UNIVERSITY OF CAPE COAST

# A COMPARATIVE STUDY OF THE PERCEIVED LEARNING STRATEGIES JUNIOR AND SENIOR HIGH SCHOOL STUDENTS ADOPT WHEN ASSESSED WITH DIFFERENT ITEM FORMATS

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BY

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

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# 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.

Principal Supervisor's Signature:…….... Date:…….....
Name: …….

Co-Supervisor's Signature:…… Date:…….....
Name: ……..

ABSTRACT

This study aimed at comparing the types of learning strategies Junior and Senior High School students adopt when they are assessed with different item formats in English Language, Core Mathematics and Integrated Science examinations. The population for the study was students from the Junior and Senior High Schools in the Komenda-Edina-Eguafo-Abirem (KEEA) District. A sample size of 600 students (300 from each level) were selected for the study. The Lottery method of the simple random sampling and a multi-level sampling technique were used in selecting the Junior and Senior High School students respectively. A descriptive survey design was carried out using questionnaire as the main instrument for data collection. The data were analysed using frequencies, percentages and Chi-square tests. Results revealed that the Senior High School students adopt deep learning strategies towards both multiple-choice and essay item formats in all the three core subjects. In contrast, the Junior High School students adopted surface learning strategies in preparing towards both items formats in all the three core subjects. The results also showed that students' adoption of specific learning strategies were based on several reasons like their prior experience and control of examination anxieties. The study recommended that the Teacher Education Division of the Ghana Education Service in collaboration with the Faculty of Educational Foundations of the University of Cape Coast and the Department of Psychology and Education of the University of Education, Winneba, who have experts in this regard organise in-service training for teachers on how to construct multiple-choice and essay items that measure outcomes beyond the knowledge level and this will challenge students to adopt appropriate strategies in learning.

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DEDICATION

To my dear mother, Madam Monica Yeboah and siblings.

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# CHAPTER ONE

# INTRODUCTION

## Background to the Study

As nations aspire for greater development and higher achievements, the place of citizenship education which provides grounds for all children to develop their capabilities as successful learners, confident individuals, responsible citizens and effective contributors to society cannot be over emphasized. Education for citizenship has emerged as a significant area of primary, secondary and early education curriculum all over the world (Scottish Executive as cited in Arhtah, 2008). It is the bedrock for the development of knowledge, skills, values, and understanding required to become informed, active and responsible citizens who are needed to shape the future health and welfare of the local, national and global community and environment (Banks, 1990; Martorella, 1994; Ross, 1997; Parker, 2001; Learning and Teaching Scothland [LTS] (as cited in Akhtah, 2008). To ensure that people going through the education system have been impacted with the required knowledge, there is the need to assess them to know the extent of the behaviour learnt or knowledge acquired.

Assessment as a key component of the teaching enterprise promotes learning. Assessments provide feedback to students. Students want to know how they perform on assignments, tests, or project work. Teachers use assessment tools to open channels of communication with students, parents and other educators. Whether mastery has been achieved or progress still needs to be

made, assessment provides valuable information to the student. Feedback, however, is likely to promote learning only under certain conditions (Nitko & Brookhart, 2007). Classroom assessment is important because it has a strong impact on learning. The way an instructor approaches assessment influences the way students perceive the class, the material for study, and their own work (Brookhart cited in Arend, 2006). Most importantly, different item formats influence students by directing their attention to particular aspects of course content and by specifying ways of processing information (Doyle as cited in Arend, 2006). Students concentrate their efforts towards whatever content or cognitive skills they believe will be tested (Black & Wiliam as cited in Arend, 2006; Bull & McKenna, 2004). So not only does assessment influence what content students spend time learning, but also the type of learning occurring. Different forms of item formats encourage different types of learning strategies among students (Hynd, Holschuh & Nist, 2000).

One way of exploring the type and quality of student learning is through the cognitive processes students use to study, called learning strategies. Learning strategies are the specific cognitive activities and thought processes that students undertake when studying for a class, such as underlining text, making an outline, or applying knowledge to a new situation. They have been defined broadly as cognitive processes that are intentional and under control of the learner (Meyer, 2004). To some extent, the type of learning strategies students adopt whether deep or surface learning strategies determine their success on the various item formats during internal and external examinations.

**Statement of the Problem**

The problem of poor performance of Ghanaian students in external examinations like the West African Senior School Certificate Examination (WASSCE) becomes the subject of discussion anytime the results of such examinations are released. For instance, in the 2014/2015 results, (i.e., May/June 2014 West African Senior School Certificate Examination) reports from the Chief-examiners indicate that a total of 242,162 candidates wrote the Core subjects of English Language, Mathematics, Integrated Science and Social Studies. Out of these, only 68,062 (28.11%) of the candidates passed with grades A1 to C6 and are, therefore, eligible for admission into tertiary institutions. The breakdown is as follows: Social Studies recorded a pass rate of 57.4 percent, English Language: 45.2 percent, Mathematics: 32.4 percent, while Integrated Science recorded a pass rate of 28.7 percent. The Head of WAEC National Office of Ghana announced this at the 2015 WAEC Distinction Awards ceremony to honour candidates who excelled in the May/June 2014 WASSCE. He stated that under the core subjects, the failure rates for those who obtained Grade F9 included 16.2 percent in Social Studies; 20.9 percent in English Language; 31.6 percent in Mathematics; and 35.6 percent in Integrated Science (West Africa Examination Council, 2014). The performance in the three core subjects in the Basic School Certificate Examination (BECE) was not different, as in the 2013/2014 academic year pass rates in the three major core subjects dropped by 14%. Again, only 60% of students who wrote the exams passed in the three major core subjects (i.e., English Language, Core Mathematics and Integrated Science) according to EMIS Data 2009 – 2014.

What baffles most stakeholders, especially, parents is that, the grades often obtained by their wards in their internal assessment do not in any way come close to the grades they obtain in these external examinations. That is, there appears to be no or little correlation between their school examination results and scores in their external examinations.

The questions that run through the minds of most stakeholders is how do these students learn in preparation towards these examinations? How do these students prepare for the various item formats (multiple-choice and essay) used in writing these examinations?

A lot of foreign studies have been carried out on the impact of item formats on students learning strategies (Marton & Saljo, 1976; Tang, 1992; Scouller, 1998). Many reasons have, therefore, been espoused by scholars on the factors that influence students' adoption of a particular learning strategy. These reasons include how students perceive assessment before, during and after the assessment. (Bond, 1990; Gibbs, 1999; Scouller, 1998).

In Ghana, Afful (2014) also found that the type of item formats used in assessing students has influence on the type of learning strategies students adopt in their studies. Unfortunately, a study to determine whether students adopt different learning strategies at the different educational levels is non-existent in the literature reviewed. It is important, therefore, to conduct a comparative study that looks at the learning strategies of students at the two progressive levels, namely Junior High School (JHS) level and Senior High School (SHS) level of Ghana's educational system before entry into the tertiary level.

**Purpose of the Study**

The main purpose of this study is to compare the types of learning strategies JHS and SHS students adopt towards different item formats and their reasons for choosing those strategies. Specifically, the study seeks to:

1. Identify the types of learning strategies JHS and SHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
2. Find out why the JHS and SHS students adopt those learning strategies when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
3. Compare the age differences of the learning strategies adopted by JHS and SHS students when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?
4. Compare the gender differences of the learning strategies of JHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
5. Compare the gender differences of the learning strategies of SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
6. Identify the types of learning strategies JHS and SHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science.
7. Find out why the JHS and SHS students adopt those learning strategies when assessed with essay items in English Language, Core Mathematics and Integrated Science.

8. Compare the age differences of the learning strategies adopted by JHS and SHS students when they are assessed with essay items in English Language, Core Mathematics and Integrated Science?
9. Compare the gender differences of the learning strategies of JHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science.
10. Compare the gender differences of the learning strategies of SHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science.

**Research Questions**

1. What type of learning strategies are adopted by JHS and SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?
2. What reasons do the JHS and SHS students assign for the learning strategies they adopt when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?
3. What age differences exist in the learning strategies adopted by JHS and SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?
4. What gender differences exist in the learning strategies of JHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?
5. What gender differences exist in the learning strategies of SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?

6. What type of learning strategies are adopted by JHS and SHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?
7. What reasons do the JHS and SHS students give for the learning strategies they adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science?
8. What age differences exist in the learning strategies adopted by JHS and SHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?
9. What gender differences exist in the learning strategies of JHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?
10. What gender differences exist in the learning strategies of SHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?

**Significance of the Study**

Formal (paper-and-pencil) assessment procedure mainly in the form of essay and objective tests are the tools most teachers use in gathering information on students (Adamolekun, 1985; Amedahe, 1989; Anhwire, 2009; Bartels, 2003; Gronlund, 1985).

A study to investigate the learning strategies students adopt toward these item formats, their reasons for the choice of these learning strategies in preparing for these formats and whether there is any difference in the learning strategies adopted by these two categories of students is important for several reasons. First, students in the Junior High Schools and the Senior High Schools

in Ghana are heterogeneous with regard to their level of understanding, development, maturity and educational attainment. In view of this, the results, conclusions and recommendations made in this study could be quite relevant and serve as a guide to all Junior High School and Senior High School teachers in the country.

Second, the results of the study revealed the kinds of learning strategies students engaged in when they are assessed with the two most used paper-and-pencil assessment item formats. Paper-and-pencil assessment item formats that involve the use of study strategies that are directed towards understanding the concepts presented in class will be known. Those that influence students to use strategies that are consistent with an intention to reproduce the material or to rote learn specific facts were revealed.

Third, the results of the study has brought to the fore students' reasons for the choice of specific learning strategies for the two particular item formats. Reasons that are erroneous and which formed the basis of students adopting certain strategies toward a particular item format were known and can be corrected.

Fourth, the study contributed to the current literature on assessment by helping to establish the link between item formats and students' learning strategies.

**Delimitation**

A study that looks at the influence of the numerous assessment item formats on students learning can be quite involving, demanding and very expensive. This study was therefore limited in scope to the influence of the two most often used paper-and-pencil classroom item formats (i.e., multiple-choice

and essay tests) on students learning strategies at the two levels of Ghana's educational ladder.

With regard to population, the study considered only second year students in the Junior High Schools and Senior High Schools in the Komenda-Edina-Eguafo-Abirem (KEEA) district in the Central Region of Ghana. This is because these students have been in the system for a relatively long time and as a result have enough experience as they have sat for several examinations.

**Limitations**

The questionnaire that was employed for the study was a self-report measure and for that matter, respondents gave responses that might not reflect the actual situation on the ground.

In addition, there were some significant problems that were encountered during this research which had the tendency of affecting the results of the study, including unfavourable weather conditions and heavy down pour interrupted some of my meetings scheduled with the respondents, absenteeism on the part of some of the target group members served as an obstacle to the administration of the questionnaire.

**Definitions of Terms**

Words and phrases have different meanings when used in different contexts. The following words/concepts are defined to depict the way they are used in this study:

*Item Formats:* They refer to the various strategies and techniques that teachers might use to acquire assessment information. These include paper - and - pencil formats, performance formats, long - term activity formats and personal communication formats (Nitko & Brookhart, 2007).

*Paper - and – Pencil Item Formats:* These are assessment techniques that require students to record their responses, give explanations, articulate their reasoning, and express their own ideas when solving a problem. Tests, written homework and written examinations are typical examples.

*Learning Strategies:* These consist of the strategies students adopt when preparing for multiple-choice or essay format examinations. These can be deep learning or surface learning.

*Deep Learning:* The kinds of learning that lead to in-depth understanding of the material being learnt in order to relate concepts to everyday experiences.

