UNIVERSITY OF CAPE COAST

ASSESSING TEACHERS' KNOWLEDGE AND COMPETENCIES IN THE USE OF MULTIPLE-CHOICE RANDOMISATION AS AN ASSESSMENT TECHNIQUE AT THE SHS AMONG SELECTED SCHOOLS IN ASHANTI REGION

CHARLES ENOCK MENSAH

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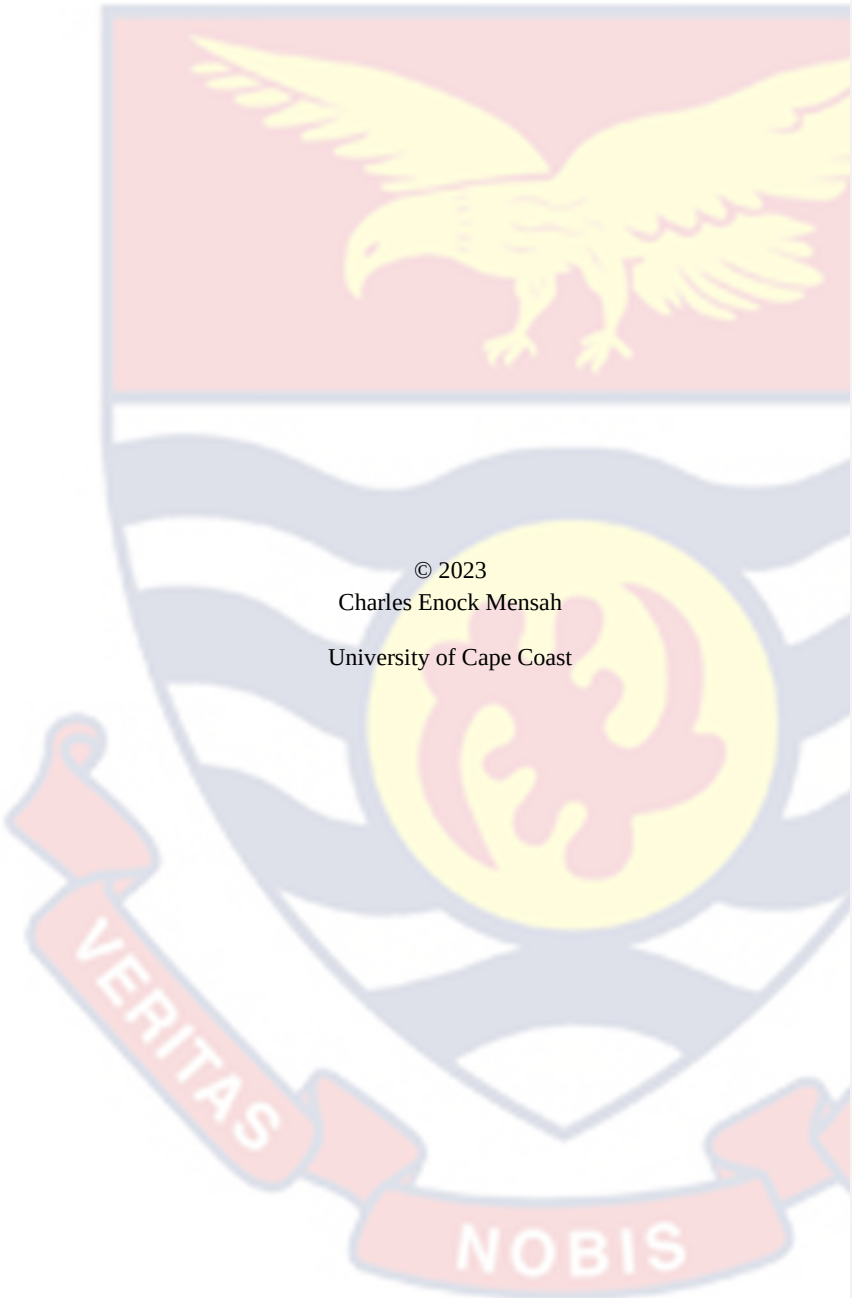

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ASSESSING TEACHERS' KNOWLEDGE AND COMPETENCIES IN THE USE OF MULTIPLE-CHOICE RANDOMISATION AS AN ASSESSMENT TECHNIQUE AT THE SHS AMONG SELECTED SCHOOLS IN ASHANTI REGION

BY

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Thesis submitted to the Department of Education and Psychology of the Faculty of Educational Foundations, College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Philosophy degree in Measurement and Evaluation

JULY 2023

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature……..…… Date……

Name: ……..……..……

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's Signature ……..…… Date ……..……

Name: ……..……..……

ABSTRACT

The study assessed teachers' knowledge and competences in the use of multiple-choice randomisation as an assessment technique among selected senior high schools in Ashanti Region. Data for the study was collected using a self-analysing questionnaire. The mixed method and the descriptive research design were adopted for the study. A sample of 317 teachers with at least 5 years of teaching experience were drawn from 11 schools that consisted 3 category A schools and 4 category B and C schools, using a multi-stage sampling technique. Independent t-tests, means, standard deviations, frequencies, and percentages were used to analyze the data. The study's findings demonstrated that senior high school teachers in the Ashanti Region were knowledgeable and competent in using multiple-choice randomisation as an assessment technique. However, time involved in the design and processes in multiple-choice randomisation was the main reason why teachers were reluctant in using it in their assessment. The study also found that senior high school teachers in the Ashanti region support the use of multiple-choice randomisation in assessment as a technique for reducing cheating connected with the use of multiple-choice questions in exams. The findings also indicated that location of teachers did not have any impact on their knowledge with respect to multiple-choice randomisation as well as being competent in using multiple-choice randomisation. Recommendations were made to the Ashanti regional education directorate's assessment unit and heads of the various senior high schools to encourage and motivate teachers to use this technique in examinations. These stakeholders were also encouraged to organize workshops and seminars for teachers on other contemporary issues in assessment to improve their knowledge and competence towards the conduct of efficient and effective examinations at our schools.

KEYWORDS

Knowledge

Competency

Assessment

Multiple-choice questions

Multiple-choice randomization

Senior High Schools

Examination

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DEDICATION

To my late parent Mr. Isaac Mensah and Sarah Kwofie

and my children

Emmanuel Nana-Banyin Mensah, Felix Mensah, Ernest Atta Mensah and

Ernestina Yaa Adoma Mensah

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LIST OF ACRONYMS

SHS	Senior High School
WAEC	West Africa Examination Council
WASSCE	West Africa Senior Secondary Certificate Examination
CCTV	Closed Circuit Television
BECE	Basic Education Certificate Examination
IRT	Item Response Theory
MCQ	Multiple-Choice Questions
MCR	Multiple-Choice Randomisation
ANOVA	Analysis of Variance

CHAPTER ONE

INTRODUCTION

Background to the Study

Schooling and examination are inseparable. Examination has over the years been the most widely used assessment tool for assessing students' achievement. There cannot be teaching without assessment and assessment in any form or type is an indispensable activity in education that provide basis for educational decisions in accordance with educational goals. Assessment is an important part of teaching and learning.

William (2013) claims that assessment serves as a bridge between teaching and learning and is the only way to tell whether or not students have learned what is being taught. In order to detect a multidimensional quality of an individual or group of individuals, a connected set of measurements known as assessment is used. This definition includes acquiring and analyzing information regarding how well students are meeting their learning objectives (Brown as cited in Yambi, 2020).

Assessment serves a wide range of functions such as how and what to improve on, monitoring instructional effectiveness, identification of students with special learning needs, grading, selection and placement, awards, certification, motivation for students to learn (Yorke, 2009; Schaughency, Smith, Van der Meer, Berg, Secolsky & Denison, 2012; Ohlsen, 2007; Stiggins, 2001).

Both formative and summative assessments play significant roles in education, but the aura on summative assessment outweighs that of the formative. State, Detrich and Keyworth (2018) are of the view that, regardless of ethnicity or socioeconomic class, summative assessment, such as standardized tests or examinations, is essential for ensuring that all schools and students are held to the same standards. As a result, schools, students, instructors, and other stakeholders have traditionally taken summative evaluation, such as examinations, very seriously. According to Geiser and Santelices (2007), a high school diploma, a scholarship, or admittance to college are just a few of the substantial advantages that passing summative exams gives, while failing can have an effect on a child's future job opportunities and income as an adult.

According to Asante-Kyei and Nduro (as cited in Thompson, Ansoglenang & Laar, 2019) the most widely accepted method of evaluating one's level of learning as well as the degree to which a course's objectives and goals have been met is through assessment. According to Emakwu (2012), examinations used in educational evaluation are meant to assess a learner's degree of skill acquisition, intellectual competency, and knowledge after receiving a specific instruction. Makaula (2018) also claims that, key judgments about students' futures in education and employment are based on how well they score on exams. Expanding Makaula's points, the University of Waterloo (2019) itemised the role of examination as to;

i. Evaluate and grade students.
ii. Motivate students to study.
iii. Add variety to student learning.

iv. Identify weaknesses and correct them.

v. Obtain feedback on your teaching.

vi. Provide statistics for the course or institution.

vii. Accredit qualified students.

Conventional practice in assessment has shown that, standard examination composition comprises both objective and essay questions for adequate content validity. However, in recent years, multiple-choice questions have dominated most school examinations; the West African Examination Council (WAEC) and other examinations, such as the Teacher Licensure Exams, feature parts that include multiple-choice items. Multiple-choice questions have recently been the most often utilized assessment format in examinations because they allow a large range of course material to be swiftly examined and objectively scored (Bailey, Cloutier, DiBattista & Kurzawa, 2011; Love, & Nedeau-Cayo, Laughlin, Rus, & Hall, cited in Abdulnabi & Brown (2017). Parmenter (2009) argued that in addition to its efficiency and scoring objectivity, the increasing class sizes and high enrollment serve as a reason why teachers and examining bodies incorporate multiple-choice questions at the expense of constructed response options. Parmenter (2009) explained that grading multiple-choice items are convenient and efficient.

Despite the fact that multiple-choice questions have several benefits for assessing student learning, it is very susceptible to cheating as compared to essay questions. Cheating introduces errors which invalidate the scores resulting into inaccurate judgments and decisions. Validity and reliability are very essential qualities in test results validation because the efficacy (credibility) of examination results is its validity. Hence, the validity of an assessment result

can be compromised by cheating. Cheating produces or introduces errors into the scores and these errors make students earn marks/scores above/below their abilities.

Therefore, to make cheating very difficult in multiple-choice examination, literature suggests the need to randomise the multiple-choice questions (Sue, 2009). Multiple-choice randomisation is a technique that brings variations in the arrangement of the items and the options of multiple-choice items in multiple papers but of the same content employed to reduce the chance of cheating. There are various forms but the commonest type is when only the questions are randomised to make cheating very difficult, both the items and the options are randomised. Several studies have shown that, the use of this technique in examinations has no adverse effect on students' performance (Tabasum, McLeod, Zhang & Yu, 2003; Satti, Khan, Mukhtar & Iqbal, 2013; Hassan, Alamri, Khan & Petel, 2019; WAEC, 2019). These studies as part of their recommendations suggested the use of randomising multiple-choice questions to minimize cheating during examination however, this technique is mostly applied among tertiary institutions in Ghana but not Senior High Schools.

Multiple-choice randomisation is very common in tertiary institution examinations. Before getting approval from the academic office, King Khalid University's Faculty of Medicine in Saudi Arabia requires all tests to be randomly divided into four versions of the same test, with the same test items in each version but in a different order (Satti, et al., 2019). Over a decade, the University of Cape Coast's College of Distance Education has used multiple-choice randomization in its quizzes and end-of-semester examinations in

Ghana. Some training colleges such as Bia Lamplighter College of Education, Jackson College of Education (private teacher training institution) and other tertiary institutions apply this technique when using multiple-choice questions either in their quizzes or end of semester examination. WAEC (Ghana) hinted at its intention to use it at the WASSCE examination in 2019 while holding a seminar in Accra for Directors of Education, WAEC officials, heads, and teachers of Senior High Schools (SHSs) in the Greater Accra Region, which suggests this technique was not used at the Senior High School (SHS) level in Ghana.

Koloi-Keiaikitse (2012) found several problems with teachers' assessment skills in a study on classroom assessment procedures among primary and high school teachers in Botswana. The problems included lack of basic testing and measurement knowledge and skills among teachers, their limited assessment training, and their failure to implement and follow the measurement recommendations they acquired in measurement courses. According to the author, these could be linked to inadequate assessment courses during teacher preparation and a lack of in-service training. Could inadequate knowledge and skills regarding basic testing and measurement concepts identified in Koloi-Keiaikitse' study account for why SHS teachers are not randomising multiple-choice questions in their assessment? Multiple-choice questions are being used in exams more frequently these days, which calls for anti-cheating measures.

Without any doubt, randomsing multiple-choice questions could be the ideal and perfect way of ensuring the use of multiple-choice questions in examination in order to obtain reliable and valid results for any use. If teachers' and practitioners in education would use multiple-choice randomisation, then

they need to have the requisite knowledge, skills and ability for successful application. Against this background, the study aimed to assess teachers' knowledge and competences in the application of multiple-choice randomisation as an assessment technique in a sample of SHSs in the Ashanti Region.

Statement of the Problem

Examination has been the most common evaluation device used to objectively examine student competencies in accomplishing course/learning objectives. But the conduct of examination in our learning institutions has become a problem due to cheating. Although some frantic measures have been put in place to mitigate cheating in examination, these appear to be measures that practically cannot address cheating associated with multiple-choice questions. The use of composite answer booklets with graph and supplementary sheets, synchronized paper, start times across all member nations, biometric registration, the installation of CCTV cameras in exam rooms, the use of metal detectors to search candidates are some of these measures (Daily Graphic 2018; Onyema, West Africa Examination Council, 2016; Eucheria, David. Isa, Alsayed, & Naveed, 2019).

Moreover, in recent years, multiple-choice questions have increasingly dominated examination questions at all levels, notably at the SHS level because of its many benefits but highly vulnerable to cheating. However, Adegoke (2010) argues that instances of exam cheating, regardless of educational level, pose a serious risk to the validity and dependability of all exams and, as a result, to the legitimacy and acclaim of all issued certificates.

Satti, et al., (2019) claim that randomising multiple-choice questions is the most effective technique to lower the likelihood of cheating, but SHS teachers in Ghana use multiple-choice questions in their exams without randomising the questions, which gives students a chance to cheat. Additionally, WAEC recommended teachers and SHS administrators to begin using multiple-choice randomisation in their final exams in 2019. However, little is known about how SHS teachers have implemented this recommendation from the examining body. However, in a time when multiple-choice questions are widely utilized in class assessments, end-of-semester exams for all senior high school and are written by large groups of students, cheating among the students is made very simple by not randomising the questions.

