

POSTGRADUATE STUDIES – SECOND CYCLE

A COMPARISON OF COMPUTER ASSISTED AND TRADITIONAL ASSESSMENT MATHODS AT TWO PRIMARY SCHOOLS IN GJILAN, KOSOVO

CANDIDATE: Amir ISMAILI MENTOR: Assoc. Prof. Dr. Veronika KAREVA

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Dedication

This study is dedicated to my family members and my friends for their moral support and the God who gave me the mental strength to undertake this proposal in the prescribed period. May God bless them all.

Acknowledgment

This research proposal marks the end of my study in Master Degree in English Language Teaching. The formulation of this research proposal has been a long and challenging process, which would not have been possible without the help and support of many people. First I wish to thank the God for having brought me this far. I would also wish to thank my family for their support and encouragement during the period I was working to come up with this research project. I would wish to thank my mentor, Assoc. Prof. Dr. Veronika KAREVA for her tireless efforts and guidance. Without her constructive critiques and recommendations, this research proposal would not have been the same.

Abstract

Conventionally, educators have been using traditional teaching and assessment methods permeated with new technology-aided teaching and assessment approaches of the time. Technology-based learning has transformed the practices of schooling from the industrial era to the information era with the use of emerging technologies to test the fundamental paradigm of education. Additionally, the increase in the use of technology-based teaching methods has revolutionized and optimized the usage of computers in assessment and testing of students. While CAA primarily entails the evaluation of performance of students through computer systems in the virtual space, the experiences and perceptions of educators and learners using CAA has not been explored. This study, therefore, seeks to develop insights entailing approaches and strategies embedded on CAAs vis-à-vis TAMs with respect to the experiences of learners and teachers. Consequently, the findings will advise on how CAAS and TAMs can complement each other to affect education outcomes positively. Using descriptive survey design, qualitative data was collected using survey questionnaires targeting teachers and pupils of two primary schools in the city of Gjilan, Kosovo. Following the analysis of the collected raw qualitative primary data, the study concluded that TAMs are continually used in rural Kosovo because of poor infrastructural resources, poorly trained teachers on computer use and application, and late onset of computer classes among learners. It was established that both teachers and learners presented with a positive attitude towards CAA methods over TAMs with learners citing ease of use in their tests, and low anxiety associated with exams. Teachers cited speed, ease in administration, marking, analysis and reporting, and well-increased security of assessments while using CAA methods.

Keywords: Traditional assessment methods (TAM), Computer-aided assessment methods (CAA), Performance, Effectiveness, Attitude.

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CHAPTER 1: INTRODUCTION

1.1 Definition of Computer Assisted Assessment (CAA) and Traditional Assessment

Conventionally, educators have been using traditional teaching and assessment methods permeated with new technology-aided teaching and assessment approaches of the time. With continued technological advances, particularly in information and communication technology (ICT), and innovativeness in educational teaching methods, educators have incorporated these technology-based innovations into their teaching environments. While graphical software applications and calculators have traditionally been integrated in math classes in institutions of higher learning, novel computerized teaching and assessment tools are currently used in different teaching subjects, including in remedial classes. The increase in application and use of computeraided assessment (CAA) tools is based on the claim that ICT tools in the 21st century, including the more traditional computer-aided assessment applications are geared towards positive influence on the learning process and outcomes of students.

According to studies by Gosling, Vazire, Srivastava and John (2004) and Chuah, Drasgow and Roberts (2006) significant disparities were established between CAA and traditional assessment methods (TAM) particularly the use of paper and pen testing. Karadeniz (2009), in a study exploring the influence of TAM and CAA focusing on web-based and mobilebased testing on the achievement of learners, established a significant score difference in the second week of assessment. Students are regarded to entail a positive attitude towards mobilebased and web-based testing in relation to ease of use, instant feedback and comprehensiveness of their responses (Ghaderi, Mogholi & Soori, 2014). As early as 1960s, computers were introduced in schools with predictions that integration of computers in teaching and assessment would change the face of education (Lissitz & Jiao, 2012). Initially, following the introduction of

computers in schools, their use was restricted to focused groups of selected students and a teacher. Subsequent era of software-based educational programs entailed the development of computer-assisted curricular programs.

Technology based learning transformed the practices of schooling from the industrial era to the information era with the use of emerging technologies to test the fundamental paradigm of education. Secondly, the increase in the use of technology-based teaching methods revolutionized optimized usage of computers in assessment and testing of students. While the anxiety level among learners sitting for a traditional assessment through paper and pen testing have been known to elevate during examination periods (Gosling et al. 2004), Buchanan (2006) showed that the use of CAA decreased both anxiety level and the time required for completion of an examination. Other studies focusing on issues surrounding the design and setting of computer-aided tests, particularly the ability of learners to review correct responses in terms of performance, established the requisite for developers of CAAs to be extremely liberal in defining examination duration limits (Sim, Holifield & Brown, 2016). Essentially, elevated levels of anxiety, student motivation and unipolar experience with computer use and application among learners elicit implications on performance levels for both CAA and TAM.

1.1.1 Computer-Assisted Assessment (CAA)

Different definitions of CAA have been developed, and formally entail the use of computer-aided education software applications in the assessment of learners, particularly in delivery of tests, take responses, and/or marking of test scores (JISC, 2007). Based on this definition, CAA is applicable in any of the three stages of assessment process. On the other hand, computer-based assessment (CBA) entails the assessment of learners by delivery and marking of test scores using computer-aided applications. According to Bull and McKenna (2004), CAA is

integrated in education curriculum to enhance motivation thus encouraging learners to put into practice-acquired skills to improve their prospects for formative assessment. Secondly, it has been established that the use of CAA augments the range of assessed knowledge, especially development of web-based applications and creation of complex diagrams.

Self-assessment and/or peer assessment are among the range of assessment methods that are, additionally broadened following CAA application. Importantly, learners and examiners are offered the opportunity for a more direct and immediate feedback, or the allowance for different methods of feedback delivery (Lingard, 2005). The scope and use of CAA defines the organizational benefits, particularly with respect to enhancing administrative efficiency. Studies by Scheuermann and Bjornsson (2009) and Bandari (2014) showed an increase in organizational objectivity and consistency by proving standardized marking schemes and feedbacks following the use of CAA. The implementation of CAA effectively requires considerable investment of financial input, time and effort. Increased dependency of IT support for hardware and software, as well as the threat of security deter effective implementation of effective CAA in many countries.

1.1.2 Traditional Assessment Methods (TAM)

In academia, assessment of learners has been shown to elaborate the progress of students and the program in general. As opposed to the CAA elucidated above, TAMs utilize standardized assessment testing approaches that employ questions with definite number of responses or answer choices (Palm, 2008). Initially, it was built on multiple choice answers, yes or no answer questions, and true or false answer questions (Quansah, 2018). Further developments led to inclusion of short answer questions. Among the TAMs, performance-based assessments, authentic assessment and alternative assessment methods have been developed over time delving

on the approaches learners use to develop answers, as well as establishment of the final response. Essay responses, together with long form responses are encapsulated within alternative assessment method, which enjoys the benefit of ease of administration (Han, 2005). Along with other TAMs, educators and administrators consider traditional assessment administration focusing on the ease of result analysis and score comparison for learners. While standardized testing dependent entirely on quantifiable responses is administered, scoring is easily performed following categorization of questions to elaborate on student performance in different subject areas.

It has been shown that the application and use of TAMs subject learners to retrospective reasoning for students respond to test questions sequentially devoid of the application of long-term critical thinking. As such, learners are not able to explicitly express their cognitive and reasoning skills in areas characterized by lack of knowledge. Palm (2008) argues that the use of TAMs influences the methods and approaches used in teaching as well. For instance, traditional assessment compels educators to prepare learners on methods of managing examinations, including how to develop and/or select correct answers. Secondly, with respect to alternative assessment, educators train their students on critical thinking and reasoning for long-form examinations. In contemporary education systems, use of TAMs requisites educators experience disruptive change in approaches entailed in teaching methods for current learners who are skewed towards information technology.

1.2 The Characteristics of CAA

The process of learning cannot be limited within demarcated boundaries. Every education system seeks to create a learning environment that supports development of a cordial relationship between learners and teachers under the foundation of trust and rich communication. The integration of CAA in education programs provides a basis for actualizing this theme in learning. Focusing on the characteristic semantics of CAA in education paradigm, the use computer-aided applications the processes involved in academic assessment is characterized by increased efficiency, flexibility and adaptation to learning strategies within technology-based teaching methods (Nikolova, 2012). Advances in CAA are also characterized by provision of more intelligent access to and management of rich teaching and assessment models embedded in computer applications. As such, in education field, CAA encourages the realization of standardized, well structured, and a verified learning entity that decreases the magnitude of exploited resources allocated for setting, administration, invigilation and marking of assessment examinations.

The development of World Wide Web and its increased used through internet connectivity and cloud storage accelerates the wide use of CAA to leverage the traditional paper and pen assessment methods. According to Nikolova (2012), CAA is characteristic of a rich assessment experience considering the use of text, audio and/or video to enhance detail and clarity. As a result, learners are motivated and more engaged through interaction with the user interface in the assessment platform. The flexibility of CAA increases its potential to be offered in diverse remote locations allowing the achievement of assessment on demand. Instant feedback on the performance of learners available through CAA augments objectivity by highlighting subject areas requiring improvements in terms of the efficiency of teaching and learning methods (Dimitrios, Labros, Nikolaos, Maria & Athanasios, 2013). While CAA systems are expensive to acquire and implement, the design of CAA is dependent on the type of assessment, with the highest cost being pegged on development and production of assessment entities of unparalleled quality.