*Surface Learning:* The kinds of learning that are often characterised with the memorisation of facts and thus less concerned with understanding the material being learnt.

**Organisation of the Rest of the Study**

The study was organised into five chapters. Chapter Two presented review of related literature. The chapter was broken into sections to cover important aspects of the review such as theoretical framework and empirical studies. The empirical review looked at studies that have bearings on the study, particularly, providing the major findings and a critique of these studies. The review was organized based on themes and sub-themes.

The methodology to be employed in carrying out the study was the subject matter of chapter three. This chapter described the research design, the population, sample and sampling technique, data gathering instruments and data collection procedure. Also, how data was analysed to answer each research questions was considered in this chapter.

In Chapter Four, results and discussion of the findings were presented. Finally, the summary of the study, including the key findings, conclusions and recommendations for policy and practice and suggestions for further research formed the concluding chapter (chapter five) of the report.

# CHAPTER TWO

# REVIEW OF RELATED LITERATURE

## Introduction

This chapter presents a review of related literature relevant to this study. For clarity, this chapter has been divided into the following sections: (a) conceptual review; (b) theoretical review; and (c) empirical review.

## Conceptual Review

### The Concept of Assessment in Education and its Relevance

Walvoord (as cited in Wiley & Sons, 2004. p. 2) defined assessment as "the systematic collection of information about students' learning, using the time, knowledge, expertise, and resources available in order to inform decision about how to improve learning".

Also, Amedahe and Asamoah-Gyimah (2013) defined assessment in education as the process for obtaining information that is used for making decisions about students, curricular, programmes and educational policy. They added that assessing students' competence means collecting information to help decide the degree to which the students have achieved the learning objectives.

Nitko (2001) further explained that decisions about students include managing classroom instruction, placing students into different types of educational programmes, assigning them to appropriate categories, guiding and counselling them, selecting them for educational opportunities, and credentialing and certifying their competence. Decisions about curricular and programmes include decisions about their effectiveness (summative

evaluations) and about ways to improve them (formative evaluations). Decisions about educational policy are made at the local school district level, the state level, and the national level.

Educational assessment is conducted for a variety of reasons and the nature of the assessment often reflects the purpose for which it is being carried out. For instance, Amedahe and Asamoah-Gyimah (2013. p.9) identified some purposes of assessment in education as follows:

1. *Planning and organization of instruction*: Educational assessment helps to plan and organize teaching activities. Before one can do any meaningful teaching he/she needs to have a clear idea of the entry behaviour of the pupils. Understanding the entry behaviour will assist one to determine what they should be taught. In other words, being familiar with the entry behaviour of pupils helps to direct and facilitate their learning. It is through assessment that one can get to know the entry behaviour of the pupils to enable him/her plan his/her instructional activities. Such an assessment can take the form of having informal discussions with the pupils, quizzing them and observing them, as the case may be.
2. *Instructional Management Decision Making*: Educational assessment is necessary for instructional management decision making. It is not sufficient to plan, organize and deliver instruction. There is the need to be on the lookout for how to help students to improve as well as make sure the teacher improve upon his/her instruction.
3. *Motivating Students*: Another purpose of assessment is motivating pupils. Motivation can activate and direct students learning by

sustaining their interest. Assessment in the form of tests and quizzes motivates pupils to learn. This, therefore, means that students will not be motivated to learn, if they know that they will not be assessed at the end of the unit, course or programme. There is no doubt that classroom assessment directs the learning of pupils.

4. *Grading Students*: Teachers are expected to assign scores or grades to their pupils based on how good their performance or achievement is, taking into consideration the teachers' objectives and standards. Although teachers continually assess their students' progress in many ways, it is necessary to formally evaluate them using grades. The marks or grades that they (teachers) assign to their students represent their evaluations about the quality or worth of achievement of the important learning objectives.

Students' poor performance in external examinations is always a problem in Ghana, yet assessors only concentrate on outcomes of the assessment to take decisions about students. For instance, assessors mostly use students' test scores to know their strengths and weaknesses before they proceed to take decisions about them. However, the issue of how the students prepare (learning strategies) before they are assessed is not given much attention. There is, therefore, the need for assessors to incorporate into their activities, appraisal of students' preparations before they assess them. This is because failure to know the students' learning strategies might in a way mislead them in taking inappropriate decisions about them.

## Item formats

Classroom teachers construct and use a number of test types in the classroom to determine the achievement of their students, motivate or encourage them to learn, identify their strengths and weakness etc. The test items could either be essay or objective types. These are the types of tests normally used in the Ghanaian classrooms and even in the external examinations. The two main types of item formats are discussed below.

### Types of Item Formats

According to Nitko and Brookhart (2007), a test is said to be objective when the procedure by which the correctness of the responses to the items is determined will not in any way differ from one rater to the other. Thus, the objective nature of a test refers to the scoring of the test. These tests normally consist of a large number of items and the responses are scored without subjectivity, to the extent that expert observers can agree on the correct responses (Etsey, 2003). There are two major types of objective tests. These are the selection type and the supply type. The selection types are the ones that a student selects the correct or best answer from among a number of options presented to him/her. These consist of the multiple-choice type, true or false type and matching type. The supply type has variations such as completion (fill-in-the blanks) and short answer.

One of the selection types of objective test that is most frequently used in the Ghanaian school systems is the multiple-choice format. This type of objective test is reviewed with the essay type because they are the two specific item formats of interest in this study.

1. **The Multiple-Choice Test Format**

Multiple-choice test can be used to measure a variety of learning outcomes such as student's ability to recall some aspects of the nations' constitution, understand a story. Some of these learning outcomes would be appropriately assessed with this assessment tool than others (Etsey, 2003; Linn & Gronlund, 1995; Nitko & Brookhart, 2007; Oosterholf, 2001).

Linn and Gronlund (1995) believed that "learning outcomes in the knowledge area which are so prominent in the school subjects are best measured with multiple-choice items" (p. 176). They mentioned knowledge of terminology, knowledge of specific facts, knowledge of principles and knowledge of methods and procedures as classic examples of learning outcomes in the knowledge area. Mehrens and Lehmann (1991) added that multiple-choice items are presently the most frequently used and also perceived to be most highly objective test items because of their nature.

Amedahe and Asamoah-Gyimah (2013) described the multiple-choice items as consisting of one or more introductory sentences followed by a list of two or more suggested responses or options. The pupil/student chooses a response that is the correct or best expression for answering the question or completing the statement. The multiple-choice item consists of these two main sections:

1. The stem which contains the problem or the question or the incomplete statement the testee is required to respond to.
2. A list of suggested answers which are also known as responses, option, alternatives or choices (p. 98).

Indeed, multiple-choice items can measure variety of learning outcomes. This is the major reason most testing agencies prefer using it in assessing students/testees. If teachers during test construction are able to fairly match the contents taught to their behavioural objectives, students would therefore adopt deep learning strategies as well in their preparation.

**Conditions for the use of Multiple-Choice Tests**

According to Burton, Sudweeks, Merrill and Wood (1991), in order for scores to accurately represent the degree to which a student has reached an educational objective in the course of his/her studies, it is essential that the form of test item used in the assessment be suitable for the objective. Multiple-choice test items are often advantageous to use, but they are not the best form of test item for every circumstance. In general, they are appropriate to use when the attainment of the educational objective can be measured by having the student select his or her response from a list of several alternative responses.

Several authors (Etsey, 2003; Linn & Gronlund, 1995; Nitko & Brookhart, 2007; Oosterholf, 2001; Tamakloe et al., 2005) are of the view that multiple-choice test can also be used to measure a variety of learning outcomes. The same authors, however, believed that some of these learning outcomes would be appropriately assessed with this assessment tool than others. Again, Linn and Gronlund (1995) believed that "learning outcomes in the knowledge area which are so prominent in the school subjects are best measured with multiple-choice items" (p. 176). They mentioned knowledge of terminology, knowledge of specific facts, knowledge of principles and knowledge of methods and procedures as classic examples of learning outcomes in the knowledge area. They explained further that knowledge of terminology as how well students

comprehend a particular term by asking them to select from the alternatives, another word which is synonymous to a given word in the stem of the question. Knowledge of specific facts requires students to reproduce certain facts presented in their learning materials. Linn and Gronlund, again, found that "questions of the 'who', 'what', 'when', and 'where' variety are most common" (p. 177). Knowledge of principles assesses students' ability to remember the basic ways in which something works. There are certain conventional methods and procedures of doing things. When a teacher assesses students on any of these laid down methods and procedures, then knowledge of methods and procedures are being sought. Apart from the learning outcomes explained above, Linn and Gronlund agree that multiple-choice items could also be used to measure higher learning outcomes. What they contend is that, these learning outcomes would be appropriately measured when outcomes in the knowledge area have been earlier measured.

There is no doubt about the fact that multiple-choice items mostly measure lower level behaviour. Though, students would always like to adopt surface learning strategies in preparing for multiple-choice items because it mostly has to do with recalling of specific facts. There is still the need for teachers at the two levels of education (Senior High School and Junior High School) to know that despite this assumption, if test items are framed very well students will adopt deep learning strategies as well in their preparation.

Amedahe and Asamoah Gyimah (2013) identified some advantages and disadvantages of multiple-choice type tests as follows:

**Advantages of the Multiple-Choice Tests**

1. One of the outstanding or major advantages of the multiple-choice tests is its content validity. The multiple-choice format is widely used in achievement tests of all types to assess a variety of learning outcomes. Multiple-choice tests cannot only measure factual recall, but can also measure the students' ability to reason and to exercise judgement. Before students can do this, they therefore need to adapt deep learning strategies in their studies to help them understand what they were taught.
2. Multiple-choice tests afford excellent content sampling, which generally leads to more content-valid score interpretations.
3. They can be scored quickly and accurately by machines, clerks, teaching assistance, and even students themselves. This is so because the element of subjectivity in scoring is totally absent in the multiple-choice test.
4. Multiple-choice items do not require students to write out and elaborate their answers. This minimizes the opportunity for less knowledgeable students to "bluff" or "dress up" their answers.

**Disadvantages of the Multiple-Choice Tests**

1. The selection format of the multiple-choice item does not allow students to construct, organise and present their own answers. Students must choose from a fixed list of options rather than creating their own ideas or solutions.
2. The construction of multiple-choice test item is time and energy consuming. It is difficult to write good multiple-choice tests with equally plausible alternatives.

3. The error introduced by guessing is only reduced by the use of multiple-choice items but not entirely overcome. The chance element is still present.

**The Essay Test Format**

Stalnaker (as cited in Reiner, Bothell, Sudweeks & Wood, 2002, p.6) defined an essay test as a test item which requires a response composed by the examinee, usually in the form of one or more sentences, of a nature that no single response or pattern of responses can be listed as correct, and the accuracy and quality of which can be judged subjectively only by one skilled or informed in the subject.

Tamakloe et al. (2005, p. 222) have also stated that: An essay test is a test which gives the student/testee the freedom to compose his/her responses to the items usually in the form of a number of logically arranged and related sentences. Its nature is such that no single response in terms of a word, phrase, or clause can be listed as correct. No plausible answers are given the testee and consequently no selection of correct answers is done by the student. Essentially, an essay test provides the student/testee with the opportunity to construct and compose his/her own responses to the items within the given limits of each item.

**Conditions for the use of Essay Tests**

Ebel and Frisbie (as cited in Afful, 2014) agrees that essay items best measure complex learning outcomes and should be used in that regard, but they added that there are certain circumstances which may not involve the measurement of complex learning outcomes but which will require the use of essay test. These include:

1. When a tester wants to test writing skills. They contend that, the most appropriate way to test students' ability to express themselves in writing is to have them to write something.

