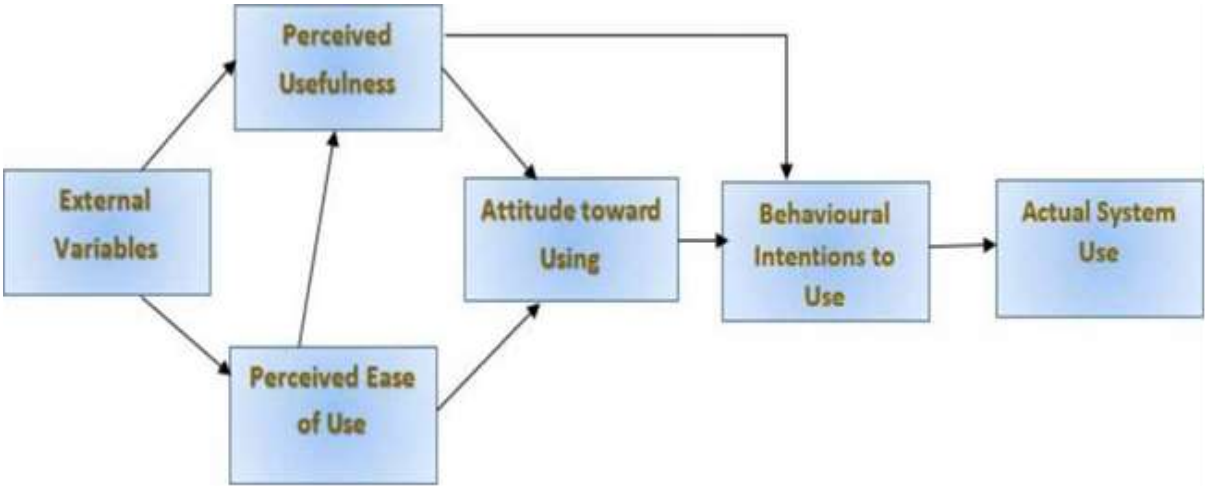


Figure 2. 4: Technology Acceptance Model (TAM) (Davis et al., 1989)

With the growing development of technology, particularly information and communication technologies (ICT), and its integration into users' private and professional life, a decision regarding its acceptance or rejection still remains an open question. In the last few decades, interest of the research community in addressing this question has resulted in the development of a number of theories and models of technology acceptance and its effective usage. The technology acceptance model (TAM), introduced by Fred Davis more than a quarter century ago, became a dominant model in investigating factors affecting users' acceptance of the technology. Derived from the psychology-based theory of reasonable action (TRA) and theory of planned behavior (TPB), TAM has taken a leading role in explaining users' behavior toward technology. By understanding the origins, development, and modifications along with the limitations of the model, we will be able to derive its application to computer-assisted assessment.

2.2.3.1. Origins of the technology acceptance model

For better understanding of the development and the emergence of TAM, a brief description of theories and models, which preceded and influenced its appearance, is required. At the very beginning of technology entering users' everyday life, there was a growing necessity for comprehending reasons why the technology is accepted or rejected. First, theories attempting to explain and predict those decisions were grounded in the field of psychology. The theory of

reasoned action (TRA) (Ajzen & Fishbein, 1980) along with the theory of planned behavior (TPB) (Ajzen, 1985) represents the origins of TAM.

Ajzen and Fishbein (1980) assumed that individuals are usually quite rational and make systematic use of available information. They developed a theory that could predict and understand behavior and attitudes. The TRA looks at the behavioral intentions rather than the attitudes as the main predictors of behaviors. In their theoretical model, Ajzen and Fishbein suggested that a person's actual behavior could be determined by considering her/his prior intention along with beliefs that the person would have for the given behavior (Davis, 1986). According to their theory, a main predictor of the behavior is the behavioral intention, while the influence of the attitude on the behavior is mediated through the intention.

As the TRA began to take hold in social science, it became obvious that this theory was not adequate and had several limitations. One of the main limitations was with people who have a little or feel they have little power over their behaviors and attitudes. Ajzen (1985) described the aspects of behavior and the attitudes as being on a continuum from one of little control to one with great control. To balance these observations, Ajzen added a third element to the original theory. This element is the concept of the perceived behavioral control. The addition of this element has resulted in a newer theory known as the TPB.

The TPB is an extension of the TRA. TPB was used to address the inadequacies that Ajzen and Fishbein had identified through their research using TRA, in particular the model's inability to deal with behaviors over which individuals have incomplete volitional control. At the heart of TPB is the individual's intention to perform a given behavior.

According to TPB, the individual's performance of the certain behavior is determined by her/his intent to perform that behavior. The intent is itself informed by attitudes toward the behavior, subjective norms about engaging in the behavior, and perceptions about whether the individual will be able to successfully engage in the target behavior or not. According to Azjen (1985), an attitude toward behavior is a positive or negative evaluation of performing that behavior. The attitudes are informed by beliefs, the norms are informed by normative beliefs and motivation to comply, and the perceived behavioral control is informed by beliefs about the individual's possession of the opportunities and resources needed to engage in the behavior. TPB also includes a direct link between perceived behavioral control and behavioral achievement. Given two individuals with the

same level of intention to engage in behavior, the one with more confidence in her/his abilities is more likely to succeed than the one who has doubts (Ajzen, 1991). The purpose of the theory is to predict and understand motivational influences on the behavior that is not under the individual's volitional control and to identify how and where to target strategies for changing the behavior.

A major limitation of TPB is that the theory only works when some aspect of the behavior is not under volitional control. The theory is based on the assumption that human beings are rational and make systematic decisions based on the available information; therefore, unconscious motives are not considered. Other problems include not taking into consideration factors such as personality and demographic variables as well as assumption that the perceived behavioral control predicts actual behavioral control, which may not always be the case (Mathieson, 1991).

Despite their limitations, both the TRA and the TPB provided useful models that could explain and predict the actual behavior of the individual. However, soon problems of adapting these models to the various contexts, like user acceptance of an information system, occurred. Most of the studies carried out failed to produce reliable measures that could explain system acceptance or rejection. In order to develop a reliable model that could predict actual use of any specific technology, Fred Davis adapted the theories of reasoned action and planned behavior and proposed the TAM. He considered that the actual use of a system is a behavior, and therefore, the TRA and the TPB would be suitable models for explanation and prediction of that behavior. However, Davis made two main changes to the TRA and the TPB models. Firstly, he did not take subjective norm into account in predicting an actual behavior and only considered the attitude of a person toward it. Secondly, he identified two distinct beliefs, perceived usefulness and perceived ease of use, that were sufficient enough to predict the attitude of a user toward the use of a system (Davis, 1986).

2.2.3.2. Development and extension of TAM

Almost three decades ago, a conceptual model (Davis, 1986) for technology acceptance emerged from the research and theories in the field of psychology. In the following years, we have witnessed the appearance of the original TAM model (Davis, 1986) as well as its simplified version called the parsimonious TAM (Davis, 1989). The model kept on developing through the years of research and experienced various extensions, reaching the recent TAM2 model (Venkatesh & Davis, 2000). Extensions implied that additional factors and variables suggested by authors were incorporated into the model in order to explain the predictors of TAM core elements.

In 1985, Fred Davis proposed the conceptual model for technology acceptance (Davis, 1986). He suggested that the actual usage of the system is a response that can be explained or predicted by user motivation, which, in turn, is directly influenced by an external stimulus consisting of the actual system's features and capabilities, Davis (1986) further refined his conceptual model to propose the TAM, which suggested that the user's motivation can be explained by three factors: perceived ease of use, perceived usefulness, and attitude toward using technology.

Davis hypothesized that the attitude of a user toward the system was a major determinant of whether the user will actually use or reject the system. The attitude of the user, in turn, was considered to be influenced by two major beliefs, perceived usefulness and perceived ease of use, with the perceived ease of use having a direct influence on the perceived usefulness. Davis defined perceived usefulness as the degree to which the person believes that using the particular system would enhance her/his job performance, whereas the perceived ease of use was defined as the degree to which the person believes that using the particular system would be free of effort (Sharp, 2007). Finally, both beliefs were

From these models and theories, the proposed model of this study is built. The following section will present the proposed model of this research and its factors, with supporting references and studies to investigate the impact of factors that may affect the student's intention to accept E-assessment.

2.2.4. The Model of Acceptance of Electronic assessment

As E-assessment is identified as end-to-end electronic assessment process where ICT is used for the whole assessment process, so E-assessment is a process completed by the use of technology. Consequently, the factors that may affect academics acceptance of E- assessment can be predicted from the models and the theories that investigate user acceptance of ICT. The model of this research is built by combining those factors which have the greatest effect on accepting E-assessment from the theories described in the previous chapter and from other studies discussed in the current chapter. Table 4-1 includes the factors of The Model of Acceptance of E-assessment, which is derived from models of user acceptance of ICT and other literature reviews.

Table 2. 1: Factors in The Model of Acceptance E-assessment

Factor and Sub-factor	Definition	References
Perceived Ease of Use	The degree to which the person believes using a specific system will not require an effort.	Davis, 1989; Taylor & Todd, 1995; Ghorab, 1997; Anandarajan et al., 2002
Perceived Usefulness	The degree to which the person believes that using a specific system will enhance his/her performance.	Davis, 1989; Taylor & Todd, 1995; Ghorab, 1997; Anandarajan et al., 2002; Park, 2009
Compatibility	The degree to which the current system matches past experience and current requirements of the user.	Tornatzky & Klein, 1982; Rogers, 1995; Taylor & Todd, 1995; Ajjan & Hartshorne 2008;
Attitude	The positive or negative evaluation indicated by the individual to undertake certain behaviour.	Fishbein & Ajzen, 1975; Davis, 1989; Ajzen, 1991; Taylor & Todd, 1995; Armitage & Conner, 2001; Ajjan & Hartshorne, 2008
Superior Influence	The influence on the user exerted by his/her supervisor.	Taylor & Todd, 1995
Peer Influence	The effect of family, friends and peers in individual intention to perform certain behaviour.	Taylor & Todd, 1995
Subjective Norm	The individual perception, which is influence by other people, towards performing particular behaviour.	Fishbein & Ajzen, 1975; Ajzen, 1991; Taylor & Todd, 1995; Armitage & Conner, 2001; Venkatesh et al., 2003; Paver et al., 2014
Self-Efficacy	The degree to which the individual has the ability to perform specific behaviour.	Taylor & Todd, 1995; Moore & Benasat, 1996; Compeau et al., 1999; Ajjan & Hartshorne, 2008; Park et al., 2012
Resource facilitating conditions	This influence includes the external factors (money, time and technology) that affect a user's decision to perform particular behaviour.	Taylor & Todd, 1995; Ajjan & Hartshorne, 2008; Eljinini & Alsamarai, 2012; Way, 2012;
IT Support	This is defined as the presence of supportive IT staff, who help lecturers to use a system and design flexible applications.	Taylor & Todd, 1995; Sitthiworachart et al., 2008; Eljinini & Alsamarai, 2012; Way, 2012
Perceived Behavioural Control	The user should have control over the influences that may affect performing certain behaviour.	Ajzen, 1991; Taylor & Todd, 1995; Armitage & Conner, 2001; Ajjan & Hartshorne, 2008

Behavioural Intention	The degree to which the individual intends to perform or not perform certain behaviour.	Fishbein & Ajzen, 1975; Davis, 1989; Ajzen, 1991; Taylor & Todd, 1995; Armitage & Conner, 2001
Moderating factors		
Age	The age of an individual has a moderating effect on the relationship between attitude, subjective norm and perceived behavioural control with behavioural intention.	Venkatesh & Morris, 2000; Venkatesh et al., 2003; Wang et al., 2009
Gender	The individual's gender has a moderating effect on the relationship between attitude, subjective norm and perceived behavioural control with behavioural intention.	Minton & Schneider, 1980; Venkatesh & Morris, 2000; Venkatesh et al., 2003; Nysveen et al., 2005; Wang et al., 2009

Source ;(venkatech et al.,2003)

This section presents the Model of Acceptance of E-assessment (MAE), designed to examine the degree of acceptance of E-assessment by academic staff and students. This research will be informed by the factors from the models and other studies that have examined these factors, to predict students' behavioural intention to accept E-assessment in cameroonian universities. This model includes the attitude factor and its related sub-factors: perceived ease of use, perceived usefulness, and compatibility. To investigate the social influence the subjective norm factor is added, with two determinants: peer influence and superior influence. The perceived behavioural control factor is also included with its related sub-factors: self-efficacy, resource facilitating conditions, and IT support. Technology facilitating conditions are included with the resource facilitating conditions sub-factor. This is because technology is considered as one of the facilitating resources (Taylor & Todd, 1995). IT support is added as a factor under perceived behavioural control, because some studies have emphasised on the importance of the availability of IT staff to support lecturers and students when using E-assessment (Way, 2012). Age and gender are considered in this study as moderating factors, because some studies have provided evidence that age and gender impact the relationships of attitude, subjective norm and perceived behavioural control with behavioural intention (Venkatesh et al., 2003).

2.2.4.1. Behavioural Intention

This is the degree to which the individual intends to perform or not perform a certain behaviour (Fishbein & Ajzen, 1975). Moore and Benbasat (1991) argue that behavioural intention can be used

to measure the user's acceptance of new technology, and many researchers have used behavioural intention in their models to investigate user acceptance of technology (Fishbein & Ajzen, 1975; Davis et al., 1989; Ajzen, 1991). All these theories and models are based on the behaviour intention factor (Venkatesh et al., 2003; Shih & Fang, 2004), which indicates that an individual's beliefs influence their behaviour (Ajzen, 1991). Moore and Benbasat (1991) point out that technology acceptance can be measured by users' intention and different studies have used behavioural intention to measure the acceptance of new technology (Lee, 2010; Cheon et al., 2012). In the development of MAE, behavioural intention is therefore used as an indicator of an academic's acceptance of E-assessment. It is divided into three determinants: attitude, subjective norm and perceived behavioural control.

2.2.4.2. Attitude

This means the positive or negative evaluation indicated by the individual regarding undertaking certain behaviour (Ajzen, 2005). Most of the studies that investigate the user's acceptance of ICT include attitude as a factor in their models (Fishbein & Ajzen, 1975; Davis et al., 1989; Ajzen, 1991). Ajjan & Hartshorne (2008) found that attitude was a significant factor that affected the acceptance of Web 2.0, referring to the new generation of tools, applications and approaches, where the user is driving content to build personal relationships (Parise & Guinan, 2008). It is decomposed into three sub-factors:

- *Perceived usefulness*: This is the degree to which the person believes that using a specific system will enhance his/her performance (Davis, 1989). Perceived usefulness is an important factor that can identify a user's intention to accept technology (Ghorab, 1997; Anandarajan et al., 2002). It has been confirmed that perceived usefulness is a factor that has a strong impact on E-learning success (Park, 2009). In this study it means the belief that using E-assessment for a member of the academic staff will enhance the performance.
- *Perceived ease of use*: This is defined as the degree to which using a specific system will not need an effort (Davis, 1989). Davis (1989) stresses the importance of this factor in user acceptance of technology. Other studies have indicated that perceived ease of use plays a key role in users' intention to accept new technology (Ghorab, 1997; Anandarajan et al., 2002). In the current study, it means that if E-assessment does not need additional effort and it is easy to use, the member of staff is likely to accept it.

- *Compatibility*: This is the degree to which the current system matches the past experience and current requirements of the user (Moore & Benbasat, 1991). This means that to motivate them to use E-assessment, it should fit the lecturers' needs and their past experience. Tornatzky & Klein (1982) stress that individuals like to adopt and use a system that is compatible with their existing needs and values. Another study found that perceived usefulness, ease of use and compatibility each have a significant effect on attitudes towards using Web 2.0 (Ajjan & Hartshorne, 2008). Rogers (1995) added the compatibility factor in his model (Diffusion of Innovations Theory) to describe user acceptance of the new technology.

2.2.4.3. Subjective norm

This is defined as the individual's perception, which is influenced by other people, towards performing particular behaviour (Fishbein & Ajzen, 1975). The subjective norm was added to the TRA, TBP, and DTPB models to examine its social effect (Fishbein & Ajzen, 1975; Ajzen, 1991). Venkatesh et al. (2003) also used the subjective norm in the Unified theory of Acceptance and Use of Technology (UTAUT) to investigate the social influences. The subjective norm addresses the impact of social influences in this study. It consists of two sub-factors:

- Peer influence: This is defined as the effect of family, friends and peers on individual intention to perform certain behaviour (Ajzen & Fishbein, 1980). In this study, peer influence means the impact of the others' opinions on lecturers in accepting E-assessment.
- Supervisor's influence: This means the influence of the supervisor such as the head of school, in encouraging lecturers to accept E-assessment.