1.3 Current Implementations of CAA

The integration of computer-aided applications in education systems to facilitate assessment of learners has been evolving into a dynamic assessment tool. The application of CAA spans from developed economies to developing economies, such as Kosovo where educators are propagating the use of computing technologies to assess learners in all academic levels (Harlen, 2014). In its application, teachers used assessment-based software applications in part or throughout a course or study subject and develop feedbacks on teaching plans and level of performance in a summative manner. Warburton and Conole (2003) cited poor time management in the development of assessment questions and learning the use of the assessment software as the primary barrier towards the current implementation of CAA. The strength of this barrier, particularly in developing economies, is associated with the adoption of CAA under the motivation of individuals as opposed to a redefined strategic decision in the education sector (Daly & Waldron, 2002).

Relieving educators burdens associated TAMs, including invigilating and marking of exams may become illusory in learning institutions where institutional strategies and objectives are not defined or where no support is provided. As a result, successful implementation of CAA, under such environment is left to change, with Bull and McKenna (2004) postulating the development of CAA in a disordered fashion. Correspondingly, adoption of CAA in academic institutions is challenged by assessment and monitoring difficulties of establishing the most apposite CAA software application to implement (Sim et al. 2016). In educational organizations that lack institutional strategy for digital transformation with regards to implementation of CAA, O'Leary and Cook (2001) advice the adoption of tailored CAA systems in respective departments. As a result, different user interfaces are common requiring learners to adapt to the

available CAA formats. Moreover, such an integration results in an increase in the costs of licenses, and problems associated with technical support.

CHAPTER 2: LITERATURE REVIEW

2.1. Previous Studies and Research

Researchers have carried out studies in the area of comparison of computer-assisted assessment and traditional methods giving mixed results. In assessing the comparability of the two methods in reading an English comprehension test, learners in Iran aged between 8 and 12 years were tested in reading and completing attitude questionnaire to understand their computerized testing attitude. This test was done using both the computerized testing and traditional paper and pencil method. The study found out that there is no significant difference between the results of computer-based and traditional assessment scores of the students (Hashemi, Mobini, & Karimkhanlooie, 2015). However, another study by Hensley (2016) concluded that there was a significant difference in performance between students who used writing assessments in computers and those who used traditional paper and pen method. The group that used computers performed better than their counterparts using traditional methods. This trend was observed more on open-ended questions than closed-ended or multiple-choice questions.

Further studies reveal that the performance of high school students who used computers in tests was dependent on their familiarity with using computers to study (Chen, White, McCloskey, Soroui, & Chun, 2011). Students aged 16 to 18 years were subjected to both assessment tests in China with a random grouping method and results showed better performance of the students using the computer-aided method. Barnes (2015) argued that there is a need to focus on issues relating to computer-assisted assessment methods in developing young learners to identify any influencing factors to the performance of children. Further, Barnes (2015) established that a comparison of the two modes of testing shows a significant difference in the performance of the learners between ages 8 and 14 years in Hungary. The differences are mostly attributed to the consistent use of computers in teaching. The speed of learners is said to have increased significantly in grasping concepts due to features available during learning with computers such as objects use and illustrations. Different subjects also show a different response to the mode of testing results. Languages, according to Hashemi, Mobini and Karimkhanlooie, (2015), did not show much difference in performances comparing the two modes of testing since they are not taught using technology in Iran. According to the findings of the study by Chen et al. (2011), sciences have been found to be more influenced by the mode of testing.

2.1.1 General Assessment

Assessment in education is a method of evaluating learners to gauge their subject understanding (Bourke & Mentis, 2014). Assessment is crucial in learning since it helps both the learners and the teachers to identify gaps in the learning process. Continuous assessments are done regularly as the learning progress while the main test or assessment is done at certain times of the learning calendar. In order for a learner to transit from one level of study to another, an assessment test is administered in most parts of the world. With the introduction of computers, learning institutions have found themselves using new methods of administering tests to students. The traditional method involved the use of pen/pencil and paper to write the answers by the learners. Computer-assisted assessment methods involve the use of computing tools such as computers to administer a test to learners.

There are three main types of assessment. They are diagnostic, summative and formative assessments (Conn, 2014). Testing the skills, strengths and weaknesses of learners is done by way of administering diagnostic assessment to learners. Students' current understanding of the subject when tested gives both the learners and teachers a starting point in terms of developing

knowledge and skills required in the subject. A better plan for teaching and learning is drawn after this type of assessment is done. Interviews, discussion boards and pre-test assessments are used to conduct the diagnostic assessment either using the traditional or computer-assisted methods.

Formative assessment provides meaningful feedback about the progress of the learning and the learner. As a continuous process, feedback is required to remain on the objectives by avoiding derailing the focus. Ben (2001) asserted that feedback in learning is an ingredient of a good learning process. Therefore, administering the formative assessment to learners give the instructor a clear path of the learning path and the subject hence improvement areas are easily identified. To remain in control of the process, observation and survey methods are very useful to the instructor. However, to gauge the learners understanding and sense of direction, an assessment is administered in the form of a survey using either traditional or computer-assisted methods.

Summative assessments are administered at the end of the learning to get the overall outcome. These are assessments done in schools at the end of the year or term to gauge the students' understanding of the whole subject matter. Projects that require specific formats or deliverables are examples of summative assessments (Ruiz-Primo, 2015). While the formative assessment focuses more on the process, the summative assessment focuses on the product. The subject is examined as a whole in the form of a project, examination, term paper or capstone. Evolution of assessment administering methods follows the patterns of the technological advancements in teaching and learning. Today, some courses are offered as both online and as one on one between learners and instructors. However, there are some that are offered purely as an online course with examinations being done using computer-assisted methods. If then the

computer-assisted assessment methods to have an influence in students performing better significantly, there is a need to investigate the claims and draw conclusions on students' performance in case of purely computer-assisted teaching and examined courses.

2.1.2 Traditional Assessment Methods

Conventional methods of written questions to assess the learners' progress are called traditional assessment methods. They are characterized by standardized questions with instructions to answer them. Majority of the traditional assessment methods use multiple answers, short answers or even true and false options. They also include performance-based assessments and alternative assessments, which utilizes long essays as questions to test students' understanding of the subject (Ben 2001). Among the benefits associated with this kind of assessment method, as Conn (2014) asserted, is ease of analysis. Due to the structured and standardized nature of these tests, analysis and comparison of the students' score is easy and straightforward. Where a large number of learners take this type of test, questions can be put into categories to determine the areas of excellence without a struggle.

Comparison across groups and time is easy to make where traditional assessments are used. Getting feedback is easy also. However, this method has its own drawbacks. Scholars have argued that real-life context miss in these assessments. Application of knowledge from critical thinking is not possible thus; students have no chance to utilize their reasoning ability. This weakness can, however, be overcome by incorporating alternative assessments in the traditional methods to help test the students' ability to apply the skills and knowledge learnt in a contextual problem. Daily tasks at the workplace require the application of problem-solving skills, a thing that traditional assessment methods lack. Their structure also affects the teachers in a number of ways. One, they compel instructors to concentrate on instructing learners how to manage

examination questions with the aim of just passing the examination. Teachers teach methods of selecting the correct answer to students who memorize some concepts and pass even without reasoning (Berry, 2008). Critical thinking and reasoning is possible where traditional assessment methods are replaced by alternative methods.

Despite the cons associated with the traditional assessment methods, paper and pencil method as popularly known is a very widely used method especially in public institutions of learning across the globe. It continues to be used mostly in the lower grades where learners are still young with little reasoning skills. Writing as an important aspect of learning influences the performance of learners who use this method in taking assessments, unlike computer-assisted methods where learners type their answers in computers.

2.1.3 Computer-Assisted Assessment Methods

Computer-assisted assessment method is a common term for methods that utilize computers in assessing the students' progress in learning. A number of forms of CAA are in existence and they include Computer-based testing, Computer Based Assessment (CBA) and online computer-based assessment. CBA is implemented using a computer while CBA is used in management or supporting the process of assessment. Computer-assisted assessment methods focus on both the process and the product. It is mainly a formative type of test since they assist the learner to know whether they learnt, what the instructor actually intended to teach as well as provide feedback (Ben, 2001).

CAA uses a certain set of criteria in assessing the learner's ability to match a certain skill level or competence. It is, therefore, a criterion-referenced technique. A certain level of skills that a student must demonstrate to have passed the test is set prior to the start of the test. However, in assessing a student relative to other students' performance, a norm-referenced

criterion can be used to assess a group of learners. One of the advantages associated with computer-assisted assessment method is its objectivity in testing the ability and competencies of students (Brown & Sally, 2013). According to Brown and Sally (2013), a well-written test in a computer-assisted method is highly reliable due to its reliability and objectivity in marking and scoring. A wide range of outcomes of learning tested can be met by adapting the tests.

There is a potential of incorporating a wide range of media in the computer-assisted assessment test compared with traditional assessment methods. Thus, make it much comprehensive and attractive to use besides its adaptability. Additionally, feedback can be instant by linking the assessment with an online assessment that is scored in real time. Some computer-assisted assessments have hints to questions thereby making them easy to use by both learners and educators. An automatic activity can be triggered based on the test results. For example, an additional test or a learning activity can be assigned to the learner based on the test results thereby improving the learning process. A computer has a large memory that can store a huge chunk of questions that can be randomly selected and administered to students. CAA, therefore, has the ability to test a wide area of a subject with ease. Management of the tests is easy with CAA since it does not require human input even in marking (Barnes, 2015). The results are therefore more credible since errors associated with human beings are eliminated.