2. Essay test is also recommended when the time to construct the test is so short. Even though, one needs to plan ahead of time for any examination that he/she intends to conduct. Certain conditions like a make-up examinations for one or few students who were legitimately unable to take the regular examination would be an instance where the teacher would have limited time and which will require essay test.

3. Another situation which calls for the use of essay test is when the test is meant for a small group of people. Despite all the advantages of using objective type items, when testing small groups of students, developing such items is not worthwhile. If anything at all, restricted type of essay test will be useful to serve in place of multiple-choice items.

When the instructor is more competent in rating students' essay responses than in constructing objective test items (p. 47).

Reiner, Bothell, Sudweeks and Wood (2002, p. 10) identified some advantages and disadvantages of essay tests as follows:

**Advantages of the Essay Tests**

1. Assess higher-order or critical thinking skills. Essay questions provide an effective way of assessing complex learning outcomes that cannot be effectively assessed by other commonly used paper-and-pencil assessment procedures. In fact, some of the most complicated thinking processes can only be assessed through essay questions, when a paper-and-pencil test is necessary (e.g,.,

assessing students' ability to make judgments that are well thought through and that are justifiable).

2. Evaluate student thinking and reasoning. Essay questions require students to demonstrate their reasoning and thinking skills, which gives teachers the opportunity to detect problems students may have with their reasoning processes. When educators detect problems in students' thinking, they can help them overcome those problems.

3. Provide authentic experience. Constructed responses are closer to real life than selected responses. Problem solving and decision-making are vital life competencies. In most cases, these skills require the ability to construct a solution or decision rather than select a solution or decision from a limited set of possibilities.

**Disadvantages of the Essay Tests**

1. Assess a limited sample of the range of content. Due to the time it takes for students to respond to essay questions and for graders to score responses, the number of essay questions that can be included in a test is limited. Thus, essay questions necessitate testing a limited sample of the subject matter, thereby reducing content validity. A test of 80 multiple-choice questions will most likely cover a wider range of content than a test of 3-4 essay questions.

2. They are difficult and time consuming to score. Answers to essay questions are likely to be graded less reliably than other types of test questions and take considerable time to grade. One of the advantages of essay questions is that they allow students some latitude in formulating their responses. However, this advantage comes at the cost of time spent scoring and reliability in scoring. Different readers may vary in their grading of the same or similar responses

(inter-scorer reliability) and one reader can vary significantly in his grading consistency depending on many factors (intra-scorer reliability). Therefore, essay answers of similar quality may receive notably different scores. Gender and ethnic bias, the length and legibility of the response, and the personal preferences of the grader with regards to the content and structure of the response are some of the factors that can lead to unreliable grading.

To conclude, I think essay items will influence students to adopt deep learning strategies more than surface learning strategies due to the complex learning outcomes it measures. For example, a student will find it extremely difficult to evaluate the worth of ideas if he/she fails to adopt the right strategies. Secondly, just for the fact that one will have to organise and compose his /her own thoughts in the examination, a student will be bent on adopting the strategies that will help him/her understand the material better. A similar view is shared by Terry (1993), when he indicated that when students are to be examined with essay questions, they tend to focus on broad concepts like looking for interrelationships among parts. However, when preparing for selection response questions like multiple-choice items, they focus on recalling facts, details and specific ideas.

## The Concept of Students' Learning Strategies

Alexander, Graham and Harris (1998) described learning strategies as forms of procedural knowledge or the 'how to' knowledge. Learning strategies facilitate learning and improve performance. In other words, they are needed for academic development. Alexander, Graham and Harris have characterized learning strategies as purposeful, in the sense that they are consciously applied to attain a desired outcome. Learning strategies are different from study skills

in that the latter can be automatized, whereas strategies require conscious effort. In order to apply learning strategies, therefore, the learner requires the will and skill to learn to master them (Weinstein, 1994).

University of Kansas Centre for Research on learning (2009) also defined learning strategy as students approach to learning which help them to understand information and solve problems with ease. The Centre further asserted that, students resort to many learning strategies and that students who do not know or use good learning strategies often learn inactively and eventually fail in school. Learning strategy instructions are, therefore, required and should focus on making students more active learners by teaching them how to learn and how to use what they have learned to be successful.

Alexander et al., (1998) also pointed to the interplay among knowledge, strategy use and motivation. The more one knows about a particular subject, the more complex the strategies which one is able to use. For example, a learner who has less prior knowledge may have to read a text a number of times before grasping its content, whereas an expert will instantly relate the new information to his/her prior knowledge of the subject. The new knowledge enables the learner to apply the proper strategies more effectively. So the learner can improve his/her strategy use, but only if he/she is aware of the relationship between the knowledge learnt and its application.

Numerous studies have explored and supported the link between the assessment practices in a course and the learning strategies students use in a course (Prosser & Trigwell, 1999; Gibbs as cited in Arend, 2006). Studies have illustrated not only how different item formats encourage different learning strategies, but how different learning strategies result in qualitatively different

learning outcomes. For example, students who read text at a deep level are better able to answer questions about the meaning and conclusions of the text, while surface strategies result in mainly descriptive answers (Meyer, 2004).

Simple methods used to study for objective tests are not as effective for long-term retention as more complex methods used to study for essay tests (McKeachie, Pintrich, Lin & Smith as cited in Arend, 2006). Surface learning approaches are found to be effective for recalling details, whereas deep learning approaches are effective for the development of more complex and meaningful knowledge structures (Hynd, Holschuh & Nist, 2000). In general, when students focus on more complex cognitive and metacognitive processes over routine rehearsal processes, they are more academically successful (Welschmeyer, Patrick & Cheney-Steen, 2004). According to Black and Wiliam (1998), students concentrate their efforts towards whatever content or cognitive skills they believe will be tested. So, assessment does not only influence what content students spend time learning, but also the type of learning strategies they adopt. Thus, different forms of assessment encourage different types of learning (Gipps, 1994). The learning strategies students use in a course ultimately influence their overall learning outcomes.

**Categories of Learning Strategies**

Based on a combination of commonly used taxonomies and classifications (e.g., Boekaerts, 1999; Mayer, 2008; Pressley, 2004; Weinstein & Mayer, 1986) the following four main categories of strategies have been defined.

1. ***Cognitive strategies***: These are strategies on a lower level than the metacognitive methods. There are three main types of cognitive strategies: (a)

first, elaboration strategies, by which connections are established between new material and what is already known; (b) rehearsal strategies, which help store information in the memory by repeating the material, and (c) organization strategies which visualize the material to facilitate students' learning in preparation towards examinations of any format (Mayer, 2008).

***2. Metacognitive strategies***: Metacognitive strategies are used in the various phases of the learning process as described by Zimmerman (2002). He distinguishes three metacognitive strategies, namely forethought phase, performance phase and self-reflection. The forethought phase involves the development of planning strategies. An example is the allocation of study time. During the performance phase, the actual learning or task performance takes place. Here the monitoring strategy comes into play and the learner repeatedly checks whether he/she understands the material (e.g., by self-questioning). The last phase is that of self-reflection, during which the learner evaluates the learning process and/or product. Evaluation and reflection techniques are used to support this phase.

***3. Management strategies***: Management strategies focus on the learning environment and are used to create the optimal learning conditions. They can be aimed at the learner him/herself (effort management; strategies that help one persist in case of difficulties), at others (help-seeking and/or collaborative learning), or at the physical environment (e.g., using dictionaries and/or going to the library).

***4. Motivational strategies***: Motivational strategies aim to enhance specific types of drive. Examples are the formulation of a learning objective, which enhances the goal orientation: the reason why one undertakes a task, which is either

performance or mastery-oriented (Harackiewicz, Barron, Pintrich, Elliot & Thrash, 2002), valuing the task, which enhances the task value beliefs: the degree to which the task is considered as relevant, important and worthwhile (Wigfield & Eccles, 2002), and the development of a positive style of attribution, which enhances the student's self-efficacy, that is, the student's belief in his or her ability to successfully complete the task (Pintrich, 2004). The enhancement of the motivation element should lead to a higher level of engagement in the task.

However, Biggs (1973), Marton and Saljo (1976) and Tang (1992) categorised students' learning strategies basically into two, namely, deep learning strategies and surface learning strategies. In their categorization, the rehearsal strategies are considered the most basic type of learning strategy, representing the surface learning approaches to learning. The other learning strategies are considered generally more complex learning strategies. Elaboration strategies help students store information into long-term memory by building internal connections and include using imagery, identifying key words, paraphrasing, and creating analogies. Organizational strategies help the learner select appropriate information and construct connections within the information to be learned. Examples are clustering, creating mnemonics, and selecting main ideas such as outlining or diagramming. Critical thinking strategies help students develop new ways of thinking about course content such as applying prior knowledge to new situations, transferring knowledge, reaching decisions, and making evaluations. Finally, metacognitive self-regulation strategies identify how students control and modify their cognitive processes. These planning, regulating, and monitoring strategies include such

tasks as setting goals, self-testing, regulating the speed of reading, and using test-taking strategies.

According to Marton and Saljo (1976), students who take a surface learning approach to learning tend not to have the primary intention of becoming interested in or understanding the subject, but rather tends to be that of jumping through the necessary hoops in order to acquire the mark, or the grade, or the qualification. Also, Tang (1992) contends that students adopting a surface learning strategy have an extrinsic motive to carry out the task for some external achievements other than the present task itself. That is, students find every means to pass especially by rote learning though, they might not have interest in the subject. This approach aims at avoiding failure but with investing minimum effort. The accompanying strategy is to learn by rote and try to memorise what is perceived as important. These students focus on isolated facts and fail to see the relation among the information. Rote learning is used for the purpose of reproducing content, not of understanding it. In contrast, students engaging in a deep learning approach have an intrinsic motivation of felt need based on interest in the task. The strategies they adopt are task specific and aim at seeking and understanding the meaning of what is being learnt. Not only do these students relate the different aspects of the information with one another, they also relate them to their previous learning and their personal experiences.

The University College in Dublin (2003), has observed that students who take a surface learning approach to learning adopt the following learning strategies:

1. They try to learn in order to repeat what they have learned.
2. They memorise information needed for assessments.

3. They make use of rote learning.
4. They take a narrow view and concentrate on details.
5. They tend to stick closely to the course requirements and
6. They are motivated by fear of failure.

However, their counterparts who take a deep learning approach to learning have the intention of understanding, engaging with, operating in and valuing the subject. Such students:

1. Actively seek to understand the material or the subject.
2. Interact vigorously with the content.
3. Make use of evidence, inquiry and evaluation.
4. Take a broad view and relate ideas to one another.
5. Are motivated by interest.
6. Relate new ideas to previous knowledge.
7. Relate concepts to everyday experience.
8. Tend to read or study beyond the course requirements.

These two learning strategies (surface and deep) are used in this study to describe the type of learning adopted by junior high school students and senior high school students and to determine any relationships that exist between assessment practices and learning.

## Theoretical Review

### Theories of Validity and Reliability of Achievement Test Results

Currently, the quality of education has focused a great deal of attention on accountability as students are required to account for whatever they have learnt at school before progressing to the next level of their education. One of the ways by which such accountability is measured is by the extent to which

students' performance in teacher-made achievement tests can predict their potential performance in the standardized achievement tests such as the West Africa Senior Secondary Certificate Examination (WASSCE) (Notar, Zuelke, Wilson, & Yunker, 2004). In discussions of this nature where accountability standards is very crucial one cannot do away with the ground theories of measurement and evaluation which are validity and reliability. This study therefore seeks to review literature on these theories (validity and reliability).