According to Khan (2013), multiple-choice tests constitute an objective method of assessment as long as cheating is kept under control. It appears multiple-choice randomisation is practiced at the tertiary institutions globally, because after an extensive literature review on this technique, no data was found among SHS in Ghana using this technique during examinations. So how does SHS teachers' control cheating any time multiple-choice questions are used in examination? Could it be that, teachers are not knowledgeable about it? These queries have no publicly available answers. Jonsson (2008) explained that, to be "competent" means to be able to act knowledgeably in relevant situation. So, does this implie that, SHS teachers are not competent that is why they do not use this technique during examination?

Though, Ankomah, (2020), Asamoah , Amoako & Bortey (2019);, Songnalle, Sundeme, & Derkye, (2019);, Bedilu, (2014); Tagele, and Bedilu, (2017); have all conducted studies on teachers' knowledge, competency, skills,

and adherence in assessment such as formative assessment, educational assessment, measurement, and test construction principles, their findings revealed abysmal performance of teachers in these studies. And there does not seem to be any literature on knowledge and competency of teachers using multiple-choice randomisation.

Again, these earlier investigations were also carried out in areas that is different from the geographic location of this study. This demonstrates unequivocally that multiple-choice randomisation is not used at the SHS level, but the explanation for this is still unknown, necessitating the conduct of the present study among teachers at SHSs in Ghana.

Against this backdrop, the goal of this study was to assess teachers' knowledge and competencies in the use of multiple-choice randomisation as an assessment technique at the SHS level in the Ashanti Region.

Purpose of the Study

The purpose of the study was to examine teachers' knowledge and competencies in the use of multiple-choice randomisation as an assessment technique at the SHS level in Ashanti Region. The specific objectives of the study were to:

1. Examine the level of knowledge of SHS teachers in the use of multiple-choice randomisations in the Ashanti Region.
2. Ascertain the competency of SHS teachers in the use of multiple-choice randomisation in the Ashanti Region.
3. Ascertain whether male and female teachers differ in their level of knowledge of multiple-choice randomisation as an assessment technique in the Ashanti Region.

4. Determine whether male and female teachers differ in their competencies in the use of multiple-choice randomisation as an assessment technique in the Ashanti Region.
5. Ascertain if location of schools could have an influence on the teachers in the use of multiple-choice randomisation as an assessment technique in Ashanti Region.
6. Ascertain if type of schools could have an influence on the teachers in the use of multiple-choice randomisation as an assessment technique in Ashanti Region.

Research Questions

The following research questions were formulated to guide the study:

1. What is the level of teachers' knowledge in the use of multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region?
2. How competent are teachers in the use of multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region?

Research Hypotheses

The following research hypotheses were developed to direct the study.

$\mathbf{H_0^1}$: The level of knowledge of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region will not differ significantly.

$\mathbf{H_1^1}$: The level of knowledge of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region will differ significantly.

$\mathbf{H_0^2}$: The competency of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region will not differ significantly.

$\mathbf{H_2^2}$: The competencies of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region will differ significantly.

$\mathbf{H_0^3}$: Location of school will not influence teachers' level of knowledge in the use of multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region.

$\mathbf{H_3^3}$: Location of school will influence teachers' level of knowledge on the use of multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region.

$\mathbf{H_0^4}$: Location of school will not influence teachers' competency in the use of multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region.

$\mathbf{H_4^4}$: Location of school will influence teachers' competency in the use of multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region.

$\mathbf{H_0^5}$: Type of school will not influence teachers' competency in the use of multiple-choice randomisation as an assessment technique at the Senior High School level in Ashanti Region.

$\mathbf{H_5^5}$: Type of school will influence teachers' competency in the use of multiple-choice randomisation as an assessment technique at the Senior High School level in the Ashanti Region.

Significance of the Study

The findings of this study will be helpful to teachers since, when used in exams, this technique will highlight students' strengths and weaknesses, allowing teachers to better understand their performance therebycontributing to an improvement in the standard of exams in our SHSs. This study will be useful to WAEC in that it will reveal teachers' level of knowledge, skills, and opinions regarding multiple-choice randomisation as WAEC works to fully implement this strategy in the BECE and WASSCE exams due to the significant role teachers play during the conduct of these external examinations.

The study's conclusions would again serve as a foundation for the National Teaching Council to apply multiple-choice randomisation in the licensure examinations for newly trained teachers and promotion examination for in-service teachers because prospective examinees may be familiar with this technique in assessment. By encouraging the use of multiple-choice randomisation in examinations at the pre-tertiary level to improve proper preparation of students for examinations, the study's findings will also serve as a foundation for policy direction by the Ghana Education Service and Ministry of Education.

The findings and recommendation of this study would also be relevant to researchers and stakeholders in education who are interested in promoting quality assessments. Finally, the study will advance the boundaries of knowledge and aid in future investigations.

Delimitation

The study was limited to all SHS teachers in the Ashanti region. The region has 134 public high schools and 66 private schools, but the study only

used 11 SHSs. Furthermore, knowledge and competences of teachers' classroom assessment are broad; nevertheless, due to limited evidence of use of multiple-choice randomisation among Ghanaian senior high schools, this study focused on teachers' level of knowledge and competencies in using multiple-choice randomisation as an assessment technique.

Limitations

The study examined teachers' level of knowledge and competencies in using multiple-choice randomisation as an assessment technique at the SHS level, the findings cannot be generalise to be a true reflection of teachers' position regarding the use of multiple-choice randomisation as an assessment technique due to the sample size.

Again, if the study had used the mixed methodological design (quantitative and quantitative) in gathering data, some explanation could have been obtained on certain items through interview to compare and understand issues better. For instance, when it's emerged from the analysis that, time involved in the design and use of multiple-choice randomisation was the main reason why teachers were not using this technique in examinations, interview could have in this direction.

The study has certain flaws, which might compromise the validity of the findings. This is due to the potential for incomplete data collection while using questionnaires to gather data. This is because the respondents may have been careless or absent-minded while considering the entire context of the problem, or they may have felt that they would not gain anything from replying to the items and hence chose not to provide their factual thoughts.

Again, because the questionnaire is a self-reporting tool using a standard scale (4-point Likert scale), there is a chance that the respondents may tick the boxes without reading them in order to provide a fair assessment of the questions, which must affect the information.

Definition of Terms

For the purpose of this study, assessment, examination, multiple-choice questions, multiple-choice randomisation, knowledge and competency were defined as follows:

Assessment

The process of gathering information (skills, knowledge, attitude) in education through testing or examination for the purpose of making decisions for student selection, placement, and grading.

Examination

An assessment tool that measures students' knowledge, abilities and skills after teaching/training in a course or programme.

Multiple-choice questions

An objective assessment format that comprises of a stem and a number of options from which responders must select the best appropriate answer from the options provided.

Multiple-choice randomisation

Multiple-choice questions with variations in the arrangement of question numbers and options among students taking the same exams.

Knowledge

Teachers' awareness of multiple-choice randomisation as an assessment technique as well as its uses and forms.

Competency

Teachers' having requisite ability to design and use multiple-choice randomisation as an assessment technique.

Organisation of the Study

The research was organised into five chapters. The introduction contains the background, statement of the problem, purpose of the study, research questions, hypotheses, significance of the study, delimitation, and limitations. The second chapter was devoted to a literature review. The themes of theoretical framework, conceptual review, empirical review, conceptual framework, and chapter summary were used to investigate the literature.

The procedures, methodologies, and data collection and analysis processes were covered in the third chapter. The research design, study area, population, sample and sampling processes, research instruments, data collection procedures, data processing, and analysis were all part of it. In chapter four, the results and discussion were presented. The organisation of the study was completed in Chapter five with a summary, conclusions, recommendations, and suggestion for future research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The study assessed teachers' knowledge and competencies in using multiple-choice randomisation as an assessment technique in the Ashanti Region among selected Senior High Schools. This chapter presents a conceptual review, an empirical review, a conceptual framework, and a synopsis of the relevant literature on the theory that served as the study's foundation. These were discussed under the following:

Theoretical Framework

Item response theory

Conceptual Review

Concept of Assessment

Concept of Knowledge in Assessment,

Concept of Competence in Assessment,

Multiple-choice Randomisation

Empirical Review

Knowledge of teachers in Assessment.

Competencies of Teachers in Assessment

Gender and teachers' assessment knowledge

Gender and teachers' assessment competency

location of school and teachers' assessment knowledge

location of school and teachers' assessment competency

Theoretical Framework

This section provides theoretical background to the study. According to Adom, Hussein, and Agyem (2018), the theoretical framework of research directs and provides a foundation for validating the legitimacy of a study's conclusions. As a result, Item Response Theory served as the theoretical framework for this investigation. The following paragraphs discuss the theory's foundation and its relevance to the study.

Item Response Theory

Item Response Theory (IRT) was propounded by Lord and other psychometricians (1952). It is a comprehensive statistical theory that examines items, test performance, and the relationship between test performance and the abilities the items are designed to measure (Hambleton & Jones, 1993). IRT was created to address the limitations of traditional test theory. The weakness of classical test theory (CTT) includes the fact that test characteristics are sample-dependent (vary across groups of test-takers), measurement errors are the same for all test-takers, and it is impossible to make accurate predictions about potential outcomes for respondents based only on their ability scores. These constraints do not allow for accurate interpretation of test results, which has an impact on the judgments made.

IRT model brings improvement in test and questionnaire analysis. IRT examines the relationship between a candidate's ability and the difficulty of the test. It accomplishes this by investigating a variety of variables such as assessment design, analysis, and scoring, with the assumption that each question or task in the test is unique; thus, this theory is relatively mathematically sophisticated (Thissen & Steinberg, 1988) According to Wikipedia, item

response theory (IRT), also known as latent trait theory, is a psychometric tool used for the design, analysis, and scoring of tests, questionnaires, and comparable instruments for evaluating abilities, attitudes, and other factors. This theory's proponents contend that the placement of the questions on the test should have no influence on students' ability to respond accurately to an item.

Petkewich (2016) stated that the information obtained from responses to specific assessment questions is what drives the IRT framework. He argued that the structure of IRT get contaminated when response to items influence one another. The idea that items do not influence each other in a test is the framework of IRT and this framework is the principle upon which multiple-choice randomisation operates. Multiple-choice randomisation is a technique that presents set of items on a measure or scale to examinees where item positions and options vary from one examinee to another but the items are of the same contents during the assessment. The rationale behind this technique is to minimise cheating when using multiple-choice questions in order to meet the core mandate of tests and examinations in assessment. Because tests and examinations results are the fulcrum of all important decisions taken in education, as a result the reliability and validity of the results is of great concern. IRT provides sound statistical analysis to any assessment instrument especially items that deal with variations in its arrangement as well as the responses.

IRT models are used for establishing and justifying test quality through an independent analysis framework**.** IRT models presume that test takers' abilities to respond to items should not be dependent on other test items, or, to put it another way, that there should be no correlation between test takers' responses to other items. Found at the basis of this analysis framework are three

fundamental concepts that explains the operations of IRT. Reise, Ainsworth, and Haviland (2005), discussed these three fundamental concepts as:

i. Item response function (IRF).

Item response function is a mathematical function in a shape of "S" or ogive that describes the position of an examinees' ability on the continuum of a given construct of items on a rating scale. Item response function assesses item quality and serves as the foundation for determining other crucial psychometric qualities. IRT models determine item response function for each item on a measure and it is the unit of IRT. Item Response Function is the goal of IRT.

ii. Information function.

The information function assesses the quality of an item based on how much psychometric information it delivers at each trait level. Information function deals with consistency and accuracy of how well items in an assessment instrument work as a whole on different trait levels. It allows you to integrate items, which is the foundation for scale construction using IRT.

iii. Invariance

Invariance estimates an individual's position on a latent-trait continuum based on answers to any collection of items with known IRF and displays item features from an IRF independent of population variables.

These concepts in totality analyze examinees or respondents' position, ability and item properties on a given scale or measure. Bulut (2015) wrote that item response theory analyses are based on two assumptions. He outlined them as:

i. Unidimensionality

The assumption of unidimensionality is that all test items assess the same latent trait, allowing respondents to be ranked on a linear scale. Items with the same trait, however, cannot always be strictly met due to a variety of cognitive, personality-related, and test-taking factors, such as level of motivation, test anxiety, and speed of work. This is one argument against the assumption that items with the same trait can always be strictly met. Finding a dominant element or factor influencing test performance is required to satisfy this assumption.

ii. Local independence.

The concept of local independence postulates that responses to other items on the test have no influence on a test taker's chances of answering a question correctly. To put it another way, given the examinees capacity, there should be no correlation between their responses to various items. As a result, the examinees' ability is responsible for the high inter-relationship among the items. Local independence is established when the assumption of unidimensionality is true.

Therefore, these concepts and assumptions together make IRT analyze items independently from a given set of questions and accurately present examinees true abilities in an exam. Establishing examinees true abilities is the fundamental purpose of examination and this purpose is the rational of multiple-choice randomisation in examination. Multiple-choice questions are frequently used in exams due to its many benefits, and as a result, there is a need to limit

how susceptible it is to cheating by randomising both the questions and the answers and IRT provides the justification for its use in examination.

Conceptual Review

This section presents some key concepts that emerged from the study and have been explained in the following paragraphs in line with their application to the study.

Concept of Assessment

Gronlund (2006) defined assessment as a collection of tasks used by teachers to compile information on the aptitude and performance of their students. The term "assessment" refers to a broad range of methods or tools that teachers use to judge and document students' academic readiness, learning progress, skill development, or educational needs, according to the Glossary of Education Reform (2014). Okoro (2005) defines assessment as the process of identifying the decision-making areas of concern, selecting the right information, and gathering and evaluating information in order to offer a report on which options to analyze. Assessment can take a form of tests, examinations, observations, interviews, laboratory work or quizzes. These procedures may be formal (pencil and paper tests) or informal (observations). Assessment is a key component in education and an indispensable activity in the teaching and learning activity. According to Mertler and Campbell (2005), assessing students' performance is one of the most crucial responsibilities of classroom teachers. McMillan (2008), explains that a teacher can make wise teaching decisions if they have a solid understanding of their pupils and are able to match their activities with accurate assessments.

Assessment serves several purposes in education. Mikre (2010) stated the following assessment functions in an essay on the roles of assessment in curriculum practice and learning enhancement as:

i. Facilitating in diagnosing learning difficulties.
ii. Providing feedback on a study program's effectiveness.
iii. Reporting specific academic accomplishments or grades to a variety of parties, such as students, parents, educational institutions to which students may apply for admission, prospective employers, occupational licensing organizations, and professional licensing bodies.
iv. Directing students' attention to instructional priorities and influencing their approach to a course curriculum.
v. Increasing students' self-confidence, motivation, and sense of self-efficacy.
vi. Guiding decisions about their students.