2.2.4.4. Perceived behavioural control

According to Ajzen (1991) perceived behavioural control "*refers to people's perception of the ease or difficulty of performing the behaviour of interest*". In other words, the user should have control over the influences that may affect performance of certain behaviour. Ajjan & Hartshorne (2008) found that perceived behavioural control is a significant factor that influenced the use of Web 2.0 This construct is decomposed into three sub-factors:

- *Self-efficacy*: This is defined as the degree to which the individual has the ability to perform specific behaviour (Taylor & Todd, 1995). Some studies have highlighted the effectiveness

of self-efficacy in users accepting technology (Moore & Benasat, 1996; Compeauet et al., 1999). Park et al. (2012) also considered self-efficacy in their model to investigate user acceptance of m-learning (mobile learning). Furthermore, Ajjan & Hartshorne (2008) found that self-efficacy has an influence on perceived behavioural control. It is important that lecturers feel that they have the ability to use E- assessment and are confident to deal with it.

- *Resource facilitating conditions*: This influence includes the external factors that affect a user's decision to perform particular behaviour (Ejaz, 2014). Taylor & Todd (1995) explain that resource facilitating conditions including sufficient time, money and technology. If one of these resources is inadequate or absent that will impact the users' technology acceptance. Lecturers should have adequate time to use E-assessment, and have the money and technology to use E-assessment. Eljinini & Alsamarai (2012) concludes that the availability of infrastructure impacts the success of E-assessment implementation. Way (2012) also highlights the importance of the infrastructure factor in establishing an E- assessment system.

2.2.4.5. IT support

This is defined as the presence of supportive IT staff who help lecturers to use E-assessment and design flexible E-assessment applications. The successful implementation of E-assessment depends on supporting IT staff to provide training courses (Sitthiworachart et al., 2008) and to implement the system correctly (Eljinini & Alsamarai, 2012; Way, 2012).

Regarding the relationships between the factors, some studies have indicated that there are relationships between attitude, subjective norm, and perceived behavioural control. Cheon et al. (2012) found significant relationships between these three factors. Other studies have identified a strong influence of all these three factors on user intention (Armitage & Conner, 2001; Paver et al., 2014), and a positive relationship has been found between subjective norm and behavioural intention (Huh et al., 2009; Lee, 2010; Cheon et al., 2012).

Different studies have confirmed that perceived ease of use and perceived usefulness are direct determinants of attitude (Davis, 1989; Venkatesh et al., 2000), and a significant effect of perceived ease of use on attitude has been found (Huang & Chuang, 2007; Lin, 2007).

Several studies in different areas have found a strong relationship between perceived behavioural control and behavioural intention, including studies on web-based learning (Lee, 2010), mobile learning (Cheon et al., 2012), computer resource centres, and Web 2.0 (Ajjan & Hartshorne, 2008). Ajzen (1991) mentions that self-efficacy is positively correlated to perceived behavioural control. Moreover, researchers have found a positive relationship between resource facilitating conditions and perceived behavioural control (Ajjan & Hartshorne, 2008; Huh et al., 2009).

2.2.4.6. Moderating Factors in MAE:

Gender and age have been found to be factors affecting the relations between behavioural intention, subjective norm and perceived behavioural control and behavioural intention (Venkatesh & Morris, 2000; Venkatesh et al., 2003).

Gender: The individual's gender can affect attitude, subjective norm and perceived behavioural control (Venkatesh & Morris, 2000; Venkatesh et al., 2003). Researchers have pointed out that there are differences between males and females, and males tend to be more highly task-oriented (Minton & Schneider, 1980). In the Unified Theory of Acceptance and Use of Technology

(UTAUT) Venkatesh et al. (2003) investigate the differences in attitude between males and females. Moreover, the effect of subjective norm and perceived behavioural control among females was found to be more noticeable than in males (Venkatesh et al., 2003). A study conducted on the usage of a mobile chat service found that gender impacts attitude towards its use, and proposed this factor as a moderating factor (Nysveen et al., 2005). Another study investigated mobile learning also has found that age and gender have moderating effects on the subjective norms (Wang et al., 2009). A further study observed significant gender differences in relation to the effects on behavioural intention (Wang & Wang, 2010). Consequently, this research has added gender as moderating factor, which influences the relationships of attitude, subjective norm and perceived behavioural control and behavioural intention.

Age: The age of an individual has an influence on attitude, subjective norm and perceived behavioural control (Morris & Venkatesh, 2000; Venkatesh et al., 2003). Morris & Venkatesh (2000) point out that its effect on attitude is more noticeable for younger users, whereas the effect on perceived behavioural control is more noticeable for older users. Furthermore, the effect on the subjective norm is more noticeable for older females (Venkatesh et al., 2003). Moreover, Wang et

al. (2009) found in their study of mobile learning that both age and gender have an impact on subjective norms. As a result, this research will examine the moderation of age on attitude, subjective norm and perceived behavioural control. Table 2.1 shows the factors in each model, including the Model of Acceptance of E-assessment (MAE).

The proposed model of acceptance of E-assessment includes factors derived from different models, which examine users' acceptance and use of ICT, and from other related studies. These factors are attitude (perceived ease of use, perceived usefulness, and compatibility), subjective norm (peer influence and superior influence) and perceived behavioural control (self-efficacy, resource facilitating conditions, and IT support). Furthermore, gender and age are added as moderating factors that influence attitude, subjective norm and perceived behavioural control relationships with behavioural intention.

2.3. EMPIRICAL REVIEW

Chin et al. (1990) aimed to explore the impact of computer-based exam and paper-based exam on 10th-grade students' anxiety and achievement levels in Burnaby, Canada. The random sampling method was used. The final sample consists from 54 male students and 51 female 10th-grade students. The experimental group took the computer-based exams and the control group took the paper-based exam. After that, the questionnaire forms were distributed to the members of both groups. It was found that the achievement levels of students in the computer- based exam are better than the achievement levels of students in the paper-based exam. It was found that there isn't any difference between the anxiety levels of the students who took the computer-based exam and the ones who took the paper-based exam. It was found that the computer-based exam is perceived as easier than a paper-based exam. It was found that students prefer taking a computer-based exam more than taking the paper-based exam. It was found that the computer-based exam is perceived as being more flexible and convenient than paper-based exam because students do not have to use the eraser to change their answers. Thus, it is a fast assessment method. It was found that computer-based exam enables students to concentrate in a better manner, due to the way of presenting questions. It was found that taking the computer- based exam is less stressful for the ones who have prior experience in using the computer. It was found that students have positive attitudes towards the computer-based exam.

Tella and Bashorun (2012) aimed to explore the attitudes of undergraduate students towards taking computer-based exams in Nigeria. A questionnaire was used by the latter researchers. The sample consists from 2209 undergraduate students. Those students were selected from the University of Ilorin in Nigeria. It was found that respondents have positive attitudes towards taking computer-based exams. It was found that computer-based exam improves students' academic performance. It was found that there are obstacles hindering academic institutions from using e-exams for assessment. Such obstacles may include: having inadequate computers, teachers' lack of computer skills, and poor internet service.

Yurdabakan & Uzunkavak (2012) aimed to explore the attitudes of primary school students towards using computer-based assessment in Turkey. A 35-item questionnaire was used. The final sample consists from 784 primary school students. These students are 3rd, 4th and 5th- grade students in Turkey. It was found that students have positive attitudes towards computer- based assessment. It was found that there isn't any statistically significant difference between the respondents' attitudes which can be attributed to gender and grade. It was found that there is a statistically significant difference between the respondents' attitudes which can be attributed to school type for the favour of the ones enrolled at state schools. It was found that computer-based assessment improves cognitive capabilities and enables students to identify the things they should know. It was found that computer-based assessment improves enables students to identify their weaknesses

Da'asin (2016) aimed to explore the attitudes of students at Ash-Shobak University College in Jordan towards e-exams. A twenty-six-item questionnaire was developed. The questionnaire forms were distributed to 112 students. 108 forms were retrieved and considered valid for analysis. It was found that there isn't any significant difference between students' attitude which can be attributed to GPA or gender. It was found that students have positive attitudes towards e-exam. It was found that e-exams are reliable and capable of measuring what they aim to measure. It was found that the e-exam system and the e-exam regulations are clear. However, it was found that e-exam increases students' anxiety and stress levels and makes cheating easier. It was found that the e-exam duration isn't adequate. It was found that e-exam doesn't improve students' performance.

Alsadoon (2017) aimed to explore the attitudes of students towards e-assessment at Saudi Electronic University in Saudi Arabia. Fifteen-item online questionnaire forms were distributed to 80 students enrolled at Saudi Electronic University during the academic year (2015/2016). The five-point Likert

scale was adopted. 44 forms were retrieved and considered valid for analysis. Means and standard deviations were calculated. It was found that students have positive attitudes towards e-assessment. It was found that e-assessment improves the quality of the learning and assessment processes and serves as an unbiased assessment method.

It was found that e-assessment reduces the stress associated with exams, and improves students' technical skills. It was found that e-assessment doesn't facilitate cheating. It was found that students prefer getting assessed through e-assessment instead of paper-based assessment. However, it was found that e-assessment isn't suitable for all courses.

Jamiludin et al. (2017) aimed to explore the attitudes of high school students towards taking national exams through the paper-based exam and computer-based exam in Kendari, Indonesia. Interviews were conducted and a twenty-item questionnaire was used. The questionnaire forms were distributed to 34 high school students in Kendari. All of the form were retrieved and considered valid for analysis. Through using the questionnaire, it was found that the computer- based exam is easier to read than the paper-based exam. That is because some paper-based exam forms aren't clear due to the poor quality of the printer. It was found that students prefer taking the paper-based exam more than a computer-based exam, especially for assessing their reading comprehension. Through conducting interviews, it was found that computer-based exam can provide students with valuable experiences in using technology. It was found that computer-based exam requires less time to be taken. It was found that it's more difficult to cheat through the computer-based exam. It was found that computer-based exam can negatively affect health specifically eyes, because students may need to take long exams. It was found that computer-based exam confuses respondents because respondents aren't used to taking such an exam. It was found that the available ICT tools are inadequate. Interviewees add that if the computer slows down, it shall negatively affect their concentration.

IsauAdewole et al. (2018) aimed to explore the attitudes of university students in Nigeria towards taking computer-based exams. 500 questionnaire forms were distributed to students who were selected from the Ladoke Akintola University of Technology in Nigeria. However, 400 forms were retrieved and considered valid for analysis. It was found that students have positive attitudes towards using computer-based exams in Nigeria. It was found that such exams enable students to edit their

answers, and serve as a secure assessment method. It was found that students do not face problems in logging nor in opening the e-exam program.

2.5. FORMULATION OF HYPOTHESES

2.5.1. Hypotheses

In order to guide the step of our research focus, the following research hypotheses (main hypothesis and specific hypotheses) was formulated.

The main hypothesis of this study is formulated as follow: perception of testing practices significantly has an impact on students' attitude towards computer-assisted assessment in higher institutions of learning. The operationalization of this main hypothesis has yielded the following specific research hypotheses:

- There is a significant relationship between perceived usefulness and students' attitude towards computer-assisted assessment in higher institutions of learning
- There is a significant relationship between perceived ease of use and students' attitude towards computer-assisted assessment in higher institutions of learning.
- There is a significant relationship between facilitating conditions and students' attitude towards computer-assisted assessment in higher institutions of learning.
- There is a significant relationship between technology anxiety and students' attitude towards computer-assisted assessment in higher institutions.

2.5.2. Definition of variables

According to Luma (1999), a variable is a characteristic on which people can differ from one another. A variable is an element whose value can change and take other forms when we make an observation to another. The variables are normally classified into Dependent and Independent Variables. The two types of variables used in this study are:

2.5.2.1. Independent variable

According to Amin (2005, p.93), an independent variable is that "*which can be manipulated upon by the researcher.*" They may be called predictor variables because they can predict or are responsible for the status of the other variables. The researcher manipulates in order to determine the

relationship with the observed states of affairs. The independent variable for this study is perception of testing practices. They involved modalities such as: perceived usefulness, perceived ease of use and Facilitating conditions.

2.5.2.2. Dependent variables

In the view of Amin (1999) a dependent variable is the characteristics that are used when the statements of the hypothesis are made. According to Asutabong (1998) dependent variables are variables which receive the effect of independent variables. The dependent variable in this study is students' attitude towards computer-assisted assessment in higher institutions of learning. students' attitude towards computer-assisted assessment in higher institutions of learning comprises elements like: affective, cognitive, and conative.

2.5.3. Indicators

An indicator which could be seen as a true representation of a variable, are in both independent and dependent variables. In this study, the indicators of the independent variable (perception of testing practices) are: perceived usefulness, perceived ease of use and Facilitating conditions. While the dependent variable (students' attitude towards computer-assisted assessment in higher institutions of learning), the indicators are affective, cognitive, and conative.

Table 2. 2: A recapitulative table of variables and their indicators

HYPOTHESES	INDEPENDENT VARIABLE	INDICATORS	DEPENDENT VARIABLE	INDICATORS	MODALITIES	ITEMS
G.H: perceptions of testing practices significantly have an impact on students' attitude towards computer-assisted assessment in higher institutions	Perception of testing practices	Perceived usefulness Perceived ease of use Facilitating conditions Technology anxiety	Students' attitude towards computer-assisted assessment in higher institutions	affective, cognitive, conative	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree	Item 9-40
RH1- There is a significant correlation relationship between perceived usefulness and students' attitude towards computer-assisted assessment in higher institutions	Perceived usefulness	Appropriateness, Value of testing, Adequateness,	Students' attitude towards computer-assisted assessment in higher institutions	affective, cognitive, conative	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree	Item 9-14, 31-40
RH2- There is a significant correlation relationship between perceived ease of use and students' attitude towards computer-assisted assessment in higher institutions	Perceived ease of use	Easiness Clarity Skills	Students' attitude towards computer-assisted assessment in higher institutions	affective, cognitive, conative	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree	Item 15-19, 31-40
RH3- There is a significant correlation relationship between Facilitating conditions and students' attitude towards computer-assisted assessment in higher institutions.	Facilitating conditions	Equipement, Training user Questions	Students' attitude towards computer-assisted assessment in higher institutions	affective, cognitive, conative	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree	Item 20-25, 31-40

RH4- There is a significant correlation relationship between technology anxiety and students' attitude towards computer-assisted assessment in higher institutions	Technology anxiety	Anxiety Confusion Stress	Students' attitude towards computer-assisted assessment in higher institutions	affective, cognitive, conative	Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree	Item 20-25, 31-40

CHAPTER THREE
RESEARCH METHODOLOGY

3.0. INTRODUCTION

This chapter describes the methods and instruments used to collect information for our study. It treats the research design, area of the study, the population of the study, the sample of the study and sampling techniques, instruments of Data collection, the establishment of the validity of research instruments, the establishment of the reliability of research instruments, procedure for the administration of instruments, and Method of data analysis. This chapter describes the method and procedures that was used to carry out this study.

3.1. RESEARCH DESIGN

The research design is a plan which specifies how data correlated to the problem is design for analysis. According to (Amin, 2005), a research design is the conceptual structure within which the quantitative research is conducted and constitutes the blue print for the measurement of variables collected for the analyses of data. In this study, the descriptive or cross-sectional survey was used. According to Kothari (2004) a survey research is one in which a group of people or items are studied by collecting and analyzing data from only a few people or items are considered to be representatives of the whole group. This design was used because the subjects need to be studied at their natural setting at a particular time without conducting an experiment. Also, this work has adopted the quantitative approach where numerical data was collected so as to test the hypothesis and answer questions concerning the current study. A quantitative research, attempts to control as many variables as possible. They therefore prefer research strategies such as random assignment and random sampling, use of standardized instruments and when appropriate an equalizing condition of groups to be compared." (Amin, 2005, p.210). Therefore, this research will not only dwell on the description of variables, but will also be involved in comparing the variables of this study.

3.2. AREA OF STUDY/SITE

Kothari (2004) explained that, the selection of the research area has a very important role to influence the usefulness of information produced. This study as already noted is carried out in the University of Yaoundé 1.

The university to Yaoundé 1 is a public university in Cameroon, located in the nation's capital Yaoundé. It was formed in 1993 following a university reform that splits the country's oldest university into two separate entities; that is the university of Yaoundé I and the university of Yaoundé II. The campus of the university of Yaoundé I is in Ngoa-Ekelle with her motto being Sapientia – collative –cognition ((MINISUP 1993). English and French are both used as language of instruction. The university of Yaoundé 1 is divided into different Faculties which include; Faculty of science (FS), Faculty of Arts, Humanities and social sciences (FALSH), Faculty of Medicine and Biomedical Sciences (FMSB), Faculty of science of Education (FSE) which is just newly created. The institution is spread over several campuses, but the main one being the campus of Ngoa-Ekelle. Faculty of Arts, Humanities and social sciences (FALSH) which is the main focus of this study was officially created alongside the university of Yaoundé I in 1993 with the objectives of training students in area of humanities and social sciences.