However, limitations are inevitable with implementing computer-assisted assessment methods. First, it is can be costly to implement this kind of system. It requires investment in machinery and human capital to successfully run it. Again, this method does not test conceptual understanding but it only tests knowledge skills. Multiple-choice questions in a computerassisted assessment are used to test understanding of the lower level and more of ability to relate but not to understand. In order to get the desired results, which are objective, skills, expertise and

practice are required. Using people, who are not well experienced or qualified in the management of assessment systems, result in substandard tests and results subsequently. Where educators are not well compliant with the required IT skills, the integrity of the assessment tests may be compromised.

Security of the information in the computer-assisted assessment system must always be maintained to have credible assessments. Security may become a challenge where hackers or cyber attackers compromise the system thereby losing objectivity. Unlike the traditional method, everyone in the system of a computer-assisted assessment method must be well trained, equipped and available for it to function (Tzuriel & Shamir, 2002). Hardware and software must be kept in good order, staff and learners must be trained on IT skills, examiners must be able to handle the system without causing downtime or erasing data accidentally etc. In view of this type of assessment method, better preparation is required to have a working system and credible results that truly measures the ability of the students. A computer-assisted assessment is being improved every day to allow better user experience and results with the systems being developed to test even higher order skills including reasoning and comprehension.

2.2. Forms of CAA

Pressure for better learning outcomes has led to frequent assessment for students offering them enhanced exposure to different tasks. Assessment is a catalyst to students learning because of the pressure that they are required to pass in respective different subject areas to proceed to the subsequent level of education. There is potential in ICT for automation of different learning aspects, although, the benefits accrued appear slowly. CAA has the prospects of easing assessment load while offering powerful and innovative assessment models (Croft, 2001). Additionally, Anderson and Krathwohl (2001) clarified that CAA helps in assisting students in different forms of learning, including acquiring better computer knowledge and applications. Students with better computer skills and knowledge perform better in CAA as compared to the students who lack computer skills. Different forms have been used in CAA to better students learning outcomes. For instance, computer-based assessment (CBA) is applied throughout the examination process with computer programs being used to mark answers that were directly entered into a computer system. CBA is subdivided into the stand-alone application, which requires one computer and has applications that work privately on private networks and designed for delivery across public networks, for instance, the web. Optical mark reading is another form of CAA that involves the use of a computer in marking of scripts that were initially composed on paper (McAlpine, 2002). Online assessment has been used to evaluate students by requiring them to give answers to the tasks provided and submit them in a virtual platform. These forms of assessments offer an opportunity for students to become more competent with computers and more knowledgeable about ICT, which opens better prospects in future. Nonetheless, there are justifiable anxieties relating to the use of computers in testing by predisposing students to a higher inclination towards cheating, as is the case with TAMs.

2.2.1 Question Styles

Question styles have allowed the diversification of assessment methods based on the level of sophistication. Question styles that are comprehensive, allow students to have an opportunity to research more on how to use assessment software in their assessments, failure to which, the complexity of the software will lead to failure in their appraisal. The TRIADS software system, which was developed in Derby University, is a software application that gives complex question styles that challenge students to get more knowledge on information technology. In 1999, TRIADS software offered 17 question styles in that year and later in 2003,

the university offered 39 question styles (CIAD, 2003). However, according to McLaughlin et al. (2004), staffs at the University of Liverpool used TRIADS and realized that the emergence of new question styles has led to difficulties associated with the inability to use other styles, consequently lacking the assurance to writing the suitable question. The developers of question styles software have the obligation of ensuring that they provide user guides on how to go about their software for learners and other users. Staff consultations, while developing suitable questions and guidelines, are relevant in overcoming the problem of vagueness. Herd and Clark (2002), for instance, developed a generic guiding principle and offered an illustration of various question styles that were used in higher learning institutions. CAA question format could be classified into four distinct groups, including the move object, draw object, point and click, and text entry categories (CIAD, 2003). These distinct groups help learners to gather more understanding on the use of computers in their academics, as well as after completion of their studies. Presenting with a vast knowledge of computer technology and application helps students to remain competitive in the job market after graduation.

2.2.2 Point and Click Styles

The implications of learning vary among various students considering the specifics of diverse systems and their uses. The typical use of a computer system may involve logging into the computer system by the use of passwords, and navigating into specific assessments through a web-type interface (Crisp, 2002). The logging into the assessment system may not be very challenging but a problem emerges requiring determination of whether students are in a position of using their login IDs to access every assessment location. For instance, login IDs may be restricted in some areas of the university portal, while the examination is held in other areas of the student portal. When a formative assessment is in the progress, students may work without

any supervision and in own spaces. In this form of assessment, students may receive feedbacks while proceeding with the test and have an opportunity of retaking questions severally until when the adequate understanding will reveal correct answers (Crisp, 2002).

However, point and click involve the use of multiple choices question (MCQ) and multiple response question (MRQ) assessments. According to Ricketts and Wilks (2002), the MCQs and MRQs have been used in assessment for a long time in TAMs, and have been transformed into CAAs. It is evident that any ability and understanding that is easily tested using other techniques, such as essays, can be confidently tested using MCQs. MCQs that are more complex can be formulated by assertion reasoning, which leads to the development of high cognitive skill testing (Bull & McKenna, 2001). The high cognitive skills can be used for assessment in higher education institutions, such as the universities, where there is complexity in learning. MRQs and MCQs have a problem of relying on false and true questions, which at times, students may consider as being unfair (Burton, 2001). Davies (2002) implies that the eminence of MCQs depends on the importance of distracters and not necessarily on the questions provided.

2.2.3 Move Object Styles

Move object questions style primarily focuses on moving objects to a specific location on the screen. The learners will only have the correct answer if the object is positioned correctly as indicated by the software system. Move object is a variation of MCQ format and is reliable in the assessment of a student's knowledge of relationships. For instance, in computing, move object styles would be used to label entity relationships diagrams (Paterson, 2002). Linguistic students could also use these styles in poems to move the highlighted words to the right word class. The problem associated with the move object style is that when the number of objects to move is

equivalent to the number of targets, a student is likely to engage all moves and miss the correct answer. The system may automatically award all the marks correctly. Move object styles are termed as being standardized in the assessment of students with minimal biases in the questions provided.

According to Boyle and O'Hare, (2003), biases in such questions may not lack, whether known or unknown to the developer, particularly those that arise coincidentally. The creation of move object styles represents conformity among the developers on the scoring format, formula and content for a given test. Hence, a standardized test is termed as an alternative to testing rather than being objective. In addition, the move object styles facilitate the assessment by providing a detailed analysis of various tests with least efforts used because learners only move objects arbitrarily, but ensuring they are placed in the right position. Students who enter various institutions of higher academic learning have a likelihood of having general knowledge in computers, thus to some extent, the move object styles will not have challenges to such learners. Most students, also, find CAA testing reliable and easy to use because timely feedback will be provided on the progress of an individual and/or class (Lilley & Barker, 2003).

2.2.4 Text Entry Style

Mason and Grove-Stephensen (2002) explain that text entry style is another form of assessment that can be used to evaluate student progress in various aspects of learning. Text entry questions involve inputting short and predefined answers to particular questions without having much explanation of the same. For instance, syntax in computer programming and factual knowledge is required for a student to be in a position of answering and scoring good marks in their tests. The main advantage of text entry styles is that students have an obligation of supplying only correct answers without the possibility of guessing. According to Reid (2002), students in different levels of learning find this style as the most demanding because of its easiness to use and only the correct answers will be provided. Therefore, students are sure of passing in the assessment because they will take tasks rapidly until the correct answers are generated in the assessment system. Use of text entry styles enables the instructors to identify students who require extra directions on how to handle particular tasks (Paterson, 2002). If a student has difficulties in conducting a test, a repeat test may be conducted in private such that students are able to monitor their progress, and what they want to achieve at the end of the test. Direct feedback may be provided to the students, which gives them ample time to conduct more research on the subsequent assessments.

On the other hand, there are disadvantages associated with text entry styles questions. For example, as portrayed by Croft et al. (2001), in domains such as mathematics, text entry is not very relevant because it is not easy to include mathematical expressions in most of the commercial software. Another drawback linked to text entry style is the marking of an answer incorrectly in the case of misspelling; hence, the time that ought to have been saved by the use of the software is no longer saved because the lecturers opt for manual checking of spelling faults.

2.2.5 Draw Object Style

Paterson (2002) explains that draw object styles encompass drawing simple objects or lines in an assessment. For instance, learners may be compelled to plot graphs, which are automatically marked in the system. This style makes it easy for students who are in the mathematics field to find it easy to draw and plot graphs with ease. Marking the drawings involuntarily in the system ensures that there is no time wastage by the tutors trying to search manually to ensure that the students have provided the correct degrees as required. Additionally, the students are equally, assured of accurate grades because the software can only cause minimal errors as compared to when marked manually. Another advantage associated with this style is that students, such as those in statistics disciplines, are able to represent their statistical analysis effectively. However, there are setbacks associated with the style irrespective of the associated accuracy to draw object style to students and lectures (Bennett, et al. 2008). For instance, the style highly discriminates between the weak and strong candidates. The strong candidates will have better grades because they have the acceptable knowledge that requires drawing an object and/or plotting graphs. Weak students, who have little knowledge on how to draw objects in the assessment, will have poor grades because only facts are needed in the machine language, and there are no chances of guesswork (Zakrzewski & Steven, 2003). Additionally, limited literature on this style is available, therefore, students among other users have no access to relevant information regarding how the software would be used efficiently with minimized or no errors (Sclater & Howie, 2003). For draw object style to be relevant to students and other users, the developers ought to provide manuscripts on the relevant steps on how to walk through the assessment system. Moreover, this style is limited to students in mathematics and statistics fields with minimal use to students in other domains, such as linguistics and history, among other disciplines.