## Validity of Assessment Results

Validity according to Nitko and Brookhart (2007), "is the soundness of one's interpretations and the use of students' assessment results'' (p. 38). To the America Education Research Association, America Psychology Association and National Council on Measurement in Education (as cited in Amedahe & Asamoah-Gyimah, 2003), validity "refers to the degree to which evidence and theory support the interpretations of test scores'' (p. 66). From this definition, validity refers to the extent to which assessment results are meaningful and appropriate or suitable interpretations and uses are assigned to students' assessment results. This, therefore, explains further that for a student's result to be valid several factors surrounding the test should be taken into consideration not the test instrument in question.

On a test with high validity the items will be closely linked to the test's intended focus. For many certification and licensure tests this means that the items will be highly related to a specific job or occupation. If a test has poor validity then it does not measure the job-related content and competencies it ought to. When this is the case, there is no justification for using the test results for their intended purpose. Several pieces of evidence can be used to support

the validity of a test including content validity evidence, criterion validity evidence and construct validity evidence.

**Content Validity-Evidence of Achievement Tests**

The main purpose of content validation is to assess whether the item adequately represent a performance domain of a psychological construct of specific interest. This is because the validity of a classroom assessment results largely depends on how well an assessment samples the learning targets (Nitko & Brookhart, 2007). In content validation, the items on the test should adequately sample the domain of concern or interest. This can be achieved by clearly identifying the important learning targets and ensuring that they are well sampled by the assessment procedure. According to Nitko and Brookhart, the tasks included in an assessment should reflect the important content and learning outcomes specified in the schools' and state's curriculum framework. They further indicated that the content included in an assessment should be of great value or significance to students' further learning or life skills.

Airasian (2005) stated that to ensure content validity, test items should match with course objectives, instruction and reflect adequate sampling of instructional materials. The items must be fairly distributed on the content of the curriculum and what a teacher teaches in class. The test constructor must be certain that the assessed content relates directly to important learning targets. To determine the content validity of test, the items are, therefore, compared with the table of test specification. Test experts or judges may also be asked to assess the extent of content validity in a particular test.

According to Amedahe and Asamoah-Gyimah (2013), one must first define content domain and/or universe of situation in assessing the content

validity of a particular test. They further explained that for the above to be achieved the test constructor should consider the subject matter-content and the type of learning target desired from students. This again indicates that without the table of specification, it will be very difficult to have a wider content coverage of the main issues in the syllabus and the main content of the test.

In the classroom assessment, the curriculum and instruction determine the domain of achievement tasks. Amedahe and Asamoah-Gyimah again, stated that to ensure content validity of teacher-made tests, one must clearly specified the domain of instructionally relevant tasks to be used to measure students achievement. Notar, Zuelke, Wilson and Yunker (2004) have confirmed that the means to achieve content validity of teacher-made tests is to develop a table of test specifications for the test. The table of specification will ensure that content tested agrees with the content taught. Miller, Linn, and Gronlund (2009) have indicated that the table of test specifications ensures that teacher-made tests produce scores that represent both the content areas and the learning outcomes that the test constructer desires. This allows the tester to identify the learning content at each level of Bloom's Taxonomy. The obstacle associated with planning a table of test specifications for each test is that these tables require considerable time and effort to develop (Parr & Bauer, 2006). However, the time and effort used to develop a table of test specification can ensure that the test is valid and reliable (Notar et al. 2004).

In effect, the content of tests mostly affect the learning strategies students adopt. If the content validity of a test is very low due to the test constructors' inability to set questions which are from the important domains or match very well the instructional objectives to the behaviours, students may

therefore intend to use surface learning strategies, and yet come out with good grades. The poor performance of most students in external examinations may be due to the fact that they are familiar with tests of low content validity and which, therefore, do not challenge them to adopt good learning strategies in their preparations.

**Criterion Validity-evidence of Achievement Tests**

Amedahe and Asamoah Gyimah (2013) indicated that "criterion-related validity is concerned with the empirical method of studying the relationship between the test scores or other measures and some independent external measures" (p. 53). Thus, criterion-related evidence serves as a basis for using the test scores to predict an individual's standing on a criterion measure of interest. This is achieved when the performance of the student on the test is checked against a standard measure, which is a direct and independent measure of the specific behaviour which the test is designed to predict. In other words, a test's criterion related validity is measured by how well it relates with some accepted criteria of the behaviour being measured. The literature distinguishes between two types of criterion-related validity evidence referring to whether the external criterion is obtained at the time of the administration of the test, or at some time in the future. Kinyua and Okunya (2014) described the two main types of criterion-related evidence (concurrent and predictive validity evidence) as follows:

***Concurrent Validity Evidence*** refers to the extent to which an individual's current status on a criterion can be predicted from their prior performance on an assessment instrument (Nitko & Brookhart, 2007). For example, the newer State of Anxiety Scale can be administered at the same time

as the older and much more established Taylor Manifest Anxiety Scale so that if the results of the former are comparable to the later, the former test will have passed criterion validity test.

***Predictive Validity Evidence*** is where the performance of one test is used to predict the potential performance in another test. For example, the performance of a student's in the West Africa Senior School Certificate Examination (WASSCE) used in predicting the Grade Point Average in the University at the first semester.

From the review, internal examination results may affect the predictions of assessors about students' performance in specified situations, if the test comprises of ineffective items. For instance, if test constructors do not use original type of questions but mostly rely on past questions and trivial items, students may adopt surface learning strategies in preparing to solve such problems. Students' results from such tests may seem impressive on the face value but when the same students sit for external examinations, where they are challenged to critically examine issues before providing answers; they may find it very difficult to come out with the right answers.

**Construct Validity-Evidence of Achievement Test**

According to DeVellis (1991), **"**construct validity-evidence is directly concerned with the theoretical relationship of a variable (e.g., a score on some scale) to other variables. It is the extent to which a measure 'behaves' the way that the construct it purports to measure should behave with regard to established measures of other constructs" (p. 46). Also, Messick (1989) defined construct validity as an integrated evaluative judgement of the degree to which empirical evidence and theoretical rationales support the adequacy and

appropriateness of inferences and actions based on test scores or other modes of assessment.

Moss (1992) pointed out that "the essential purpose of construct validity is to justify a particular interpretation of a test score by explaining the behaviour that the test score summarised" (p, 233). This means asking whether the interpretation given to the test score truly summarised the behaviour. That is, a construct needs to be both operationalized and syntactically defined in order to measure it effectively. The operationalizing of the construct involves developing a series of measurable behaviour or attributes that are posited to correspond to the latent construct. Defining the construct syntactically involves establishing assumed relationships between the construct of interest and other related constructs or behaviours (Benson, 1998; Crocker & Algina, 1986; Gregory, 1992).

In sum, construct validity seeks to ensure that the test is actually measuring the intended attribute and no other extraneous attributes. For example, if a social studies test is designed using difficult vocabulary beyond the level of the learner then such a test will be described as having low construct validity because it is measuring other constructs besides the intended construct of sociability. Students may adopt appropriate learning strategies if the desired construct is what is being measured.

**Criteria for Evaluating Validity of a Test**

Whatever the type of validity a tester is intending, Linn, Baker and Dunbar (1991) proposed eight criteria for evaluating validity in assessment that cross-cut the above types of validity. These are the:

(i) *Consequences*, that is, on the effects of the assessment on the learner the test constructor will be asking questions regarding intended purpose of test as and to what extent the learner is prepared to live by this purpose.

(ii) *Content quality* focuses on the consistency with current content conceptualization.

(iii) *Transfer and generalizability* means the validity focuses on the assessment's representatives of a larger domain.

(iv) *Cognitive complexity* focuses on whether the cognitive level of knowledge assessed is corresponding with the learner's experiences.

(v) *Meaningfulness* addresses the aspect relevance of the assessment in the minds of students.

(vi) *Fairness* deals with aspect of extent to which the test items are taking into account potential individual differences among learners.

(vii) *Cost and efficiency* focuses on the practicality or feasibility of an assessment in terms of the cost of producing and administrating the test and time required to complete the tasks.

**Factors Affecting Validity of Assessment Results**

A number of factors affect the degree of validity of assessment results. These factors tend to reduce the degree of validity of the results affecting its use and appropriate interpretations. Amedahe and Asamoah-Gyimah (2013, p. 59) outlined some of these factors as:

1. Unclear directions: To help the student to respond meaningfully to test items, there is always the need to provide clear directions to them. Directions that do not clearly indicate to the testee how to respond to the

tasks and how to record the responses will tend to reduce the validity of the results. This is because students may get confused over how to respond and how to record their responses that may in turn affect their performance.

2. Reading Vocabulary and Sentence Structure: The sentence structure should not be too complex for the level of the students. When the vocabulary and sentences are too difficult and complicated for the students taking the assessment, it will result in the assessment measuring the student's reading comprehension ability rather than the student's achievement in a subject matter content. In this case, the use and interpretation of the test scores may have low validity.
3. Ambiguity of Items: When test items are ambiguous, they can be interpreted in different ways. This can result in misinterpretation and confusion. This will intend reduce the validity of the students' results.
4. Inadequate time limits: Students need to be given adequate time to complete a test. Too short duration to complete tests may deprive testees the opportunity to reason and respond accordingly while too long duration may also cause testees to finish very early and misbehave by sometimes cheating or changing the right answer and which therefore introduces a lot of biases to their results.
5. Poor Construction of Items: A poor construction can take the form of the items providing clues to the answer. In the selection type of test items the clues are provided by certain word(s) in the stem of the item (e.g, is/an) or grammatically inconsistent options. Poorly constructed items

makes the tester deviate from his purpose of testing and this therefore reduce the validity of the results.

From the review, if assessors and other stakeholders can give sound interpretations to students' assessment results and even put their scores into appropriate use, I believe that internal assessors especially, teachers, in constructing tests items will always consider novel items which may challenge students to critically examine the issues before solving them. This will motivate students to adopt deep learning strategies as well in their preparations towards examinations. Assessors will, therefore, be in the good position to put students' results into appropriated uses since they may attain results which truly reflect students' performance.

**Reliability of Assessment Results**

Reliability refers to the consistency of the scores obtained. That is, how consistent the scores are for each individual from one administration of an instrument to another and from one item to another. Reliability is a measure of how stable, dependable, trustworthy and consistent a test is in measuring the same thing each time (Worthen, Borg & White, 1993). Amedahe (1989) has indicated that high reliability of teacher-made tests is required because of the important decisions based on these tests. This assertion is very crucial particularly in Ghana where standardised tests is non-existent and major decisions about students and learning are made based on the scores of teacher-made tests.

For the students' test scores to be consistent in both internal and external examinations then, internal examinations like the teacher-made test must be crafted very well to elicit the desirable behaviour. Students may adopt deep

learning strategies in other to perform very well on teacher-made test with very high reliability either on items within the same test, from one administration to another or from one item to the other, etc. If students perform very well during internal examinations where test items are well crafted, then their scores in internal examinations may be consistent with their scores in the external examinations. This will, therefore, help improve their performance.