3.3. POPULATION OF STUDY

Kothari defines population as the limits within which the research findings are applicable. A social research like this collects data on the behaviors of humans for better predictions. A population is the complete collection or universe of all the element units that are of interest in a particular investigation. The population of this study consisted students from university of Yaoundé 1. They were both were male and a female. This population is suitable for this study because, the study is out to investigate the impact of information competence and the use of e-library resources among students knowing how students of higher learning institutions are involved in information search.

The population of university of Yaoundé1 was chosen by the researcher because of the proximity and challenges of these students with their encounter with e-assessment. The population is made up of male and female students, young, adult and old, from level 2 and 3 of university. These undergraduate students come from various parts of the country (Cameroon), carrying with them great expectations for their future. They come to this institution to acquire the knowledge, know-how and life skills necessary for their insertion in the active life. Our choice in this sense was made on the main university campus of University of Yaoundé I. Description of the university population: The university population that constitutes our target population is heterogeneous and our target population is heterogeneous and estimated at about 50,000 students (Minsup, 2011). The students are distributed in different level 2 and 3 of FALSH, in varying proportions. Their presence on campus depends

on the role they are expected to play. In this sense, As the University of Yaoundé I is a prototype of a public institution, it is easier to meet students during the day, on working days, that is, from Monday to Friday.

3.4. SAMPLE AND SAMPLING TECHNIQUE

3.4.1. Sample size

According to Amin (2005), a sample is a proportion of elements selected from the population which helps the researcher to make a generalization about the whole population which is a representative fraction of the population. In addition, sample serves the principal purpose of making possible the study of problems which otherwise could not be undertaken due to cost, time, personal or scope. This means that a sample helps the researcher to use a small part of the mother population in the study after which the results are generalized. This is because using the entire population for a research is expensive and time consuming.

The sampled in our study include all the masters one and two students of the Faculty of Arts, Humanities and social sciences (FALSH), which include the students (male and female), from different background, culture, with different educational qualifications, and from different categories. The samples of this study came from FALSH that were those accepted to collaborate in this study. The information gotten from the records office showed that the total number of students in these faculty for the academic year 2017/2018 is about 1560. Considering the table of Krejcie and Morgan (1970) for determining the sample size for research activities, we assumed a sample size of 316 students to be representative of this population (Amin, 2005).

3.4.2. Sampling technique

Sampling technique is the process of selecting elements from a population in such a way that the sample elements selected represented the population (Amin, 2005). Sampling plays a great role in the research process in that it ensures the method of selection of the right subject from the data will be collected. A sample is needed as a researcher alone cannot succeed in studying the whole population.

This study uses a random sampling technique to select its subjects. This approach helped the researcher to meet ready students who accepted willingly to collaborate in this study. This was because the researcher could only obtain data from voluntary participants who were available and accepted to complete the questionnaire at the time it was

administered. So the sampling method used for this research was the simple random sampling which gave all students in our sample population, equal opportunity of being selected and included in the study.

3.5. RESEARCH INSTRUMENT

The research instrument used to collect data in this study was the questionnaire. According to Amin (2005), a questionnaire is a self-report instrument used for gathering information about variables of interest in an investigation. It can be seen as a written list of questions that are answered by a number of people so that information can be collected from the answers. The data or information collected permits the researcher to verify the research hypothesis.

This questionnaire was designed in line with the research questions and the hypothesis. The questionnaire was used to systematically obtain information on student's personal characteristics, attitudes and knowledge. A questionnaire used because the group targeted could read and understand the questions and provide information required by the researcher. The questionnaire was also developed to measure observed behaviors with the use of 5-point Likert scale.

The questionnaire submitted to the students of the FALSH developed in English and French. The questionnaire began with an introduction for the respondents or the students to know the purpose of the research. The questionnaire was made up of 40 questions. They were closed ended questions with specific responses that could be easily analyzed as shown in appendix. This questionnaire is divided into five sections. The first part is on background of respondents, the second part is made up of questions on perceive usefulness, the third part includes questions on perceived ease of use, the fourth part include questions on facilitating conditions and the fifth part include questions on students' attitude of e-assessment.

The questionnaire was developed with the aid of literature review taking into consideration the objectives and hypotheses of the study.

3.6. VALIDATION OF RESEARCH INSTRUMENT

3.6.1. Validity of research instrument

Kothari define validity as the quality of a data gathering instrument or procedure that enables it to measure what it is supposed to measure. Validity also refers to the accuracy with

which an instrument measures what it intends to measure. The validity could be seen as the extent to which a measurement instrument measures what it purports to measure. The questionnaire of this study was constructed with the help of fellow of my classmate. It was then submitted to the supervisor who checked to ensure that the instruments were appropriate for the collection of relevant data. Corrections were made before approval of instruments as good for final administration. In this study the questionnaire was subjected to the Face and Content validity.

3.6.1.1. Face validity

To ensure face validity, the questionnaire of this study was constructed with the help of fellow classmates. It was then submitted to the supervisor who scrutinized the items, checking appropriateness of language and clarity. After making the necessary corrections from this expert, the questionnaire was considered to have attained face validity.

3.6.1.2. Content validity

The questionnaire or the instrument was constructed using the various indicators. This instrument was given to some experts or judges who examined the validity of the contents. This validity is called content validity. According to Amin (2005, p.286), "*content validity is the extent to which the content of an instrument corresponds to the content of the theoretical concept it is designed to measure*". In other words, content validity refers to the degree to which the test actually measures or is specifically related to the threats for which it was designed.

Procedure for establishing content validity is as follows, the instrument is given to experts or judges for proper scrutiny. Experts scrutinized the questionnaire by checking the relevance of the items to the objectives of the study. This was confirmed by the researcher's supervisor.

3.6.2. Reliability of the research instrument

An instrument is reliable if it produces the same results whenever it is repeatedly used to measure trait or concept from the same respondents even by other researchers. Test-retest reliability is also known as stability reliability. In refers to the degree to which scores on the same tests by the same individuals are consistent over time Amin (2005). In order to establish the reliability of the instrument, the test-retest reliability was used.

First of all, the questionnaire was administered to 10 students. After one week it was re-administered to the same group of students. The score of the two tests were correlated or compared. The reason why the test was re-administered again after one week was to avoid the possibility of the respondents to recall former responses. Also, if we waited for too long, respondents' ability to answer questions might have changed due to intervening learning or maturation.

3.7. ADMINISTRATION OF INSTRUMENT

In order to obtain data to be analysed for this study, we came out with the questionnaire. It was personally administered and the responses were collected on the spot to increase the chances of getting valid information. The collection of data in the various departments took us two days. First of all, we started the data collection in the department of Psychology, then Sociology, and the other department. The process was the same in every department, with the permission of the administration; I gain access to the students and briefly explain the purpose of my study and give the questionnaire to be filled. We assured them that the work is strictly for academic purposes and that they were not to reveal their identity.

3.8. DATA ANALYSIS TECHNIQUE

This work applies the correlation research design which describes the extent to which the variables are interrelated. With correlation studies, the data collected is used to verify if there is a relationship between two or more variables. According to Amin (2005, p.218) a correlational research attempt to determine whether, and to what degree, a relationship exists between two or more quantifiable variables. The relationship can now be used to make predictions. Given the sample size and the nature of dependent and independent variables, we have chosen the Chi-square. The chi-square test tells whether the frequency obtained or observed are different from the frequencies you might expect based on the chance variation along. The chi-square test enables us to decide whether there is a relationship or deviation between occurrences. This will be done by comparing the observed or obtained frequencies to the expected frequencies, thereby determining the probability of their being different or not.

Both descriptive and inferential statistics are used to analyze the responses and verify the hypotheses. For qualitative data, responses will be coded, summarized and reported in relation to the specific research questions as provided by the different groups of respondents. Tables, percentages, charts, mean, standard deviations will be used to analyze the data. Also, the Statistical Package for Social Sciences (SPSS) version 28.0 will be used for data analysis.

In this particular study, data analysis consisted of a tool to analyze the data obtained from the survey. To organize and give meaning to our data, we use various statistical tools: descriptive statistics, mean, standard deviation, the univariate analysis of variances (ANOVA), the Pearson Product Moment Correlation Coefficient. To describe our data analysis techniques, we will follow the steps by explaining what we did and the statistical tools involved. Quantitative data analysis of this study involved two major steps:

1. Data preparation in which data was logged, checked for accuracy, and entered into the computer using SPSS, which is designed to analyze, display, and transform data Trochim and Donnelly (2007).

2. Data organization was developed and documented into a database structure that integrates the various measures present in the data Trochim and Donnelly

The survey consisted of questionnaire administration in the various school of our sample. Surveys are the primary source for data collection of this nature. In so doing, the results from the 4-point Likert scale questions of the survey were analyzed using SPSS software. Frequencies of distribution such as frequency tables Trochim and Donnelly were used to describe multiple variables such as standardized test scores and demographic data. The central tendency of a distribution "is an estimate of the center of a distribution of value (p. 266) used to determine and describe the median of sets of values of the data that require this approach. Ranges, which are measures of dispersion in a frequency distribution Trochim and Donnelly were also used to describe the variability of data values.

In order to do this, researchers summarize the data, so that readers can construct a mental picture of the relationship between the data and the phenomena under study.

3.8.1. Representing the Data

Trochim and Donnelly (2007, p.83) stated that the use of graphic displays is particularly valuable in making the logic of mixed-method design explicit. In this perspective they affirmed that Most techniques for displaying evidence are inherently multimodal, bringing verbal, visual, and quantitative elements together. The researcher also used tables to report results related to the research questions. According to Trochim and Donnelly, these visual forms depict the trends and distributions of the data and allow readers to better understand the quantitative results of the study in a summarized form.

3.8.2. Bivariate Descriptive Statistics

A frequent goal in data analysis is to efficiently describe and measure the strength of relationships between variables (Muijs, 2004). In this regard, bivariate descriptive statistics describes such relationships.

3.8.3. Correlation

The correlation coefficient was used to test our research hypotheses. The purpose was to measure the degree of association between the independent variables in our research hypotheses and professional development of student teachers, symbolize by the correlation coefficient.

The correlation coefficient is a simple descriptive statistic that measures the strength of the linear relationship between two variables (Amin, 2005). The value of the correlation coefficient r ranges from -1 for a perfect negative correlation, to +1 for a perfect positive correlation. The degree of association between two variables is described by the coefficient of correlation, which indicates the strength of this association. In this study, in order to determine existing relationships between two variables, the researcher used the Pearson's r correlation coefficient because the purpose of this study is to predict the dependent variable from the independent variable (Muijs, 2004). In so doing, the Pearson Product Moment Correlation coefficient was used because the data in this study are parametric, that is, its interpretation does depend on the population fitting a parameterized distribution. This means that the quantitative data in this study numerical interpretation. The researcher also preferred to use parametric statistics because there is generalization of the results of this study to a larger population.

Interpreting the Pearson's Product Moment Correlation Coefficient: The usefulness of the correlation depends on its size and significance (Muijs, 2004). If r reliably differs from 0.00, the r-value is statistically significant, that is, does not result from a chance occurrence, implying that if the same variables were measured on another set of similar subjects, a similar r-value would result. If r achieves significance, it is possible to conclude that the relationship between the two variables was not due to chance. According to Muijs (2004), the size of any correlation generally evaluates as follows:

Table 3. 1: Table of correlation

Correlation value	*Interpretation*
0.00 to 0.10	Weak
0.11 to 0.29	Low
0.30 to 0.59	Modest
0.60 to 0.79	Moderate
0.80 to 0.89	Strong
0.90 to 1.00	Very strong

On the other hand, it is important to state that correlation does not imply causation. In this regard, just because one variable relates to another variable does not mean that changes in one cause changes in the other. In other words, other variables may be acting on one or both of the related variables and affect them in the same direction. Cause-and-effect may be present, but correlation does not prove cause (Muijs (2004). In this study, the researcher was not interested in verifying if the occurrence of one variable caused or increased the occurrence of the other variable. The researcher was only interested in determining the strength of the correlation between the variables.

3.8.4. Ethical Issues

Leedy and Ormrod (2005) categorized ethical issues in research into four groups namely: informed consent, right to privacy, honesty with professional colleagues and protection from harm. The researcher therefore, conformed to professional practices by making respondents aware of the purpose of the study that is to inform the consent. Permission to collect data were firstly obtained from the researcher supervisor on behalf of university management. There will be a cover letter explaining the reason for the survey and also the possible potential uses.

The survey was carried out only after permission had been granted by the appropriate school authorities. Students were not expected to disclose their names and participation was voluntary. Students who expressed unwillingness to participate were excluded. This chapter has given a picture of where the field work was carried out and the type and nature of data that has been collected. The next chapter will present the findings from the statistical analysis carried out in the SPSS statistical program.

This chapter of research methodology deals with the introduction, research design, area of study, population of study, samples, instruments, variables, indicators and ended with a ethical issues. The critical examination of this chapter as shown above served as a stepping stone for the presentation of results and analysis of data collected from the field.

CHAPTER IV
PRESENTATION AND ANALYSIS OF FINDINGS

Chapter four presents the results of data which was collected through a questionnaire constructed in relation to the variables of study. The technique used in data presentation is the one where data is organised, presented and analysis is made to show their impact on the entire study. Tables and charts are used to give a descriptive representation of the results and the first part begins with the analysis of background characteristics of the respondents. This is followed by the analysis of the different variables with much emphasis and attention on the relationship that exists between them.

4.1. PRESENTATION AND DESCRIPTION OF DATA

In this section, we are going to present and analyse the data collected from the sampled population with respect to the personal characteristics of the respondents. The data obtained from the opinions of the respondents following the order of items in constructed questionnaire are presented through percentages, tables, charts and graphs to draw the trends.

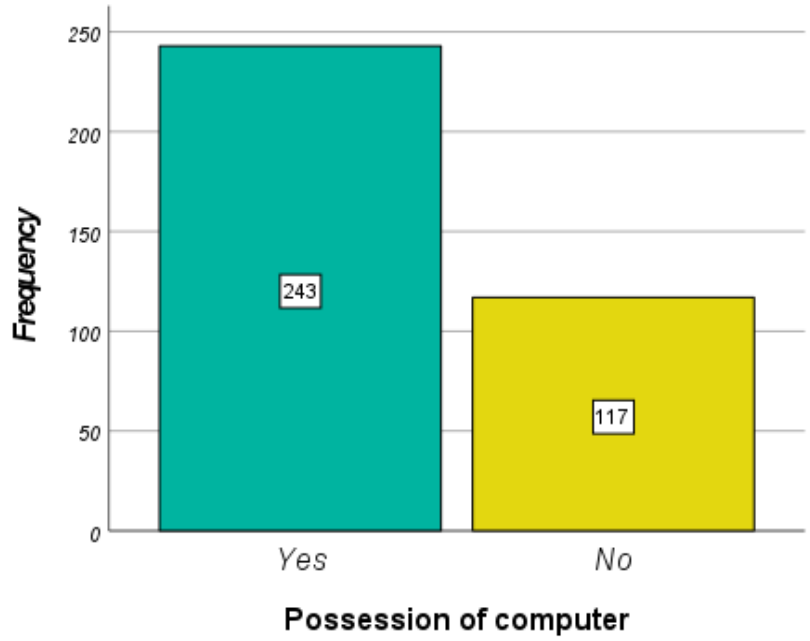
4.1.1. Distribution of respondent according to possession of computer

The table 4.3 presents the distribution of students according to the possession of computer. We observe from the above table that 67.50% of the students (about 243 students) have a computer. In the other hand, while 32.50% of students do not have a computer.

Table 4. 1: Distribution of students according to possession of computer

Possession of computer	Frequency	Percentage
Yes	243	67,50
No	117	32,50
Total	360	100,00

Source (The Author)



: Diagram of the distribution of respondents according to parent's level of education

4.1.2. Distribution of respondent according to academic level

Table 4.4 and figure 4.4 present the distribution of respondents according to their status in the class. We observed from the below table that the highest number of students (250) in the sample population are new in level three with a percentage of 69.44%. The rest of our students in the sample (110 students) giving a percentage of 30.56%.