2.3 CAA Methods versus TAMs

Assessments entail engagement and authentic demonstration of the abilities of learners to sharpen their problem-solving capabilities in handling various challenges they face in their academic life. TAMs are widely used in different levels of education because they are easy to use as compared to CAA, which requires pupils to undergo various sessions to learn on how to use the computers effectively. The approaches of assessment that are widely used in TAM as stated by Quansah (2018) are the true/false, multiple choices, essays, and short answers. True/false questions require pupils to decide which of the two answers provided is correct. It is easy for teachers to administer true/false tasks and on the other hand, it is easy for pupils to take the tasks. Nevertheless, guessing as depicted by Durbin (2002) in most cases increased success chances by 50% and it became difficult especially when the answer is false to determine whether the pupils know the correct answer. Simonson et al., (2000) suggested that the only possible solution to determine whether pupils clearly know the correct answers, they provide for true/false questions is to ask for clarity for any answer provided. On the other hand, CAA also uses multiple choices to assess pupils. The computer program provides tasks that require pupils to tick appropriately on the answers they find to be correct.

Multiple-choice tests are also assessment methods used in TAMs. Reeves (2000) depicts that schools and teachers prefer multiple-choice assessments because they are economical, fast, and easy to score. The chances of guessing are also reduced by multiple-choice assessment due to the many choices provided. On the other hand, the choices are scored objectively thus, the test is termed as being fair and reliable compared to the subjectively scored tests. Multiple-choice questions may be hard and time-consuming to create unless they are testing the low level of cognitive demands. On the other hand, CAA uses multiple-choice assessment method whereby some programs require students to click on the correct answer to allow them to proceed to the next level. Use of multiple-choices in testing pupils by use of CAA may not provide clarity on whether students understood why they provided specific answers because they were mandated by the computer program to provide the correct answers. Han (2005) in his study stated that the use of essays to assess pupils is an important tool in assessment because pupils' skills and thinking capacity are tested. However, advantageous essays are to pupils, at times they are not practical because it is time-consuming and may be difficult for some students. CAA also uses essays in

assessing their students that allows students to test their thinking capacity and their ability to use computers efficiently (Letterie, 2003). Another testing method that is used in TAM and CAA is the short-answer test, where items are provided either directly for learners to provide the answer or statements are left out for students to provide the answers.

Teaching in TAM involves mostly the use of books and it is mostly theoretical rather than practical while CAA involves the use of information from books as well as the use of computers for practical purposes. Students who learn using TAM may find it easy and advantageous because only minimal research is required. Another importance of TAM is the ease of assessment and analysis of pupils' scores. Secondly, teachers are able to categorize questions to determine areas that pupils have excellent performances and the parts that have difficulties and determine how to help the pupils perform better. Comparing TAM and CAA in terms of ranking students, it is difficult to rank student in CAA because most of the results are computer-aided and cannot determine which pupil has the correct knowledge of a task. However, as elaborated by Hudson (2004), CAA is advantageous to students because they are able to demonstrate their skills as compared to TAM pupils who tackle their tasks directly without thinking of the longterm critical thinking. CAA allows students to demonstrate and apply their knowledge and skills to answer various questions, which enable them to perform better in problem solving in the future. Another advantage of TAM in regard to teaching as purported by Yõldõrõm, Özden, and Aksu (2001) is that teachers spend time teaching their pupils on how to handle different tasks and how to make choices on multiple-choice tasks. On the other hand, teachers in CAA spend time focusing on critical reasoning which pupils apply naturally in long-form questions.

2.4 Models of Delivery

The most frequent model for delivery that is common in the delivery of CAAs is through a traditional linear test. Conversely, computerized administrations may provide substitute models of delivery that are useful in the fulfillment of the program goals. The new models that are mostly used in assessment delivery include multi-level, randomized test-let and adaptive testing. These delivery models are essential in ensuring the enhancement of security in testing. Tests delivery has to be highly secured with the aim of ensuring that learners acquire genuine marks for the efforts put during the study period (Goldberg & Pedulla, 2002). In regards to the randomized test-lets, model test-lets, include mini-tests that contain a few items, which are put together in accordance with their specifications in a comparable approach such as that of fulllength tests. Test-lets are not anticipated to be their own administrators but are ideally built with similar content and psychometric properties. Pomplun and Ritchie (2004) describe that in a randomized test-let mode of delivery, the blueprints show type and the number of test-lets that are required to be administered, and not the number of items. The test-lets are randomly assigned to the student to meet the expectations of the blueprints.

A multiple-level test is, to some extent, similar to the randomized test-let model. The only difference is that the ability of students is determined after administration of every test-let. The subsequent test-let to be administered is aimed at the aptitude of students. Lastly, fully adaptive tests or adaptive tests show clearly the ability of students after the administration of every test (Kolen & Brennan, 2004). At this phase, students are able to comprehend their performance and determine whether there is a need for more understanding of what the tests required. Contractors may have a variety of capabilities with regard to these models of delivery. A specific vendor system is deliberated in the implementation of the vision of different algorithms and different models in the essence of adapting or randomizing how student ability is

evaluated. According to Bennett (2002), the capability of delivery models shows little differences from each other. Pommerich (2004) elucidated that different systems used by contractors provide variant experiences and presentations from students, hence depicting that the capability of a model may be influenced by the interface of testing used. The capability of the mode of delivery may continue being challenging as a result of the emergence of computer-based technologies like the development of formats of new items which may not be easy to produce in paper mode but requires scrolling procedures that are automated.

2.5 Literature Gap

Advances in technology are rapidly evolving, particularly in the last two decades. These advances are taking root in the education industry with the development of teaching and assessment systems in all academic levels. Currently educators in different parts of the world are turning to both computer aided teaching methods and computer-aided assessment methods. Learning institutions, particularly in developing economies, are recognizing the need to bled CAA with traditional models of teaching and assessment in classrooms. Essentially, computerassisted methods of teaching have been in existence for long focusing on enhanced convenience in delivering educational materials through the use of both audio and visual media formats. Teachers utilize regular assessment of students to enhance learning outcomes among learners in the course of student learning process. Different approaches have been designed to facilitate grading of student progress, especially through summative assessment, which facilitates monitoring of the effectiveness of the delivery strategies in teaching and learning. Evaluation methods on the perception of learners on particular subjects or topics have not been developed with a standardized approach for assessing learners within a classroom context. CAAs have been elucidated as viable alternatives enabling the evaluation of progress of learners in different

academic spheres. While CAA primarily entails the evaluation of performance of students through computer systems in the virtual space, the experiences and perceptions of educators and learners using CAA has not been explored. This study, therefore, seeks to develop insights entailing approaches and strategies embedded on CAAs vis-à-vis TAMs with respect to the experiences of learners and teachers. Consequently, the findings will advise on how CAAS and TAMs can complement each other to affect education outcomes positively.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

This section describes the tools and techniques that were used by the researcher to collect, analyze and carry out data presentation that is easily interpreted. A suitable methodology guides the researcher in collecting the relevant data thereby improving the credibility of the findings (Coe, Waring, Hedges & Arthur, 2017). This section covers the research aim, research questions and hypothesis in details. Additionally, the research design used in the study, together with the included participants, is discussed. Finally, the section closes by describing the research instruments used, data collection and data analysis procedures followed in the entire study.

3.1 Research Aim

This study aimed primarily at assessing how the computer-aided and traditional assessment methods affect the educational outcomes of learners. The secondary aim was to assess whether the use of CAA affects the teaching capability and effectiveness of teachers. In order to achieve the above objectives, it was important to put into perspective the strategies and processes employed by both the assessment methods under the study in achieving the goal of objectively assessing the learners' progress as well as the end user experiences. By achieving the main aim of this study, the researcher was able to demonstrate the significance it has in different quarters. With relatively few studies having been carried out in the area of comparison of traditional assessment methods and CAA, very few of them have sought to the opinion of both the teachers and learners on the subject. Those researchers who attempted to address the topic before did it with a broad focus, unlike this study, which is very specific in addressing the gaps and giving recommendations based on the findings. These gaps were identified by not only understanding opinions but also gaining insight on the experiences of both the traditional and

CAA methods to identify inefficiencies that guided the researcher in giving the recommendations. Recommendations based on previous research work have the advantage of enriching the existing literature and opening up new areas of research (Lukenbill, 2012).

3.2 Research Questions

In this research work, research questions were adopted to guide the measurement of objectives. It was also crucial to use questions to address specific concerns in every question and collect the relevant data based on the assertions of White (2017). The following were the research questions adopted

- i. Is there a significant difference in educational outcomes of learners by using either traditional assessment methods or CAA?
- ii. Does the use of CAA affect the teaching capability and effectiveness of teachers?
- iii. What benefits would pupils get from using computer-aided and traditional assessment method?
- iv. What is the attitude of the pupils in using computer-aided and traditional assessment methods?
- v. What is the attitude of the teachers in using computer-aided and traditional assessment methods?