Assessment in education cannot be under-estimated if the purpose of education is to be achieved. According to Jimaa (2011), the three main components of education (curriculum, instruction, and assessment), which form "the three legs of the classroom stool," each leg must be equally strong in order for the "stool" to function properly be balanced, and supporting. Jimaa (2011), disclosed that, the assessment 'leg' of the classroom stool is frequently the weakest of the three, the least understood and the least efficiently applied. It is in this line that this study sought to strengthen assessment practices at the SHS through the use of multiple-choice randomization to protect and encourage the use of multiple-choice questions during examinations.

Concept of knowledge in Assessment

Teachers' knowledge in assessment is one of the requisite abilities in the preparation and training of teachers in the Colleges of Education and the Universities. It is through assessment that teachers can ascertain the impact of their teaching as well as evaluating educational goals. Therefore, teachers must be knowledgeable in assessment in order to choose and select appropriate assessment tools and techniques when assessing students.

Knowledge is divided into two categories: declarative knowledge and procedural knowledge. Declarative knowledge is knowledge that can be stated as a true statement, also known as lexical or factual knowledge, whereas procedural knowledge is the capacity or competence to perform something (Csap,2004; and Jana,2016). Teachers need both declarative and procedural knowledge in assessment.

According to Paterno (2001), assessment knowledge refers to teachers' knowledge of the fundamental principles of sound assessment procedures, terminology, as well as the development and application of assessment methodologies and approaches. According to Center on Standards and Assessment Implementation (2018), assessment knowledge consists of knowledge in fundamental assessment concepts such as assessment purposes, uses, principles, unethical, illegal, and inappropriate assessment methods as well as assessment resources**.** According to Stiggins (1995), assessment knowledge includes knowing what is being assessed, why it is being assessed, how to assess it most effectively, how to construct a representative sample of the assessment, what difficulties may develop throughout the assessment process, and how to avoid them.

In this study, assessment knowledge consists of teachers' procedural knowledge in multiple-choice randomisation regarding its uses, and design in assessment. Multiple-choice randomisation is a concept that is thought to be an appropriate technique for enhancing the weaknesses related to the use of multiple-choice questions in examinations, hence the need for teachers to be knowledgeable about its use in assessment in order to improve its effectiveness. Teachers in multiple-choice randomisation consist of their awareness of this technique in assessment, its usefulness, their familiarity with types/forms, stages, procedures involved.

Teachers' knowledge in assessment is crucial to their roles and responsibilities in the assessment component of education. According to Popham (2009), educators' lack of knowledge in assessment can significantly affect educational quality.

Mellati and Khademi (2018) claim that by employing suitable assessment techniques and grading processes, teachers can improve their teaching, increase students' willingness to study, and improve students' achievement. According to Black and Dylan (1998), the inefficient adoption of a variety of assessment procedures in the classroom is due to teachers' lack of assessment knowledge and experience.

Teachers' knowledge in assessment aids in obtaining valid and reliable result that can serve all the purposes of assessment. This study aims to determine whether teachers at the SHS level in Ghana are knowledgeable enough to use multiple-choice randomisation in their assessments. Teachers' having adequate knowledge in assessment would promote effective teaching and learning in schools.

Concept of Assessment competencies

Assessment competency is a fundamental requirement for all teachers regarding assessment if the intended purpose and its use are to be met. Competency according to Pereira (2002) is a multidimensional construct that incorporates knowledge, skills, aptitudes, and values. Competency is the ability to perform or accomplish a task that meets a required standard (McConnell, 2001). In this study, assessment competencies refer to teachers' abilities to randomise multiple-choice questions and their options, code, prepare marking scheme and score.

According to Weinert (as cited in Winterton, Delamare - Le Deist, and String-fellow (2006) certain dimensions are considered to influence an individual's degree of competencies. These competencies were outlined as; ability, knowledge, understanding, skill, action, experience, Motivation. There are various forms of competency that could be required by an individual at a given situation. Cheetham and Chivers (as cited in Winterton, et al. 2006) presented five forms of such competencies as;

i. Cognitive competence. This comprises both theoretical and conceptual knowledge, as well as informal tacit knowledge learned through experience.
ii. Functional competences. These are the abilities or expertise that a person working in a specific occupation should have and be able to demonstrate.
iii. Personal competency. This is characterised as a generally enduring characteristic of a person that is causally related to successful or exceptional work performance.

iv. Ethical competencies. According to their definition, these are "the possession of suitable personal and professional values and the ability to make solid judgements" based on situations relevant to one's job.

v. Meta-competencies. These are related with learning and reflecting, as well as with the capacity to deal with ambiguity.

Competency is an indispensable ingredient required in every performance. Competency is required by every teacher in order to perform the assessment aspect in the teaching profession. Teachers utilize assessment to collect information for making various judgments, such as educational decisions about pupils, as part of their responsibilities (to provide the student with comments on his or her development, strengths, and deficiencies) to assess instructional efficiency and curriculum sufficiency, as well as to guide policy (AFT, NCME, & NEA, 1990).

Assessment competencies such as knowledge and skills, according to the American Federation of Teachers, National Council on Measurement in Education, and National Education Association, are critical to teachers' roles as educators because they believe that student assessment is an integral component of teaching and that excellent teaching cannot exist without competent student assessment. In view of this, the association deems it right for teachers to possess competencies such as skillfulness in;

i. Designing assessment strategies that are appropriate for guiding instructional decisions (i.e ability to use appropriate principle and technique for the assessment).

ii. Conducting, marking, and evaluating the outcomes of both teacher- and externally-developed assessment methods.

iii. Recognising immoral, unlawful, or otherwise unsuitable assessment procedures and assessment information use (capacity to maintain fairness and ethical problems regarding the assessment process.

According to Tagele, Bedilu, and Yeworlew (2015), the effectiveness of assessment practices used in the classroom affects the quality of learning, which is a crucial and fundamental part of teaching. This therefore underscores the need for teachers to demonstrate competency during assessment. Assessment competency is a very significant ability for teachers in the organization and administration of assessment. Darling-Hammond (2006) argues that, Assessment competency is required in order to select assessment procedures that require critical thinking or creative ability, which will result in greater effectiveness and independence of students' learning by monitoring their performance or achievement levels as well as conducting accurate assessments.

Tagele, et al., (2015) argued that, attaining educational system goals, such as providing a high-quality education, will be aided by teachers' competence in student assessment of their academic progress. They cautioned that the lack of assessment competency among teachers can result in erroneous decision when evaluating students' academic achievement due to inadequate assessment knowledge and skills. In order to achieve the primary goal of classroom assessment, which is to obtain accurate, reliable, and useful information regarding student achievement, Arulappen (2013) concludes that teachers should have the knowledge and competence to determine what is to be measured and define it precisely so that tasks constructed would require the intended knowledge, skills, and understanding.

The design and use of multiple-choice randomisation require some amount of knowledge, skills, abilities and expertise on the part of teachers. These constructs harmonise to make one competent. Competency at this point implies teachers' ability to successfully design and use multiple-choice randomisation in examination. And teachers using multiple-choice randomisation in examinations will enhance their teaching in the sense that, this technique will provide better feedback on students' strengths and weaknesses.

The foregoing literature review underscores the importance of assessment competency and that is why this study sought to examine teachers' competency in using multiple-choice randomisation as an assessment technique at the SHS level.

Multiple-choice randomisation

The primary goals of any assessment of students should be to give them accurate feedback on how they performed as well as valid and reliable assessments of their knowledge and abilities**.** (Al Mahmoud, Elzubeir, Shaban, & Branicki cited in Satti, Hassan, Alamri, Khan & Petel 2019). However, for an assessment to be effective, it must be accurate, trustworthy, usable, economical, outcome-based, and most importantly, authentic. (Khan, Tabasum, Mukhtar & Iqbal, 2013). Multiple-Choice Questions (MCQs) are increasingly being used as the dominant type of assessment in higher education due to their validity, objectivity, and high efficiency. (Bailey, DiBattista & Kurzawa, 2011; et al., 2012; Satti, et al., 2019).

Multiple-choice questions are objective assessment items that consist of a stem and a collection of options from which examinees must select the correct answer. According to McLeod, Zhang, and Yu (2017), these kinds of questions

are now frequently used to assess a wide range of teaching objectives in all academic fields and at all levels of schooling. Many standardized tests in many jurisdictions consist of multiple-choice questions in those exams.

However, one disadvantage of using MCQs is their vulnerability to cheating, particularly in summative assessments when exams are written by large groups of students accommodated in congested settings. This has a detrimental impact on the assessment tool's reliability. Khan, et al., (2013) stated that, sound invigilation and supervision, or randomising the MCQs, are the most effective deterrents to the use of unfair means in any examination. Randomisation is used to reduce the possibility of cheating by scrambling the sequence of multiple-choice questions (MCQs) and responses across multiple papers with the same content. (McLeod, Zhang & Yu., 2003; Khan et al., 2013; Satti, et al., (2019).

There are several ways of applying randomisation to a given set of multiple-choice questions. The USC Marshall School of Business (2017) classified randomisation into three categories. These are;

i. Changing the Order of the Questions Presented (Different Students Get Different Questions). A predetermined number of questions are drawn at random from a larger question pool, so that two students receiving the identical questions is doubtful.
ii. Randomising Question Order (Same Questions, Different Order) While the questions are the same for all students, the order in which they are presented will vary.
iii. Answer (Options) Randomisation

The answers for a specific question are randomly ordered. Typically used for multiple-choice and multiple-response questions.

The items or questions, as well as the answer choices or multiple responses for each item, must be carefully planned, constructed, and edited in order to create high-quality multiple-choice questions. After the multiple-choice items and response options have been prepared, the next step is to determine the precise arrangement and ordering of the multiple-choice items and answer options. Several studies have established that, randomising multiple-choice questions has little influence on student performance. (McLeod, Zhang & Yu., 2003; Khan, et al., 2013; Satti, et al., 2019).

Three methods were provided by Attali and Bar-Hillel, cited in Joseph (2005), for changing the placement of correct answers in order to make the examinees' knowledge of the answer-key pattern unpredictable. These techniques are random, arbitrary, and balanced.

a. Arbitrary method

   Arbitrary method is similar to randomsation, in that, the correct answers are placed among the options either in the middle or edge-averse locations

b. Balance method

   A balanced method places the correct answer in each potential option an equal number of times. When the keys are unbalanced, pupils can correctly guess using elimination procedures such as the underdog strategy

c. Randomised method

This procedure assigns the locations of the right answers entirely at random. Die, unbiased coins, and computer programs are a few examples. At each given turn, there is an equal chance for each potential result.

In the current educational climate, multiple-choice questions (MCQs) are without a doubt one of the most widely used assessment forms, and as such, they must be protected throughout its administration. The only means of ensuring this form of protection is to randoms the items before using it in any assessment. But are SHS teachers' competent to randomise MCQs before using it in their assessment? This is what this study seeks to find out.

Empirical Review

This section presents a review of papers and articles related to the study's research questions and hypotheses.

Knowledge of Teachers in Assessment

According to DeLuca and Klinger; MacLellan, studies have shown that teachers frequently maintain low levels of assessment knowledge and skills, with beginning teachers being particularly unprepared for assessment in schools (as cited in Deluca and Johnson, 2017). Therefore, Popham (cited in Deluca and Johnson, 2017) believed that "educators' inadequate knowledge in assessment can affect educational quality."

To confirm or deny the claim that teachers' lack of assessment knowledge can have an impact on educational quality, Amoako, et al., (2019) conducted a study to explore SHS mathematics teachers' knowledge of formative assessment practices in the Cape Coast metropolis. The study employed a descriptive cross-sectional survey and a census approach and

involved 148 mathematics teachers from all thirteen public SHS in the Cape Coast city.

The Majority of mathematics teachers in SHS in the Cape Coast Metropolis had little to no knowledge of formative assessment practices, according to the study's findings. The results, however, showed a strong correlation between formative assessment knowledge and practice among SHS mathematics teachers. The knowledge of Swaziland's primary school teachers about measurement and assessment was examined by Matsenjwa and Thwala (2013). Seventy twos primary school teachers were selected at random from 40 schools to participate in the descriptive survey. The study's conclusions indicated that primary school teachers had some knowledge of measurement and assessment but lacked the competency to use a variety of assessment techniques. The survey also revealed that teachers typically used oral and practical assessments, despite the fact that such observations and project methodologies were rarely used

A similar study by Benzehaf (2017), into teachers' assessment practices and skills among 40 high school teachers at Jadida region in Morocco revealed weak assessment practices among the teachers. These were ascertained through analysis of data from the questionnaire and interview used during the data collection. Idika and Eke (2017) also investigated lecturers' understanding of applying different assessment procedures to assess people with special needs in all-inclusive classrooms at universities in Nigeria's South-South geopolitical zone. The descriptive survey design included forty (40) special teachers and sixty (60) non-specialist teachers, with a sample of 20 (50%) specialist teachers and 30 (50%) non-specialists. The study's findings revealed, among other

things, that non-specialist instructors lack understanding and implementation of assessment techniques in all-inclusive classrooms, whereas specialist lecturers have appropriate knowledge of assessment techniques.

Furthermore, Alufohai and Akinlosotu (2016) confirmed the assessment deficiencies of teachers in a similar study on the attitudes and familiarity of secondary school teachers with continuous assessment (CA) practices in Nigeria's Edo Central Senatorial District. The results of the 543 teachers chosen from a population of 1084 teachers in the district revealed that the majority of teachers perceived CA processes as a systematic and comprehensive way of assessment but were unaware of its cumulative and guidance-oriented aspects.

Finally, Alkharusi, Aldhafri, Alnabhani, and Alkalbani (2012) conducted an investigation into the educational Assessment of Attitudes, Competence, Knowledge, and Practices Among Muscat Teachers in the Sultanate of Oman. Responses were collected from 165 in-service teachers teaching a variety of subjects in grades 5 through 10. The results of the study revealed that, while teachers had a good attitude toward and perceived themselves to be competent in educational assessment, they had a low level of knowledge in educational assessment. The study also discovered that teachers used a variety of assessments in the classroom, largely to motivate students to learn and assign grades, with some variations based on gender, grade level, and subject area.

All these studies reported weak assessment knowledge and practices among the teachers which supports Jimaa's (2011) contention that the assessment 'leg' of the classroom stool is frequently the weakest, least

understood, and least effectively implemented of the three. Well, since you can't give what you don't have, it is not surprise that, even findings from Idika and Eke (2017) point to the fact that, lecturers who have not been train in educational assessment perform poorly in the study. However, in all the studies reviewed under this sub-heading, these studies assessed multiple assessment techniques that makes addressing their findings very cumbersome. This study addressed these issues as it focused on assessing teachers' knowledge and competency in using multiple-choice randomisation at the SHS level.