Table 4. 2: Distribution of students according to academic level

Academic level	***Frequency***	***Percentage***
Level Two	110	30,56
Level Three	250	69,44
Total	360	100,00

Source (The Author)

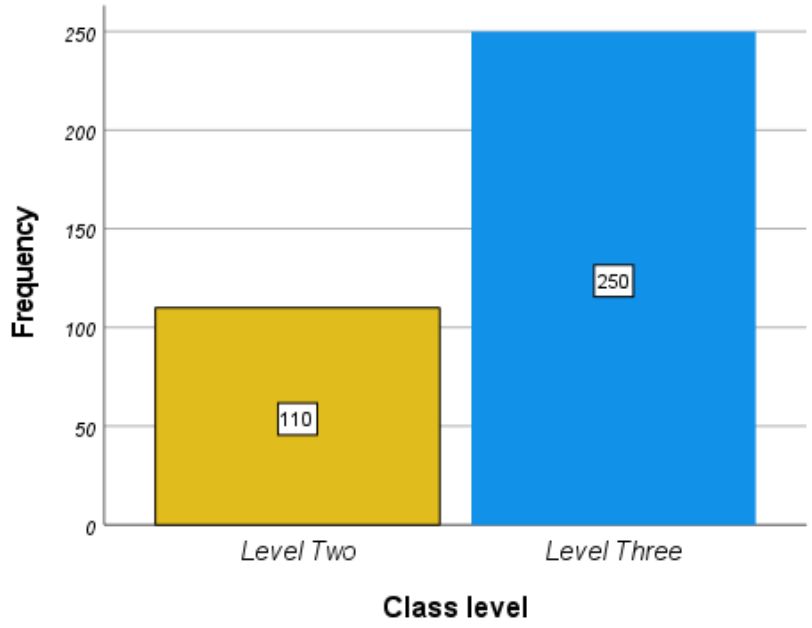


Figure 4.4: Diagram of the distribution of students according to academic level

Table 4. 3: Distribution of respondent according to their department by gender

Department by gender			**Gender**		**Total**
			Male	*Female*	
Department	Count	17,00	7,00	24,00	
	% of Total	4,72	1,94	6,67	
	Count	25,00	38,00	63,00	
	% of Total	6,94	10,56	17,50	
	Count	24,00	19,00	43,00	
	% of Total	6,67	5,28	11,94	
	Count	14,00	23,00	37,00	
	% of Total	3,89	6,39	10,28	
	Count	13,00	7,00	20,00	
	% of Total	3,61	1,94	5,56	
	Count	18,00	24,00	42,00	
	% of Total	5,00	6,67	11,67	
	Count	9,00	9,00	18,00	
	% of Total	2,50	2,50	5,00	
	Count	9,00	9,00	18,00	
	% of Total	2,50	2,50	5,00	
	Count	5,00	6,00	11,00	
	% of Total	1,39	1,67	3,06	
	Count	38,00	46,00	84,00	
	% of Total	10,56	12,78	23,33	
Total	Count	172,00	188,00	360,00	
	% of Total	47,78	52,22	100,00	

Source (The Author)

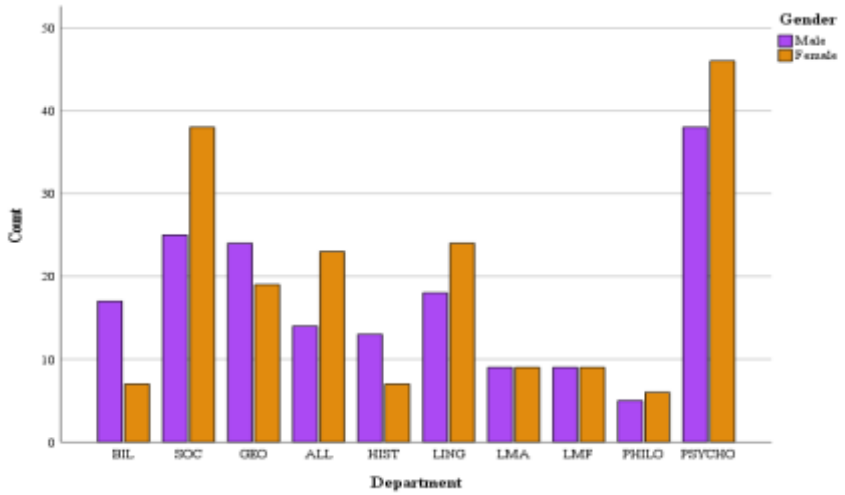


Figure 4. 1: Diagram of the distribution of respondent according to their gender by school

4.1.8. Distribution of respondents according to their possession of computer by gender

The possession of computer and gender crosstabulation is shown in table 4.8 and figure 4.8 below. It can be observed that the highest numbers of respondents (243) which are made up of 118 male and 125 females have a computer with a percentage of 67.50% involving 32.78% for male and 34.72% for female. At the bottom proportion, are 117 students who do not have a computer with 54 male students (15.00%) and 63 female students (17.50%); with a total of 32.50% of the sample population.

Table 4. 4: Distribution of respondents according to their possession of computer by gender

Possession of computer by gender			**Gender**		**Total**
			Male	*Female*	
Possession of computer	Yes	Count	118,00	125,00	243,00
		% of Total	32,78	34,72	67,50
	No	Count	54,00	63,00	117,00
		% of Total	15,00	17,50	32,50
Total		Count	172,00	188,00	360,00
		% of Total	47,78	52,22	100,00

Source (The Author)

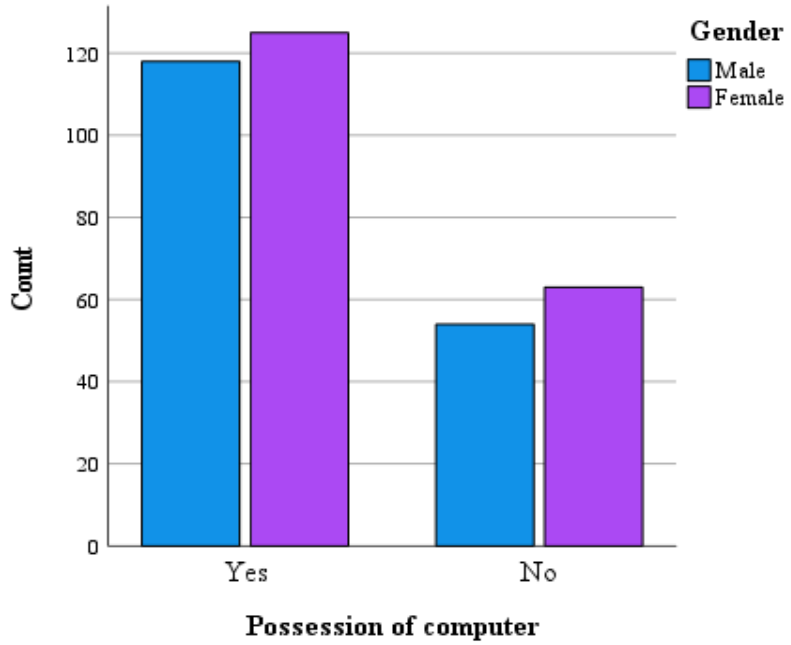


Figure 4. 2: Diagram of the distribution of respondents according to their status in the class by school

4.1.9. Distribution of respondents according to their academic level by gender

Table 4.9 and figure 4.9 below, shows the distribution of the students according to their academic level by gender. It can be noted that 250 students who participated in the study are students are in level three which are made up of 63 male and 187 female with a percentage of 17.50% and 51.94% respectively; giving a total of 69.44%. This proportion is followed by 110 students which are made up of 109 male and 01 female making a total percentage of 30.56%.

Table 4. 5: Distribution of respondents according to their academic level by gender

			Gender		Total
			Male	Female	
Academic level	Level Two	Count	109,00	1,00	110,00
		% of Total	30,28	,28	30,56
	Level Three	Count	63,00	187,00	250,00
		% of Total	17,50	51,94	69,44
Total		Count	172,00	188,00	360,00
		% of Total	47,78	52,22	100,00

Source (The Author)

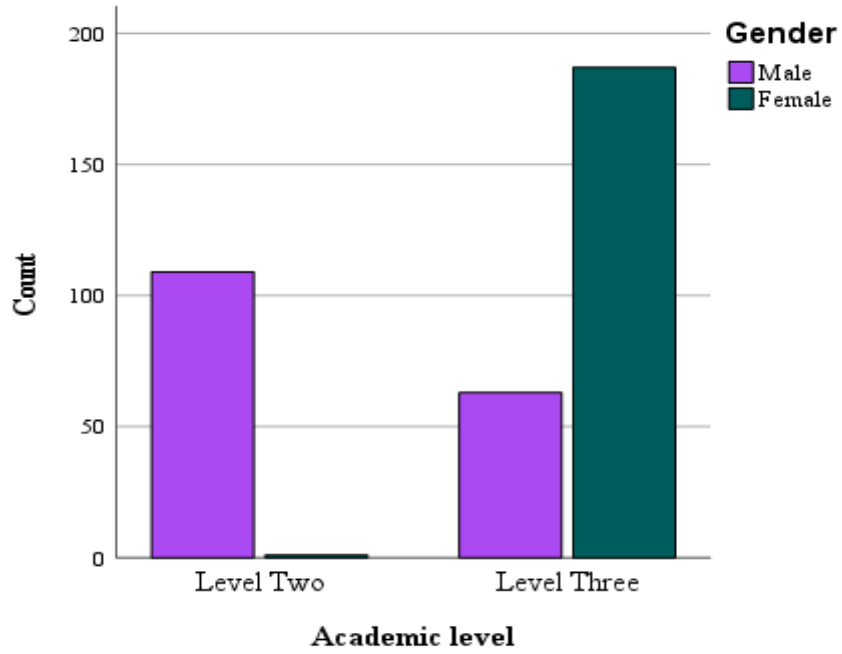


Figure 4. 3: Diagram of the distribution of respondents according to their class by school

4.1.9. Distribution of respondents according to their first official language by gender

Table 4.9 and figure 4.9 below, shows the distribution of the respondents according to their first official language by gender. It can be noted that 232 respondents who participated in the study are French-speaking students which are made up of 107 male students and 125 female students with a percentage of 29.72% and 34.72% respectively; giving a total of 64.44%. This proportion is followed by 128 students which are made of 65 male students and 63 female students making a total percentage of 35.56%.

Table 4. 6: Distribution of respondents according to their first official language by gender

First official language by gender			Gender		Total
			Male	Female	
First official language	French	Count	107,00	125,00	232,00
		% of Total	29,72	34,72	64,44
	English	Count	65,00	63,00	128,00
		% of Total	18,06	17,50	35,56
Total		Count	172,00	188,00	360,00
		% of Total	47,78	52,22	100,00

Source (The Author)

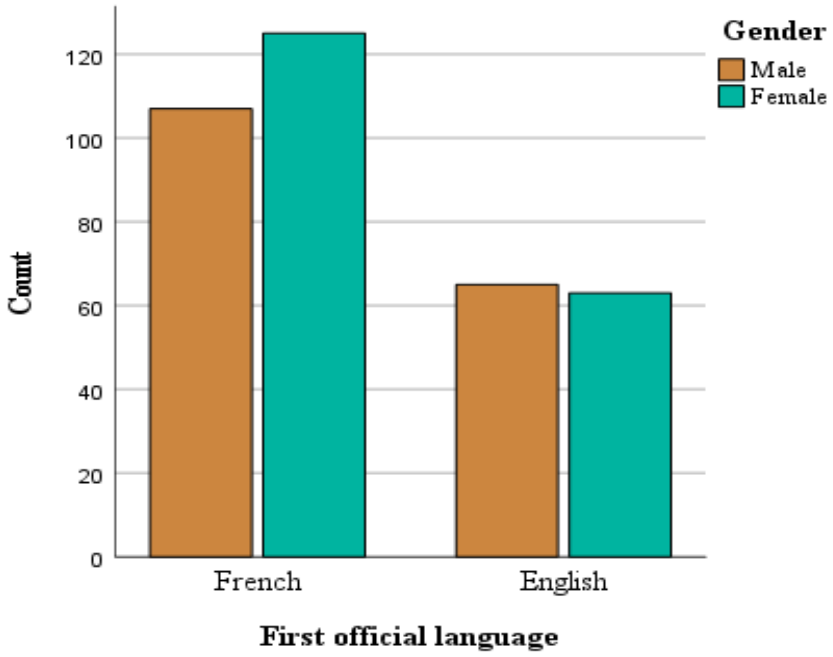


Figure 4. 4: Diagram of the distribution of respondents according to their first official language by gender

4.2. PRESENTATION AND DESCRIPTION OF RESPONDENTS' OPINIONS ON OUR STUDY VARIABLES

In this section, we are going to present and analyse the data collected from the sampled population with respect to the personal characteristics of the respondents. The data obtained from the opinions of the respondents relate to each scale following the order of the items as shown in the constructed questionnaire.

4.2.1. Distribution of students' opinions on perceive usefulness

Table 4.10 below presents the distribution of the opinions of students on opinions on perceive usefulness. From the results in the table, we observe that the highest majority of students believe that using electronic assessment would enhance their academic development (M = 3.94), indicating that they believe that using electronic assessment would make it easy for them to achieve more in their academic goals (M = 3.94). And students also find using electronic assessment useful (M = 3.96). This table indicates that the students generally perceive computer-assisted assessment to be useful.

Table 4. 7: Distribution of students' opinions on perceive usefulness

	Mean	Std. Deviation
Online assessment is appropriate for my subject area.	3,61	1,30
I believe that using electronic assessment would enhance my academic development	3,94	1,06
Using electronic assessment would increase my academic productivity	3,08	1,44
I believe that using electronic assessment would make it easy for me to achieve my academic and professional goals.	3,94	,95
I find using electronic assessment useful.	3,96	1,04
N = 360		

Source (The Author)

4.2.2. Distribution of students' opinions on perceive ease of use

Table 4.11 below displays the distribution of students' opinions on perceive ease of use. The results on the table reveal that many students declare that they couldn't give every question enough time to answer (M=3.87). This signifies that a very high majority of the students find electronic assessment easy to use (M= 3.73). though some usually find test instructions are not usually clear (M= 3.18). Additionally, student find that it is easy for them to become skillful at using electronic assessment (M= 2.55) that is why majority of the students try to find their interaction with electronic assessment is clear and understandable (M=2.32).

Table 4. 8: Distribution of students' opinions on perceive ease of use

	Mean	**Std. Deviation**
Learning to use electronic assessment is easy for me	2,29	1,54
My interaction with electronic assessment is clear and understandable.	2,32	1,42
It is easy for me to become skillful at using electronic assessment.	2,56	1,40
I find electronic assessment easy to use	3,73	1,19
I couldn't give every question enough time to answer	3,87	1,08
The test instructions were not clear	3,18	1,34
N =360		

Source (The Author)

4.2.3. Distribution of students' opinions on facilitating conditions

Table 4.12 provides the distribution of the students' opinions on facilitating conditions. The results on the table reveal that, students declare that technical problems make electronic

exams impractical (M = 3.87). Also, many students declare that staring at a computer screen made their eyes tired (M=3.73). In that same line, many students agree that not being able to go back to review the questions confused them (M = 3.18). This signifies that many students find the university's testing system not being effective (M = 2.32).

Table 4. 9: Distribution of students' opinions on facilitating conditions

	Mean	**Std. Deviation**
The equipment is available to me to work on electronic assessment	2,29	1,54
The university's testing system have problems	2,32	1,42
Presenting the test through the computer confused me	2,56	1,40
Staring at a computer screen made my eyes tired	3,73	1,19
Technical problems make electronic exams impractical	3,87	1,08
Not being able to go back to review the questions confused me	3,18	1,34
N = 360		

Source (The Author)

4.2.4. Distribution of students' opinions on technology anxiety

The distribution of the respondents' opinions on Cognitive judgements of progress are observed in table 4.13 below. The highest number of students agree that using a computer adds to the stress of exams (M = 3.56) that is why they feel confused when test is presented through the computer (M = 3.28). It is also observed that many students feel comfortable using electronic assessment on their own (M = 2.51). Despite the fact that some students declare that submitting electronic tests requires computer skills that they do not have (M=2.43), but, some students have the knowledge and the ability to make use of electronic assessment (M=2.33). The other number of students declare that not knowing the remaining questions caused them anxiety and stress (M = 1.93)

Table 4. 10: Distribution of students' opinions on technology anxiety

	Mean	**Std. Deviation**
I would feel comfortable using electronic assessment on my own.	2,51	1,35
Presenting the test through the computer confused me	3,28	1,43
I have knowledge and ability to make use of electronic assessment	2,33	1,43
Submitting electronic tests requires computer skills that I do not have	2,44	1,34
Not knowing the remaining questions caused me anxiety and stress	1,93	1,39
Using a computer adds to the stress of exams	3,56	1,33
N = 360		

Source (The Author)

4.2.5. Distribution of students' opinions on attitude towards computer-assisted assessment

Table 4.14 provides the distribution of students' opinions on attitude towards computer-assisted assessment. The results on the table reveal that, students in overall, they are satisfied with using electronic assessment (M = 3.98). This signifies that a very high majority of students agreed that they prefer taking electronic-exam more than taking paper-based exam (M=3.85). but nonetheless, many students agree that electronic-exam doesn't enables me to show a better academic achievement (M = 3.84). This signifies that many students electronic-exam makes them feel more stressed than paper-based exam (M = 3.62). That is why they feel that their scores on the electronic tests do not reflect their true knowledge of the course (M =3.23).