3.3 Research Hypothesis

In order to address the assumptions of the questions above, the following alternative hypotheses were formed to be tested after data analysis.

i. There is a significant difference in educational outcomes of learners by using either traditional assessment methods or CAA;
- ii. The use of CAA significantly affects the teaching capability and effectiveness of teachers;
- iii. There are significant benefits pupils would get from using computer-aided and traditional assessment method;
- iv. There is a significant positive attitude of the pupils in using computer-aided and traditional assessment methods; and
- v. There is a significant positive attitude of the teachers in using computer-aided and traditional assessment methods.

3.4 Research Design and Methodology

The researcher used a descriptive survey design since the design of this survey is descriptive in nature. It was aimed at describing the current phenomenon detailing variable state with the use of observational data. According to Aguinis (2015), the method that a researcher uses to collect information from a sample of the population by administering a questionnaire or interviews is a descriptive survey. This design was the most suitable in human behavior exploration and social situation description (Singleton & Straits, 2010). Based on Ponto (2015) conclusions, the description of the research design was a general organizational framework that showed the relationships among variables studied. Further, it was noted that the use of this research design was to enumerate a clear plan used to obtain empirical evidence on the studied relationship and variables. It was the conceptual structure within, which the research was carried out (Kennedy-Clark, 2015). This research design was, therefore, the plan employed to generate answers to the identified research problem.

This research study adopted a qualitative research methodology to collect and analyze research data. The choice of the methodology was informed by the research design and

objectives. Therefore, the suitability of the qualitative methodology in this study was affirmed by the exploratory nature of questions in the survey. Due to the ease and flexibility of the survey, the methodology that would accommodate such characteristics easily was identified to be a qualitative one. A survey is used to collect responses from a sample of individuals through questions (Check & Schutt, 2012). A descriptive survey was, therefore, more appropriate and in line with the goal since this study was seeking to build a profile about the educational outcomes of learners by using either traditional assessment methods or CAA methods.

3.4.1 Participants

The participants, who were respondents in this study, were both teachers and learners of elementary schools in the city of Gjilan, Kosovo. The study population constituted learners and teachers in primary schools in Kosovo. Aguinis (2015) described the target population of participants as individuals with similar characteristics and who may have answers to research questions that findings can be generalized. The choice of teachers was informed by the fact that they had answers regarding their perception or attitude towards using computer-aided and traditional assessment methods. Similarly, the learners had their own views of the same subject. Since it was not possible to involve all the teachers and the learners in elementary schools, a sample of two elementary schools was taken. A random sampling method was used to identify the sample that actually participated in answering the questions.

A population sample is a subset of the entire population that is accessible and representative. On the other hand, sampling is defined as the procedure employed to gather subjects of study (Buchanan & Coulson, 2015). The two identifies schools representing the entire population of learners and teachers in Kosovo. The ages of pupils to be included in the study ranged from 12 to 15 years. These were learners attending low secondary school classes. The

teachers who participated in the study were drawn from all the classes and comprised of both computer-aided and traditional assessment methods teachers. Both male and female teachers were involved in the study without discrimination or prejudice. Authority to involve teachers and learners in the study was sought from the school administrators of the participating schools. English was the language used primarily for communication, while Albanian was used for any clarifications. All participants responded to the study questions voluntarily and without any incentive.

3.4.2 Instruments

Research instruments are data collection and recording tools used in a study subject. For this study, two different questionnaires were designed to collect data from both the teachers and the learners. Questionnaires and interview guides are best suitable instruments for a survey study (Singleton & Straits, 2010). They were specifically designed to determine the practicability and to make a comparison of the computer-aided and traditional method of assessment in primary schools. They were designed to be able to provide the researcher with views and opinions directed towards the study from both the teachers and the learners. The instrument captured preliminary details of the school and the respondent such as the name of the school, the category of the school (private or public). It further captured the gender of the teachers, as well as their levels of educational qualifications. The importance of the preliminary data in this research was to assist in building classifications and comparison of the respondents' answers during data analysis (Hyers, 2018).

To test for validity and reliability, a pilot study was done on a 10% sample of respondents. According to Amis (2010), it is important to confirm and validate the functionality of the instrument to be relied on during research as well as test the data collection and analysis.

The results showed the questionnaire was easy to understand and data extracted from the pilot study was consistent with the final study findings. The extent of an instrument's ability to measure what it was designed to measure is referred to as its validity (Lukenbill, 2012). To ensure the objectives of the study were accurately captured, content validity analysis was carried out and it was established that the questionnaire addresses all the objectives when seeking to collect the data. According to Lukenbill (2012), the ability of the instrument to produce consistent results in different comparable surveys indicates its reliability. From the pilot studies, both the reliability and the validity of the used instrument were confirmed. The instruments of data collection were distributed during class sessions and online to both the learners and the teachers and structured survey data was collected. In order to acquire data that was easy to classify yet accurate, questions were closed-ended. To avoid ambiguities, the language and the structure of the questions were simple to understand.

3.4.3 Analysis Procedures

The primary data collected from the respondents on the field was recorded in separate data analysis sheets for both the teachers and the learners. Responses were analyzed using both statistical tools and simple pattern observation. The nature of the research, which was survey made it easier for the researcher to make the analysis of results that were generalized, comparable and easy to summarize. A survey normally creates patterns and explains individual responses in the final qualitative analysis results (Singleton & Straits, 2010). These patterns explained the behavior exhibited by a group of respondents based on common factors such as age and sex. Data were analyzed statistically to illustrate the patterns of the opinions as expressed in comparison of the CAA and traditional assessment methods.

The results were presented in tabular and descriptive forms of descriptive statistics comprising of frequencies, percentages, means and standard deviations. Figures and tables were used to illustrate the analyzed data. In order to draw conclusions, the results of the teachers were compared with the results of the learners. This step was aimed at identifying points of commonalities and different opinions purely based on the fact that the respondent is either a teacher or a learner.

CHAPTER 4: DATA ANALYSIS

4.1 Introduction

The collected data were based on the primary aim of the study, which entailed an assessment of how CAA and TAMs affect the educational outcomes of learners in elementary schools in the city of Gjilan, Kosovo. Data was collected and analyzed in search for answers to the five research questions listed above. The research population was composed of teachers and pupils of elementary schools in the city of Gjilan focusing on two primary schools: one school in a rural setup and the second school in a city setup. The included participants encompassed 40 pupils and 6 teachers from the rural school, and 40 pupils and 6 teachers from the urban school. In total, 52 questionnaires were distributed to pupils and teachers accordingly, where all the 12 teachers filled them adequately (100% response rate), while 3 questionnaires filled by the learners were inadequately completed and were not considered for data analysis (94.3% response rate).

4.2 Results from the Teacher Questionnaire

4.2.1 Descriptive Demographic Analysis of Teachers

Since only two primary schools included in the study, one school was in a city setup while the other was in a rural setup. The urban school was a private institution while the rural school is a public institution. The included teachers encompassed 6 (50%) participants from the urban primary school and 6(50%) participants from the rural primary school. The Fig. 1 below illustrates the proportionality of the type of schools and number of teachers engaged in responding to study questionnaires. The choice of two different categories of schools was in synch with the aim and objectives of the study comparing the teaching and assessment environment in a school applying traditional assessment methods against a school applying

computer assisted assessment methods. In the rural school, the laid down infrastructure was characterized by lack of support for technology, while the urban school had well laid structures for incorporating technology and CAA methods learning.

Figure 1: Category of Participating Primary Schools and Teachers



Although the study tried to establish gender parity among the participating teachers, 75% (9 of 12 teachers) were female while 25% (3 teachers) were males as depicted in the Fig. 2 below. The difference was pegged on the prevailing trend of more men training in math, technical and technology-related subjects as opposed to women who are more inclined on languages and humanities.

Figure 2: Gender of Participating Teachers



The majority (58.3%) of teachers have a bachelor's degree in respective areas of training followed by a 8.3% of teachers with master's degree training. As illustrated in Fig. 3 below, only a minority of primary school teachers (25%) had diploma degree training, and none had doctorate degree training.

Figure 3: Education Level of Participating Teachers



Expectedly, educators with advanced post-graduate degrees engage in teaching students in institutions of higher learning. Those with master's degrees were categorized as professionals in their respective subjects and assisted in supporting, monitoring and evaluating teaching progress and the quality of assessment amongst learners.

4.2.2 Teachers Competence and Attitude towards ICT

All the teachers from the urban primary school has personal computers, either as desktop computers in their homes or laptop computers, which are more mobile communication devices, that are usable at home or at work. Access to computers in school libraries and the school computer lab was showed to make it easy for teachers to access computer technology with ease. Only two teachers from the rural primary school reported to have personal computers. The majority accessed computer services from home (50%) and from the school library (16.7%) in the rural learning institution. Poor allocation of resources and laid-down infrastructure were noted as the hindrance to equipping rural schools with computer technology. Primarily, internet connectivity and inadequate security are the primary challenges.

The competency and ability to use computer applications were rated based on the level of education and experience in using computers. For instance, all teachers with graduate training (66.7%) rated themselves as having very high competency and ability to use computers. The major reason given for such a high competency level in computer applications was adequate training during their university programs, vast experience in using personal computers, and prolonged teaching experience using computer-aided teaching and assessment approaches. On the other hand, teachers with diplomas graded themselves as having moderate competency and others graded their competence and ability to use computers as high. These participants cited low

to moderate training in computer applications and associated their competence to vast experience in self-training and use of computers, either in internet cafés, school computer labs or libraries.