Competencies of Teachers in Assessment

In a study that assessed teachers' competence in the educational assessment of students among 814 secondary school teachers, Tagele and Bedilu (2017) discovered that secondary school teachers in Ethiopia's Amhara National Regional State were not competent in the educational assessment of their students. Each of the seven standards used in the educational assessments of the students, as well as the overall assessment, revealed a lack of competency on their behalf. The competency areas included selecting assessment methodologies, establishing assessment procedures, administering, scoring, and interpreting assessments, using assessments for decision making, using assessments for grading, conveying assessment results, and spotting unethical behavior.

The study discovered a relationship between teacher competency and service years. Teachers' assessment literacy improved as their teaching experience grew. The mean score of the male teachers was also greater than the mean score of the female teachers. Also, teachers who had a strong experience in measuring and evaluating students fared marginally better than those who

had not taken any assessment courses. The study found that secondary school teachers in the Amhara National Regional State lacked sufficient knowledge in classroom assessments, that could have a detrimental effect on the region's educational standard.

In a study in Maleysia, Sawari (2013) did an extensive review of literature that focused on teacher competence in assessment. He identified four areas regarding teacher competency in assessment. These four areas were;

i. training in the mastery of assessment guidelines,
ii. standard assessment,
iii. list of lacking skills among teachers in assessment
iv. Lacking skills among Islamic teachers in assessment.

In the perspective of Sawari (2013), for teachers to be competent in assessment, they should have formal training but her study revealed low quality practice in assessment due to lack of training with few teachers who had formally trained in basic principles in assessment. She continued by saying that it is essential for educational systems to provide a blueprint or rubric assessment that all teachers must follow in order to prevent unethical or biased assessment from one school to the other and to avoid double standards among teachers. As a result of the application of different values regarding what is significant in education, standards, have become more important, Hunter (2009). These requirements ought to be a part of a more comprehensive educational process that can define what is expected of students in the classroom and lead to advancements in education. Additionally, Sawari (2013) found that teachers lacked measurement knowledge, particularly with regard to ideas about normative data and how standardized assessments work.

In addition, 691 teachers from primary, junior, and senior secondary schools in Botswana were examined by Koloi-Keaikitse (2017) for their level of competency in classroom assessment practices using IRT models. The results showed that teachers had higher levels of competency in test design and in the calculation of statistical tools like measures of central tendency, but lower levels of competency in portfolio assessment and lower levels of confidence in their ability to The capacity of a teacher to assess students in the classroom is strongly correlated with their academic background.

In a study involving 367 secondary school teachers from Malaysia's Johor Bahru District, Arulappen (2013) looked at this relationship. The study's goal was to discover whether a teacher's competency in assessment may be influenced by their academic background, professional training, teaching experience, competency in developing classroom tests, or experience in taking courses relevant to assessment. use classroom assessment results to guide their teaching and learning.

According to the study, teachers with bachelor's degrees and master's degrees in their academic backgrounds performed better in classroom assessments than those with diplomas and certificates. The findings of Arulappen's study indicate that acquiring more education can improve assessment competency. The study's shortcoming, however, stems from the absence of specific competences that would have given the idea that teachers with high academic credentials are competent about assessment-related matters.

In a study that used 60 teachers from secondary schools in Bahir Dar Town, Ethiopia, to investigate teachers' competency in educational assessment of pupils, Bedilu (2014) found that teachers demonstrated insufficient levels of

knowledge and skills. Each of the seven competency areas in which teachers were assessed showed only a low level of competency. Contrarily, the levels of competency among teachers in non-governmental schools were significantly greater than those in governmental ones.

In addition, Onyefulu (2018) found that multiple-choice, short-answer, restricted essay, and fill-in-the-blanks questions were often used by teachers in both elementary and secondary schools. But occasionally, teachers in secondary schools would give their students long essay questions. The results showed that teachers' assessment techniques in elementary and secondary schools needed some improvement. According to the researcher, these findings' implications show that there is opportunity for improvement and that there is a need for more opportunities for professional growth in classroom assessment as well as dedicated quality oversight from their supervisors. Due to the fact that an unequal number of respondents would result in unanticipated differences in the figures used in the analysis, the study should have employed an equal number of respondents when collecting data for comparative studies of this kind.

From the literature survey, the findings point out various challenges associated with competencies of teachers in assessment and require immediate attention. Also, limitations identified in the literature review suggest more empirical studies be conducted to ascertain the issues affecting teachers' assessment practices. This study seeks to assess teachers' knowledge and competency in using multiple-choice randomisation at the secondary school level.

Multiple-Choice Randomisations in Assessment

McLeod, Zhang, and Yu (2003) developed items and their choices into four distinct orders and administered them to 442 students at the University of Western Ontario in Canada in an experimental study on the influence of multiple-choice randomisations on student performance.

The four treatment combinations created for the trial were as follows:

i. Completely randomised combinations;
ii. Partially randomised combinations;
iii. Completely ordered combinations;
iv. Partially ordered combinations;

In all, five hundred exams questions were generated and randomly without replacement grouped into the four treatments with sample size of 125. The exams were not coded, and neither the students nor the teachers were aware of the particular student's treatment strategy when they were given. There were no differences in scores across the four treatment combinations, according to an analysis of the data using mean and standard deviation.

In another study, Khan, Tabasum, Mukhtar, and Iqbal (2013) investigated "the influence on student performance by shuffling questions and their responses in medical colleges' admission tests" in Pakistan. The University of Health Sciences (UHS), Lahore, conducted a prospective, cross-sectional study using this technique during entrance exams for admission to medical colleges in Punjab. From 2008 to 2011, applicants took scrambled question and answer tests in four different codes at various provincial centers and cities (except MCAT 2010, which contained three codes only). For all of the exams, the codes contained the same information. Theirs was the first study of its sort to examine repeated sequences of shuffled but similar-content multiple choice

question sheets in a high-stakes entrance examination over a period of time. The results of the study revealed no variations in the grades of students who were given papers that followed to the topic coverage pattern. The mean scores of the candidates at each center for various codes each year were not found to differ statistically.

In their investigation on the impact of test item scrambling on students' performance and the level of difficulty of multiple-choice questions on a college of medical examination, Satti, Hassan, Alamri, Khan, and Petel (2019) also looked into the influence of multiple-choice randomis

ations. King Khalid University in Saudi Arabia provided 98 level 500 (5th year) undergraduate medical students for the study. Four groups of test items were created randomly (A, B, C and D). Version (A) had the questions arranged in a way that ensured they covered all of the content covered in class; version (D) had the questions arranged in a manner that was the opposite of version (A), and versions (B) and (C) had the questions randomly assigned.

The findings showed that the exam's difficulty level or student performance were unaffected by the randomisation of test items into versions intended to prevent cheating. This finding supports research by McLeod, Zhang, and Yu (2003) as well as Khan, Tabasum, Mukhtar, and Iqbal (2013) that found multiple-choice randomisation has no impact on students' performance on tests.

On the contrary, Etsey and Ollenu (2015) discovered substantial variations in performance when item order was changed in English Language, Mathematics, and Science for 810 JSS 3 students preparing for their Basic Education Certificate Examination (BECE) in Ghana. These students were selected from 12 different public and private schools in the Greater Accra

Region's urban and rural locations. The urban schools were deliberately selected from Accra, as well as the rural schools from Ga-rural areas, which share borders with the Eastern Region and (Kasoa and its surroundings) in the Central Region.

English language, mathematics, and science multiple-choice questions with 40 items each were used for the study. The items were put in a random order, ranging from simple to complex to simple. The survey discovered significant performance differences in the areas of science, mathematics, and English language.

Despite the fact that numerous studies have backed the use of randomisation to lower the incidence of cheating on multiple-choice exams, none of the researchers have specified the level of knowledge and competencies needed to employ this technique in assessment. This study set out to evaluate teachers' knowledge and competency in employing multiple-choice randomisation at the SHS level in order to overcome this limitation.

Gender and teachers' assessment knowledge

In a study on teachers' classroom assessment abilities in Muscat public schools in Oman, Alkharus (2011) took into account characteristics like gender, subject area, grade level, teaching experience, and in-service assessment training. 213 teachers provided responses to a self-perceived assessment skills scale during the data collection process. When it came to self-perceived assessment skills, such as presenting assessment findings and developing test items, female teachers outperformed male teachers in the analyses. The self-perceived assessment abilities for grading, using performance assessment, and interpreting exam questions, however, did not show any statistically significant

gender differences. This conclusion contradicts the findings of Asamoah, Songnalle, Sundeme, and Derkye (2019), who discovered that male and female senior high school teachers in Ghana's Upper West Region had significantly different knowledge of formative assessment. Male teachers knew more about formative assessment than female teachers. The study involved 295 senior high school teachers.

However, Chalachew and Terefe's (2020) teachers' study on high schools in Ethiopia's South West Shewa Zone revealed that self-perceived skills varied depending on gender and teaching experience. When discussing assessment results, female teachers communicated more effectively than their male counterparts. The researchers used an observation checklist and a modified assessment practice inventory questionnaire developed by Zhang and Burry-Stock in 2003 to collect data from the 197 teachers who participated in the study from seven high schools.

Similarly, the independent t-test results in a study by Afshar, Tofighi, Asoudeh, and Ranjbar (2018) that examined how alternative assessment knowledge, teaching experience, gender, and academic degree affected EAP teachers' assessment literacy showed no significant difference in assessment literacy between male and female EAP teachers. By using a convenience sampling, the researcher selected 106 EAP teachers (74 men and 32 women) with PhDs (N=77) or MA/MScs (N=29) with a variety of academic backgrounds to participate in the study. The 212 participants completed the Classroom Assessment Literacy Inventory (CALI), which was developed by Mertler and Campbell (2005).

Gender and teachers' assessment competency

In a study on the influence of gender on the development of effective teaching abilities among Ghanaian distance education (DE) students, Ahiatrogah (2017) discovered that gender accounts for differences in how distance education (DE) teacher trainees gained their teaching abilities.

The study used 5 regional study centers from the College of Distance Education at the University of Cape Coast. Participants were 376 students, of which 203 (53.99%) men and 173 (46.01%) women were used for study. The time spent on many aspects of effective teaching techniques cannot, however, be completely disregarded. The study claimed that it was challenging to pinpoint precisely what caused gender differences.

Osman (2021) conducted a study in the Sissala East Municipality in the Upper West Region of Ghana using a sequential explanatory mixed-method design to look into the concepts of classroom assessment held by basic school teachers. Using the convenience sampling method, 260 teachers were selected from four (4) circuits made up of lower primary, upper primary, and junior high school. The variables in the study included gender, educational attainment, age, teaching experience, number of years of teaching experience, and assessment-training. In-class exercises, objective evaluations, and essay-style questions were among the teachers' assessment strategies that the study found to have a significant relationship with gender.

When it comes to using objective assessments and in-class activities, female teachers placed much higher importance on these areas than their male colleagues. However, compared to their female colleagues, male teachers acknowledged using essay-style questions to assess students more frequently. These differences between male and female teachers' use of objective

assessments and essay assessments may be related to the speed with which objective assessments can be scored compared to essays. Due to domestic or marital responsibilities, female teachers may not have the extra time needed to score essay assignments. Males, on the other hand, might have some extra time outside of class to work on essay-style questions that require scoring.

Wanakacha, Aloka and Nyaswa (2018) conducted a study on whether gender can influence teachers' intrinsic and extrinsic motivation in performance of their core functions among 143 Kenyan Secondary School teachers'. The study found no impact of gender on teachers' intrinsic and extrinsic motivation to perform their core functions. Of course, assessment is one of the core duties of teachers in the classroom and this implied that, both male and female teachers performed their duties as expected of them with gender not impacting on their abilities.

However, Dien, Abang, and Ngban (2022) found that gender had a significant impact on teaching effectiveness and that female teachers outperformed their male counterparts in a study on teaching effectiveness in relation to demographic factors, such as age and gender, among secondary school teachers in the Calabar Education Zone of Cross River State, Nigeria. Although the researcher acknowledged that there is some debate over gender differences in teachers' effectiveness, it is recognized in this work as a potential component that could explain for individual variations in teacher practice. The study used 328 students and 164 teachers selected from the Calabar Education Zone constituted the study's 492 participants. A questionnaire titled Teachers' Demographic Factors and Teaching Effectiveness was used to collect data for the study.

Who Makes Effective Teachers, Men or Women? was the topic of a study. In a study among secondary school teachers in India, Islahi and Nasreen (2013) found no evidence of gender differences in their findings. The study used 482 teachers, 245 of whom were males and 237 of whom were females. Both male and female teachers exhibited minor differences in efficacy, with slight variations depending on demographic characteristics.

Location of school and teachers' assessment knowledge

In Shweta's (2013) study, the effectiveness of secondary school teachers was compared to their socio - demographic factors (gender, social background, category, marital status, teaching subjects, age, qualification and school teaching experience). 100 secondary school teachers from the Ghaziabad district of the U.P. in Jaipur were randomly selected for the survey-cumulative exploratory descriptive study, and data were collected from them using a self-made teaching effectiveness questionnaire. According to the investigation, secondary school teachers' ability to impart knowledge was influenced by their social backgrounds. Teachers in urban areas were more knowledgeable than those in rural areas.

Location of school and teachers' assessment competency

Geographical location of every human entity plays significant role during assessment. In education, locational influence on schools have largely contributed to students' academic performance as past and current studies continue to document findings to this effect.

An investigation by (Rana 2019) into the differences in secondary school teachers' levels of teaching competency in relation to their gender,

location of employment, type of school, educational background, and prior teaching experience was conducted in India. Random sampling was used to select 100 teachers from the ten secondary schools in Jammu Tehsil for the study. Questionnaire developed by Passi and Lalitha (1994), titled the general teaching competency scale (GTCS) was used in the study during the data collection. The t-test results revealed that secondary school teachers' teaching abilities varied significantly based on their location, kind of institution, area of expertise, credentials, and prior teaching experience. Teachers in private secondary schools were better trained than those working in public institutions, and teachers in rural as opposed to metropolitan settings were better at their jobs. It has been demonstrated that postgraduate teachers are more competent than graduate teachers, and that less experienced teachers have higher teaching abilities than more experienced teachers.

A study on Who Makes Effective Teachers, Men or Women? from an Indian perspective was undertaken by Islahi and Nasreen (2013). 245 men and 237 women out of 482 teachers were used in the study. The study's conclusions showed that a teacher's effectiveness is unaffected by the school's location and that this is true whether the teacher is employed in an urban or rural setting. Mahanta (2012) found that teachers in urban areas of India had higher levels of professional competency than teachers in rural areas. This information was presented in a report on a study that examined the degree of professional competence across gender (male and female) and location (rural and urban). In the study, 300 teachers from 50 secondary schools in the Assamese district of Kokrajhar completed a self-made questionnaire.