Table 4. 11: Distribution of students' opinions on attitude towards computer-assisted assessment

	Mean	**Std. Deviation**
The lack of sequence in the presentation of the items of the same question distracted my thinking	2,84	1,32
It is a good idea to use electronic assessment for academic development.	3,62	1,31
Overall, I am satisfied with using electronic assessment.	3,98	1,08
Electronic-exam makes me feel more stressed than paper-based exam	3,08	1,44
Electronic-exam doesn't enables me to show a better academic achievement	3,86	1,23
I prefer taking electronic-exam more than taking paper-based exam	3,84	1,32
I feel that my scores on the electronic tests do not reflect my true knowledge of the course	3,23	1,39
I have a generally favourable attitude toward using electronic assessment	2,29	1,54
Valid N (listwise)		

Source (The Author)

4.3. VARIABILITY OF STUDENTS' ATTITUDE TOWARDS COMPUTER-ASSISTED ASSESSMENT BY PERSONAL CHARACTERISTICS

The aim of data analysis is to efficiently describe and measure the strength of relationships between variables (Muijs, 2004). Bearing this mind, bivariate descriptive statistics describes such relationships. The survey was conducted with sample population of secondary school

students in the Yaoundé VI sub-division with special interest in their background characteristics. So, the one way-ANOVA test and the t-test are used to determine the variability of students' attitude towards computer-assisted assessment by background characteristics of respondents which involve school, gender, class, age category and parents' level of education.

4.3.5. Variability of attitude towards computer-assisted assessment by department

We want to see if students' attitude towards computer-assisted assessment varies by department. We are addressing the question that, does the attitude towards computer-assisted assessment differs by department? So we are comparing the attitude towards computer-assisted assessment of the ten groups by using the univariate analysis of variance as shown in the table below.

Table 4. 12: Description of attitude towards computer-assisted assessment by department

	N	Mean	Std. Deviation	Std. Error
BIL	24	3,3125	,58514	,11944
SOC	63	3,3433	,59355	,07478
GEO	43	3,2965	,70764	,10791
ALL	37	3,2230	,71694	,11786
HIST	20	3,3438	,33657	,07526
LING	42	3,3542	,45859	,07076
LMA	18	3,3611	,64865	,15289
LMF	18	3,3125	,65480	,15434
PHILO	11	3,0682	,63827	,19245
PSYCHO	84	3,4583	,62495	,06819
Total	360	3,3424	,61000	,03215

Source (The Author)

Table 4.15 above shows that there are some relative differences in the Means and Standard Deviations of the various classes involved in the study. The test of the difference of the attitude towards computer-assisted assessment by department between these departments is presented in table 4.16 below.

Table 4. 13: Analysis of the effect of attitude towards computer-assisted assessment by department

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2,624	9	,292	,779	,636
Within Groups	130,961	350	,374		
Total	133,585	359			

Source (The Author)

The analysis of variances as shown in table 4.16 above reveals that being a student of a particular class, does not affect students' attitude towards computer-assisted assessment by department in a significant way as shown in the results of this study, F (9, 350) = 0.779, p>0.05.

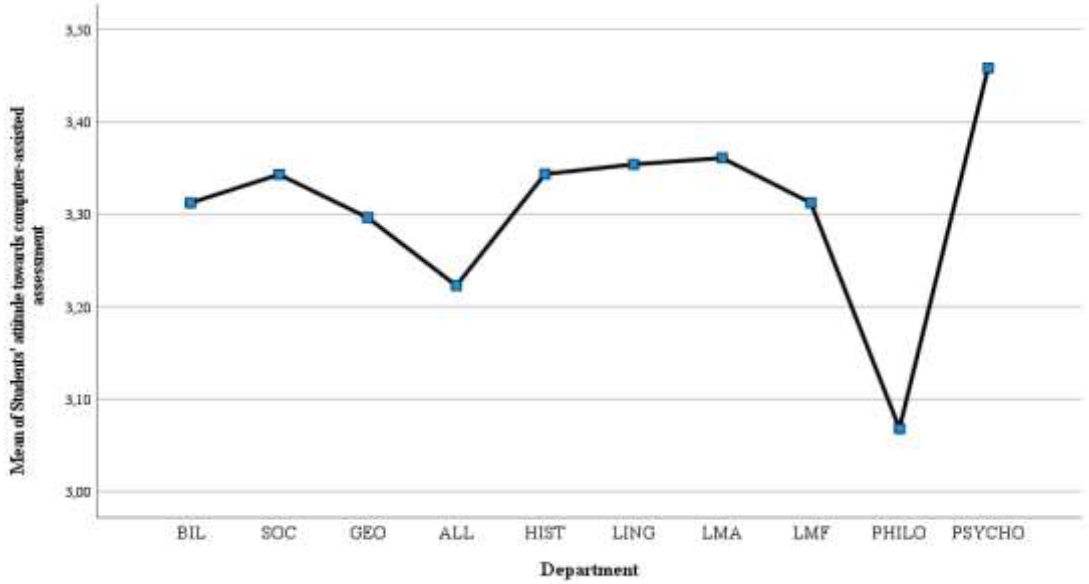


Figure 4. 5: Graph on the variability of students' attitude towards computer-assisted assessment by department

The overall analysis as illustrated in figure 4.14, reveals a non-significant difference in students' attitude towards computer-assisted assessment for the different departments, F (9, 350) = 0.779, p>0.05.; meaning that, though students' attitude towards computer-assisted assessment is different in the various groups, the difference remains non-significant. So it can be concluded that, the department attended by the student does not affect students' attitude towards computer-assisted assessment.

4.3.2. Variability of students' attitude towards computer-assisted assessment by gender

Literature shows that students' attitude towards computer-assisted assessment vary according to gender. We want to look at the variability of students' attitude towards computer-assisted assessment across the gender of the students. We will be addressing the question: does students' attitude towards computer-assisted assessment differ across gender? Since this is a case of comparison of two means, we are going to use the T-test as shown on the table below.

Table 4. 14: Description of students' attitude towards computer-assisted assessment by gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
students' attitude towards computer-assisted assessment	Male	172	3,3081	,58261	,04442
	Female	188	3,3737	,63396	,04624

Source (The Author)

Table 4.17 above shows that there were some relative differences in the Means and Standard Deviations of the two genders involved in the study: for male students (M = 3.31, SD = 0.58), and for female (M = 3.37, SD = 0.63). However, the main issue at this level is to test whether the differences are significant between the genders. The t-test of the differences between male and female is presented in table 4.18 below.

Table 4. 15: Analysis of the effect of students' attitude towards computer-assisted assessment by gender

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	p
Students' attitude towards computer-assisted assessment	Equal variances assumed	,135	,713	-1,018	358	,309
	Equal variances not assumed			-1,022	358	,307

Source (The Author)

The results show that, on the average, reported variability of students' attitude towards computer-assisted assessment in the study is not significantly different for Male students (M = 3.31, SD = 0.58) than for Female students (M = 3.37, SD = 0.63), t (358)= -1.02, p>0.05.

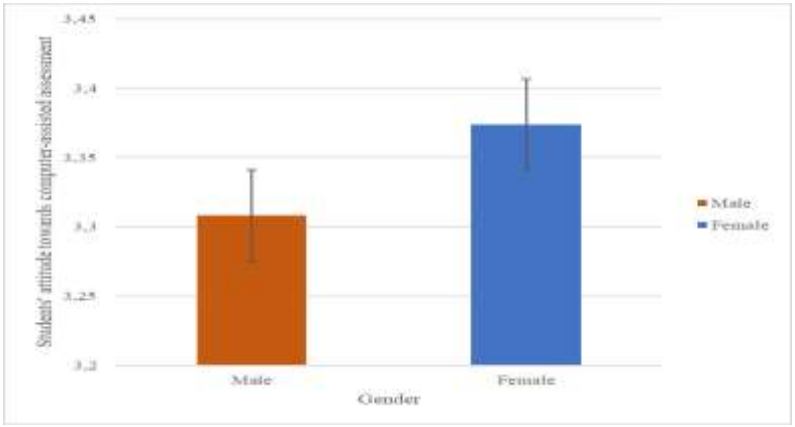


Figure 4. 6: Bar chart of the variability of students' attitude towards computer-assisted assessment by gender

The overall analysis as it is shown in figure 4.11, displays a non-significant difference in the attitude towards computer-assisted assessment for male students and female students (p>0); meaning that, though the students' attitude towards computer-assisted assessment is different in the two groups, the difference remains non-significant. So it can be concluded that, the gender of the student does not affect their attitude towards computer-assisted assessment.

4.3.3. Variability of students' attitude towards computer-assisted assessment by possession of computer

We want to see if students' students' attitude towards computer-assisted assessment varies according to their possession of computer. In other terms, we will be addressing the question that, does the students' attitude towards computer-assisted assessment differ between students according to their possession of computer? Since this is a case of comparison of many means, we will use the t-test as shown in the table 4.20 below.

Table 4. 16: Description of students' attitude towards computer-assisted assessment by possession of computer

	Possession of computer	N	Mean	Std. Deviation	Std. Error Mean
Students' attitude towards computer-assisted assessment	Yes	243	3,3452	,61385	,03938
	No	117	3,3365	,60450	,05589

Source (The Author)

Table 4.19 above shows that, there are some relative differences in the Means and Standard Deviations of the possession of computer involved in the study. The test of the differences between the possession of computer is presented in table 4.20 below.

Table 4. 17: Analysis of the effect of students' attitude towards computer-assisted assessment by possession of computer

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	p
Students' attitude towards computer-assisted assessment	Equal variances assumed	,000	,983	,125	358	,900
	Equal variances not assumed			,126	233	,900

Source (The Author)

The analysis of variances as shown in table 4.20 above reveals that having a possession of computer, does not affect the students' attitude towards computer-assisted assessment in a

significant way as shown in the results of this study, t (358) = .125, p > 0.05.

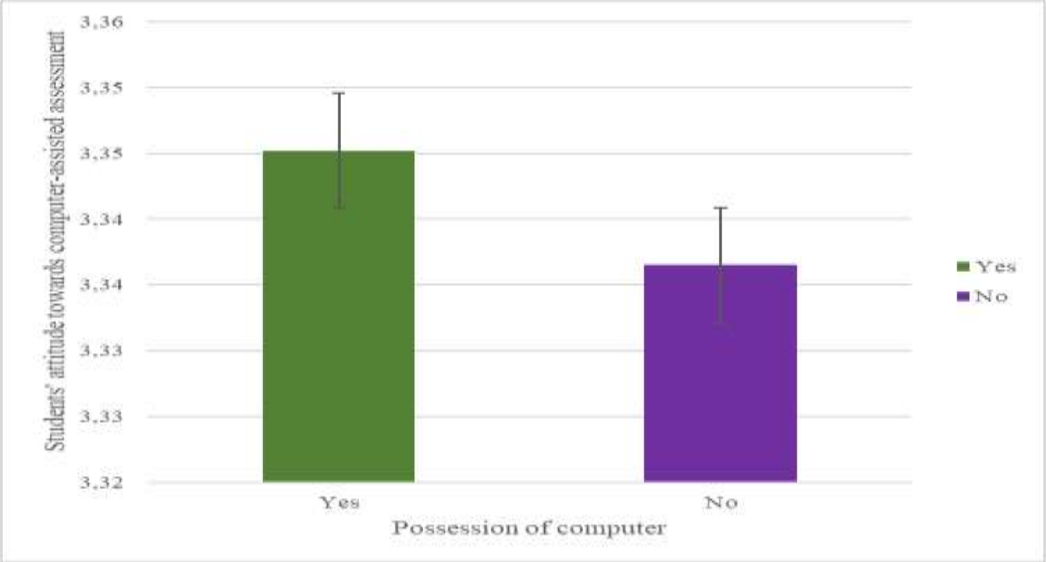


Figure 4. 7: Graph on the variability of students' attitude towards computer-assisted assessment by possession of computer

The overall analysis as illustrated in figure 4.12, revealed a non-significant difference in students' attitude towards computer-assisted assessment for the possession of computer, t(358) = .125, p > 0.05; meaning that, students' attitude towards computer-assisted assessment is not significantly influenced by their possession of computer.

4.3.4. Variability of students' attitude towards computer-assisted assessment by academic level

We want to see if students' students' attitude towards computer-assisted assessment varies by the academic level. In other terms, does students' attitude towards computer-assisted assessment differ across the academic level? So we will compare the students' attitude towards computer-assisted assessment by using the t-test as shown in the table below.

Table 4. 18: Description of students' attitude towards computer-assisted assessment by academic level

	Academic level	N	Mean	Std. Deviation	Std. Error Mean
Students' attitude towards computer-assisted assessment	Level Two	110	3,3795	,56916	,05427
	Level Three	250	3,3260	,62753	,03969

Source (The Author)

Table 4.21 above shows that, there are some relative differences in the Means and Standard

Deviations of level two students (M = 3.38, SD = 0.57) and level three students (M = 3.33, SD = 0.63). However, the main issue at this level is to test whether the differences are significant between the different groups of students. Since this is a case of comparison of two means, we are going to use the t-test as shown on table 4.22.

Table 4. 19: Analysis of the effect students' attitude towards computer-assisted assessment by academic level

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	p
Students' attitude towards computer-assisted assessment	Equal variances assumed	,014	,905	,767	358	,444
	Equal variances not assumed			,796	228	,427

Source (The Author)

The results show that, on the average, reported variability of students' attitude towards computer-assisted assessment in the study is not significantly different for level two students (M = 3.38, SD = 0.57) than for level three students M = 3.33, SD = 0.63), t (358) = 0.767, p>0.05.

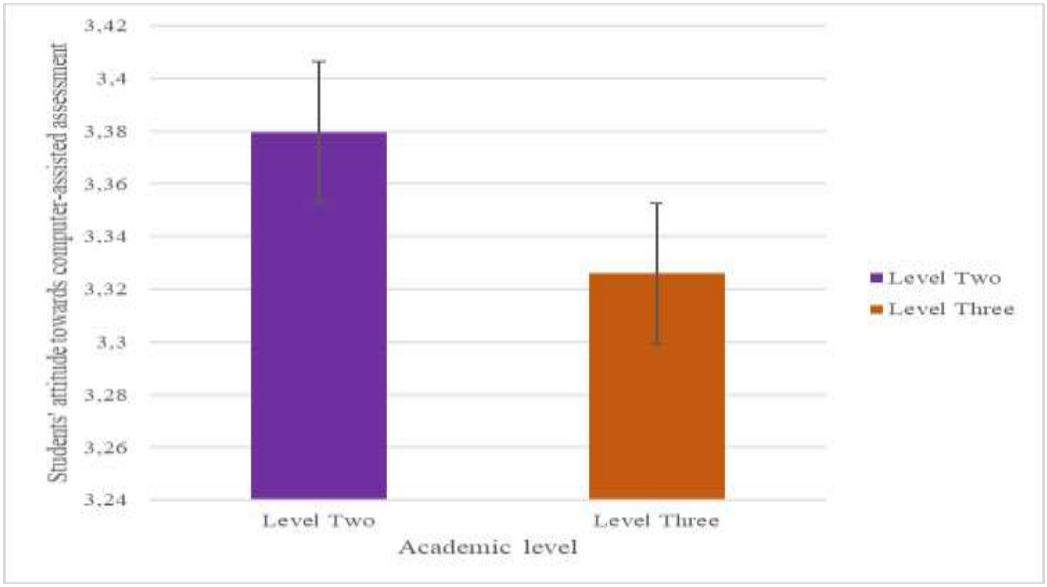


Figure 4. 8: Bar chart of the variability of students' attitude towards computer-assisted assessment by academic level

The overall analysis as seen on figure 4.13, displays a non-significant difference in the students' attitude towards computer-assisted assessment for level two students and level three students (p>0.05); meaning that, though the students' attitude towards computer-assisted assessment is different in the two groups, the difference remains non-significant. So it can be

concluded that, the academic level does not affect the attitude towards computer-assisted assessment among students.

4.3.5. Variability of students' attitude towards computer-assisted assessment by first official language

We want to see if students' attitude towards computer-assisted assessment varies by first official language. We are addressing the question that, does the students' attitude towards computer-assisted assessment differ across the first official language? So we are comparing the attitude towards computer-assisted assessment of the two groups by using the t-test as shown in the table below.

Table 4. 20: Description of students' attitude towards computer-assisted assessment by language

	First official language	N	Mean	Std. Deviation	Std. Error Mean
Students' attitude towards computer-assisted assessment	French	232	3,3384	,60145	,03949
	English	128	3,3496	,62753	,05547

Source (The Author)

Table 4.23 above shows that there are some relative differences in the Means and Standard Deviations of the various classes involved in the study: French (M = 3.33, SD = 0.60) and English (M = 3.35, SD = 0.63). The test of the difference of the attitude towards computer-assisted assessment between these classes is presented in table 4.24 below.

Table 4. 21: Analysis of the effect of students' attitude towards computer-assisted assessment by first official language

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	p
Students' attitude towards computer-assisted assessment	Equal variances assumed	,045	,832	-,167	358	,434
	Equal variances not assumed			-,165	252	,434

Source (The Author)

The analysis of variances as shown in table 4.24 above reveals that being a student of a particular class, does not affect students' attitude towards computer-assisted assessment in a significant way as shown in the results of this study, $t(358) = -0.167$, $p > 0.05$.