**Methods of estimating Reliability of Test results**

Amedahe and Asamoah-Gyimah (2013) identified and explained the various methods used in estimating reliability as:

**Test-Retest reliability**: As the name implies, this method of estimating reliability or stability of test scores involves the administration of test on a group of students two times with a given time interval between the two administrations of the test. The situation where a person comes out with the same or similar results in both test, the test is said to have higher reliability and vice versa. The test-retest method seems to yield the most reasonable estimate of test reliability but some measurement experts agree that this method is not without problems (Allen &Yen, 1979; Crocker & Algina, 1986; Tamakloe, Atta & Amedahe, 2005). "The most serious problem with this method of estimating reliability is the potential for a carry-over effect between testings: the first testing may influence the second testing" (Allen & Yen, 1979, p. 77)

**Alternate/Equivalent forms reliability**: This method provides a measure of the degree to which generalizations about student performance from one assessment to another are justified. Alternate/equivalent forms of a test are made up of tasks carefully developed from the same table of specification. This, therefore means that the alternate form method requires constructing two similar

forms of a test with the same content and level of difficulty and administering both forms to the same group of examinees. Crocker and Algina (1986) added that the two forms should be administered within a very short time period, allowing only enough time between tests so that examinees will not be tired. It is considered desirable to balance the order of administration of the forms so that the examinees are randomly assigned to the first test form followed by the second test form, whereas the other half take the second followed by the first. The correlation coefficient between the two sets of scores is computed, usually with the Pearson Product Moment formula. This correlation coefficient is called the coefficient of equivalence. The higher the coefficient of equivalence, the more confident test users can be sure that scores from the different test forms may be used interchangeably.

**Split-Half reliability**: This method of reliability estimates the internal consistency of a test. Internal consistency estimate provides information on how items in a test measure the same dimension of an attribute of concern. Again, internal consistency is achieved when performance on each item by testees correlate well with their total performance on the test.

**Kuder-Richardson reliability**: This method of reliability estimates is also concerned with the internal consistency of the test. They focus on the consistency with which students perform one task to another. K-R20 is suitable for determining the reliability of dichotomously scored items, that is, items scored either 0 or 1 such as multiple-choice items. The formula is as follows:

$KR20 = [n/n -1] [1- \Sigma pq/SD_x^2]$

where n = the number of items

$SD_x^2$ = the total variance of the test

p= proportion of examinees who got an item correctly

q= proportion of examinees who got an item wrong

The above formula was later modified to become more generalised in order to cover that of constructed response items. This general version which was developed by Cronbach was named coefficient alpha (The formula is as follows:

Coefficient alpha ($\alpha$) = $[n / n-1] [1- \Sigma Sdi)^2 / ( Sd_x{}^2]$

Where; n = the number of items

$Sdi^2$ = the variance of the item i

With each of the two formulae, a single test is administered and the required statistics are determined and substituted into the formulae to determine the reliability coefficient. The reliability coefficient simply indicates the percentage of the score variance that can be attributed to the construct being measured.

**Inter-Rater reliability:** This type of reliability estimate is normally used when dealing with essay type test. Here, the same test is scored by two raters to determine the consistency of errors in both tests. In the situation where both raters come out with either both high or low scores, it shows that the errors in both tests are consistent and therefore decisions by users will be reliable.

**Factors Affecting Reliability of Assessment Results**

Again, Amedahe and Asamoah-Gyimah (2013. p. 79) identified some factors that may affect the consistency of assessment results as follows:

1. Characteristics of a Test: The weaknesses of the items in a test can take the form of poor wording, unclear directions/instructions or ambiguity of the items. These factors generally create difficulty for the student with regard to what exactly is either being measured or what to do and tend

to lower the consistency of their performance. Ambiguity of test items, for example, may lead to differences in how an item is interpreted and may give rise to guessing which reduces reliability.

2. Test Difficult: When a test is difficult, students may be induced to guess the answers to the items (selection type items) or bluff (e.g., essay type items) hence introducing errors into the scores.
3. Test Length: A test with limited number of items is not likely to measure the abilities or behaviours under consideration exhaustively and accurately and therefore errors may occur in the measurement.
4. Time Allocated to the Test: When a time allotted for taking a test is too short, testees would not have enough time to read and think about the problems before answering them. The test is completed in a rush. This could lead to fluctuation in performance from one occasion to another. It could also lead to guessing. On the other hand, if the time is too long, the fast students would finish and be tempted to assist their colleagues and friends leading to irregularities. It is obvious that cheating during tests cannot result in consistent scores from one occasion to another.
5. Subjectivity in Scoring: If a test is subjectively scored, inconsistencies are allowed to create random errors within the scores that in turn lower the reliability of the test.
6. Testing Condition: When uniformity of the testing conditions is not ensured during test administration inconsistencies are likely to be introduced into the performance of the students which would affect the scores.

7. Group Variability: Group variability influences reliability because reliability coefficient are directly influenced by the spread of scores in the group assessed. Other things being equal, the larger the spread of scores, the higher the estimate of reliability will be. Because larger reliability coefficients result when individuals stay in the same relative position in a group from one assessment to another, it follows that anything that reduces the possibility of shifting positions in the group also contributes to larger reliability coefficients. In general, if the group tested is heterogeneous the reliability of the scores tends to be high.

In line with the validity and reliability theories reviewed, Afful (2014, p. 45) asserts that one would appreciate why assessors have over the years yearned for assessment scores of students that are consistent over time; they partly contribute to the measurement of a construct and the validity of assessment results. I believe that the reliability of students' assessment scores will be better achieved when students adopt more of deep than surface learning strategies. This is so, because, the former enhance students understanding of issues and will therefore ensure high stability of an achievement of a construct over time. Even though, high reliability does not guarantee validity, an assessor who achieves high reliability is better placed in achieving high validity than his/her counterpart who achieves low reliability. To this effect, assessment formats that encourage the adoption of more of deep than surface learning strategies will better facilitate the measurement of constructs.

## Empirical Review

### Reasons Students adopt particular Learning Strategies

Several research works have been carried out on reasons for the adoption of a particular learning strategy. Baeten, Kyndt, Struyven and Dochy (2010) have shown that age is one of the reasons for students' choice of specific learning strategies. In their study, they contended that older students, mostly, adopt deep learning strategies while younger students tend to focus on the intake of knowledge and adopt surface strategies.

Furthermore, gender has also been found to influence the adoption of any of the two learning strategies. Marrs and Sigler (as cited in Wang, 2013) found that among American colleges, female students tended to adopt deeper strategies to learning than males, even though, Baeten, Kyndt, Struyven and Dochy. (2010) assert that the relationship between gender and approaches to learning cannot be conclusively established.

Soresi (2000) emphasized that for students to control anxiety and fear about exams and tests, connecting new ideas with previous knowledge bases they use learning strategies to facilitate study activities. Some of these learning activities include highlighting, organizing, and taking notes systematically, self-controlled learning. That is, learning strategies increase the tendency to regularly revise and review what one studied at school and activities at home as well. Nota, Soresi, and Zimmerman (2004) found that effective learning strategies promote academic success and the tendency to continue ones' education.

Macaro (2007) commented on the link between task and test-taking strategy, using the example of an oral task. Macaro explained further that

"prediction" may operate differently as a strategy when the task is multiple-choice than any other type of item format like the essay or when the task is fill-in. However, only a handful of empirical studies (Chau 2005; Oxford & Nyikos 1989; Watanabe, 1992) have suggested that item formats influence learners' choice of learning strategies. They suggested that learners' prior experience of tests may play a powerful role in shaping their learning strategies.

Andrews, Fullilove and Wong (2002) investigated the Hong Kong Advanced Supplementary 'Use of English' oral examination and found evidence of wash back effects. The research compared the transcripts of candidates' performance in the oral test with textbook exercises and commercial test-guidance books. The authors concluded that the 'UE Oral test is exerting some influence on students' performance in spoken English'. However, the learning outcomes for different students varied significantly. They added that 'the test may have led to improved performance [for some], but in others, only a superficial learning outcome, such as the ability to conform to the requirements of exam format, or to produce memorised phrases'. This study indicated that test takers' awareness of the changed test format did directly lead to a change in their performance on their oral tests.

Watanabe (1992) called for further studies on other possible variables which might influence students' learning strategies (such as motivation and learning experiences) to explain why the high-stakes test did not lead to candidates using a narrower range of learning strategies. Considering the role played by language learners' previous test experiences, one limitation of this study is that it did not clearly analyse and demonstrate the differences (such as

formats and assessed skills) between the university entrance English test and the participants' test experiences in the university.

Ellis (2008, p.713) speculated that "although specific tasks may predispose learners to use particular strategies, they cannot predetermine the actual strategies that will be used, as learners construct a task in accordance with their understanding of what is required and their own learning goals".

Researchers have investigated the effects of academic discipline, students perception of what is to be assessed and assessment type on students' learning strategies (Biggs, 1973; Eley, 1992; Entwistle & Ramsden, 1983; Nelson Laird, Shoup, Kuh & Schwarz, 2008; Prosser & Millar, 1989; Svensson, 1977). A study by Nelson Laird et al., (2008) which investigated the effects of academic discipline (classified as soft field or hard field) on student learning strategies found that, students who majored in soft field programmes (programmes that are characterized by a high level of disagreement as to what constitutes new knowledge, what are appropriate methods for inquiry, what criteria are applied to determine acceptable findings, what theories are proven) like the social sciences tended to use deep strategies to learning. On the contrary, students who majored in a hard field disciplines (disciplines that possess a clearly defined and unambiguous ways of defining, ordering, and investigating knowledge with greater consensus about the content) like the physical sciences tended to use deep learning approaches to learning less as compared to students in soft fields.

Similarly, Eley (1992) investigated the effect of academic discipline on students' learning strategies and academic performance. He used Biggs' Study Process Questionnaire on 320 Monash University undergraduate students

offering Accounting, Chemistry, Biochemistry and English programmes. Eley found out that, accounting students adopt more surface learning approach than Chemistry, Biochemistry or English students, though, the differences were found to be non-statistically significant. The study also revealed that, students who adopt surface learning approach to learning score lower marks while their counterparts who adopt deep and strategic approaches obtain higher marks in tests and examinations.

Zaza, Suhaiza, Suhaimi and Yusof (2013) examined the relationship between learning approaches and academic performances of Business Ethics. This was a compulsory course for all students pursuing Bachelor of Business Administration, Bachelor of Economics and Bachelor of Accounting at the International Islamic University of Malaysia. Data were collected on the 209 students (62.9% female, 37.1 male) using a questionnaire known as The Approaches and Study Skills Inventory for Students (ASSIST). The data were collected during a formal lecture period in the last two weeks of the second semester in the 2010/2011 academic year. Students were given approximately 10 to 15 minutes to complete the questionnaire. One hundred and sixty-seven completed questionnaires were received from the students indicating a response rate of 79.9%. Descriptive statistics (mean and standard deviation), independent-samples t-test and correlation analysis were used in analysing the data. The results indicated that, students adopted deep learning approach than any other approaches in learning the Business Ethics course. The study further revealed that, the adoption of learning approaches has significant relationship with students' academic performance. Specifically, there was a significant positive relationship between deep learning approach and students' academic

performance. In contrast, there was a significant negative relationship between surface learning approach and academic performance. These results imply that students who have deep understanding of the course and carefully strategize their learning technique to obtain maximum grades are likely to achieve better result in their final examination. On the contrary, students who adopted surface learning approach to learning, are likely to memorise the subject contents without understanding them as their main aim is only to get through the course. As a result, they might not perform well in the final examination.

A similar study by Smith and Miller (2005), investigated the influence of assessment type and discipline of study on students' learning approaches. The study specifically had three aims. First, the study sought to provide more clarity on how assessment type might influence student learning by requiring students to report on how they go about their learning when being assessed under an examination condition where questions are either in a multiple-choice or essay format. The second aim was to investigate whether discipline of study might also influence student approaches to learning. Finally, although gender was not the focus of the study, the data provided an opportunity for some exploration of the relationship between gender and learning approaches. Students' learning approaches were explored at a more detailed level in terms of their learning motives and strategies. Participants were 248 Australian students from an Australian university. The sample was made up of 56 economics, 99 computing and 93 psychology students. Economics and computing students were combined to form a single discipline group referred to as business students because these groups showed considerable similarity in their learning approach scores during the preliminary (pilot study) analysis.