Sadhukhan (2018) reported that a teacher's location in India has an impact on how effectively they teach. This was established when she studied how gender, location, subject stream, and experience relate to teaching efficacy among secondary school teachers. 600 secondary school teachers were drawn from three separate West Bengal districts-Nadia, North 24 Parganas, and South 24 Parganas through the use of purposeful random sampling approaches. The data gathering phase employed a self-made questionnaire.

Therefore, it was obvious that the availability and accessibility of resources and materials in the urban areas would promote students' performance and teacher effectiveness. Nevertheless, teachers in both urban and rural areas received equal amount of training at the universities. Therefore, this study sought to find out if beyond the uniform training, whether, location could influence their ability in using multiple-choice randomisation in their assessment.

Type of school and teachers' assessment competency

A significant difference between secondary school teachers at public and private schools was found by Shu'aibu and Beri (2019) in their exploratory study on teacher effectiveness among senior secondary school teachers in Dutse Municipal, Jigawa State, Nigeria. Due to their greater teaching abilities when compared to teachers in private schools, the majority of secondary school teachers in public schools were professionals. A questionnaire was utilized as the study's source of getting information from 199 senior secondary school teachers selected through a multistage selection approach.

Sehjal (2021) also investigated the influences of gender, location, and school type on the effectiveness of secondary school teachers in Punjab, India.

From the Punjabi community of Jalandhar, 130 teachers were chosen at random. In order to collect information from teachers, the study adopted a, questionnaire developed by Dr. Shallu Puri and Prof. S.C. Ghakhar (2010) which was titled teacher effectiveness scale questionnaire. According to the investigation, there were observable variations in secondary school teachers' effectiveness based on the type of school.

Private and public-school teachers differ significantly, as Sehjal (2021) found. The study's objective was to ascertain the ways in which teachers' perceptions of information technology were influenced by gender, region, and school type (IT). The Jalandhar district used Stratified Random Sampling to pick a sample of 100 secondary school teachers who worked in both public and private institutions. The questionnaire designed by Nasrin and Islahi (2021) titled "Attitude Scale towards Information Technology for Teachers" (ASTITT-NI) was used to gather information. Teachers from private schools were shown to be more open to using information technology at the senior secondary school level than teachers from public schools.

Conceptual Framework

A relationship between teachers' knowledge, competency, and multiple-choice randomization was established by the study based on the literature review. A model illustrating how the variables are related is shown in Figure 1.

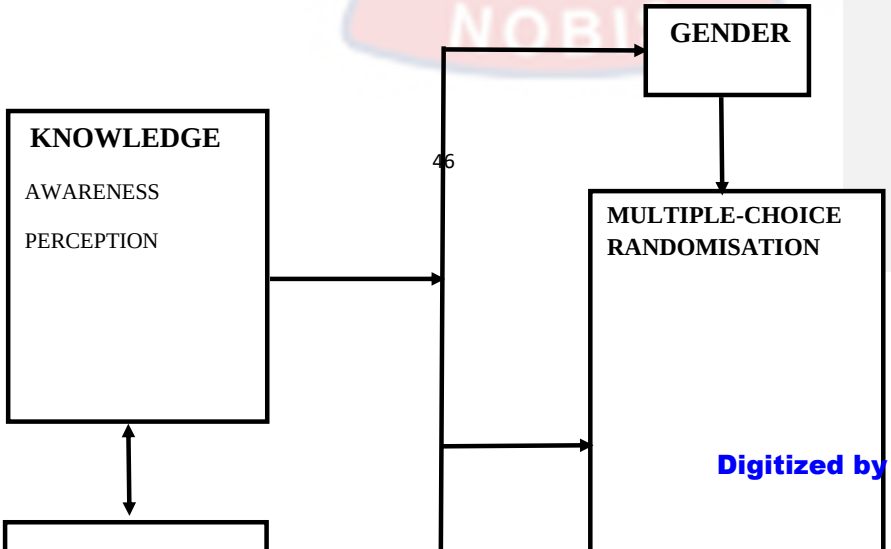

Figure 1: *Conceptual Framework of Teachers' Knowledge and Competency in using Multiple-Choice Randomisation.*

Source: Author's Construct (2020).

Figure 1 illustrates the two independent variables (knowledge and competency) as well as the dependent variable (multiple-choice randomisation). The study aimed at determining the degree of teachers' knowledge in multiple-choice randomisation, their familiarity with its many forms and varieties, as well as their awareness of the steps and procedures involved, and if their position on the technique's effects on assessment. The main area of attention in terms of competency was the ability of teachers to design multiple-choice randomisation, either the questions solely or the alternatives or both, and to administer and score.

As a result, figure 1 demonstrated how those inter-related constructs harmonise in making a teacher knowledgeable and competent in the design and use of multiple-choice randomisation with an interaction between teachers' competency and knowledge. In other words, the competence of teachers in the design and use of multiple-choice randomization depends on their degree of knowledge. Competency requires great amount of knowledge, which is a necessary element. Because, to accomplish anything to a standard, a high level of knowledge is necessary.

Figure 1 also demonstrates how demographic factors like gender and region may have an impact on teachers' knowledge and competency in multiple-choice randomization. This is owing to the fact that female teachers may not have enough time to read or attend assessment related courses that would improve their knowledge and skill in multiple-choice randomization compared to their male counterparts because of their household and other domestic commitments. Furthermore, compared to teachers in peri and rural areas, teachers in urban areas may have better access to technology, libraries, and other learning resources that could help them stay current on contemporary educational issues. Therefore, this framework could be used to explain teachers' knowledge and competency in using multiple-choice randomization.

Chapter Summary

From the literature review, most of the studies reported challenges regarding teachers' conduct and usage of assessment in our schools. However, most of the assessment areas were found to be broad that makes it difficult to be addressed by stakeholders. Whereas some studies also introduced a technique of curbing a major pandemic (cheating) in assessment concerning the

use of multiple-choice questions in examination, those studies failed to address how others can apply the technique in using multiple-choice questions in examination considering its high use in assessment in recent times. This provided the justification for this study to assess teachers' knowledge and competency in randomising multiple-choice questions for examinations at the SHS level.

CHAPTER THREE

RESEARCH METHODS

Introduction

The study assessed teachers' knowledge and competencies in using multiple-choice randomisation as an assessment technique at the secondary school level in Ghana's Ashanti Region. This chapter describes the research methodology and procedures that were employed to carry out the study. These include:

Research Design,

Study Area,

Population,

Sample and Sampling Procedure,

Data Collection Instruments,

Data Collection Procedures,

Data Analysis Procedure.

Research Design

A research design is an activity plan, according to Rao (2001). It is a strategy for gathering and analysing data in an economical, effective, and meaningful way. Rao, further elaborated that, research design tells what observation to make, how to make and how to analyse the quantitative representation of the observation. A design suggests how many observations to be made, which variables are active and what type of statistical tools to be used. The study used a descriptive survey design.

Using multiple-choice randomisation as an assessment technique at the SHS in Ghana's Ashanti region was the focus of the study, which attempted to assess teachers' knowledge and competencies in the area. Finding out how knowledgeable and competent teachers were in using multiple-choice randomisation as an assessment technique was a necessary step in this process.

Gay (1992) claims that descriptive survey design establishes and documents reality. Descriptive surveys analyse, synthesise, and combine data, highlight its ramifications and connections,
Osuala (1991).

The descriptive survey method was chosen because it has the advantage of eliciting excellent responses from a diverse group of respondents. It provides a meaningful picture of events while also explaining people's attitudes and behaviors based on the information available at the time (Best and Khan, 1986). The design increases the efficient collection of data from a large number of people in a short period of time and at a lower cost. Despite these advantages, it can be difficult to ensure that the statements or questions that must be answered when using the descriptive design are clear and do not deceive because the particular wording of these statements or questions can have a significant impact on the survey outcomes (Seifert & Hiffgung, 1991).

To address this issue, during the pilot-test stage, items on the questionnaire that were determined to be confusing or to include trivialities were examined and adjusted. The supervisor's and other specialists' ideas after reviewing the data gathering instrument aided in this approach.

Study Area

The Ashanti Region of Ghana designated as the study's location. The 2020 population and housing census found that there were 5,924,498 people living there. Geographically speaking, the region is in the centre of Ghana. According to the size of its land area, it is the third largest of Ghana's 16

administrative regions (Wikipedia). Six of the sixteen political regions share borders with the region. The Bono, Bono East, and Ahafo Regions are located in the north of the region, Eastern Region is in the east, Central Region is in the south, and Western North Region is in the southwest. A District Chief Executive is in charge of each of the region's 43 administrative districts. The Akans make up the majority of the region's population, with 94.2% of them becoming naturalized citizens.

Ashanti region has 3 public and 6 private universities as well as 8 Colleges of Education. Agriculture is the dominant economic activity of the people. The region is also known for its mining of minerals such as gold, bauxite, manganese, and a host of quarry sites. However, trading and automotive works like repair of motor vehicles and motorcycles, manufacturing of equipment and tools are the occupation of people within the Kumasi metropolis and its adjoining districts.

Population

The term "population" refers to a group of element or cases, whether individuals, objects or events that conforms to a specific criterion and to which a researcher intends to generalize the results of a research, (McMillan & Schumacher 2001). A researcher is most interested in the overall collection of elements. In light of this, all secondary school teachers in Ghana's Ashanti Region were included in the study's target population. There are 200 SHSs in the region which consist of 134 public and 66 privates. However, the accessible population was 11 senior high schools which constituted; three (3) category A schools, four (4) category B schools and three (4) category C schools. A breakdown of the schools used for the study is provided in Table 1 below.

Table 1: Accessible Teacher Population for the Study

Schools	Cat.	Population			Gender
		M	F	T	
Opoku Ware SHS	A	143	32	175	Boys
T I Ahmadiya (KSI)	A	148	45	193	Mixed
St. Louis Girls	A	80	47	127	Girls
Jachie Pramso SHS	B	111	41	152	Mixed
Aduman SHS	B	128	56	184	Mixed
Kumasi Wesley Girls	B	73	50	123	Girls
Osei Tutu SHS (Akrop)	B	115	28	143	Boys
Adu-Gyafi SHS	C	173	58	231	Mixed
Ejisu SHS	C	94	51	145	Mixed
Namong SHS	C	106	27	132	Mixed
Nkawie SecTech	C	143	54	197	Mixed
Total		1314	489	1808	

Source: GES, Regional Regional Education Directorate (2021)

Criteria for Inclusion

Participants for the study were selected with a minimum of 5years teaching experience. The rational for this criterion was to involve experience teachers as well as teachers who are abreast with the conduct of examination at the senior high school level.

Sample and Sampling Procedure

Ghana Education Service (G.E.S.) has classified all secondary schools in Ghana into three categories (A, B, and C) in accordance with academic

performance and school facilities. Table 2 below shows the breakdown of the categorization of all the public SHS in Ashanti region.

Table 2: Type of School, Category and number of SHS in Ashanti region

Type of School	Category A	B	C	Total
Mixed	1	48	67	116
Boys	3	2	-	5
Girls	2	7	1	10
Total	6	57	68	131

Source: GES, Ashanti Regional Education Directorate (2021)

In order to have a representative sample of each type of school for the study, a school was selected from each type and category of schools as a result of the numbers in the groups. First, only one mixed-gender school was chosen from the category A using a purposive sampling method. Then, using simple random sampling, a school from each of the boys' and girls' schools in category A was selected.

Again, simple random sampling was used to select four category B schools, which included two mixed schools, one boys' school, and one girls' school. However, because almost all of the schools in category C were mixed, the researcher purposefully used simple random sampling and chose four extra schools to complete the school selection for the study. In total, 11 schools were chosen through a multi-stage selection process, with three schools from category A and four from categories B and C.

The sample size was calculated using the Krecjie and Morgan sample size determination table as a guide (as cited in Bukhari, 2021). The table

established a sample size of 317 from a total accessible population of 1759, which was then shared proportionally among the schools based on the population of the teachers' as shown in the formula.

$$\frac{teacher\ pop}{total\ population} \times sample\ size \text{ eg. } \frac{175}{1808} \times 317 = 31$$

The number of teachers involved in each school was calculated and Table 3 below shows the breakdown of the outcome.

Table 3: Number of Teachers selected from each Schools

Schools	No. of Teachers		
	Male	Female	Total
OPOKU WARE SHS	25	6	31
T I Ahmadiya (Kumasi)	26	8	34
St. Louis Girls Shs	14	8	22
Jachie Pramso Shs	20	7	27
Aduman Shs	22	10	27
Kumasi Wesley Girls	13	9	22
Osei Tutu Shs (Akropong)	20	5	25
Adu-Gyamfi Shs	31	10	41
Ejisuman Shs	16	9	25
Namong Shs	18	5	23
Nkawie Sectech	26	9	35
TOTAL	231	86	317

Data Collection Instrument

Fraenkel and Wallen (2002) contend that gathering data is a crucial component of all research projects since it influences the findings of a study. They stated that the kind of data to be collected, the method(s) of collection, and the scoring of the data all need to be thoroughly considered out. A

questionnaire was the instrument used to collect data for this investigation. It was titled "Teachers' knowledge and competency in using multiple-choice randomisation as an assessment technique". According to Kumar (2005), the use of questionnaire is less expensive and offers greater anonymity. These notwithstanding, it has certain weaknesses such as low response rate, likelihood of ambiguity, bias on the part of some respondents and others that the researcher took the necessary steps to deal with ambiguity of items and other weaknesses which were minimize to the barest minimum.

A close questionnaire composed by the researcher on knowledge and competency in multiple-choice randomisation was used for the data collection. It was divided into three (3) sections (A-C), with the first section (A) focusing on the respondents' background information. The other two (2) sections arose from the research questions. Section B had 9 items on research question 1 and Section C had 14 items on research question 2. The questionnaire has 27 items in total, with 4 nominal items and 23 items measuring knowledge and competency in multiple-choice randomisation on a 4-point Likert-Scale. Strongly Agree (SA) was given a score of 1, Agree (A) was given a score of 2, Disagree (D) was given a score of 3, and Strongly Disagree (SD) was given a score of 4.

The Likert scale, which provides a single score from a group of items, has a very high reliability (between 0.85 and 0.94), allows for a ranking of the responses, and is reasonably simple to create, according to Sarantakos (1998). Against these strengths, the researcher followed laid down procedures in using questionnaire as an instrument and obtained a valid and reliable data for interpretation and analysis.

Validity of the Instrument

Validity, according to Mugenda & Mugenda (2003), is determined by the accuracy and precision of conclusions drawn from research findings. Two lecturers from the Departments of Education and Psychology as well as the researcher's supervisor evaluated the instrument's construct and content validity as part of their professional evaluation of the tool's ability to gauge teachers' competency in using multiple-choice randomisation. They were given copies of the instrument to analyze and ensure that the items measured the things that were supposed to be measured, were clear, and relevant.