Responses to the question on the implications of introducing ICT and integrating it to traditional assessment methods varied between teachers from rural school and those from the urban primary school. The responses from rural schoolteachers were based on common understanding of the importance of ICT in teaching and assessment of pupils. As such, the common responses included the use of ICT to promote the development critical thinking skills, which are necessary for enhancing problem-solving skills. This response from rural schoolteachers was congruent to the capacity of ICT to facilitate crating learning from urban schoolteachers.

Rural School Teachers	Urban School Teachers
ICT allowed learners determine their learning activities	ICT facilitate active learning
ICT allowed teachers and learners work in teams	ICT enables evaluative learning
ICT promoted development of critical thinking skills to find new solutions to problems	ICT facilitate creative Learning
Application of ICT allowed integration of theory and practice	ICT enables integrative learning
The system is student-directed allowing diagnostics is assessment	ICT facilitate collaborative and cooperative learning

Table 1: Implications for Integrating ICT into TAMs

Table 1 above highlights on different responses provided. Active learning was a common feature in the responses and can be associated with allowing for calculation and analysis of learner's academic performance during assessment using CAA methods and providing feedbacks in real-time. In terms of marking and grading, teachers considered CAA methods as student-centered allowing for evaluative learning and delivering useful feedbacks since learners are not immersed in rote and memorization learning. Integrative learning was considered by 83.3% of the participating teachers by allowing application of theory into practice and eliminating the

synthetic separation between the two. Whether introduction of CAA methods reduced exam irregularities was a question of the age of students, distance and bandwidth. Teachers pointed to at the need for accountability at school and district levels, type of student reward, accountability of teachers with respect to incentives and penalties, and student barriers as the motivation to examination cheating. Therefore the use of CAA methods was shown by 8 (66.7%) teachers to reduce text security risks in terms of barring unauthorized access to tests, eliminating copying during examinations, and eliminating tampering with answer booklets. Equally, introduction of CAA methods does not prevent collusion amongst pupils taking examinations, memorization of test questions and answers, and use of technology-based cheating through hacking. Lastly, CAA methods were shown by 2 (16.7%) urban school teachers to increase the risk of accessing secure examination content and data during transition, examination theft in the underground market, and reduction of financial resources allotted for enhancing exam security due to elevated costs associated with CAA development.

4.2.3 Challenges in Introducing ICT into Assessment

Based on the observation checklist, it was noted that the primary school in the rural setup did not have enough resources. In particular, there was a computer lab of 6 computers but they were not working. The school had 3 other computers working: two in the library and one in head office. The two computers in the library were shared among students in class demonstrations, while teachers used the same for examination results entry, analysis and printing of results. The computer in the head office was mainly for student data records and functioning as the server and database backup for other computers. When teachers were queried, various reasons emerged including poorly designed and constructed classrooms to support the security and aeration required for many computers in one central point (5 of 6 teachers), inadequate number of teachers in rural primary schools (2 of 6 teachers), and lack of adequately trained primary school teachers with technical knowhow on computer repair and applications. As a result, the school infrastructure was rated poorly in terms of supporting CAA methods as expressed in table 2 below.

Type of School	Rate	Reasons
Rural Primary	Very Low	 Poorly constructed classrooms to support computer labs
		 Inadequate and inadequately trained teachers on CAA methods
Urban Primary	Moderate	Computers are not enough
		 The number of trained teaching staff is relatively low
		 Poor government policy on implementation of CAA methods in elementary schools

Table 2: Rating of School Infrastructure in Terms of Supporting CAA Methods

The rating of urban primary school was slightly different from that in the rural setup. All the teachers in the urban setup rated their school infrastructure as moderate in the support of CAA methods. From basic observation, the school had a computer lab and an application instructor. The computer lab was spacious enough for 15 students in one class lesson although every computer was shared between two students. The school hosts a cloud database and one in a server computer to ensure access of information in remote locations. In addition to 15 computers in the lab, there were other 5 computers in the library, which were mainly reserved for teachers and library services. Two printers were also within the school premises, one in the computer lab and the other in the library. Lastly, in addition to electricity connection to the main power grid, the school has a power generator to function as a backup in case of a power outage from the mains. Among the teachers included in the study, the teachers with a master's degree was the computer applications instructor, who was engaged in tutoring pupils, assisting teachers develop

and implement their CAAs, as well as managing data entry and analysis of examination records, among other data recorded in the school.

The attitude of teachers towards using CAA methods and TAMs varied depending on the school setup where a particular teacher taught. All the urban school teachers rated the illiteracy level amongst students and teachers as very low citing early introduction of computer training lessons among pupils early. Moreover, the lessons were carried out by a professional (computer instructor) who was assisted by other teachers with moderate to high training in respective specialties. Contrariwise, teachers in rural school setup indicated a moderate (66.7%) to high (33.3%) illiteracy levels among students in the use of ICT in classroom. The reasons indicated include inadequate computers per number of pupils sharing, and late introduction of computer lessons since the two computers were reserved for the last two upper grades. The use of CAA methods was shown to affect the teaching capability and effectiveness of teachers since teaching and assessment interact with each other. Teachers indicated that they could only assess learners using CAAs only if learners were taught using computer aided teaching methods, which are superior to traditional teaching methods. Teachers showed that proper training of teachers (100%), adequate government policies on CAA implementation (83.3%) and adequate schoolbased implementation strategies (91.7%) are approaches that can be instituted to facilitate successful use of CAA methods in schools.

4.3 Results from the Learner Questionnaire

4.3.1 Descriptive Demographic Analysis of Learners

The two school included in the study were mixed schools. On average, the ratio of boys to girls was anticipated to by 1: 1 but 39 boys and 41 girls were included in the study. In this regard, 48.75% boys and 51.24% were boy and girls, respectively as represented in Fig. 4 below.



Figure 4: Gender of Participating Pupils

The age range mode was 13-14 years representing 81.4% of the total pupil population included as illustrated in Figure 5 below.

Figure 5: Age Group of Participating Pupils



4.3.2 Student's Attitude towards ICT

Using ether traditional assessment methods or CAA had a great significant among students. The use of CAA was more superior as compared to traditional assessments method as stated by most pupils in both rural and urban schools. The high interest for computers showed by 56 (70.8%) pupils in urban schools portrays that using CAA gave better outcome in academics. Additionally, the mindset of motivation that pupils have while working in computers resulted in better performance in their assessment because they feel comfortable working using computers. 20 (20.8%) pupils confirmed that cheating in examinations was minimized because pupils have no adequate knowledge to search for answers online. Only 7 (8.3%) pupils stated that using CAA had no much difference for the traditional assessment methods because pupils memorize possible questions and answers just like it is the case in traditional assessment method. All (100%) pupils in rural schools. Traditional methods of assessment do not expose pupils to the modern technology hence to being attractive to most pupils in the modern world.

When using computer aided methods there was prove for pupils' engagement because there were blended learning styles that kept pupils engaged for a longer period as compared to the traditional methods where only theory was involved in learning. Pupils also prepared for workplace right from their primary level education. Pupils who had knowledge in computer technology had better capacity of performing better at their work place in future. All (100%) pupils in both rural and urban schools showed that they preferred integration of technology such as computers and tablets in their curriculum. Students were willing to use different forms of

technology to connect with their students and their teachers with an aim of improving their academic performances. Use of computer aided technology facilitated in ensuring that student gained instantaneous access to knowledge. 35 (87.9%) pupils in rural schools indicated that they were interested in gaining more knowledge through the use of internet, which gave straightforward answers as compared to books. Traditional assessment method was disadvantageous to pupils because the questioned involved the use of simple multiple choices without exposing pupils with the opportunity of providing guidance on how they arrived at the answer. Some students that is 5 (12 %) in rural schools showed interest in traditional assessment method because they found it simple and not complicated to adapt and use to handle various task.

Students in both urban and rural schools felt motivated and attracted to using CAA in their studies. Those in urban schools that showed positive attitude towards CAA were 28 (70.8%) and 35 (87.9%) in rural schools. The percentage in rural schools outweighed that in urban because pupils in rural areas may not have had an opportunity to access modern technology hence their interest in CAA was overwhelming. A number of 4 (10%) in urban schools and 3 (6.9%) in rural schools said that they would perform best when using computers. Other students that is 8 (19.2%) in urban schools and 2 (5.2%) in rural schools said that CAA made it easier to complete assessments.

4.4. Results from the Analyzed Studies

In order to ensure sustainable training and assessment using CAA methods, timetable for computer lab lessons are required to be consistent and in consideration of other subjects. All computers in both schools were secured by maintaining security access codes, particularly in accessing records of set examinations and examination results for all pupils, among other sensitive data such as financial statements. With the purpose of ensuring security of the cloud databases, pupils were only allowed access to internet services periodically with security measures taken to bar IP addresses to inappropriate contents. Different previous studies point to divergent views pertaining to implementation and use of CAA methods over TAMs in assessing learners. Circumstances surrounding setting and administration of exams, security entailed in the assessment, and evaluation of performance of learners were explored. First, Sim et al. (2016) showed that the environment surrounding traditional teaching and assessment methods are marred with security issues. Initially, a study by Frohlich (2000) elaborated that TAMs are exposed to insecurity in examination papers and scripts during setting and transportation to and from examination centers. According to Curtis (2003) exam tampering was indicated on transportation boxes of English and English Literature exam papers leading to an emergency replacement of those examination papers. Contrariwise, Sim, Malik and Holifield (2003) asserted that security in computer systems is relatively easily maintained through encryption-decryption strategies to warrant security of examination questions and answers while disseminating them to respective learners over the internet.