Students were asked to respond to the Studying Process Questionnaire (Biggs, 1987) as they would if preparing for a multiple-choice examination, or for an essay examination. Participants were required to rate their responses on a five-point Likert type scale with values ranging from 1 (rarely true) to 5 (almost always true). Results indicated that assessment type did not have a significant effect on any of the learning measures. That is, a student's learning strategy is not directly influenced in any significant way by whether the assessment is in an essay or a multiple-choice format. However, the academic discipline had a significant main effect on student learning strategies.

Scouller and Prosser (1994) also conducted a study to investigate students' experiences in studying for multiple-choice question examinations. A sample of 190 first and second year university students from three courses in two faculties completed questionnaires on their general orientations to learning (classified as deep, surface or achieving), their perceptions of the skills and abilities being assessed by multiple-choice question (MCQ) examinations and the learning strategies (either deep or surface) they intended to employ for their forthcoming MCQ examinations. Questionnaire was the main instrument used in the collection of data. Data were analysed in respect of the above variables by a variety of statistical tools, namely, t-test, descriptive statistics and multiple regression. Results revealed that students with surface general orientations to study appear to have a confused perception of MCQ examinations and thus have no planned learning strategies with which to prepare for this examination. Scouller and Prosser (1994) found out that students are not more likely to employ surface strategies when preparing for their multiple-choice

examinations because some students perceived the examination to be assessing higher order thinking skills.

Scouller (1998) researched into the influence of assessment method on student learning strategies paying particular attention to multiple-choice item format and that of essay item format. A sample of 206 second year education students from the University of Sydney consisting of 133 female students (69.3%) and 59 male students (30.7%) were selected for the study. A 5-point Likert scale questionnaire was the instrument used for the study. The questionnaire contained several statements which depicted surface and deep learning strategies on the first part and lower and higher levels of cognitive processing on the second part.

Data were analysed using descriptive statistics (mean, standard deviation). His first interest in this study was to find out the learning strategies students adopt when they are to be assessed with multiple-choice questions and essay assignments. Scouller found out that students significantly employed surface learning strategies (M = 3.39, SD = 0.56) more when preparing for multiple-choice examination than when preparing for essay examination (M = 2.94, SD = 0.65) but the same students significantly employed deep learning strategies (M = 3.26, SD = 0.68) more when preparing for their essay than when preparing for multiple-choice examination (M = 2.85, SD = 0.64).

Scouller's second area of interest in this same study was to determine whether students perceive these two tasks as assessing different levels of intellectual abilities and skills (classified as lower or higher, according to Bloom, Engelhart, Furst, Hill and Krathwohl, 1956) and whether such perceptions have any relationship with the kind of learning strategies students

adopt toward these two assessment tasks. His results revealed that students perceived (a) multiple-choice examination as assessing lower cognitive abilities (M = 3.72, SD = 0.73) than assessing higher cognitive abilities (M = 2.73, SD = 0.77), (b) essay as assessing higher cognitive abilities (M = 3.95, SD = 0.63) than as assessing lower abilities (M = 3.01, SD = 0.65).

Scouller's last interest in this study was to find out whether there is a relationship between the perception that (a) lower levels of cognitive processing are being assessed and the employment of surface learning strategies (b) higher levels of cognitive processing are being assessed and the employment of deep learning strategies. The results of this aspect of his study showed a strong positive relationship between the above two relationships.

Tang (1992) conducted a study in the Physiotherapy Section at the Hong Kong Polytechnic to determine the effects of two modes of assessment (examination and assignment essay) on students' preparation strategies towards the professional diploma course in physiotherapy (PDPT). This is a three-year programme that aimed to develop within the students' knowledge, skills and attitudes in the professional practice of physiotherapy, which included the ability to analyse and evaluate the practice in the context of the Chinese local health care system. The subjects for the study were 158 Hong Kong tertiary students attending the first year of a physiotherapy programme. The study was divided into two parts, namely, the quantitative and qualitative parts respectively. The quantitative part required students to respond to a 42 item questionnaire (Studying Process Questionnaire) designed by Biggs in 1973 that sought information on students study strategies (surface, deep and achieving). The qualitative part consisted of interviews of 39 randomly selected students

from the sample to also explore their perception of assessment demands and its effects on the adoption of preparation strategies. Data were analysed using path analysis and descriptive statistics.

With respect to perception of test demands, results indicated two major categories of student perceptions of examinations, namely, quantitative perceptions (those who see testing as assessing the quantity of information and hence adopt low level cognitive strategies such as rote learning, memorising and reproducing) and qualitative perceptions (those who see testing as assessing understanding, integration and application of knowledge and hence adopt high level cognitive strategies. However, a group of students emerged whose perceptions of test demands did not seem to be totally identifiable with either the quantitative or the qualitative orientation. These students perceived that, test required both understanding and memorising, a combination of both quantitative and qualitative demands. To these students, the main objective in studying for the test was to understand the learning materials. However, they also perceived the need to memorise some of the factual information after they had been understood in order to take the test. Tang (1992) also found out that students have more quantitative perceptions toward examination and, therefore, employ surface learning strategies when preparing for their examinations (type not specified). The same students have more qualitative perceptions toward their essay and hence employ deep learning strategies when preparing for their essay. The achievement oriented students do not have preferred strategies, their choice of strategies seemed to depend on what they perceive as the requirements of the assessment. They will resort to mixed strategies if the need arises to achieve results.

Afful (2014) also found out Senior High School students' perception of the levels of intellectual abilities and skills that two specific assessment formats (multiple choice and essay) measure and the learning strategies they adopt towards these two formats. Taking a sample size of 270 Senior High School Students selected from three public schools in the Ajumako-Enyan-Essiam District, a cross-sectional descriptive survey was carried out using questionnaire as the main instrument for data collection. The data were analysed using means and standard deviations, frequency and percentages, Pearson product moment correlation and dependent sample t-test.

The results revealed that students perceived multiple-choice items as assessing more of lower than higher order learning outcomes and employ surface learning strategies when preparing for this type of examination. The same students, however, employ more of deep than surface learning strategies when preparing for essay items which they perceived as assessing more of higher than lower order learning outcomes. He, therefore, suggested a study to compare the learning strategies of students at different levels of education when assessed with different item formats. This study, therefore, seeks to address the gap in the earlier studies reviewed.

**Summary of Related Literature Review**

Literature reviewed so far has indicated that there are many assessment formats, especially, paper-and-pencil formats that are available to the teacher in assessing students learning. The review has also indicated that measurement experts have over the years tried to put in place measures to ensure that they reduce errors of measurement to the barest minimum in their assessment of psychological constructs.

Studies reviewed which were mostly from foreign origin have produced somewhat mixed results but increasingly seem to support the view that students are strategic and employ different learning strategies towards different assessment formats but in most cases employ deep learning strategies towards essay items and surface learning strategies towards multiple-choice items respectively.

The current study was an attempt to contribute to the resolution of the issue of the type of learning strategies students adopt towards multiple-choice and essay items using Ghanaian students at the two academic levels of education (Senior High School and Junior High School).

# CHAPTER THREE

# RESEARCH METHODS

This chapter describes how the study was conducted. It describes the design, population, sample and sampling procedure, data collection instruments, data collection procedure, and finally how data collected were analysed.

## Research Design

Gay, Mills and Airasian (2006) explained research design as the structure of the study. Research design is, thus, a plan or blue print that specifies how data relating to a given problem should be collected and analysed.

This research is a comparative study. The main research design for the study is the descriptive survey. Descriptive research involves collecting data in order to test hypotheses or answer specific questions concerning the current status of the subject of the study. It determines and reports the way things are (Gay, Bruening & Bruce, 2000). The design is also directed towards determining the nature of a situation as it exists at the time of the study. At the heart of descriptive survey research is the desire to obtain answers from a large group of people or elements to a set of carefully designed and administered questions (Frankel & Wallen, 2003). This study was carried out to determine the strategies or preparations students adopt when they are to be assessed with multiple-choice or essay examinations. It also sought to find out students' reasons for the choice of such strategies. This, obviously, involved collecting data from students in order to answer questions concerning the current status of the students in terms of strategies they used in studying and the reasons

underlying them. Data on the eight research questions were collected by asking students to respond to some specific questions concerning each area, obviously making it more survey type than any other type.

With regard to strengths of this design, surveys are relatively inexpensive, especially self-administered surveys. The anonymity of surveys also allows people to feel more sincere with their responses, especially if it is clear that the answers will remain confidential. Moreover, very large samples are feasible making the results statistically significant even when analysing multiple variables. Again, many questions could be asked about a given topic thus enhancing the reliability of the results (Gay et al., 2000).

Descriptive survey also comes with its own problems. For instance, Seifert and Hoffnung (2000) maintain that there is the difficulty of ensuring that the questions to be answered using the descriptive survey design are clear and not misleading because survey results can vary significantly depending on the exact wording of questions. It may also produce untrustworthy results because they may delve into private matters that people may not be completely truthful about. They further maintain that surveys often make use of questionnaires which require respondents who can articulate their thoughts well and sometimes even put such thoughts in writing. The questionnaire is, therefore, limited by illiteracy. Getting a sufficient number of the questionnaire completed and returned when used so that meaningful analysis can be made is another weakness of the descriptive survey design. These disadvantages were carefully considered and care was taken to ensure that they do not affect the validity and reliability of the results of the data collected for the study.

**Population**

The target population for the study comprised all Junior and Senior High School students in the Central Region of Ghana. The accessible population for the study was second year Junior and Senior High School students from the Schools in the Komenda-Edina-Eguafo-Abirem (KEEA) District. In all, there were 2,605 Junior High School students from 66 schools within the eight (8) education circuits and 859 Senior High School students from the three (3) Senior High Schools in the district as per the district Education directorate's profile data (Researcher's data, 2016). The distribution of the population of the second year Junior High School students and Senior High School students is shown in Tables 1 and 2.

Table 1- *Distribution of the population of the second year Junior High School students in the KEEA District by Circuits*

| Circuit | Males (%) | Females (%) | Totals (%) |
|---|---|---|---|
| Agona | 164 (56.6) | 126 (43.4) | 290 (100.0) |
| Ayensudo | 186 (55.2) | 151 (44.8) | 337 (100.0) |
| Dominase | 143 (55.4) | 115 (44.6) | 258 (100.0) |
| Elmina | 170 (50.4) | 167 (49.6) | 337 (100.0) |
| Essaman | 234 (52.0) | 216 (48.0) | 450 (100.0) |
| Kissi | 193 (53.6) | 167 (46.4) | 360 (100.0) |
| Komenda | 157 (48.8) | 165 (51.2) | 322 (100.0) |
| Ntranoa | 130 (51.8) | 121 (48.2) | 251 (100.0) |

Table 2- *Distribution of the population of the second year Senior High School students in KEEA District by Schools*

| School | Males (%) | Females (%) | Total (%) |
|---|---|---|---|
| Eguafo SHS | 102 (47.9) | 111 (52.1) | 213 (100.0) |
| Komenda Secondary Technical | 164 (59.2) | 113 (40.8) | 277 (100.0) |
| Edinaman SHS | 191 (51.8) | 178 (48.2) | 369 (100.0) |

**Sampling Procedure**

Osuala (2005) defined a sample as a group of people drawn from the larger population. With the total population of 859 Senior High School students and 2,605 Junior High School students in the eight educational circuits in the Komenda-Edina-Eguafo-Abirem (KEEA) District, the recommended sample sizes were 265 Senior High School students and 331 Junior High School students respectively according to Krejcie and Morgan (1970) sample size determination table for descriptive research.