Comments were made regarding the language used, the clarity of the items, their relevance, the format, the structure, and the content of the research instruments in order for it to be deemed appropriate. The final validation of the instrument was performed using the pilot test.

Pilot testing and Reliability

Prior to the actual study, Wiersma (1995) underlined the importance of pilot testing the study instruments to validate the tools' constructs and establish their suitability for the intended purpose. This validates the appropriateness of the data collection instrument. In the Offinso Municipality of the Ashanti region, St. Jerom Senoir High School (Abofour), was used for the pilot test of the instrument. The school has a teacher population of 118 out of which 31 teachers participated but 29 questionnaires were obtained for analysis. Teachers with at least five years of classroom experience were given the questionnaire at random, and were gathered the same day. The items were discussed and rated by the respondents after the pilot testing, and any adjustments that were required

were made. The purpose of the pilot testing was to determine the instrument's reliability.

Reliability was defined by Petters, Asuquo, and Eyo (2015) as the consistency with which a measuring tool produces particular results while the entity being measured has not changed. The reliability of the instrument was analyzed using Cronbach's alpha, a measure of internal consistency. The Cronbach alpha method is recommended when measuring the internal consistency of a dichotomously scored instrument.

The questionnaire's reliability index estimated using the statistical product for service solution (SPSS Version 25.0) program was 0.99. The first sub-scale of the questionnaire that measured teachers' knowledge in multiple-choice randomisation produced an index of 0.96 and was made up of 9 items. The second sub-scale made up of 14 items measured teachers' competencies in Multiple-choice randomisation gave a coefficient of 0.978. Refer to appendix A for detail pilot test results.

Data Collection Procedure

During the data collection, a cover letter from the University of Cape Coast's College of Distance Education (CoDE) was used to reach the teachers through the heads of the selected senior high schools. After permission was granted, research assistant in the various schools assisted in the administration of questionnaires randomly to teachers with five years teaching experience. Care was taken to explain issues to the participants for the good course of the study and filled questionnaires were collected the same day. Their privacy, confidentiality and anonymity were treated with the greatest concern to ensure the good course of the study. With the help of the research assistant, the entire

questionnaire was administered at all of the schools over the period of two weeks, with visits not more than two of the schools every day.

Data Analysis Procedure

As stated by Kumar (2005), the first stage in data processing is to make sure the data is "clean," meaning it is devoid of contradictions and gaps. Editing is the name of this procedure. The instrument generated quantitative and categorical responses; thus, a code book was created to make it easier to enter the data. A piece of information collected from a responder must be entered into a specified column, according to the fixed format, which was used. This was to minimise errors that occur during data entering. Demographic information, as well as responses to the 23 research items, were classified from 1 to 4 accordingly.

Following the coding and processing of the valid data, the entered data was analysed with the help of SPSS version 26 software. (i.e excluding missing data). The demographic data were analysed using frequency and percentage distribution tables. Frequency, mean, percentage distribution, and descriptive analyses were all used to analyze research questions 1 and 2. The other four hypotheses were tested using an independent sample t-test.

Ethical Consideration

All social research, according to Punch (2000), is dependent on data from people about people, so consent, access, and related ethical considerations are involved. In view of this, adequate steps were taken to meet the general protocols and procedures regarding the use and administration of questionnaire

in data collection. During the administration of the instrument, an introductory letter from CoDE, University of Cape Coast, was used to get access to schools. Please see Appendix B. The consent of the schools and participants were addressed adequately. To ensure the study's success, participants' privacy, confidentiality, and identity were carefully protected.

Chapter Summary

The study assessed teachers' knowledge and competencies in using multiple-choice randomisation as a method of assessment at the SHS level in Ashanti Region schools. Quantitative methods and the descriptive research design were used to gather the data for the investigation. All 134 public senior high schools and 66 private senior high schools in the region were included in the study's population. The accessible population was made up of 11 senior high schools, which consisted three (3) category A schools, four (4) category B schools, and three (4) category C schools.

From 11 schools, 317 teachers with at least five years of experience in the classroom were chosen using a multi-stage sample methodology. Teachers' Knowledge and Competency in Using Multiple-Choice Randomisation as an Assessment Technique was the title of a self-made questionnaire used to collect data for the study. To analyse the collected data, descriptive statistics including frequencies, percentages, means, standard deviations, and inferential statistics were utilised.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to assess the knowledge and competencies of Ashanti region teachers in the use of multiple-choice randomisations. With the descriptive survey design as the method of data collection, two research questions were developed to serve as the study's guide. 317 teachers from 11 senior high schools who answered a 23-item questionnaire were used to gather data using a multi-stage sampling technique. In this chapter, the findings and discussion are provided. A total of 302 of the 317 teachers who were surveyed returned the questionnaire, producing a 95.3% response rate. The following paragraphs provide more information on the findings and discussions.

Demographic Characteristics

The demographic information of the respondents is presented in this section. Gender, age, and educational level are among the details provided.

Table 4: Demographic Distribution of Participants

Variables	Frequency	Percentage (%)
Gender		
Male	220	72.8
Female	82	27.2
Age		
25 – 29 years	62	20.5

Table 4: Continued

30 – 39 years	150	49.7
40 – 49 years	73	24
50 – 60 years	17	5.6

Educational level		
First degree	247	81.8
Masters	55	18.2

Source: Field survey (2022)

As shown in Table 4, the study involved more males (72.8%) than females (27.2%). The study was also dominated by participants within the ages of 30 – 39 years (49.7%), followed by those aged 40 – 49 years (24.2%), whiles the least among them was those aged 50 – 60 years (5.6%). A great majority of the respondents were first degree holders (81.8%), whereas 18.2% were master's degree holders.

Analysis of the Main Data

Research Question 1

What is the level of teachers' knowledge in the use of multiple-choice randomisation as an assessment technique at the SHS level?

The purpose of this research question was to determine teachers' knowledge of multiple-choice randomisation. Tables 5 and 6 show the details of the responses made by respondents to a variety of statements.

Table 5: Knowledge in Multiple-choice Randomisation

Statement	No		Yes	
	f	%	f	%

I am aware of multiple-choice randomisations in objective test.	5	1.7	297	98.3
I know the technique is about students answering the same questions but in different question numbers and options.	28	9.3	274	90.7
I know the usefulness of multiple-choice randomisations in an examination.	13	4.3	289	95.7
I know the stages involved in constructing multiple-choice randomisation items.	80	26.5	222	73.5
I know the guidelines in constructing multiple-choice randomisation items.	49	16.2	253	83.8
I know both questions and answers can be randomised.	27	8.9	275	91.1
I know the various types and/or forms of randomising question and options.	102	33.8	200	66.2
I need training before I can use this technique in assessment.	217	71.9	85	28.1
I can easily apply it in my class tests and examinations	51	16.9	251	83.1
I know this technique makes cheating difficult during examination.	52	17.2	250	82.8

Source: Field survey (2022)

From Table 5, among the 10 items, respondents correctly answered nine. These among others include: 'I am aware of multiple-choice randomisations in objective test' (98.3%); 'I know the usefulness of multiple-choice

randomisations in an examination' (95.7%); 'I can easily apply it in my class tests and examinations' (83.1%); and 'I know this technique makes cheating difficult during examination' (82.8%). These responses were then scored with a '1' for Yes and a '0' for No.

Table 3 shows an overview of the respondents' scores.

Table 6: Level of Knowledge

Level	Range	Frequency	Percentage (%)
Low	0 – 5	14	4.6
High	6 – 10	288	95.4
Total		302	100.0

Source: Field survey (2022)

As indicated in Table 6, the vast majority of the respondents had high level of knowledge in multiple-choice randomisation (95.4%).

Research Question 2

How competent are teachers in the use of multiple-choice randomisation as an assessment technique at the SHS level?

The purpose of this research question was to examine teachers' competency with multiple-choice randomsation. Tables 7 and 8 show the responses of the respondents.

Table 7: Competence in Multiple-choice Randomisation

Statements	No		Yes	
	f	%	f	%

I have the requisite knowledge and skills to randomise multiple-choice questions.	57	18.9	245	81.1
I can randomise both questions and options.	50	16.6	252	83.4
I can code appropriately when questions and options have been randomised.	97	32.1	205	67.9
I can prepare corresponding marking scheme for each group.	48	15.9	254	84.1
For effectiveness, both the questions and options should be randomised into four groups.	94	31.1	208	68.9
I can administer and score randomised questions for any assessment.	68	22.5	234	77.5
I can do both partial and complete randomisation of both questions and options.	98	32.5	204	67.5
I can randomise questions and answers into the various types and/or forms.	88	29.1	214	70.9
Randomising questions and options could be very difficult if you are not knowledgeable.	33	10.9	269	89.1
It is time consuming that is why I don't apply it during assessment.	75	24.8	227	75.2
This technique requires training before teachers can apply it in their assessment.	49	16.2	253	83.8
Lack of training in its use is the cause for teachers not using it in their assessments.	69	22.8	233	77.2
Randomising questions and options are a good assessment technique for sound objective assessment.	21	7.0	281	93.0
I encourage teachers and schools to apply it during class test, and semester exams.	24	7.9	278	92.1

Source: Field survey (2022)

From Table 7, the respondents correctly answered all the 14 items on competency. The respondents, for example,81.1% indicated they have the requisite knowledge and skills to randomise multiple-choice questions, 83.4%

said they can randomise both questions and options, 84.1% can prepare corresponding marking scheme for each group, 70.9% said they can randomise questions and answers into the various types and/or forms, and 93% indicated that randomising questions and options are a good assessment technique for sound objective assessment. The respondents' competence responses were further scored as '1' and '0' for Yes and No respectively. Table 5 shows an overview of the respondents' scores.

Table 8: Level of Competence

Level	Range	Frequency	Percentage (%)
Low	0 – 7	30	9.9
High	8 – 14	272	90.1
Total		302	100.0

Source: Field survey (2022)

According to Table 8, the majority of respondents (90.1%) displayed strong mastery of multiple-choice randomisation.

Normality of Distribution for Knowledge

This section details results on the distribution of knowledge in Table 9. From Table 9, the mean, median, and 5% trimmed mean for knowledge were approximately equal, suggesting normality of the distributions. The skewness and kurtosis for knowledge were within the ranges of ±2 for skewness and ±7 (Hair, Black, Babin, & Anderson, 2010). The skewness and kurtosis coefficients support the normality of the distributions.

Table 9: Descriptive Statistics on Knowledge

Statistic	Knowledge
Mean	7.93

Standard deviation	1.42
Median	8.0
5% Trimmed mean	8.0
Skewness	-.81
Kurtosis	.71

Normality of Distribution for Competence

This section details results on the distribution of competence in Table 10. From Table 10, the mean, median, and 5% trimmed mean for competence were approximately equal, suggesting normality of the distributions. The skewness and kurtosis for competence were within the ranges of ±2 for skewness and ±7 (Hair, Black, Babin, & Anderson, 2010). The skewness and kurtosis coefficients support the normality of the distributions.

Table 10: Descriptive Statistics on Competence

Statistic	Competence
Mean	11.12
Standard deviation	2.54
Median	12.0
5% Trimmed mean	11.30
Skewness	-.90
Kurtosis	.35

Hypothesis 1

H_0^1: The knowledge of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in Ashanti Region will not differ significantly.

H_1^1: The knowledge of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in Ashanti Region will differ significantly.

This hypothesis sought to ascertain the variation in teachers' knowledge levels as measured by the use of multiple-choice randomisation. This hypothesis was investigated using the independent samples t-test. The gender variable, which has two levels—male and female—was the independent factor. The scores on knowledge in MCR were the dependent variable. The variances for the male and female were the same (Levene, F = .42, *p* = .520). Table 11 shows a summary of the findings.

Table 11: Gender Difference in Knowledge in MCR

Group	N	Mean	SD	df	t	Sig.
Female	82	8.02	1.37	300	.678	.498
Male	220	7.90	1.44			

Eta squared (η^2) = .002; Levene, F = .42, *p* = .520

According to the findings, there is no statistically significant difference between the knowledge of the genders in multiple-choice randomisation, *t*(300) = .68, *p* = .498, η^2 = .002 (Table 11).Practically, the magnitude of the effect as indicated by the eta squared is very small. The result implies that teachers, irrespective of their gender, possess the same level of knowledge in Multiple-choice randomisation.

In view of the findings, the null hypothesis, which stated that " The knowledge of male and female teachers in using multiple-choice randomisation as an assessment technique will not differ significantly," was confirmed.

Hypothesis 2

H_0^2: The competencies of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in Ashanti Region will not differ significantly.

H_2^2: The competencies of male and female teachers in using multiple-choice randomisation as an assessment technique at the Senior High School level in Ashanti Region will differ significantly.

This hypothesis sought to determine gender difference in competence in the use of Multiple-choice randomisation. The independent samples t-test was used to test this hypothesis. The dependent variable in multiple-choice randomisation competency was scores. Gender was the independent variable, and there were two levels: male and female. The variance between the groups was homogenous, Levene, F = .79, p = .374. Table 12 presents the t-test results.

Table 12: Gender Difference in Competence with respect to Multipl-choice randomisation

Group	N	Mean	SD	df	t	Sig.
Female	82	11.39	2.30	300	1.15	.253
Male	220	11.01	2.62			

Eta squared (η^2) = .004

The mean scores of male and female teachers' competence in multiple-choice randomisation show no statistically significant difference, $t(300) = 1.15$, p = .253, η^2 = .004. Practically, the magnitude of the effect was very small. The

implication of the result is that male and female teachers' competence in multiple-choice randomisation.

Following the result, the null hypothesis that "The competencies of male and female teachers in using multiple-choice randomisation as an assessment technique will not differ significantly was not rejected.

Hypothesis 3

H_0^3: Location of schools will not influence teachers' knowledge on the use of multiple-choice randomisation as an assessment technique.

H_3^3: Location of schools will influence teachers' knowledge on the use of multiple-choice randomisation as an assessment technique.

The purpose of this hypothesis was to see if there were any differences in teachers' knowledge of how to apply multiple-choice randomisation. The independent samples t-test was used to test this hypothesis. The location of schools was the independent variable. Location was categorised as urban and town. The dependent variable was scores on knowledge in multiple-choice randomisation. Equal variance was assumed, Levene, F = 3.50, p = .062. the t-test results are presented in Table 10.

Table 13: Difference in Knowledge in multiple-choice randomisation with respect to Location

Location	N	Mean	SD	df	t	Sig.
Urban	102	7.79	1.54	300	-1.22	.222
Rural	200	8.01	1.35			

Eta squared (η^2) = .004

Table 13 shows that there is no statistically significant variation in the degree of knowledge of teachers in multiple-choice randomisation based on

their location, t (300) = -1.22, p =.222, 2 =.004. The magnitude of the effect was insignificant. As a result, the null hypothesis "School location will not influence teachers' knowledge of using multiple-choice randomisation as an assessment technique" was maintained.