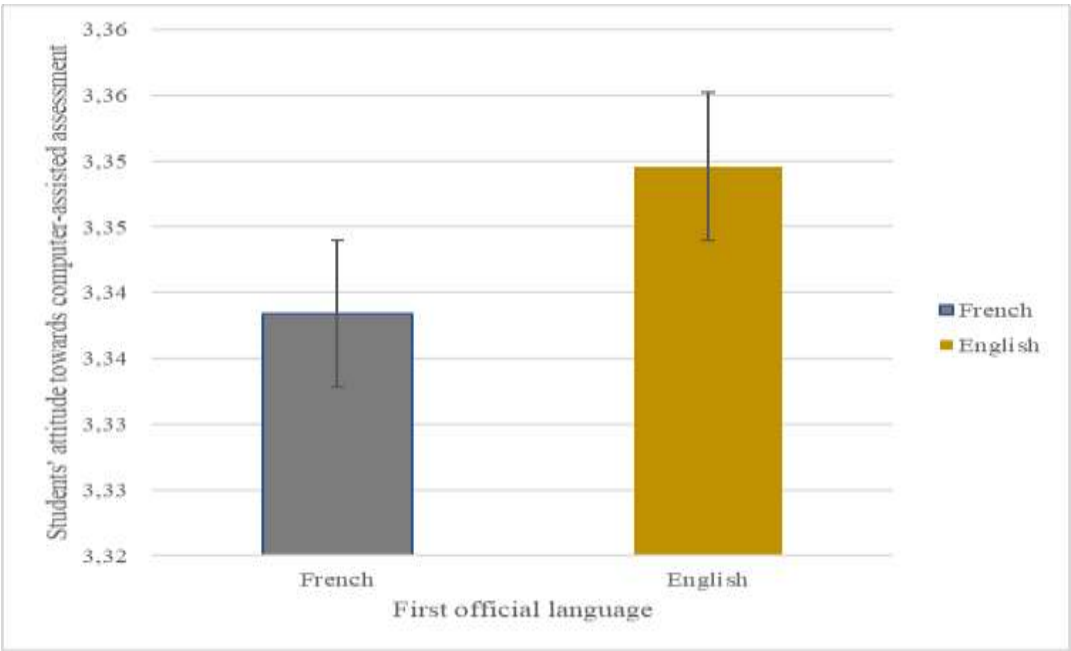


Figure 4. 9: Graph on the variability of students' attitude towards computer-assisted assessment by language

The overall analysis as illustrated in figure 4.14, reveals a non-significant difference in students' attitude towards computer-assisted assessment for the different language, $t(358) = -0.167$, $p > 0.05$; meaning that, though the attitude towards computer-assisted assessment is different in the various groups, the difference remains non-significant. So it can be concluded that, the first language spoken by the student does not affect their attitude towards computer-assisted assessment.

4.3.6. Variability of students' attitude towards computer-assisted assessment by age

We want to examine the variability of students' attitude towards computer-assisted assessment across the age category of the respondent. We are addressing the question that, does the attitude towards computer-assisted assessment differ according to the age category of the student? Since this is a case of comparison of many means, we have used a univariate analysis of variance to assess the variability of attitude towards computer-assisted assessment across the age category.

Table 4. 22: Description of students' attitude towards computer-assisted assessment by age

	N	Mean	Std. Deviation	Std. Error
< 21 years	144	3,3724	,68185	,05682
21-25 years	156	3,2925	,55240	,04423
26-30 years	60	3,4000	,56879	,07343
Total	360	3,3424	,61000	,03215

Source (The Author)

Table 4.25 above shows that there were some relative differences in the Means and Standard Deviations of the various classes involved in the study: Less than 21 years (M = 3.37, SD = 0.68), 21-30 years (M = 3.29, SD = 0.55) and 26-30 years (M = 3.40, SD = 0.57). The test of the difference of the attitude towards computer-assisted assessment between these age categories is presented in table 4.26 below.

Table 4. 23*: Analysis of the effect of the attitude towards computer-assisted assessment by age*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,718	2	,359	,964	,382
Within Groups	132,868	357	,372		
Total	133,585	359			

Source (The Author)

The analysis of variances as shown in table 4.26 above reveals that, the age categories does not affect the attitude towards computer-assisted assessment in a significant way as shown in the results of this study, F (2, 357) = 0.964, p>0.5.

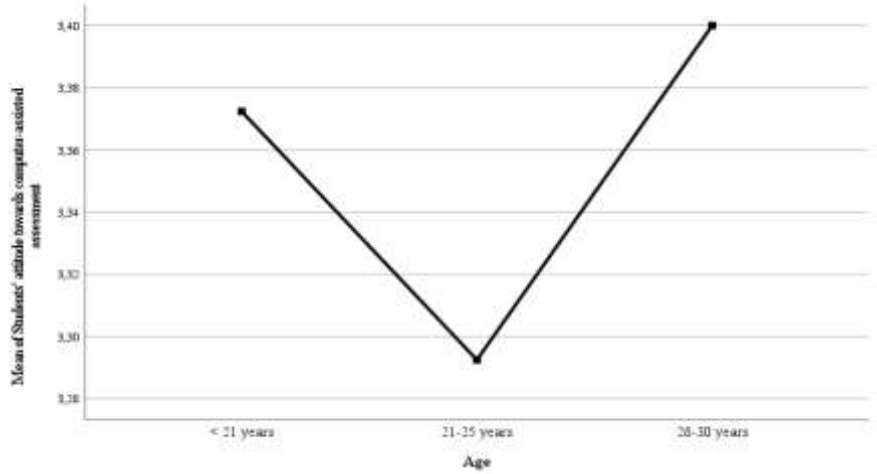


Figure 4. 10: Graph on the variability of students' attitude towards computer-assisted assessment by age

The overall analysis as illustrated in figure 4.15, reveals a non-significant difference in students' attitude towards computer-assisted assessment for the different classes, F (2, 357) = 0.96, p>0.5; meaning that, though the attitude towards computer-assisted assessment is different in the various groups, the difference remains non-significant. So it can be concluded that, the age category of the students does not affect their attitude towards computer-assisted

assessment.

4.4. VERIFICATION OF RESEARCH HYPOTHESES

This section deals with the verification of our research hypotheses. As a statistical tool, the Pearson correlation coefficient is used to test our research hypotheses. Also, we have used multiple regressions to assess the predictive nature of perception of testing practices on students' attitude towards computer-assisted assessment. The statistical processing of the data is done through the SPSS software (SPSS 28.0 for Window) as shown in table 4.27 below.

Table 4. 24: Means, standard deviation and correlations between our study variables

		1	2	3	4	5
1	Perceive usefulness	1				
2	Perceive ease of use	,174***	1			
3	Facilitating conditions	,151**	,02	1		
4	Technology anxiety	,04	-,06	,48***	1	
5	Students' attitude towards computer-assisted assessment	,860***	,362***	,166**	,112*	1
Mean		3,63	3,13	2,59	2,73	3,34
Standard Deviation		,76	,59	,49	,55	,61
Note : N = 360 ; df = 358 ; * = p<0.05 ; ** = p<0.01 ; *** = p<0.001						

Source (The Author)

Table 4.27 above displays the correlation matrix of our study variables. The results shows major's strong correlations between our study variables, namely between the independent variables (Perceived usefulness, Perceived ease of use, Facilitating conditions, Technology anxiety) and the dependent variable (attitude towards computer-assisted assessment).

4.4.1. Perceived usefulness and attitude towards computer-assisted assessment (RH1)

Perceived usefulness plays a key role in the attitude towards computer-assisted assessment in students. That is why the first research hypothesis (RH1) claims that, there is a significant relationship between perceived usefulness and attitude towards computer-assisted assessment. The shape of scatter plot in figure 4.16 displays the direction of the relationship showing the relationship between perceived usefulness and attitude towards computer-assisted assessment.

Table 4. 25: The correlation between perceived usefulness and attitude towards computer-assisted assessment

		Perceive usefulness	Students' attitude towards computer-assisted assessment
Perceive usefulness	Pearson Correlation	1	,860**
	Sig. (2-tailed)		<,001
	N	360	360
Students' attitude towards computer-assisted assessment	Pearson Correlation	,860**	1
	Sig. (2-tailed)	<,001	
	N	360	360
Note : N = 360 ; df = 258 ; *** = p<0.001			

The results have shown that there is a significant positive correlation between perceived usefulness and attitude towards computer-assisted assessment, r (358) = .860; ($p < .001$). From this result, we can conclude that, perceived usefulness significantly influences the attitude towards computer-assisted assessment. This test-value gives a coefficient of determination of 0.74, meaning that 74% of the variability of students' attitude towards computer-assisted assessment is explained by perceived usefulness.

4.4.2. Perceived ease of use and attitude towards computer-assisted assessment (RH2)

Perceived ease of use has a great influence on students' attitude towards computer-assisted assessment. That is why, the second research hypothesis (RH2) claims that, there is a significant relationship between perceived ease of use and attitude towards computer-assisted assessment. The shape of scatter plot in figure 4.17 displays the direction of the relationship showing the relationship between perceived ease of use and attitude towards computer-assisted assessment.

Table 4. 26: Correlation between perceived ease of use and attitude towards computer-assisted assessment

		Perceive ease of use	Students' attitude towards computer-assisted assessment
Perceive ease of use	Pearson Correlation	1	,362***
	Sig. (2-tailed)		<,001
	N	360	360
Students' attitude towards computer-assisted assessment	Pearson Correlation	,362***	1
	Sig. (2-tailed)	<,001	
	N	360	360
Note : N = 360 ; df = 258 ; *** = p<0.001			

The results have shown that, there is a significant positive correlation between perceived ease of use and attitude towards computer-assisted assessment, r(358) =.360, (p < .001). From this result we can conclude that, perceived ease of use significantly influences the attitude towards computer-assisted assessment. This test-value gives a coefficient of determination of .13, meaning that 13% of the variability of students' attitude towards computer-assisted assessment is explained by perceived ease of use.

4.4.3. Facilitating conditions and attitude towards computer-assisted assessment (RH3)

The third research hypothesis (RH3) claims that there is a significant relationship between facilitating conditions and attitude towards computer-assisted assessment. The shape of scatter plot in figure 4.18 displays the direction of the relationship showing the relationship between Facilitating conditions and attitude towards computer-assisted assessment.

Table 4. 27: Correlation between facilitating conditions and attitude towards computer-assisted assessment

		Facilitating conditions	Students' attitude towards computer-assisted assessment
Facilitating conditions	Pearson Correlation	1	,166**
	Sig. (2-tailed)		,002
	N	360	360
Students' attitude towards computer-assisted assessment	Pearson Correlation	,166**	1
	Sig. (2-tailed)	,002	
	N	360	360
Note : N = 360 ; df = 258 ; ** = p<0.01			

The results have shown that, there is a significant positive correlation between facilitating conditions and attitude towards computer-assisted assessment, r(358) = .166, (p = .002). From this result, we can conclude that, facilitating conditions and attitude towards computer-assisted assessment. This test-value gives a coefficient of determination of 0.028, meaning that 2.8% of the variability of students' attitude towards computer-assisted assessment is explained by facilitating conditions.

4.4.4. Technology anxiety and attitude towards computer-assisted assessment (RH4)

Technology anxiety have a great influence on students' achievement. That is why the fourth research hypothesis (RH4) claims that, technology anxiety significantly influences students' attitude towards computer-assisted assessment. The shape of scatter plot in figure 4.19 displays the direction of the relationship showing the relationship between technology anxiety significantly influence students' attitude towards computer-assisted assessment.

Table 4. 28: Correlation between technology anxiety and students' attitude towards computer-assisted assessment

		Technology anxiety	Students' attitude towards computer-assisted assessment
Technology anxiety	Pearson Correlation	1	,112*
	Sig. (2-tailed)		,034
	N	360	360
Students' attitude towards computer-assisted assessment	Pearson Correlation	,112*	1
	Sig. (2-tailed)	,034	
	N	360	360
Note : N = 360 ; df = 258 ; * = p<0.05			

The results have shown that there is a significant positive correlation between technology anxiety and students' attitude towards computer-assisted assessment, r (358) = .112, ($p < .05$). From this result, we can conclude that, technology anxiety significantly correlates the students' attitude towards computer-assisted assessment. This test-value gives a coefficient of determination of .012, meaning that 1.21% of the variability of students' attitude towards computer-assisted assessment is explained by technology anxiety.

4.4.5. Prediction of students' attitude towards computer-assisted assessment

Several authors have emphasized the importance of assessment for students and have investigated factors for improving students' attitude towards computer-assisted assessment. In that light, much research has been carried out to predict students' attitude towards computer-assisted assessment. After a multiple hierarchical regression analysis, we consider now the parameters of the model for students' attitude towards computer-assisted assessment.

In the first model, R2=.74. This implies that the predictor variable (perceive usefulness)

accounts for 74% of the variability of students' attitude towards computer-assisted assessment. Then, the second model displays, a ΔR^2 =.78. This implies that the predictor variable (perceive usefulness and perceive ease of use) account for 78% of the variability of students' attitude towards computer-assisted assessment. But the third model is the better one, because ΔR^2 =.79. This implies that, the predictor variable (perceive usefulness, perceive ease of use and technology anxiety) account for 79% of the variability of students' attitude towards computer-assisted assessment. Thus, the third model is a better predictor of students' attitude towards computer-assisted assessment. The table 4.28 below presents b-value estimates. These values indicate the individual contribution of each predictor to the model.

Table 4. 29: Coefficients of the regression model for students' attitude towards computer-assisted assessment

Model		***B***	***Std. Error***	***Beta***	***R^2***	***ΔR^2***
1	*(Constant)*	,848	,080		,740***	,740***
	Perceive usefulness	,688	,022	,860		
2	*(Constant)*	,259	,099		,786***	,046***
	Perceive usefulness	,657	,020	,822		
	Perceive ease of use	,224	,025	,219		
3	*(Constant)*	-,029	,122		,793***	,009***
	Perceive usefulness	,654	,020	,817		
	Perceive ease of use	,230	,025	,225		
	Technology anxiety	,103	,027	,093		
Note : N = 360 ; *** = p<0.001						
Dependent Variable: Students' attitude towards computer-assisted assessment						

Source (The Author)

Perceive usefulness significantly predicts students' attitude towards computer-assisted assessment, β = .82, t (358) = 33.49, p<.001, and perceive ease of use significantly predicts students' attitude towards computer-assisted assessment, β = .22, t (358) = 9.19, p < .001. Technology anxiety significantly predict students' attitude towards computer-assisted assessment, β = .09, t (358) = 3.85, p<.001. It means that these predictor variables (perceived usefulness, perceived ease of use, technology anxiety) interact together to relatively and substantively predict students' attitude towards computer-assisted assessment.

The main purpose in this chapter is to present the results of the data that were collected from

the field. The various modalities have been presented according to their degree of occurrences and percentages. Then the hypotheses were tested. The results show that, self-regulated learning significantly correlates with students' attitude towards computer-assisted assessment, as the general hypothesis of our work stipulates. The above results will be discussed in the next chapter

CHAPTER V
DISCUSSION OF FINDINGS, IMPLICATIONS, RECOMMENDATIONS, SUGGESTIONS AND CONCLUSIONS

5.0. INTRODUCTION

The objective of this study is to investigate the impact of self-regulated learning strategies on students' attitude towards computer-assisted assessment in higher institution of learning. The main research instrument used for this investigation are the questionnaire. Four research hypotheses were formulated alongside research questions to guide the investigations. The data collected was analysed using the one-way analysis of variance (ANOVA), the independent sample student t-tests, the Pearson correlation coefficient and the Stepwise multiple regression. After the verification of hypotheses, all our research hypotheses were confirmed. In this chapter, we shall interpret and discuss the findings in relation to the hypotheses, objectives and the views or findings of some authors. From this interpretation and discussion of findings, the researcher shall make her conclusion and provide some recommendations as well as suggestion for future research on the studied phenomenon. The chapter shall equally elaborate the limitations of the study.

5.1. SUMMARY OF FINDINGS

From the analysis and interpretation of data in the preceding chapter, the researcher arrived at the following findings:

Looking at the demographic characteristics of the respondents, no significant variation was found to exist in students' attitude towards computer-assisted assessment between the students of the various characteristics. This is an indication that, no characteristic has a significant effect on students' attitude towards computer-assisted assessment.

Considering the different departments that were involved in the study and the gender, there are some relative differences in the means and standard deviations of the various schools, gender involved in the study, class level and age category. The overall analysis reveals a non-significant effect of department on students' attitude towards computer-assisted assessment. Meaning that, students' attitude towards computer-assisted assessment is not significantly affected by their department. Likewise, the results show that, on the average the variability of students' attitude towards computer-assisted assessment in the study is not significantly

different for male and female students meaning that, the gender of the student does not affect students' attitude towards computer-assisted assessment.