The lottery method of the simple random sampling technique was used in selecting 100 second year students from each of the three Senior High Schools. Thus, a total of 300 Senior High School students were selected to participate in the study by responding to questionnaires on each of the core subjects (English Language, Core Mathematics and Integrated Science).

With respect to the sampling procedure for the Junior High School students, a multi-level sampling technique was used. A two-stage cluster sampling technique was employed to select 360 Junior High School students from the 2,605 students within the district. The districts has eight circuits and so the circuits were used as clusters. Out of the number of schools in each of the

eight circuits, three schools were randomly selected to ensure fair distribution of the schools in the circuits.

Again, in each of the randomly selected three Junior High Schools, the lottery method of the simple random sampling technique was used to select 15 second year students from each of the three schools from each circuit to participate in the study. This means that, in all 45 Junior High School students were selected from each of the eight circuits and 360 Junior High students were selected from all the eight circuits.

The distribution of the sample with respect to the Junior High Schools and the Senior High Schools is shown in Tables 3 and 4.

Table 3- *Distribution of Junior High Schools and Students Selected by Circuits*

| Circuit | Number of JHS 2 students |
|---|---|
| Agona | 45 |
| Ayensudo | 45 |
| Dominase | 45 |
| Elmina | 45 |
| Essaman | 45 |
| Kissi | 45 |
| Komenda | 45 |
| Ntranoa | 45 |
| Total | 360 |

Table 4- *Distribution of second year Senior High School students Selected by schools*

| School | Males (%) | Females (%) | Total (%) |
|---|---|---|---|
| Eguafo SHS | 48 (47.9) | 52 (52.1) | 100 (100.0) |
| Komenda Secondary Technical | 59 (59.2) | 41 (40.8) | 100 (100.0) |
| Edinaman SHS | 52 (51.8) | 48 (48.2) | 100 (100.0) |

**Data Collection Instrument**

The main instrument for this study was a questionnaire designed by me under the supervision of my supervisors. Questionnaire is defined by Johnson and Christensen (2004) as a self-report data collection device that each research participant fills out as part of a research study.

Ogah (2013) describes questionnaire as very strong in eliciting information because of the relative ease in responding to them and dealing with the data which are often collected from relatively large samples. Questionnaire was appropriate for the sample as it included both Junior High School students and Senior High School students in the Komenda-Edina-Eguafo-Abirem (KEEA) District who could read and write. In addition, a questionnaire is generally, used to obtain information, often numeral data. Moreover, it can be completed without the presence of the researcher, which helps save time and makes it suitable for collecting information from large number of samples.

The questionnaire was in twelve sections and made up of 87 items. The items were both closed-ended and open-end, though, the majority were closed-ended. The questionnaire elicited students' responses on the learning strategies they adopt when studying for multiple-choice and essay examinations of the

three core subjects (English Language, Core Mathematics and Integrated Science) and the reasons they adopt these learning strategies (*See Appendix A*).

On the front page of the questionnaire were three items which requested information on the background of the respondents, that is, the name of school of the study participants, their sexes and ages. Sections A consisted of 8 items which elicited information on the learning strategies students adopt when they are assessed with multiple-choice items on English Language. In this section of the questionnaire, statements with even serial numbers (4, 6, 8, and 10) depicted surface learning strategies while statements with odd serial numbers (5, 7, 9, and 11) depicted deep learning strategies. On the right side of each item was a row of boxes and participants were required to respond by ticking either 1 (True of me) or 2 (Not true of me) to indicate the type of learning strategies they have been using.

Section B consisted of six items numbered 12, 13, 14, 15, 16, and 17 which elicited information on the reasons for students adopting these learning strategies when preparing for multiple-choice items on English Language. On the right side of each of the first five items was a row of boxes and participants were required to respond to either 1 (Yes) or 2 (No) to each of the statements by ticking. The last item in this section required students to answer by writing.

Section C consisted of eight items which elicited information on the learning strategies students adopt when they are assessed with essay items on English Language. At this section of the questionnaire, statements with even serial numbers (18, 20, 22, and 24) depicted surface learning strategies while statements with odd serial numbers (19, 21, 23 and 25) depicted deep learning strategies. On the right side of each item was a row of boxes and participants

were required to respond by indicating either 1 (True of me) or 2 (Not true of me) by ticking to indicate the types of learning strategies they have been using.

Also, the Section D consisted of six items numbered (26, 27, 28, 29, 30 and 31) which elicited information on the reasons students adopt these learning strategies when preparing for essay items on English Language. On the right side of each of the first five items was a row of boxes and participants were required to respond by indicating either 1 (Yes) or 2 (No) to each of the statements by ticking. The last item in this section required students to answer by writing.

Section E consisted of eight items which elicited information on the learning strategies students adopt when they are assessed with multiple-choice items on core mathematics. In this section of the questionnaire, statements with even serial numbers (32, 34, 36, and 38) depicted surface learning strategies while statements with odd serial numbers (33, 35, 37 and 39) depicted deep learning strategies. On the right side of each item was a row of boxes and participants were required to respond by indicating either 1 (True of me) or 2 (Not true of me) by ticking to indicate the types of learning strategies they have been using.

The rest of the sections follow the same pattern.

**Validity and Reliability of the Instrument**

The validity of a research instrument is the extent to which the instrument elicits the accurate response needed for the study. The reliability of a research instrument is the degree to which the instrument would measure consistently a characteristic when applied more than once to the same person(s) under similar conditions (Nitko & Brookhart, 2007). In order to ensure validity

and reliability of the research instrument, the questionnaire was designed to address the research questions. The questionnaire was first given to colleagues to review and I made the necessary corrections. Gall, Borg and Gall (1996) indicate that validating of an instrument is improved through expert judgment. Hence the corrected version was then given to my supervisors to review and make comments on issues such as language difficulty, ambiguity of words and whether certain items failed to address the research questions. After working on these comments the edited version was then presented to my supervisors again for scrutiny, after which the instruments was pilot tested. The pre-testing was done using 50 students from the Junior High Schools and Senior High Schools in the Cape Coast district; that is, 25 students from each level. The questionnaire was personally administered to the 50 students. The data from the pre-test were analysed with the help of version 22 of the SPSS to determine the reliability of the instrument. Alpha reliability coefficients for the twelve sections finally stood at 0.74 for section A, 0.67 for section B, 0.61 for section C, 0.69 for section D, 0.57 for section E, 0.6.82 for section F, 0.51 for section G, 0.70 for H, 0.55 for section I, 0.66 for section J, 0.51 for K, 0.64 and for section L, 0.55. The overall reliability of the instrument for the main study was 0.73.

The pre-testing, apart from assisting in enhancing the reliability of the instrument also helped to improve the questions by making them easier for students to understand. For example, during the pre-testing, a lot of the students had difficulty in understanding some of the questions that elicited the learning strategies they adopt when assessed with multiple-choice and essay item formats. These questions were reviewed to bring them to the level of students. On the whole, the pre-testing helped to modify the instrument.

The reliability (internal consistency) of the questionnaire for the pre-test and the main study were estimated using Cronbach's co-efficient alpha. According to Cronbach (as cited in Ebel & Frisbie, 1991), co-efficient alpha can provide an internal reliability estimate for a measure composed of items of varying point values such as essays or attitude scales.

**Data Collection Procedures**

An ethical clearance from the Institutional Review Board was sent to the District director to obtain permission to conduct the study in the schools (see *Appendix B*). After, an introduction letter, introducing me to the authorities of the schools selected was sent to all the headmasters prior to the data collection (*See Appendix C*. During such visits, the purpose of the study was explained to the heads and permission was sought from them for the collection of data in the schools.

One key issue addressed during these familiarisation visits was to put before the school authorities my proposed data collection schedule. This was done in order to allow for their inputs as to whether those dates earmarked for the data collection in their schools were appropriate and feasible.

The questionnaires were administered to the students at the various schools and collected the same day. I spent two weeks gathering the data. On the days of data collection, after selecting the sample, I introduced the students to the questionnaire with a few general words about the purpose of the study and why they would be completing the instrument. For example, students were informed about the need for a study to assist them with their approach to studies and that the study sought to find out if they needed help and the sort of help they needed in their studies. They were therefore cautioned to answer the questions

on the questionnaire as honestly as they could. They were also informed to read each statement and make sure they understood it before responding to them. They were assured of anonymity and confidentiality of their participation in the study. According to Trochim (2000), this briefing is required to erase respondents' biases and prejudices. This also helped ensure good relationship with the students and probably make them to be more sincere with their responses.

The questionnaire was administered personally to the selected students in Junior and Senior High Schools within the dates agreed upon with the school authorities. Souvenirs (pens) were given to all respondents before administration of the questionnaire. This was done to motivate them to participate in the study. Completed questionnaires were collected on the very day of administration. This, therefore, helped to ensure a high return rate from the respondents.

Out of the 660 questionnaires administered, 600 were returned and this constituted 90.9% return rate.

**Data Processing and Analysis**

The data collected in this study was checked, edited and coded. The data gathered were statistically analysed using frequencies, percentages, cross-tabulations and Chi-square tests with the version 22 of the Statistical Package for Service Solutions (SPSS) software. The section below shows how the data pertaining to the eight research questions were analysed.

**Research question one**

What learning strategies do JHS and SHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?

The responses to the items on the questionnaire regarding this research question were analysed using frequencies and percentages of the responses to the eight items relating to this research question. The items on this sections were interpreted to show the learning strategies students adopt by students in their preparation towards multiple-choice item formats with respect to the three core subjects (English Language, Core Mathematics and Integrated Science).

Within each group, a search was made to determine which of the statements fall under the deep or surface learning strategies. The frequencies and percentages of the deep or surface statements of learning strategies that fall into each of the two groups were the basis for determining the number of deep or surface learning strategies students adopt when they are assessed with multiple-choice items.

**Research question two**

What reasons do the JHS and SHS students assign for the learning strategies they adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?

The responses to the items on the questionnaire to this research question were analysed using frequencies and percentages of the responses to the five items relating to this research question. The items on this section were interpreted to show the students' reasons for the choice of the deep and surface learning strategies in the preparation towards multiple choice items with respect

to the three core subjects (English Language, Core Mathematics and Integrated Science).

**Research question three**

What age difference(s) exist in the learning strategies adopted by JHS and SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?

The responses to the items on the questionnaire to this research question were analysed using cross-tabulations and Chi-square tests. The eight items (four surface learning strategies and four deep learning strategies) on this section relating to the research question were interpreted to show whether there are age differences in the learning strategies the JHS and SHS students adopt when assessed with multiple choice items with respect to the three core subjects (English Language, Core Mathematics and Integrated Science).

**Research question four**

What gender differences exist in the learning strategies of JHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?

The responses to the items on the questionnaire to this research question were analysed using cross-tabulations and Chi-square tests. The eight items (four surface learning strategies and four deep learning strategies) on this section relating to the research question were interpreted to show whether there are gender differences in the learning strategies the JHS students adopt when assessed with multiple choice items with respect to the three core subjects (English Language, Core Mathematics and Integrated Science).

**Research question five**

What gender differences exist in the learning strategies of SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?

The responses to the items on the questionnaire to this research question were analysed using cross-tabulations and Chi-square tests. The eight items (four surface learning strategies and four deep learning strategies) on this section relating to this research question were interpreted to show whether there are differences in the learning strategies the SHS students adopt when assessed with multiple choice items with respect to the three core subjects (English Language, Core Mathematics and Integrated Science).