Regarding setting and administration of exams, both CAAs and TAMs are known to deliver clear and explicit test instructions. On the other hand, CAAs provide tests that are engaging, well laid and more legible than TAMs, which may be impaired depending on the quality of printing (Quansah, 2018). Since TAMs are widespread, studies have shown that CAAs requisites learners to be familiar with different formats and assessment techniques embedded within the CAA system. With respect to evaluation of learner performance, a study by Russell and Plati (2001) indicated that pupils habituated to learning and writing using computer-based platforms exhibited better performance when responding to open-ended questions when written

via a computer system as opposed to pen-and-paper answers. In Kosovo, the primary stumbling block towards integration into school curriculum the use of CAA methods as part of the core teaching methodology is language barrier. Currently, as part of the new curriculum, the government policy dictates staining of learners to acquire English as a first foreign language starting in grade 3.

Wang, Jiao, Young, Brooks and Olson (2008) argued that implementation of computer aided teaching and assessment methods are impeded by infrastructural inadequacies. Rural schools are, thus, disadvantaged in this regard. For instance, it has been recognized that increased access to computers is a platform for increased experience in computer application for teachers and early contact with computers for learners. Similarly, Scheuermann and Bjornsson (2009) argue that learners who have early use of computers and extended experience with computer applications elicit better performance in their CAAs that those will little training and experience. On the other hand, when comparing the implications of the use of computer-based assessments and paper-and-pen based assessments, Ghaderi et al. (2014) showed the benefits of CBTs arguing that administration, marking and analysis of the results is easier and faster than in PBTs. Additional parameters in a learner assessment, such test objectivity, learner anxiety, score comparison and uniformity of assessment administration are easily reported in CAA methods vis-à-vis traditional assessment methods (Mojarrad, Hemmati, Gohar and Sadeghi, 2013).

The attitude of learners is evaluated in the current study with the researcher inquiring on the attitude of pupils towards completing their school-based work and term assessments using either CAA methods or TAMs. All learners were inclined towards using computer systems as opposed to the pen and paper alternatives. These findings were in concert with Higgins, Russell and Hoffmann (2005), who explored the attitude of learners too. In Higgins et al. (2005) study,

pupils were asked whether taking tests using a computer system was easier or harder than taking the same test using a paper and pen alternative. Approximately 82% of all pupils in participation showed that computer aided tests were easier than their paper-and-pen alternative while 87% of participants reported their preference in taking their tests on computers. Correspondingly, Way, Davis and Fitzpatrick (2006) elaborated that learners assessed via online tests were more comfortable in their tests on the computer than when the same learners were subjected to traditional paper-and-pen testing. Lastly, Chua (2012) exhibited that computer-assisted testing elicited elevated intrinsic and extrinsic motivation to learners in test challenge, self-efficiency, and comprehension among pupils, particularly those with experience in using computers.

CHAPTER 5: CONCLUSIONS

5.1 Conclusions from the Teacher Questionnaire

The primary purpose of this study was to evaluate how CAA methods TAMs impact on the educational outcomes of learners. The study also focused on exploring whether implementing CAA methods affects the teaching capability and effectiveness of teachers. Traditional teaching and assessment methods are highly applied in rural school set up in Kosovo. Several factors have been associated with continued use of TAMs in rural schools with poor infrastructure being the major factor. In practice, different infrastructural inadequacies including poorly developed classrooms to support a computer lab, inadequately sized classrooms that are poorly aerated and secured. Resource allocation in the rural setup is poor in Kosovo as in other developing economies. Teachers concluded that late introduction of ICT classes elicits negative impacts on the use of CAA methods among learners in the rural setup since it would have required the teachers to have trained learners using computer aided teaching/learning methods.

Schools in the urban setup have the potential to integrate and use CAA methods in their academic curriculum. Infrastructural shortages, such poor classroom designs are resolved in cities. School amenities are designed to support good security, enhanced ventilation and lighting. As such, many schools within an urban setup are able to maintain functioning computer laboratories in their facilities. Technical experts in computer hardware repair and software maintenance are adequate in cities as opposed to the rural setup. There are many avenues to computer access in towns and cities, ranging from personal computers to internet cafés, to institutional facilities with unrestricted access. Comparatively, educators are able to notice the differences between learners on rural education set up and those within an urban setup in terms of their competency and ability to use computers in CAAs. Schools with computer labs begin

training their pupils on computer use early, and are, therefore, able to perform better in their CAAs.

In concert with the reviewed literature on the comparison between the implications of the use of computer-based assessments and paper-and-pen based assessments, educators argued that the use of CAA methods were advantageous in terms of speed and ease of administration, marking and analysis of the results than in PBTs. Moreover, while competence, attitude, and experience of teachers are unquestionable, CAAs have been documented to lessen feedback while enhancing schematic and procedural knowledge. It was evidenced that the attitude of teachers depicted better teaching approaches, which assured them of higher engagement with their pupils in the course of learning. Finally, it is concluded that although examination irregularities are a multifaceted ordeal, the security of CAAs is better than that of TAMs. Threats to examination security in CAAs are linked to the hackers, particularly in the dissemination of texts and answers over the internet. Contrariwise, administration of traditional PBTs is prone to security threats, especially with regard to tampering with examinations during transit. Design, development, and implementation of apposite strategies towards CAAs can be successful in Kosovo by following two key approaches. First, the study concluded that the government is required to enact education policies that support country-wide adoption of the assessment approach. Second, schools need developing implementation strategies that are need-based in view of infrastructural requirements of individual institutions.

5.2 Conclusions from the Learner Questionnaire

In response to the benefits that learners acquire from using CAA methods in relation to the traditional assisted methods, pupils from the rural school setup painted a picture of inadequate training on computer use and application. As such, these learners were not in a position to gauge its effectiveness. On the other hand, the use of pen and paper methods in their assessment was defined effective when augmented with CAAs in the printing of examination papers and answer booklets, as well as in the analysis and reporting of performance of different learners. Many learners in the rural school setup had not accessed the internet and did not have knowledge of inappropriate sites since the time afforded for them in computers was highly limited. The knowledge of such sites was pegged on the use of mobile communication devices, particularly smart mobile phones and tablets at home. Furthermore, more than 5 pupils shared a single computer, which translated to minimal individual experience with the input devices.

In view of the schools in an urban setting, the infrastructural resources within individual schools permit implementation of CAA methods in the education curriculum. Learners are introduced to computer use and application training early. Equally, English language training commences early and learners are able to interact with different English-based user interfaces adequately. Considering a large number of computers within a school, particularly in institutions with computer laboratories, individual learners spend more time in front of a computer, gaining much experience than rural school learners. As identified in the literature review above, these learners with experience in computer use and applications perform better when presented with computer-assisted assessments. Secondly, the analysis of the findings in the current study confirms that pupils have a higher affinity for computer-aided methods of assessment than traditional methods of assessment associating CAAs with ease in completing their assessment.

The current study shows a positive attitude of both teachers and pupils towards computeraided methods of assessment. Among learners, the use of computers was labelled appealing associating more comfort and better performance to the use of computers. Other pupils showed more interest in completing their school-based work, and termly assessments on computers indicating higher index on ease of use. These parameters do not define different approaches in the setting of the exam but reviewed literature link lower anxiety in CAAs than in TAMs, which have been translated to higher learner performance. Equally, teachers are shown to express a positive attitude on the use of CAA methods. While computer-aided methods of assessment are advocated in all schools in Kosovo, their implementation should be preceded by computerassisted teaching methods to ensure learners are at par with computer use to facilitate better and timely responses in CAAs.

5.3 Conclusions from Current Literature

Different previous research articles have been explored in relation to the research questions. The summative argument is that there is a significant difference in educational outcomes of learners by using computer-aided methods of assessment over traditional methods of assessment. Secondly, the implementation and use of CAA methods have been shown to influence the teaching capacity and effectiveness of teachers with respect to efficiency in administration, analysis, reporting, and security of learner assessment. Current literature suggests that the use of CAA methods enhances problem-solving abilities, motivation while lowering the anxiety associated with examinations among pupils. Additionally, literature has exhibited a positive attitude towards the use of CAA methods over TAMs in both learners and teachers.

Regarding the formed hypotheses, according to the results from the learner's questionnaires, using ether traditional assessment methods or CAA had a great significant among students. The application of CAA was more superior as compared to traditional assessments method as stated by most pupils in both rural and urban schools. The high interest for computers showed by 56 (70.8%) pupils in urban schools portrays that using CAA gave better outcome in academics. Additionally, the mindset of motivation that pupils have while working in computers

resulted in better performance in their assessment because they feel comfortable working using computers. This argument shows that there is a significant difference in educational outcomes of learners by using computer-aided methods of assessment over traditional methods. We, therefore accept the hypothesis that there is a significant difference in educational outcomes of learners by using computer-aided methods of assessment over traditional methods of evaluation.

According to the results obtained from the learners' questionnaire, the use of CAA methods was shown to affect the teaching capability and effectiveness of teachers since teaching and assessment interact with each other. Educators indicated that they can only assess learners using CAAs only if learners were taught using computer aided teaching methods, which are superior to traditional teaching methods. It is also concluded that although examination irregularities are a multifaceted ordeal, the security of CAAs is better than that of TAMs. It shows use of CAA methods have been shown to influence the teaching capacity and effectiveness of teachers with respect to efficiency in administration, analysis, reporting, and security of learner assessment. We therefore accept the hypothesis that the use of CAA affects teaching capability and effectiveness of teachers.