Also, the results show that, on the average the variability of students' attitude towards computer-assisted assessment in the study is not significantly different for academic level, meaning that, the level of the student does not affect their attitude towards computer-assisted assessment. Similarly, the results show that, on the average, the variability of students' attitude towards computer-assisted assessment in the study is not significantly different for their age category, meaning that, the age category of the student does not affect their attitude towards computer-assisted assessment.

Looking at the different research hypotheses, with respect to the independent variable and the dependent variable, the results show major strong correlations between our study variables, namely, between the independent variables (Perceived usefulness, Perceived ease of use, Facilitating conditions, Technology anxiety) and the dependent variable (students' attitude towards computer-assisted assessment). The results obtained were as follows:

- There is a significant correlation between perceived usefulness and students' attitude towards computer-assisted assessment, $r(358) = 0.860$, ($p < 0.001$).
- There is a non-significant correlation between perceived ease of use and students' attitude towards computer-assisted assessment, $r(358) = 0.360$, ($p > 0.05$).
- There is a significant correlation between facilitating conditions and students' attitude towards computer-assisted assessment, $r(358) = 0.166$, ($p < .01$).
- There is a significant correlation between technology anxiety and students' attitude towards computer-assisted assessment, $r(358) = 0.112$, ($p < .05$).

Judging from the results gotten and with the verified hypotheses, it is with certainty that the researcher summarily affirms to a certain extent that there is a significant relation between perception of testing practices on students' attitude towards computer-assisted assessment.

5.2. DISCUSSION OF FINDINGS

The discussion of the findings is based on the hypotheses stated above. These discussions are as follows;

5.2.1. Perceived usefulness and students' attitude towards computer-assisted assessment

Our first research hypothesis aimed at determining the relation that exists between perceived usefulness and students' attitude towards computer-assisted assessment. From the analysis, 74.00% of the variability of students' attitude towards computer-assisted assessment is explained by perceived usefulness.

The positive direction of the relationship signifies that, perceived usefulness and students' attitude towards computer-assisted assessment increase in the same direction. This implies that, for students' attitude towards computer-assisted assessment to be positive, students should perceive the usefulness of computer-assisted assessment for their academic and professional life. The correlation coefficient is positively significant with $r(358) = 0.74$, ($p < 0.001$). Therefore, an increase in perceived usefulness will lead to an increase in the level of students' attitude towards computer-assisted assessment.

In that light, judging by the magnitude of coefficient, this study found that PU (with the coefficient of 0.860) had a much greater influence on students' attitude towards computer-assisted assessment, which meant users were much more concerned about the usefulness of the computer-assisted assessment system than the easiness of using the CAA system (Maqableh & Mohammed, 2015). This was a bit different from the findings of Davis, as the impact of PU was found only a little higher than PEOU in that study (Davis, 1989). The enhancement of the importance of PU may be due to the actual circumstance when this study was undertaken. Because of the outbreak of COVID-19, students tended to highly weigh the functionality of the electronic assessment system (EAS) and less care the effortless of using the EAS. Thus, the result showed that, students were concerned less about the difficulties of using the EAS as they had the confidence to manage the new system and were willing to use it if it can bring them benefits through its functionality.

The above statements were further supported by the coefficient of variables. Therefore, it could be deduced that the main reason for student's attitude of using CAA was due to its capability of providing convenient equipment or facility to arrange assessment amid the epidemic instead of 'disliking' the paper-based assessment. In addition, it could be noticed from coefficients, that students believed both the university and themselves would be quite well-prepared for the implementation of EAS. Although a student might just treat the conventional user manual as an additional supporting measure as they perceived the real-time

online assistant to be more valuable. The coefficient of PU showed that students did acknowledge the value of EAS on teaching & learning improvement although this element was in a less important position.

5.2.2. Perceived ease of use and students' attitude towards computer-assisted assessment

Our second research hypothesis sought to assess the influence of perceived ease of use and students' attitude towards computer-assisted assessment. Judging from the collected and analysed data, it is realized that, perceived ease of use does correlate with perceived usefulness and students' attitude towards computer-assisted assessment, $r(358) = 0.360$, ($p < 0.001$). These results signify that, perceived ease of use does have an impact on perceived usefulness and students' attitude towards computer-assisted assessment.

The identified positive relationship between PEOU and students' attitude towards computer-assisted assessment was aligned with previous research (Venkatesh, V., Davis, F. D., & College, 2000; Park et al., 2009; Parshall, 2002). This positive effect further supported the finding that students cared more about the functionalities of the EAS instead of the efforts they perceived when shifting from paper-based assessment to e-assessment. This means, in the users' aspect, they were driven to adopt a new system primarily due to the functions accompanied by the system, in addition, the effortlessness on achieving those functions would further enhance their willingness to adopt the new system. In the scope of this study, students were willing to face some sort of difficulties for the new application of EAS on the premise that PU had been perceived by them. In the contrast, although difficulties may hinder students' adoption intention to some extent, no amount of PEOU can compensate students for the functional disability of the EAS. Students' expectations on the functions of EAS had been enlarged due to the outbreak of COVID-19 as this new form of assessment not only boosted their learning experience, but also provide some sort of health protection amid the pandemic. Thus, during the design and development stage of EAS, project managers should avoid overemphasizing the ease of use while the principal focus should be the functions of the system, especially under the circumstance of the COVID-19 pandemic. Furthermore, PU of EAS, instead of PEOU of the system, should be the focal point when launching promotions for this new ICT application.

Also, a result of this study indicates that students' perceptions about the ease-of-use of CAA can determine their attitude about the usefulness of CAA. Similar result was obtained in the

studies by Davis (1989) and Nikou & Economides (2013). This result means that if students find it easy to use a CAA software, then they regard such CAA as useful. Moreover, the correlation test conducted in this study (Table 4.29) between perceived ease-of-use and perceived usefulness ($p < 0.001$) indicates that the easier it is for students to undertake CAA, the more useful they think CAA is.

Furthermore, the results of this study indicate that students' attitude about the ease-of-use of a CAA can determine their intentions to undertake CAA frequently or in the future. Similar results were obtained in the studies by Seidelman (2014), Jimoh et al. (2011), Nikou & Economides (2013) and Maqableh & Mohammed (2015).

5.2.3. Facilitating conditions and students' attitude towards computer-assisted assessment

The third research hypothesis sought to answer whether facilitating conditions significantly correlate with students' attitude towards computer-assisted assessment as well as the level of awareness of students of this aspect on their academic studies. This hypothesis is supported by the correlational and regression analyses. From research findings presented in the previous chapter, facilitating conditions positively correlated with students' attitude towards computer-assisted assessment, $r (369) = 0.166$, ($p < .01$). With the test-value giving a coefficient of determination of 0.028, this means that 2.80% of the variability of students' attitude towards computer-assisted assessment is explained by facilitating conditions.

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 indicated that the university provides them with human and technical resources when undertaking CAA. 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 CAA so as to offer help and support to the students. Furthermore, students indicated that CAA contains a help menu. This conforms with one of the principles of "a usable and easy-to-use CAA system" which state that there must be a help menu in a CAA (Hakkinen, 2015). Also, with the presence of a help menu, students might not have a hard time interacting with the CAA even if there is no staff member present.

The results of this study, as well as the studies by Seidelman. (2014) and Nikou and Economides (2013), showed that significant relationships exist ($p < 0.05$) between

"facilitating conditions" and the "perceived ease-of-use of CAA" (Table 4.30). This relationship means that, the existence of facilitating conditions influences (positively) the perceptions of students about the ease of use of CAA. For instance, if there is a staff or a help menu in the CAA, then students would find it easy to understand how to carry out some basic tasks in the CAA.

Furthermore, the presence of CAA trainings/tutorials is another form of facilitating condition, because it helps students to easily understand how the CAA works before undertaking CAA (Fry, H., Ketteridge, S., & Marshall, 2004). In this study, students indicated that there are no trainings/tutorials on how to undertake a CAA prior to the actual assessment. This result is contrary to one of the best practices for implementing CAA, as recommended by Fldoe (2015). The author recommends that, students undertaking CAA should be trained by the technical or support staff on how to interact with the CAA before undertaking the CAA. Also, students should be given a short tutorial on how to interact with the CAA in the assessment venue, just before the assessment starts.

5.2.4. Technology anxiety and students' attitude towards computer-assisted assessment

The third research hypothesis sought to answer whether technology anxiety significantly influence students' attitude towards computer-assisted assessment. This hypothesis is supported by the correlational and regression analyses. From research findings presented in the previous chapter, technology anxiety positively correlated with students' attitude towards computer-assisted assessment wherein, $r(358) = 0.110$, ($p < .05$). With the test-value giving a coefficient of determination of 0.011, this means that 1.10% of the variability of students' attitude towards computer-assisted assessment is explained by technology anxiety.

The results obtained in this study showed that students do experience challenges when undertaking CAA. It is important to note that most of the students who indicated that they experience challenges when undertaking CAA 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 CAA (Demirci, 2007).

As obtained in this study, the most common challenge experienced by students when undertaking CAA is Internet connectivity. 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.

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 (McDonald, 2002). For instance, in the study by Kozma (2009), it was shown that students' performances in a CAA dropped due to a downtime in Internet connection caused by the absence of appropriate bandwidth required to transmit Internet connection signals.

The results of this study, as also obtained in the studies by Taras (2005) and Thompson et al. (2009), showed that, the presentation of items on the screen is a challenge experienced by students when undertaking CAA. 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 CAA. The items presented in a CAA 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.

Another challenge students experience when undertaking CAA is the use of unfamiliar terms, icons or symbols within a CAA. 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 CAA. In this study, students indicated that, sometimes, it takes time for them to clearly understand what certain terms, icons or symbols represent when undertaking CAA. According to Harms and Adams (2008), terms or symbols used in CAA 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 CAA (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) and Mercedes & al. (2012). 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 Rollings-Carter. (2010), 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; Jeong, 2012).

Students indicated that the time allocated for undertaking CAA is insufficient. Similarly, in the studies by Liu (2012) and Young (2015), students indicated that they need more time to complete CAA. 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 CAA. 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 CAA (Noyes & Garland, 2008). Furthermore, Apostolou et al. (2009) stated that some students find it difficult to finish CAA 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 CAA that delay them, then they might require more time to complete the CAA.

5.3. THEORETICAL AND PROFESSIONAL IMPLICATIONS

A frequently recurring theme in educational psychology for educators is to help students succeed academically. Considerable research has been directed towards understanding testing strategies to adequately measure students' learning and achievement. A review of current literature reveals that, high education students today are struggling to adapt to growing assessment strategies due to new era of digitalization in education.

The TAM model indicated that students' attitude evolved in a changing environment. The results of the EAS model revealed that although students' behavioral acceptance towards a novel ICT application align with the traditional TAM model to some extent, new observations were found under new conditions. The study showed that students' perception of values, as well as their preference, evolved as the surrounding environment changed. The reasons for this evolvement could be complicated, for example, the diminishing impact of influential people may be due to the development of ICT and raising the influential power of social media. However, this evolvement needed to be examined and understood as it would affect

the successful implementation of a new CAA application. Thus, factors of the past studies should be re-examined to fit into the present circumstance, and more importantly, new factors addressing the significant change of environmental conditions should also be considered and investigated when formulating a new model. The findings of this study suggested students' attitude would change remarkably during crucial or critical circumstances, and the influence of the new environmental factors could surpass other important factors in normal circumstances.

Electronic testing in students' opinions is important because they save time, are easier to correct, are easier to use, give immediate feedback (grades), make students feel less anxious and more comfortable, and require less physical effort. However, e-tests are not to replace paper-and-pencil tests but rather be used in addition to them. Since Sorensen (2013) stated that when students were subjected to e-tests along with paper-and-pencil tests, they had positive attitudes towards e-tests; however, when they were given only e-tests their attitudes were negative (Rollings-Carter, 2010). The researchers thus recommend that instructors in this specific university who are not using e-tests to use them because students have positive attitudes towards them. Instructors are encouraged to take into consideration all the causes that make students feel uncomfortable or hesitant while taking e-tests. They need to control for all these factors, such as: making room for students to explain their answers and how they got to them (higher order thinking), making sure students feel more at ease and less anxious while solving e-tests, and trying to minimize technology-related problems by having IT experts on cite when the students are taking e-tests.

5.4. LIMITATIONS AND SUGGESTIONS FOR FURTHER STUDIES

Findings of this study have implications for informing students and educational stakeholders on how to better manage the testing practices that have emerge in most of our public and private universities and have negatively played on the smooth flow of educational activities and students' academic achievements. With this study targeting higher education institutions, there is a need to exercise caution when generalizing the findings of this study to other institutions.

In addition, the current study relied solely on self-report measures, specifically a questionnaire, for the collection of data. Employing just the quantitative research design, the dependability of these research findings is limited to an extent. In order to fix these

limitations, future research should include other higher institution types, for its findings to be generalized at its utmost.

In addition, the use of a mix method in collecting useful data, if applied in future studies still in this light, will improve on the quality and pertinence of the research findings.

It may also be valuable in future research designs to obtain more demographic information regarding socioeconomic status, parental occupation, peer influence, the role of teachers and guidance counsellors, language spoken at home, social support networks, parental status and religion. This information could provide greater clarity regarding the myriad or bulk of variables that contribute to or influence students' development of critical thinking skills and academic achievements.

Longitudinal research designs would also help to better assess the influence of perception of testing strategies on students' attitude towards computer-assisted assessment in higher education institutions.

In addition, incorporation of a mixed research design can help to further illuminate the unique influence of perception of testing strategies on students' attitude towards computer-assisted assessment in higher education institutions.

5.5. RECOMMENDATIONS

Educational stakeholders should come out with a text clearly defining the strategies that should be used within university settings to improve students' perception of testing strategies and enhance students' attitude towards computer-assisted assessment in higher education institutions. Also, parents and all those directly or indirectly involved with education should be called to the important role they have to play as far as students' attitude towards computer-assisted assessment in higher education institutions.

The first recommendation is that; providing faculty members and undergraduates at The university of Yaoundé I with courses about the way of using e-exam systems. Such courses must also promote knowledge about the significance of e-exam. Developing strategies by the Ministry of Higher Education for promoting knowledge about the significance of using e-exam as an assessment method in Cameroonian universities. More specifically, Providing Cameroonian universities with funds by the Ministry of Higher Education to procure adequate ICT tools and the latest software. Conducting similar studies with investigating the

relationship between such attitudes from one hand and academic performance and gender from another hand Increasing the number of computer labs at Cameroonian universities.

The second recommendation is that, teachers should intentionally monitor and enhance students' self-regulation. Monitoring and enhancing students' motivation and engagement is an important skill, but these are also difficult responsibilities for teachers to fulfill on a reliable basis. They need to be intentional in their effort to help their students become self-regulated learner. Monitoring students' motivation and self-regulation is difficult not only because classrooms are large, fluid, and diverse environments but also because motivation is a private, subjective, and unobservable student experience. That is, teachers cannot objectively see their students underlying psychological need satisfaction, self-efficacy, interest, goal orientation, etc. The instructional task of monitoring what is unobservable and only privately experienced (i.e., student motivation) would seem overly difficult. In contrast to motivation, however, student self-regulation is a relatively objective, and observable event that can be track through pertinent indicators. That is, teachers can see whether or not a student is paying attention, putting forth effort, enjoying class, analysing and solving problems in a sophisticated way, and contributing constructively into the flow of instruction. The instructional task of monitoring what is observable and publicly expressed (i.e., student self-regulation) would seem possible.

The knowledge of students' perceptions and attitudes about CAA by academic institutions has been regarded as one of the important factors to be considered before administering CAA. When academic institutions know what and how students feel about CAA, it enables them (academic institutions to know the right and fair way of administering CAA. As seen in the results of this study, the presence of facilitating conditions during the administration of CAA often has an effect on the performance of students in a CAA. Thus, academic institutions are advised to provide both technical and human support to students at all times when CAA is being undertaken. Also, academic institutions should organise training and tutorial sessions for students before the commencement of a CAA. This would help students who are unfamiliar with computers. Furthermore, when academic institutions are faced with challenges affecting students during the implementation of CAA.

Some results obtained in this study can be beneficial to the developers of CAA 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 CAA software. For instance, students indicated that the use of mouse-scrolling features in CAA 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 CAA. Therefore, this study recommends that CAAs 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 CAA abide by the standards guiding the design of user interfaces suitable for CAAs, for instance, the standards by Harms and Adams (2008).

GENERAL CONCLUSION

This chapter has dealt with the discussion of the research findings. The four research hypotheses were all confirmed in the preceding chapter based on the results of our statistical analyses and discussion of the result in relation to the research hypotheses were equally provided in this chapter.