Hypothesis 4

H_0^4: Location of schools will not influence teachers' competency on the use of multiple-choice randomisation as an assessment technique.

H_4^4: Location of schools will influence teachers' competency on the use of multiple-choice randomisation as an assessment technique.

This hypothesis was designed to determine the differences in multiple-choice randomisation competency based on the teachers' schools' locations. A t-test on independent samples was used to test this claim. Whereas location was the independent variable, the dependent variable was the teachers' scores on competence. Urban and rura town were used to describe this. The variances for the two groups were homogeneous, according to Levene, F =.001, p =.974. The t-test results are presented in Table 14.

Table 14: Difference in Competence in MCR with respect to Location

Location	N	Mean	SD	df	t	Sig.
Urban	102	10.95	2.56	300	-.81	.421
Rural	200	11.20	2.53			

Eta squared (η^2) = .002

As shown in Table 14, there is no statistically significant difference in teachers' competence in multiple-choice randomisation based on the location of their school, *t* (300) = -.81, *p* = .421, η^2 =. 002.The magnitude of the effect was very small. This implies that competence of teachers does not differ with respect

to their location. Following from the result, the null hypothesis that "Location of schools will not influence teachers' competency on the use of multiple-choice randomisation as an assessment technique" was upheld.

H_0^5: Type of school will not influence teachers' competency on the use of multiple-choice randomisation as an assessment technique at the Senior High School level in Ashanti Region.

H_5^5: Type of school will influence teachers' competency on the use of multiple-choice randomisation as an assessment technique at the Senior High School level in Ashanti Region.

The goal of this hypothesis was to ascertain whether teachers from various types of schools differed in their competency in multiple-choice randomisation. The hypothesis was tested using one-way analysis of variance, having obtained equality of variances, Levene (2, 299) = .47, p = .627. The independent variable was type of school, and this had three levels, namely, categories A, B, and C schools. The dependent variable was responses on competence in MCR. The ANOVA results are presented in Table 15.

Table 15: Difference in Competence in MCR based on Type of School

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	23.439	2	11.719	1.83	.163
Within Groups	1919.505	299	6.420		
Total	1942.944	301			

Eta squared = .001

From Table 15, there is no statistically significant difference in competence in MCR among teachers with respect to the types of schools they

teach, F (2, 299) = 1.83, p = .163, η^2 = .001. The magnitude of the effect was very small. The result means that teachers across all types of schools have same level of competence in MCR. Following the result obtained, the null hypothesis that "Type of schools will not influence teachers' competency on the use of multiple-choice randomisation as an assessment technique" was not rejected.

Discussion

In this subsection, the results are discussed in relation to the study's research questions and hypotheses as well as the literature it reviewed.

Teachers' knowledge in multiple-choice randomisation as an assessment technique

The vast majority of respondents showed excellent knowledge with multiple-choice randomisation. The findings of this study imply that teachers are aware of this technique for objective examinations, are aware of its advantages, are aware of the processes involved in using it, and are aware of the various forms it can take. It also implies that teachers know how to arrange multiple choice items as well as their responses randomly such that every examinee, at a particular point in time has different set of questions and response options. The results of the present study are in disagreement with some early studies, (Amoako et al., 2019; Matsenjwa & Thwala, 2013; Idika & Eke, 2017; Alufohai &Akinlosotu, 2016; Alkharusi, Aldhafri, Alnabhani, & Alkalbani, 2012).

The majority of mathematics teachers in SHS in the Cape Coast Metropolis, according to Amoako et al. (2019), had limited knowledge in formative assessment techniques. Similar findings were made by Matsenjwa and Thwala (2013), who found that primary school teachers lacked the

necessary knowledge to effectively use a variety of assessment methodologies despite having a basic understanding of measurement and assessment. Additionally, Idika and Eke's (2017) study discovered that while specialist lecturers showed acceptable knowledge of assessment procedures, lecturers in Nigeria's South-South geopolitical zone lacked the knowledge and ability to use assessment strategies in all-inclusive classrooms.

Again, Alufohai and Akinlosotu (2016) discovered that the majority of teachers perceived continuous assessment practices as a comprehensive and all-encompassing system of evaluation but lacked adequate knowledge of its cumulative and guidance-oriented properties. Last but not least, Alkharusi, Aldhafri, Alnabhani, and Alkalbani (2012) study revealed that muscat teachers in the Sultanate of Oman had a low level of knowledge in educational assessment. It must be acknowledged that though the findings of the current study are in disagreement with previous studies, these studies are not directly the same, however, they are related. While the previous studies looked at knowledge in general assessment practices, the current study was limited to a specific assessment practice, thus, multiple choice randomisation. Obviously, when a teacher is knowledgeable in issues of assessment, admittedly, are equally expected to have requisite knowledge on various assessment techniques such as multiple-choice randomisation.

How competent are teachers in the use of multiple-choice randomisation as an assessment technique at the SHS level?

The study was dominated by teachers who are competent in using multiple choice randomisation. The findings indicated that the majority of the respondents demonstrated high level of mastery in multiple-choice

randomisation. This result has implication on teachers' competency in the use of multiple-choice randomisation. High level of mastery put teachers in a better position to apply this technique in examination. With this, teachers are expected to randomise their multiple-choice questions into any of the type or form when it becomes a requirement before an exam question could be accepted at the senior high school level.

Teachers having high ability in multiple-choice randomisation also indicate their readiness towards the use of this technique in minimising cheating that has characterise WASSCE and internal exams. It could be inferred that the high level of mastery on multiple-choice randomization shown by teachers could be attributed to their exposure of this technique used in assessment and administered on them and perhaps recent media talks on how to reduce exam cheating at all levels are other factors that can contribute and account for teacher perceived multiple-choice randomisation competence.

However, finding competency in abstract is intriguing because demonstration or putting knowledge into practice is the most effective and persuasive way to prove competency. This is due to the fact that, prior to the completion of this study, very little information about schools that implement multiple-choice randomisation in exams could be provided. Furthermore, because theory and practice differ, having sufficient understanding does not automatically translate into ability. But these results indicating that teachers have a high level of mastery in multiple-choice randomisation indicates that a policy from the Ashanti region's education directorate towards the introduction of this method in exams would require little orientation.

The findings of this study, which show that teachers can effectively use multiple-choice randomisation, contradict some previous findings by others (Tagele & Bedilu, 2017; Bedilu, 2014). Secondary school teachers were found by Tagele and Bedilu (2017) to be incompetent in terms of evaluating their students' academic progress. Bedilu (2014) discovered once more that teachers' knowledge and skills in evaluating students' academic progress were lacking. When reviewing the aforementioned findings, it is clear that there is no assessment practice or approach that the teachers can use to evaluate their students. But assessment considerations are incorporated into the curriculum during the training and preparation of teachers. In my honest view, the teachers might be competent in some particular assessment areas.

The result of this study is consistent with the findings of Arulappen (2013), who discovered that teachers with a bachelor's or master's degree as their academic qualification were more competent in classroom assessments than teachers with a diploma or certificate. Yes, academic qualification has been proven to be a catalyst for productivity and performance. According to Sethy (2020) in Odish, teachers with higher qualifications (MA&MEd) were more effective teachers than those with lower qualifications. Additionally, Prajapati & Mohalik (2013) discovered that teachers with higher degrees had improved teaching efficacy. These and other research have demonstrated the significance of academic background when talking about performance.

These results demonstrate how important it is for teachers to be skilled in assessment and to study techniques like multiple-choice randomisation during professional development. This is so because students' learning and achievements can be improved by teachers with strong assessment

backgrounds. The ability of teachers to evaluate students correctly is one way they contribute to high-quality education. It is envisaged that the results of this study would be used as the foundation for the Ashanti region's SHS multiple-choice randomisation implementation.

Gender difference in knowledge of multiple-choice randomisation as an assessment technique

This hypothesis investigated if male and female teachers had different levels of knowledge when using multiple-choice randomisation as an assessment technique. According to the findings, there was no statistically significant difference in knowledge across genders in the multiple-choice randomised test.

This implies that all teachers, regardless of gender, have the same level of knowledge in multiple-choice randomisation as an assessment technique. Because, senior high school teachers may have acquired orientation in assessment, including tests and measurement, techniques of test development, test administration, and test scoring, therefore they share a common level of knowledge and practices. Thus, male and female teachers have equal understanding of classroom assessment, therefore, no differences in terms of knowledge in multiple-choice randomisation as an assessment technique. It could also be that, in-service assessment training may have been effective or sufficient for both male and female teachers thus, having an impact on their knowledge.

According to the research of Asamoah, Songnalle, Sundeme, and Derkye (2019), there were significant differences in the assessment knowledge

of male and female teachers at senior high schools in Ghana's Upper West Region.

The findings of this investigation contradict their findings. Again, the current study contradicts Alkharus (2011), who discovered gender differences in classroom assessment skills among Muscat public schools in Oman after conducting a study on teachers' classroom assessment skills using variables such as gender, subject area, grade level, teaching experience, and in-service assessment training. In comparison to male teachers, female teachers scored higher on self-perceived assessments of their abilities to communicate assessment outcomes and create test items.

When Afshar, Tofighi, Asoudeh, and Ranjbar (2018) examined the effects of alternative assessment knowledge, teaching experience, gender, and academic degree, they found that there was no visible difference in the assessment literacy of male and female EAP teachers. This finding is supported by the current research. According to Chalachew and Terefe's (2020) research on teachers' self-perceived skills as a function of gender and teaching experiences in the classroom assessment among high schools in the south-west Shewa Zone, female teachers were discovered to be better communicators when it came to sharing assessment results than their male counterparts.

Teachers should be given frequent professional development in assessment, particularly multiple-choice randomisation, regardless of their gender. Because the performance of their students and the ultimate educational goal will be affected if there are discrepancies between them in any educational variable. However, there were no noticeable differences in this study on multiple-choice randomisation between male and female teachers.

Gender difference in competence of multiple-choice randomisation as an assessment technique

This hypothesis sought to ascertain whether or not male and female teachers differed in their competency with multiple-choice randomisation as an assessment technique. The results of the study revealed no statistically significant differences in the multiple-choice randomisation abilities of men and women. The findings imply that all teachers, regardless of gender, possess an equivalent level of proficiency in using multiple-choice randomisation as an assessment technique. This can be attributable to the caliber of the measurement or assessment training that teachers recieved during their pre-service and in-service training.

Though in-service training would equip assessment literacy level of teachers, area of competence is also key. It could also be inferred that the same level of competence on multiple-choice randomisation shown by teachers could be due to their exposure during in-service training and an assessment test administered on them and that teachers are not deficient in the application of assessment concepts and principles in the classroom. This finding collaborates with Islahi and Nasreen (2013), who found no gender influence on teacher competencies among teachers at the secondary school level in Indian. Both male and female teachers demonstrated insignificant different competencies with regards to assessment. Also, the finding of this study is in conformity with Wanakacha, Aloka and Nyaswa (2018) who conducted a study on whether gender can influence teachers' intrinsic and extrinsic motivation in performance found no impact of gender on teachers' intrinsic and extrinsic motivation to perform their core functions.

Ahiatrogah's (2017) research contradicts the results of this study when it comes to the gender component of the development of effective teaching skills among Ghanaian distance education (DE) students. Gender variations in DE teacher trainees' learning of pedagogical skills were identified in the study. Again, the findings of this study disagree with those of Osman (2021), who discovered a significant correlation between gender and the methods used to evaluate teachers (class activities, objective tests, and essay-style questions). In contrast to their female counterparts, male teachers used essay-style questions to assess students at higher rates than they did for objective evaluations and in-class activities. However, female teachers had much higher values for these two types of assessments.

Furthermore, the findings of this study differ from those of Dien, Abang, and Ngban (2022), who studied secondary school teachers in the Calabar Education Zone of Cross River State, Nigeria, in order to determine how effective their teaching was in relation to demographic factors like age and gender. In that study, they found that gender had an impact on teaching efficiency and that female teachers outperformed their male counterparts.

The aforementioned conclusions make gender inequality between men and women clear, as stated by the researchers in their various studies. However, despite the fact that the research locations are not the same, there is no scientific basis for a gender discrepancy among in-service teachers. Why should there be variations in delivery and other facets of responsibility when teachers are trained and prepared at universities and institutes of education using a common curriculum? Of course, there could be disagreements regarding upgrading of teachers in the context of certificate-granting programs, but I believe both sides

are doing a great job of competition. Stakeholders in education must address the reasons behind these differences. Given that children are affected whenever there is a gender imbalance among teachers. The implications from this study are that both male and female teachers can competently use multiple-choice randomisation successfully in their assessment.

Location of schools will or will not influence teachers' knowledge on the use of multiple-choice randomisation as an assessment technique

The purpose of this hypothesis was to ascertain whether a schools' locations affected teachers' knowledge in multiple-choice randomisation as an assessment technique. According to the findings, there was no statistically significant difference between teachers' levels of knowledge in multiple-choice randomisation based on where they were located. The claim that schools' locations won't affect teachers' knowledge in multiple-choice randomisation as an assessment technique was thus affirmed, despite the fact that every human being's geographic location matters greatly when it comes to assessment. This presupposes that, the amount of training received at the universities or colleges of education during measurement and evaluation courses, has contributed to the insignificant difference in knowledge among the teachers on the use of multiple-choice randomisation as an assessment technique with regards to location of school.

Rana (2019), who looked into how secondary school teachers' assessment knowledge varied depending on where their schools were located, found considerable differences. This study's finding conflicts with what she discovered. Again, the results of this study do not give evidence to corroborate with Shweta's (2013) study, that there is a correlation between secondary school

teachers' performance and their demographic characteristics (gender, social background, category, marital status, teaching subjects, age, qualification and school teaching experience). The study reported that teachers' ability to impart knowledge was influenced by their social backgrounds and that teachers in urban areas were more knowledgeable than those in rural areas.

Knowledge as a key quality of a teacher should not be influenced by a teacher's location. Teachers must be knowledgeable and knowledge acquisition is easier today than it was in earlier times because of technology. Even though multiple-choice randomisation is a unique assessment technique, respondents in this study demonstrated a high level of familiarity with it. The terms "teaching" and "assessment" are complementary ways of describing each other. In other words, teaching without assessment is useless, and vice versa. As a result, it is crucial for teachers to have a solid understanding of assessment in order to effectively evaluate their instruction and understand how well their students are meeting curriculum objectives. Both urban and rural teachers in this study displayed high level of knowledge in multiple-choice randomisation that is good in the event of using it in their local examination.