Traditional methods of assessment do not expose pupils to the modern technology hence to being attractive to most pupils in the modern world. When using computer-aided methods there was prove for students' engagement because there were blended learning styles that kept pupils engaged for a longer period as compared to the traditional methods where only theory was involved in learning. Pupils also prepared for workplace right from their primary level education. Current literature suggests that the use of CAA methods enhances problem-solving abilities, motivation while lowering the anxiety associated with examinations among students. It suggests that there are significant benefits pupils reap from using CAA as compared to traditional

methods. Therefore accepting the hypothesis that there are significant benefits pupils have in using CAA as compared to TAMs.

All (100%) pupils in rural schools purported that they were motivated to use CAA if they were efficiently provided in their schools. Traditional methods of assessment do not expose them to the modern technology hence to being attractive to most students in the modern world. It shows a higher preference to CAA compared to traditional assessment methods by the pupils. According to the research, all learners in both rural and urban schools showed that they preferred integration of technology such as computers and tablets in their curriculum. They were willing to use different forms of technology to connect with their students and their teachers with an aim of improving their academic performances. Use of computer aided technology facilitated in ensuring that students gained instantaneous access to knowledge. 35 (87.9%) pupils in rural schools indicated that they were interested in gaining more knowledge through the use of internet which gave straight forward answers as compared to books. Therefore, we accept the hypothesis that there is significant positive attitude in using CAA rather than the traditional assessment methods. They greatly support or look forward to its implementation.

The attitude of teachers towards using CAA methods and TAMs varied depending on the school setup where a particular teacher taught. All the urban school teachers rated the illiteracy level amongst students and educators as very low citing early introduction of computer training lessons among pupils early. Additionally, instructors in rural school setup indicated a moderate (66.7%) to high (33.3%) illiteracy levels among students in the use of ICT in classroom. The reasons indicated include inadequate computers per number of pupils sharing, and late introduction of computer lessons since the two computers were reserved for the last two upper

grades. It rejects that there is a positive attitude of the teachers towards using CAA and would rather stick to traditional assessments methods.

CHAPTER 6: LIMITATIONS AND RECOMMENDATIONS

6.1 Limitations of the study

The primary limitation of this study was that the participants were pupils enrolled at a single primary school in a rural setting and another in an urban setting in Kosovo, which limited generalizability of the findings to primary schools countrywide, and to secondary school settings. Secondly, the study was limited to assessment methods without considering the teaching methods irrespective of the high connection between teaching and assessment. The third limitation concerned the study format, which assessed the theoretical aspects of teachers and learners thoughts as opposed to evaluating the practical aspect of CAA and TAM use via experimental approaches.

6.2 Recommendations

The first recommendation entails the successful implementation of CAA methods in all school in Kosovo. The government, through the Ministry of Education, should develop education policies targeting integration of CAA methods in all schools, which define computer-assisted teaching methods that are able to be merged with the traditional teaching methods. The policies should also focus on resource allocation in terms of allocating funds to schools to acquire computers and software systems to facilitate the program. It is recommended that schools should develop policies and strategies of creating ample and secure environment for the implementation of CAA in schools with the construction of classrooms, offices, and laboratories that are well aerated and secure. Fourth, teachers are advised to undergo additional training on computer use and application to warrant apposite transfer of knowledge from educators to learners, guaranteeing better performance. The current study recommends further research on the comparison between CAAs and TAMs using experimental designs such that hand-on indicators

are evaluated. Secondly, research is recommended on evaluating the performance at different academic levels, primary school, lower secondary and higher secondary, on the benefits associated with CAAs in order to advice education stakeholders on which level to commence the computer-assisted methods.

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APPENDIXES

Appendix I: Teachers' Questionnaire

This questionnaire is specifically designed to determine the practicability and make a comparison of computer aided and traditional method of assessment in primary schools. It is geared in providing the researcher with views and opinions directed towards the study.

You are kindly requested to complete it without fear and with all honesty.

INSTRUCTION

Please answer all the questions honestly and exhaustively by putting a tick ($\sqrt{}$) or numbers in the appropriate box that closely matches your view or alternatively writing in the spaces provided where necessary. NB: This information will be used strictly for academic purposes only and will be treated with utmost confidence

Section 1: Primary School Information

- Name of the school.....
- Category of the School: Private [] Public: []
- Gender of the teacher: Male [] Female []
- Does your school have computers? Yes [] No []
- How many computers are in the school? []
- How many teachers have access to the computers? []

Section 2: Teachers Competence and Attitude towards ICT

[]

- 1. Indicate you level of education: Diploma [] Bachelors [] Masters [] Others []
 - If other please specify.....
- 2. How do you gain access to computers?
 - a. Personal computers []
 - b. Internet café / Home []
 - c. School computer lab []
 - d. Library []
- 3. How can you rate your competency and ability to use computers?
 - a. Very High []
 - b. High []
 - c. Moderate []
 - d. Low
 - e. Very Low []
 - f. Explain.....
- 4. Do you think the introduction to ICT into the traditional method lessens the feedback in terms making and grading? Yes [] No []
- Do you think the introduction of computer-aided method will reduce exam irregularities? Yes [] No []

COMPUTER ASSISTED VERSUS TRADITIONAL ASSESSMENT METHODS

Section 3: Challenges in introducing ICT into assessment

[]

[]

[]

- I. How can you rate your competency and ability to use computers?
 - a. Very High []
 - b. High []
 - c. Moderate []
 - d. Low
 - e. Very Low []

f. Explain.....

- II. How would you rate the school infrastructure in terms of supporting computer aided assessment method?
 - a. Very High []
 - b. High
 - c. Moderate []
 - d. Low
 - e. Very Low []
 - f. Explain.....
- III. How would you rate the level of illiteracy amongst the students and teachers in terms of using ICT in the classrooms?
 - a. Very High []
 - b. High
 - c. Moderate
 - d. Low
 - e. Very Low []
 - f. Explain.....
- IV. Do you think using computer aided assessment method ensures exam security is adequate?

[]

[]

[]

- a. Highly possible []
- b. Possible [] c. Maybe []
- d. Low []
- e. Not likely []

f. Explain....

- V. Do you think computer aided assessment method can be employed successfully?
 - a. Highly possible []
 b. Possible []
 c. Maybe []
 d. Low []
 e. Not likely []
 f. Explain.....

Thank you for taking your ample time to fill the questionnaire.

Appendix II: Students' Questionnaire

This questionnaire is specifically designed to determine the practicability and make a comparison of computer aided and traditional method of assessment in primary schools. It is geared in providing the researcher with views and opinions directed towards the study.

You are kindly requested to complete it without fear and with all honesty.

Section 1: Background Information

1. Name of the school:

Above 15

[]

- 2. Category of the School: Girls [] Boys: [] Mixed[]
- 3. Gender of the student: Male [] Female []
- 4. Indicate your age range: 12-13 [] 13-14 []
- 5. Do you have computers are in your school? Yes [] No []
- 6. If yes, kindly indicate the ration of students per computer in the computer laboratory.
 - a. One (1) computer per student []
 - b. One (1) computer per 2-4 students []
 - c. One (1) computer per 5-7 students []
 - d. One (1) computer per 8-10 students []
 - e. One (1) computer per the entire class []
- 7. How many computer lessons do you get taught per week?
 - a. Every single day of the week.
 - b. More than once a week.
 - c. Once a week.
 - d. Not so regularly.
- 8. Does your school offer internet facilities?
 - a. Yes []
 - b. Sometimes []
 - c. Never []

Section 2: Student's Attitude towards ICT

- 1) How often do you use computers to do your assessments?
 - a. I use the computer at home and in school []
 - b. I only use the computer in school []
 - c. I only use the computer at home []
 - d. I never use the computer either at home or in school []
- 2) How would you rate your ease of use and ability in using computers?
 - a. Very high []
 - b. High []
 - c. Moderate []
 - d. Low []
 - e. Very low []
- 3) What is your attitude towards the use of computers in performing your assessments?
 - a. I feel that i perform at my best when on a computer []

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- b. I feel comfortable when on a computer []
- c. The use of computer is not appealing to me []
- d. Most of the time i feel frustrated when using a computer []
- 4) What method of assessment makes it easier to perform your school based work?
 - a. Traditional method of assessment []
 - b. Computer aided method of assessment []
 - c. There is no difference between the two methods of assessment []
- 5) Which assessment method makes it easier to complete your assessment?
 - a. Traditional method of assessment []
 - b. Computer aided method of assessment []
 - c. There is no difference between the two methods of assessment []

Thank you for taking your time to fill the questionnaire.

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Appendix III: Observation Checklist NAME OF THE SCHOOL:.....

		YES	NO
•	Does the school have enough resources (computer laboratories)?		
•	In the computer lab, is there an instructor?		

Facilities:

•	Is the computer lab spacious to accommodate pupils?	
•	Are the computers adequate for each student and instructor?	
•	Does the school have a data base back up for its information?	
•	Within the computer lab, are there other sources like printer or	
photocopiers?		
•	Is there a generator in case of power shortage?	

Administrative information:

	YES	NO
Is there a lab session timetable for students and staff?		
Does the computer lab maintain security measures/access codes or keys?		
Are the students allowed to access the internet in the labs?		
Is the computer secured to protect students from accessing inappropriate contents?		
Does the school curriculum include use of computer aided assessment methods are parts of its core teaching methodology?		
Does the school have the capacity to ensure that the software is up to date and secured?		