Testing practices are important for higher education institutions. In this era of information technology exchange and connectedness, knowledge continues to grow in an exponential way and technology fortifies this progress. Students graduating from high education institutions must have the skills and knowledge to be students who will be making future decisions based on diverse sources of data for their community. Therefore, it is imperative that all students be adequately assessed when they leave formal schooling. However, there are still many unresolved issues regarding students' assessment to effectively know their real skills. Perception of testing practices appears as good way to help students develop a positive attitude towards computer-assisted assessment.

The main objective of this study was to find out whether Perception of testing practices significantly influence students' attitude towards computer-assisted assessment. Four specific hypotheses were derived from the general hypothesis. 360 students from the FALSH of the University of Yaoundé I, were used as the sample population. The opinion of those who constituted the sample was sought through a questionnaire. These data were analyzed in relation to the research hypotheses. The data collected was analyzed using ANOVA test, T-test, Pearson correlation test and multiple regressions for the interview data. In the process of data analysis, results revealed that perceived usefulness, perceived ease of use, facilitating conditions, and technology anxiety significantly correlate with students' attitude towards computer-assisted assessment. It is therefore the needs of the educational system to help teachers and students adapt and accept the introduction of electronic assessment in the teaching/learning process to acquire the right attitude towards computer-assisted assessment that would help them to contribute in the development the nation.

Based on the confirmation of the research hypotheses, it was therefore concluded that there is a significant relationship between perception of testing practices and students' attitude towards computer-assisted assessment. The chapter equally provided some difficulties encountered by the researcher and also provided recommendation, to the state who is the

principal stakeholder of our educational system to prepare students to their motivating roles in their various assessment interventions in the academic environment. Finally, the researcher also provided some suggestion for future study on the problem.

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APPENDIX

QUESTIONNAIRE TO STUDENTS

Dear Students,

I am a master's student of the Faculty of Sciences of Education of the University of Yaoundé I, I am currently undertaking a research for a Master's degree in Education. Though the primary purpose of the research is to meet the requirements of the above degree, it is expected that its results will go a long way in improving academic's experience of students. Your sincere and honest response will be greatly appreciated and used only for the purpose of the research and will be treated with all confidentiality.

Many thanks for your sincere cooperation.

Yours sincerely
BIH Dorothy

I. DEMOGRAPHIC INFORMATION	
1	***Name of Department:*** _____
2	***What is your gender:*** ☐ 01. Male ☐ 02. Female.
3.	***Possession of computer*** ☐ 1. Yes ☐ 2. No
4.	***Class Level:*** ☐ 1. Level Two ☐ 2. Level Three
5.	***First official language:*** ☐ 1. French ☐ 2. English
6.	***Your age*** ☐ 1. 21 ☐ 2. 21-25 ☐ 3. 26-30 ☐ 4. 31-35 ☐ 3. Above 35

Instructions : For sections II, III, IV and V - Please read each statement and tick the box which most closely matches your opinion on a scale : (SD) Strongly Disagree, (D) Disagree, (N) Neutral, (A) Agree, (SA) Strongly Agree ,

II. PERCEIVE USEFULNESS						
		SD	***D***	***N***	***A***	***SA***
7.	***Online assessment is appropriate for my subject area.***					
8.	***I believe that using electronic assessment would enhance my academic development***					
9.	***Using electronic assessment would increase my academic productivity***					
10.	***I believe that using electronic assessment would make it easy for me to achieve my academic and professional goals.***					
11.	***I find using electronic assessment useful.***					
(SD) Strongly Disagree, (D) Disagree, (N) Neutral, (A) Agree, (SA) Strongly Agree						

III. PERCEIVE EASE OF USE						
		SD	***D***	***N***	***A***	***SA***
13.	***Learning to use electronic assessment is easy for me***					
14.	***My interaction with electronic assessment is clear and understandable.***					
15.	***It is easy for me to become skillful at using electronic assessment.***					

16.	***I find electronic assessment easy to use***					
17.	***I couldn't give every question enough time to answer***					
18.	***The test instructions were not clear***					
(SD) Strongly Disagree, (D) Disagree, (N) Neutral, (A) Agree, (SA) Strongly Agree						

IV. FACILITATING CONDITIONS						
		SD	***D***	***N***	***A***	***SA***
19	***The equipment is available to me to work on electronic assessment***					
20.	***The university's testing system have problems***					
21.	***Presenting the test through the computer confused me***					
22.	***Staring at a computer screen made my eyes tired***					
23.	***Technical problems make electronic exams impractical***					
24.	***Not being able to go back to review the questions confused me***					
(SD) Strongly Disagree, (D) Disagree, (N) Neutral, (A) Agree, (SA) Strongly Agree						

IV. TECHNOLOGY ANXIETY						
		SD	***D***	***N***	***A***	***SA***
25.	***I would feel comfortable using electronic assessment on my own.***					
26.	***Presenting the test through the computer confused me***					
27.	***I have knowledge and ability to make use of electronic assessment***					
28.	***Submitting electronic tests requires computer skills that I do not have***					
29.	***Not knowing the remaining questions caused me anxiety and stress***					
30.	***Using a computer adds to the stress of exams***					
(SD) Strongly Disagree, (D) Disagree, (N) Neutral, (A) Agree, (SA) Strongly Agree						

V. MEASURES OF ATTITUDE TOWARDS COMPUTER-ASSISTED ASSESSMENT						
		SD	***D***	***N***	***A***	***SA***
31.	***The lack of sequence in the presentation of the items of the same question distracted my thinking***					
32.	***It is a good idea to use electronic assessment for academic development.***					
33.	***Overall, I am satisfied with using electronic assessment.***					
34.	***Electronic-exam makes me feel less stressed than paper-based exam***					
35.	***Electronic-exam enables me to show a better academic achievement***					
36.	***I prefer taking electronic-exam more than taking paper-based exam***					
37.	***I have a generally favourable attitude toward using electronic assessment***					
(SD) Strongly Disagree, (D) Disagree, (N) Neutral, (A) Agree, (SA) Strongly Agree						

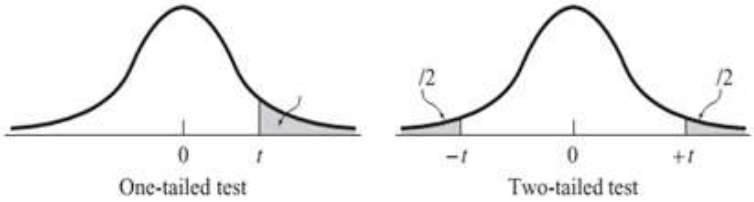
Thanks for your kind collaboration

Determining the size of a random sample (s) for a given population size (N)

N	S	N	S	N	S
10	10	220	140	1,200	291
15	14	230	144	1,300	297
20	19	240	148	1,400	302
25	24	250	152	1,500	306
30	28	260	155	1,600	310
35	32	270	159	1,700	313
40	36	280	162	1,800	317
45	40	290	165	1,900	320
50	44	300	169	2,000	322
55	48	320	175	2,200	327
60	52	340	181	2,400	331
65	56	360	186	2,600	335
70	59	380	191	2,800	338
75	63	400	196	3,000	341
80	66	420	201	3,500	346
85	70	440	205	4,000	351
90	73	460	210	4,500	354
95	76	480	214	5,000	357
100	80	500	217	6,000	361
110	86	550	226	7,000	364
120	92	600	234	8,000	367
130	97	650	242	9,000	368
140	103	700	248	10,000	370
150	108	750	254	15,000	375
160	113	800	260	20,000	377
170	118	850	265	30,000	379
180	123	900	269	40,000	380
190	127	950	274	50,000	381
200	132	1,000	278	75,000	382
210	136	1,100	285	100,0000	384

Note: From R.V. Krejcie and D. W. Morgan (1970), Determining sample size for research activities, Educational and psychological measurement, 30, 608, Sage Publications.

Appendix *t*: Percentage Points of the *t* Distribution



One-tailed test Two-tailed test

	Level of Significance for One-Tailed Test								
	0.25	*0.20*	*0.15*	*0.10*	*0.05*	*0.025*	*0.01*	*0.005*	*0.0005*
	Level of Significance for Two-Tailed Test								
df	*0.50*	*0.40*	*0.30*	*0.20*	*0.10*	*0.05*	*0.02*	*0.01*	*0.001*
1	1.000	1.376	1.963	3.078	6.314	12.706	31.821	63.657	636.620
2	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	31.599
3	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	12.924
4	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	8.610
5	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	6.869
6	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.959
7	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	5.408
8	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	5.041
9	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.781
10	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.587
11	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.437
12	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	4.318
13	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	4.140
15	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	4.073
16	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	4.015
17	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.965
18	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.922
19	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.883
20	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.850
21	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.819
22	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.792
23	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.768
24	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.745
25	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.725
26	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.707
27	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.690
28	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.674
29	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.659
30	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.646
40	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.551
50	0.679	0.849	1.047	1.299	1.676	2.009	2.403	2.678	3.496
100	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.390
∞	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.291

Source: The entries in this table were computed by the author.

Appendix *F*: Critical Values of the *F* Distribution

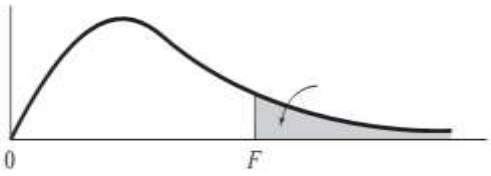


Table 1 $\alpha = 0.05$

Degrees of Freedom for Denominator	Degrees of Freedom for Numerator															
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	50
1	161.4	199.5	215.8	224.8	230.0	233.8	236.5	238.6	240.1	242.1	245.2	248.4	248.9	250.5	250.8	252.6
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.43	19.44	19.46	19.47	19.48	19.48
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.70	8.66	8.63	8.62	8.59	8.58
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.86	5.80	5.77	5.75	5.72	5.70
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.62	4.56	4.52	4.50	4.46	4.44
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	3.94	3.87	3.83	3.81	3.77	3.75
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.51	3.44	3.40	3.38	3.34	3.32
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.22	3.15	3.11	3.08	3.04	3.02
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.01	2.94	2.89	2.86	2.83	2.80
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.85	2.77	2.73	2.70	2.66	2.64
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.72	2.65	2.60	2.57	2.53	2.51
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.62	2.54	2.50	2.47	2.43	2.40
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.53	2.46	2.41	2.38	2.34	2.31
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.46	2.39	2.34	2.31	2.27	2.24
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.40	2.33	2.28	2.25	2.20	2.18
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.35	2.28	2.23	2.19	2.15	2.12
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.31	2.23	2.18	2.15	2.10	2.08
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.27	2.19	2.14	2.11	2.06	2.04
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.23	2.16	2.11	2.07	2.03	2.00
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.20	2.12	2.07	2.04	1.99	1.97
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.15	2.07	2.02	1.98	1.94	1.91
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.11	2.03	1.97	1.94	1.89	1.86
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.07	1.99	1.94	1.90	1.85	1.82
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.04	1.96	1.91	1.87	1.82	1.79
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.01	1.93	1.88	1.84	1.79	1.76
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	1.92	1.84	1.78	1.74	1.69	1.66
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.87	1.78	1.73	1.69	1.63	1.60
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.84	1.75	1.69	1.65	1.59	1.56
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.75	1.66	1.60	1.55	1.50	1.46
200	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88	1.72	1.62	1.56	1.52	1.46	1.41
500	3.86	3.01	2.62	2.39	2.23	2.12	2.03	1.96	1.90	1.85	1.69	1.59	1.53	1.48	1.42	1.38
1000	3.85	3.01	2.61	2.38	2.22	2.11	2.02	1.95	1.89	1.84	1.68	1.58	1.52	1.47	1.41	1.36

Source: The entries in this table were computed by the author.

Table V

Loi du r de Bravais-Pearson (Probabilités bilatérales)

ddl \ Seuil	0.20	0.10	0.05	0.02	0.01	0.001	0.0001	0.00001
1	0.9512	0.9878	0.9971	0.9997	1.0000	1.0000	1.0000	1.0000
2	0.8002	0.9002	0.9502	0.9802	0.9902	0.9992	1.0000	1.0000
3	0.6872	0.8055	0.8785	0.9345	0.9589	0.9913	0.9982	0.9997
4	0.6085	0.7294	0.8116	0.8823	0.9173	0.9742	0.9920	0.9976
5	0.5510	0.6696	0.7546	0.8330	0.8747	0.9510	0.9807	0.9924
6	0.5069	0.6216	0.7069	0.7889	0.8345	0.9251	0.9657	0.9842
7	0.4717	0.5824	0.6665	0.7499	0.7978	0.8984	0.9482	0.9734
8	0.4429	0.5495	0.6320	0.7156	0.7647	0.8723	0.9295	0.9608
9	0.4188	0.5216	0.6022	0.6852	0.7349	0.8472	0.9104	0.9470
10	0.3982	0.4974	0.5761	0.6582	0.7080	0.8235	0.8913	0.9324
11	0.3804	0.4763	0.5531	0.6340	0.6837	0.8011	0.8726	0.9176
12	0.3647	0.4577	0.5326	0.6122	0.6615	0.7801	0.8545	0.9027
13	0.3508	0.4410	0.5141	0.5924	0.6413	0.7605	0.8370	0.8879
14	0.3384	0.4261	0.4975	0.5744	0.6227	0.7421	0.8203	0.8734
15	0.3273	0.4125	0.4823	0.5579	0.6057	0.7248	0.8043	0.8593
16	0.3171	0.4002	0.4684	0.5427	0.5899	0.7086	0.7890	0.8455
17	0.3079	0.3889	0.4557	0.5287	0.5752	0.6933	0.7744	0.8322
18	0.2994	0.3785	0.4439	0.5157	0.5616	0.6789	0.7604	0.8193
19	0.2915	0.3689	0.4330	0.5035	0.5489	0.6654	0.7471	0.8068
20	0.2843	0.3600	0.4229	0.4922	0.5369	0.6525	0.7344	0.7948
21	0.2776	0.3517	0.4134	0.4817	0.5258	0.6404	0.7223	0.7832
22	0.2713	0.3439	0.4045	0.4717	0.5153	0.6289	0.7107	0.7720
23	0.2654	0.3367	0.3962	0.4624	0.5053	0.6179	0.6996	0.7612
24	0.2599	0.3299	0.3884	0.4536	0.4960	0.6075	0.6889	0.7508
25	0.2547	0.3234	0.3810	0.4452	0.4871	0.5976	0.6787	0.7408
26	0.2499	0.3174	0.3740	0.4373	0.4787	0.5881	0.6689	0.7311
27	0.2453	0.3116	0.3674	0.4298	0.4707	0.5791	0.6596	0.7217
28	0.2409	0.3062	0.3612	0.4227	0.4630	0.5705	0.6505	0.7127
29	0.2368	0.3010	0.3552	0.4159	0.4558	0.5622	0.6418	0.7040
30	0.2328	0.2961	0.3495	0.4095	0.4488	0.5543	0.6335	0.6955
31	0.2291	0.2915	0.3441	0.4033	0.4422	0.5467	0.6254	0.6874
32	0.2255	0.2870	0.3389	0.3974	0.4359	0.5394	0.6177	0.6795
33	0.2221	0.2827	0.3340	0.3917	0.4298	0.5323	0.6102	0.6718
34	0.2189	0.2787	0.3293	0.3863	0.4240	0.5256	0.6029	0.6644
35	0.2157	0.2748	0.3247	0.3811	0.4184	0.5190	0.5960	0.6572
36	0.2128	0.2710	0.3204	0.3761	0.4130	0.5128	0.5892	0.6502
37	0.2099	0.2674	0.3162	0.3713	0.4078	0.5067	0.5827	0.6435
38	0.2071	0.2640	0.3122	0.3667	0.4028	0.5009	0.5763	0.6369
39	0.2045	0.2606	0.3083	0.3622	0.3980	0.4952	0.5702	0.6306
40	0.2019	0.2574	0.3045	0.3579	0.3933	0.4897	0.5642	0.6244
50	0.1808	0.2308	0.2734	0.3219	0.3543	0.4434	0.5134	0.5708
60	0.1651	0.2110	0.2502	0.2950	0.3250	0.4080	0.4740	0.5289
70	0.1530	0.1955	0.2320	0.2738	0.3019	0.3799	0.4425	0.4949
80	0.1431	0.1831	0.2173	0.2567	0.2831	0.3570	0.4165	0.4666
90	0.1350	0.1727	0.2051	0.2424	0.2674	0.3377	0.3946	0.4427
100	0.1281	0.1639	0.1948	0.2302	0.2541	0.3212	0.3758	0.4221
200	0.0907	0.1162	0.1382	0.1637	0.1810	0.2300	0.2705	0.3054
300	0.0741	0.0950	0.1130	0.1340	0.1482	0.1886	0.2222	0.2513
400	0.0642	0.0823	0.0980	0.1161	0.1285	0.1637	0.1930	0.2185
500	0.0574	0.0736	0.0877	0.1040	0.1150	0.1466	0.1729	0.1959
1000	0.0407	0.0521	0.0621	0.0736	0.0815	0.1040	0.1227	0.1392