Location of schools will or will not influence teachers' competence on the use of multiple-choice randomisation as an assessment technique

This hypothesis sought to ascertain whether or not the geographic location of schools affected teachers' competency with multiple-choice randomisation as an assessment technique. The findings revealed that there was no statistically significant variation in the level of competence of teachers in multiple-choice randomisation based on their location. This suggests that a teacher's competency is unaffected by their location. After analysing the results,

it was determined that the null hypothesis, which claimed that "Location of schools will not influence teachers' abilities on the use of multiple-choice randomisation as an assessment technique," was correct.

This shows that secondary school teachers, whether they work in an urban or rural setting, have the same level of competence when it comes to using multiple-choice randomisation as an assessment technique. This finding also suggests that the location of teachers will not have any impact on how multiple-choice randomisation policies are implemented in the region. It also implies that, this technique in assessment can be used by teachers in both urban and rural areas to reduce cheating in objective tests and to improve assessment across the region.

This finding that, location of teachers does not affect their competency in the use of multiple-choice randomisation is in disagreement with some existing studies. Rana (2019) studied into how secondary school teachers' assessment skills varied depending on where their schools were located and discovered big disparities. Particularly, teachers in rural schools outperformed their counterparts in urban schools in terms of planning, presenting, closing, and skills evaluation. However, teachers teaching in both urban and rural schools have an equal number of managerial abilities. The results of this study also go against a study by Mahanta (2012), who found that teachers in urban regions had higher levels of professional competency than those in rural areas. The results also conflict with those of Sadhukhan (2018), who claimed that a teacher's location in India affects how effectively they teach.

The aforementioned studies are not in line with findings of this study that location of teachers does not affect the competency of teachers in using

multiple-choice randomisation although, the geographical settings are not the same. The curriculum used in training and preparing the teachers used in this study differ from the others. Furthermore, it is possible that the teachers engaged in this study had heard a lot of discussions concerning multiple-choice randomisation, which could explain why there is no substantial difference between urban and rural teachers. In any case, there is no justification for location to have any impacts in education let alone the teachers who have sight and are leading the blind (students). Therefore, is good that location did not have any impact on teachers' competence in using multiple-choice randomization.

Type of schools will or will not influence teachers' competence on the use of multiple-choice randomisation as an assessment technique

In this study, type of school referred to the category of schools (A, B & C) of which the teachers were teaching at. Academic performance of students and facilities available were the main factors used to classify the schools as has been explained in the methodology under sample and sampling procedure. The category A schools are very few compared to the B and C that are located within the region's capital, Kumasi. As a results, students and parents always strive for enrollment during admission into a category A school. This has created the impression that, there are variations among teachers' abilities.

As a result, this hypothesis intended to examine whether or not the type of school influences teachers' ability in assessment particularly in using multiple-choice randomisation as an assessment technique. The findings revealed no significant difference in teachers' competence in multiple-choice randomisation with respect to type of school. The findings imply that teachers, regardless of school type, have the same degree of competency in multiple-

choice randomisation as an assessment technique. It also demystifies the notion of variation among teachers' abilities and validate the fundamental assertion that teachers are taught and prepared from a common curriculum. Moreover, they receive periodic refresher and continuous professional development organise by G. E. S and other stakeholders.

This conclusion, that teachers, regardless of the type of school they teach in, have the same level of competence in using multiple-choice randomisation as an assessment technique contradicts certain earlier findings. Shu'aibu and Beri (2019), for example, observed a significant disparity between public and private secondary school teachers. Majority of secondary school teachers in public schools were professionals compared to teachers in private schools that was attributed to their superior teaching qualities.

Moreover, a similar study by Sehjal (2021) also found notable differences in secondary school teachers' efficacy depending on the type of institution between private and public high school teachers. Finally, another study by Sehjal (2021) recorded a considerable variation between government and private teachers in a study that sought to determine how teachers' attitudes about information technology (IT) varied by their gender, location, and school type. It was found that private school teachers were more receptive to information technology than government teachers.

These studies appear to differ from this current study in the sense that, the previous studies compared abilities and interest of public teachers to that of private teachers. They do not differ, however, because both the current study and the prior studies tested teachers' abilities, and the comparisons were made among teachers rather than students from both sides. A positive attribute from

these studies is that public teachers has shown equal mastery of abilities in almost the studies. This study highlights the necessity for continuous professional development to increase teachers' assessment competency. This is due to the fact that assessment is a continual process that strives to improve student learning progress and achieve knowledge.

Teachers can better support students' development in accordance with educational objectives if they are able to accurately assess students. Teaching experience can also account for teachers' multiple-choice randomisation competence including constructing, administering, developing performance assessment, and communicating assessment results with others.

Chapter Summary

This chapter presented the findings and discussions on the study's two research questions and four hypotheses. According to the findings, teachers were knowledgeable and competent in applying multiple-choice randomisation in their assessments. However, their major problem were time and orientation that has made them reluctant in its use in examination. The results also showed teachers appreciation to how this technique can minimise cheating and improve the conduct of assessment at the SHS level.

In terms of multiple-choice randomisation, the findings also showed no discernible disparities between male and female teachers' knowledge and competency. Moreover, gender and location of schools did not have any impact on teachers' knowledge and competency in using multiple-choice randomisation.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents a summary of the study's key findings, conclusions, and recommendations. The chapter also discusses how the study has advanced knowledge and makes recommendations for future investigations.

Overview of the Study

This study assessed the knowledge and competency of teachers in multiple choice randomisation. The study also looked at differences in teachers' competency in multiple choice randomisation based on gender, school type, and location of schools. Descriptive survey methodology was used for the investigation. The study's population consisted of 1803 SHS teachers from the Ashanti region. Even though there were 317 research participants overall, only 308 of them actively took part. Purposive and simple random sampling techniques were both used to select the study's sample.

Data for the study was gathered through questionnaire. For knowledge and competency respectively, the internal reliabilities of the measures were 0.961 and 0.978.

The data were analysed using independent samples t-tests, one-way ANOVA, frequency counts and percentages, mean and standard deviations, mean and standard errors, and mean and variances. With an alpha level of.05., all inferential analyses were carried out.

Summary of key Findings

The key findings reported in accordance with the study's objectives are as follows:

1. The vast majority of responders knew a lot about multiple-choice randomisation.
2. The study was dominated by teachers who had high competence in multiple choice randomisation.
3. The study found no statistically significant variance in knowledge and competency based on gender. In practice, the magnitude of the effect was insignificant.
4. Location of teachers did not influence their knowledge in multiple-choice randomisation. The magnitude of the effect was insignificant.
5. Teachers' competency in multiple-choice randomisation was not affected by the location of schools, with a very small effect size.
6. The mean knowledge scores in the multiple-choice randomised, however, varied statistically significantly depending on the type of school. Compared to teachers in category A schools, teachers in category B schools had a greater knowledge of various randomisation. Teachers in category B schools and category A schools, however, were not different from one another or from those in category C schools.
7. No teachers' competency in multiple-choice randomisation varied statistically significantly according to the types of schools they taught at. The magnitude of the effect was very small. The result means that teachers across all types of schools have same level of competence in multiple-choice randomisation.

Commented [U1]:

8. A number of benefits were found to be associated with multiple choice randomisation. These include: multiple-choice randomisation makes sharing of answers during examination very difficult; it makes memorising answers before examination in appropriate; it minimises invigilation anxiety, it improves the administration of objective questions, it minimises cheating in tests/examinations, and also improves assessment skills of teachers.

Conclusions

From the findings of the study, the following conclusions were made:

1. Vast majority of teachers who were respondents to the study's questionnaire had high level of knowledge in multiple-choice randomisation.
2. Greater number of teachers were also competent with respect to multiple-choice randomization.
3. Teachers know the significance and impacts of multiple-choice randomization in assessments and on students' performance but time involve in the design of multiple-choice randomization accounted for teachers reluctant in using it in their assessment.
4. The issue of gender does not necessarily matter as far as knowledge and competence in multiple choice randomization is concerned, therefore, teachers, irrespective of their gender, have equal abilities in multiple choice randomization.
5. Location did not have any impact on teachers' knowledge as well as competency in using multiple-choice randomization therefore teachers located in the rural areas possess' equal level of knowledge and

competency in multiple-choice randomization with their counterpart in the urban areas.

6. School type appeared to be associated with teachers' knowledge in multiple choice randomization. There were significant differences in knowledge of teachers' base on the category of school type of the teacher.
7. Teachers' high knowledge in multiple choice randomization is a precursor to they becoming highly competent in multiple choice randomization that would promote the quality of assessments at our senior high school level.

Recommendations

The following were recommended:

1. The regional assessment unit of the Directorate of Education, Kumasi, and heads of SHSs are to motivate and encourage teachers in Kumasi to apply multiple choice randomisation in examination to enhance their skills and also to improve the conduct of examination in our schools.
2. The Ministry of Education, Ghana (MoE), Ghana Education Service (GES) and the heads of the various SHSs in Ashanti region are encourage to organise assessment workshops for teachers on the need to employ modern concepts and techniques in assessment to obtain feedback that will give the teachers better understanding of students' strengths and weaknesses.
3. It is recommended that other Metropolitan Directorate of Education adopt and implement the use of multiple-choice randomisation as a technique to enhance their assessment practices.

Suggestions for Further Research

With regard to the current study's scope, it is advised that future research should incorporate senior high school teachers from around the nation in addition to the Ashanti Region. Future research should collect data from other concerned individuals or institutions (i.e., examiners, policy makers, and examination boards), and a similar study be conducted using university teachers in Ghana.

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APPENDICES

APPENDIX A

INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST

COLLEGE OF DISTANCE EDUCATION

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Our Ref: CoDE/G/R/VOL.3/149 **13th September, 2021**

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

A LETTER OF INTRODUCTION: CHARLES ENOCK MENSAH

The bearer of this letter is a student of the College of Distance Education, University of Cape Coast with student registration number ED/MEP/18/0007. He is pursuing a Master of Philosophy degree in Measurement and Evaluation. He is investigating the topic **"Assessing Teachers' Knowledge and Competencies in the Use of Multiple-Choice Randomization as an Assessment Technique at the Senior High Schools among Selected Schools in Ashanti Region".**

Kindly extend to him any curtesy he may require in relation to his postgraduate studies at the University of Cape Coast.

Thank you.

Yours faithfully,

Dr. Felix Kumedzro.

(Coordinator)

APPENDIX B

DETAILED SPSS RELIABILITY REPORT

Summary Reliability Statistics for the Research Instrument (Questionnaire)

Scale	N0. of items	Cronbach's Alpha
RQ 1: Teacher Knowledge in MCR	9	.961
RQ 2: Teacher Competence in MCR	14	.978
RQ 3: Impact of MCR in Assessment	9	.976
Overall scale	**32**	**.990**

As seen in Table 2, the reliability co-efficient of the instrument as measured by Cronbach's Alpha revealed that the items are highly reliable. Thus, there was internal consistency among the items. So, it was concluded that the items on the instrument are highly satisfactory for actual data collection. Below is the individual report.

Reliability Statistics for Research Question One (9 items)

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.961	9

Reliability Statistics for Research Question Two (14 items)

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.978	14

Reliability Statistics for Research Question Three (9 items)

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.976	9

Reliability Statistics for the overall items (32 items)

Case Processing Summary

		N	%
Cases	Valid	29	100.0
	Excluded[a]	0	.0
	Total	29	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.990	32

APPENDIX C

UNIVERSITY OF CAPECOAST

COLLEGE OF DISTANCE EDUCATION

QUESTIONNAIRE

The purpose of this questionnaire is to obtain information on teachers' knowledge and competency in the use of multiple-choice randomizations as an assessment technique at the SHS in the Ashanti Region of Ghana. Please this exercise is for academic purpose only and shall not be used for anything other than that. I therefore crave your indulgence to response to the items as objectively as possible. It is estimated to take 5 – 10 minutes of your time to contribute to the success of this study. Information provided will be treated with utmost confidentiality.

Instruction: You are kindly requested to tick [√] only one response.

SECTION A: Demographic information

1. School:

a. OPOKU WARE SHS [ ]

b. T I AHMADIYA (KUMASI) [ ]

c. ST. LOUIS GIRLS SHS [ ]

d. JACHIE PRAMSO SHS [ ]

e. ADUMAN SHS [ ]

f. KUMASI WESLEY GIRLS [ ]

g. OSEI TUTU SHS (AKROPONG) [ ]

h. ADU-GYAMFI SHS [ ]

i. EJISUMAN SHS [ ]

j. NKAWIE SECTECH [ ]

k. NAMONG SHS [ ]

l. ST. JEROME [ ]

2. Gender:

a. Female [ ]

b. Male [ ]

3. Age:

a. 25- 29 [ ]

b. 30- 39 [ ]

c. 40-49 [ ]

d. 50- 60 [ ]

4. Educational level:

a. 1st Degree: [ ]

b. Masters: [ ]

c. PhD [ ]

SECTION B: Teachers' knowledge of multiple-choice randomization.

Please tick appropriately; Strongly Agree (SA)=1, Agree (A) =2 , Disagree (D) = 3, Strongly Disagree (SD) = 4

No.	Statements	SA	A	D	SD
5	I am aware of multiple-choice randomizations in objective test.				
6.	I know the technique is about students answering the same questions but in different question numbers and options.				
7	I know the usefulness of multiple-choice randomizations in an examination.				
8.	I know the stages involved in constructing multiple-choice randomization items				
9	I know both questions and answers can be randomized.				
10	I know the various types and/or forms of randomizing question and options.				
11	I need training before I can use this technique in assessment.				
12	I can easily apply it in my class tests and examinations.				
13	I know this technique makes cheating difficult during examination.				

SECTION C: Teachers' competency in multiple-choice randomizations.

Please tick appropriately; strongly Agree (SA) =1, Agree (A) =2, Disagree (D) = 3, Strongly Disagree (SD) = 4

No.	Statements	SA	A	D	SD
14	I have the requisite knowledge and skills to randomize multiple-choice questions.				
15	I can randomize both questions and options.				
16	I can code appropriately when questions and options have been randomized.				
17	I can prepare corresponding marking scheme for each group.				
18	For effectiveness, both the questions and options should be randomized into four groups.				
19	I can administer and score randomized questions for any assessment.				
20	I can do both partial and complete randomization of both questions and options.				
21	I can randomize questions and answers into the various types and/or forms.				
22	Randomizing questions and options could be very difficult if you are not knowledgeable.				
23	It is time consuming that is why I don't apply it during assessment.				
24	This technique requires training before teachers can apply it in their assessment.				

25.	Lack of training in its use is the cause for teachers not using it in their assessments.				
26	Randomizing questions and options is a good assessment technique for sound objective assessment.				
27	I encourage teachers and schools to apply it during class test, and semester exams.				