**Research question six**

What learning strategies do JHS and SHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science?

The procedure used in answering research question one was applied to this research question since the two research questions are similar with respect to what they sought.

**Research question seven**

What reasons do the JHS and SHS students assign for the learning strategies adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science?

The procedures used in answering research question two was applied to this research question since the two research questions are similar with respect to what they sought.

**Research question eight**

What age differences exist in the learning strategies adopted by JHS and SHS students when they are assessed with essay items in English Language, Core Mathematics and Integrated Science?

The procedure used in answering research question three was applied to this research question since the two research questions are similar with respect to what they sought.

**Research question nine**

What gender differences exist in the learning strategies of JHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?

The procedures used in answering research question four was applied to this research question since the two research questions are similar with respect to what they sought.

**Research question ten**

What gender differences exist in the learning strategies of SHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?

The procedures used in answering research question four was applied to this research question since the two research questions are similar with respect to what they sought.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## Introduction

This chapter presents and discusses the results based on the data gathered from six hundred (600) respondents. In analysing the data to answer the eight research questions, cross-tabulations showing the frequencies and their corresponding percentages for each item were constructed. The background information of participants was also presented before the results regarding the research questions. The presentation is divided into eleven sections (1-11). Section one presents the background information of respondents. Section 2 focuses on the learning strategies students in the JHS and SHS adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science and it answers research question one. Section 3 focuses on the reasons JHS and SHS students adopt those learning strategies when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science and it addresses research question two. Section 4 addresses the age differences in the learning strategies of the JHS and SHS students when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science and this answers research question three. Section 5 addresses the gender differences in the learning strategies of the JHS students when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science and this answers research question four. Section 6 addresses the gender differences in

the learning strategies of the SHS students when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science and this answers research question five.

Section 7 addresses the learning strategies students in the JHS and SHS adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science and it answers research question six. Section 8 identifies the reasons JHS and SHS students adopt those learning strategies when assessed with essay items in English Language, Core Mathematics and Integrated Science and it answers research question seven. Section 9 addresses the age differences in the learning strategies of the JHS and SHS students when they are assessed with essay items in English Language, Core Mathematics and Integrated Science and this answers research question eight. Section 10 addresses the gender differences in the learning strategies of the JHS students when they are assessed with essay items in English Language, Core Mathematics and Integrated Science and this answers research question nine. Section 11 addresses the gender differences in the learning strategies of the SHS students when they are assessed with essay items in English Language, Core Mathematics and Integrated Science and this answers research question ten.

## Section 1: Demographic Information of Participants

This section deals with the results of the demographic data of participants. The results are presented in tables 5 and 6.

### Distribution of Respondents by Gender

Item 2 of the questionnaire requested respondents to indicate their gender. Table 5 shows the distribution of respondents by gender.

Table 5- *Distribution of the Gender of Respondents*

| Level | Males | | Females | |
|---|---|---|---|---|
| | Freq. | % | Freq. | % |
| JHS | 193 | 64.3 | 107 | 35.7 |
| SHS | 147 | 49.0 | 153 | 51.0 |

Source: Field survey, Adusei (2017)
JHS = Junior High School, SHS = Senior High School

It can be observed from Table 5 that majority, 340 (56.7%), of the students from the two levels of education (Junior High and Senior High Schools) were males while 260 (43.3%) were females. This suggests that male students were more than females at the two levels of education in the Komenda-Edina-Eguafo-Abirem (KEEA) District of the Central Region of Ghana.

**Distribution of Respondents by Age**

Item 3 on the questionnaire requested respondents to indicate their ages. Table 6 shows the distribution of by respondents by age.

Table 6- *Distribution of Age-ranges of respondents*

| Level | 10 - 12 yrs | | 13 – 15 yrs | | 16 – 19 yrs | | 20 yrs and over | |
|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| JHS | 106 | 35.3 | 125 | 41.7 | 67 | 22.3 | 2 | 0.7 |
| SHS | 0 | 0.0 | 13 | 4.3 | 242 | 80.7 | 45 | 15.0 |

Source: Field survey, Adusei (2017)
JHS = Junior High School, SHS = Senior High School

Table 6 shows that majority 231 (77.0%) of the Junior High School students fall within the age ranges of 10 to 12 years and 13 to 15 years while majority 287 (95.7%) of the Senior High School students fall within the age ranges of 16 to 19 years and 20 years and over. The results from the Table

clearly shows that the students in the Senior High Schools are older than those in the Junior High schools.

**Section 2**

**Research Question One: What learning strategies do JHS and SHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?**

Items 4 to 11 (section A); 32 to 39 (section E) and 60 to 67 (section I) of the questionnaire asked students to indicate the learning strategies they adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science, respectively. Again, eight items on each of the above sections of the questionnaire (4 depicting surface learning strategies and the other 4 depicting deep learning strategies, see *Appendix A*) were provided for respondents to indicate whether those statements apply to them with respect to multiple-choice item format assessment. Respondents were asked to indicate the learning strategies they adhere to by responding to either "True of me" or "Not true of me". The results are presented in Tables 7, 8 and 9.

Table 7- *Distribution of the Learning Strategies JHS and SHS students adopt when being assessed with Multiple-choice questions in English Language*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | True of me | Not True of me | True of me | Not True of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 4. I tend to read very little beyond what is actually required to pass. | 191 (63.7) | 109 (36.3) | 173 (57.7) | 127 (42.3) |
| 5. I do a thorough reading and make very sure I understand every concept. | 174 (58.0) | 126 (42.0) | 232 (77.3) | 68 (22.7) |
| 6. I memorise the meaning of words and their opposite in past questions and pamphlets. | 199 (66.3) | 101 (33.7) | 163 (54.3) | 137 (45.7) |
| 7. I search for meaning of words and their opposite in the dictionary and on the internet when I come across in past questions and pamphlets. | 146 (48.7) | 154 (51.3) | 171 (57.0) | 129 (43.0) |
| 8. I memorise new words taught in class to be able to recall them during exams. | 128 (72.7) | 82 (27.3) | 225 (75.0) | 75 (25.0) |
| 9. I use the new words taught in class in my daily conversation to help me identify them during exams. | 172 (57.3) | 128 (42.7) | 195 (65.0) | 105 (35.0) |
| 10. I answer past questions alone and memorise the answers. | 180 (60.0) | 120 (40.0) | 176 (58.7) | 124 (41.3) |
| 11. I compare my class notes and past questions and seek further assistance from colleagues and teachers where necessary. | 141 (47.0) | 159 (53.0) | 142 (47.3) | 158 (52.7) |

Source: Field survey, Adusei (2017)

Table 7 shows the learning strategies the JHS and SHS students adopt when they are assessed with multiple-choice items in English Language.

To start with, in terms of the surface learning strategies, 191 (63.7%) of the Junior High School students said tending to read very little beyond what is actually required to pass was true of them while 173 (57.7%) of the Senior High School students said it was true of them. Also, with respect to the habit of memorising the meaning of words and their opposite in past questions and pamphlets, a higher majority 199 (66.3%) of the Junior High School students said it was true of them as compared to a smaller majority 163 (54.3%) of the Senior High School students. Surprisingly, a higher majority 225 (75.0%) of the Senior High School students said memorising new words taught in class to be able to recall them during exams was true of them as compared to the smaller majority 218 (72.7%) of the Junior High School students who said same. A higher majority of the Junior High School students 180 (60.0%) said they answer past questions alone and memorise the answers in preparing for multiple-choice questions in this subject as compared to the smaller majority 176 (58.7%) who said same.

Concerning the deep learning strategies, with the issue of doing a thorough reading to make very sure every concept is understood, 232 (77.3%) of the Senior High School students said it was true of them while 174 (58.0%) also said it was true of them. Again, higher majority 171 (57.0%) of the Senior High School students said searching for meaning of words and their opposite in the dictionary and on the Internet when they come across them in past questions and pamphlets was true of them as compared to the minority 146 (48.7%) of the Junior High School students. Regarding the use of new words taught in class in

daily conversations to help identify them during exams, a higher majority 195 (65.0%) of the Senior High School students said it was true of them as compared to the smaller majority 172 (57.3%) of the Junior High School students who said the same. Similarly, a higher minority 142 (47.3%) of the Senior High School students said that they compare their class notes and past questions and seek further assistance from colleagues and teachers where necessary as compared to the minority 141 (47.0%) of the Junior High School students who responded the same.

In sum, the findings on the Table shows that the Junior High school students mostly adopt surface learning strategies while the senior high school students mostly adopt deep learning strategies.

Table 8- *Distribution of the Learning Strategies JHS and SHS adopt when being assessed with Multiple-choice questions in Core Mathematics*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | True of me | Not True of me | True of me | Not True of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 32. I memorize the important and key maths formulae to remind me of the important parts of my math class. | 278 (92.7) | 22 (7.3) | 213 (71.0) | 87 (29.0) |
| 33. I study the class notes and textbook again and again. | 117 (39.0) | 183 (61.0) | 229 (76.3) | 71 (23.7) |
| 34. I read through the class notes and mark up contents that have been dropping in the past questions and specialise on them. | 251 (83.7) | 49 (16.3) | 172 (57.3) | 128 (42.7) |
| 35. I link the class notes to text book examples to improve my understanding | 102 (34.0) | 198 (66.0) | 232 (77.3) | 68 (22.7) |
| 36. I just accept the math theory conclusions and memorise them. | 227 (75.7) | 73 (24.3) | 116 (38.7) | 184 (61.3) |
| 37. I use real examples to confirm the math theory conclusions. | 95 (31.7) | 205 (68.3) | 180 (60.0) | 120 (40.0) |
| 38. I only stick to what the teacher teaches me in class. | 226 (75.3) | 74 (24.7) | 128 (42.7) | 172 (57.3) |
| 39. I always compare the difference between the teacher's explanation and textbook content. | 69 (23.0) | 231 (77.0) | 210 (70.0) | 90 (30.0) |

Source: Field survey, Adusei (2017)

The data in the Table 8 shows the learning strategies the JHS and SHS students adopt when they are assessed with multiple-choice items in core mathematics tasks.

With the surface learning strategies, a higher majority 278 (92.7%) of the Junior High School students said they memorize the important and key maths formulae to remind them of the important parts of their math class while a smaller majority 213 (71.0%) of the Senior High School students said same. Also, a higher majority 251 (83.7%) of the Junior High School students said reading through the class notes and marking up contents that have been assessed in the past and specialise on them was true of them as compared to the smaller majority 172 (57.3%) of the Senior High School students who gave the same response. On the strategy of just accepting the math theory conclusions and memorising them, the majority 227 (75.7%) of the Junior High School students said that it was true of them as the minority 116 (38.7%) of the Senior High School students responded same. The majority 226 (75.3%) of the Junior High School students said they only stick to what the teacher teaches them in class while majority 172 (57.3%) of the Senior High School students said it wasn't true of them.

With the deep learning strategies, the issue of studying the class notes and textbook again and again, a higher majority 229 (76.3%) of the Senior High School students said it was true of them as compared to the minority 117 (39.0%) of the Junior High School students who responded same. When asked if they link the class notes to textbook examples to improve their understanding, the majority 232 (77.3%) of the Senior High School students said it was true of them as compared to the minority 102 (34.0%) of the Junior High School

students. The use of real examples to confirm the math theory conclusions was shown on the table to be true of the majority 180 (60.0%) of the Senior High School students than the minority 95 (31.7%) of the Junior High School students. Furthermore, they majority 210 (70.0%) of the Senior High School students said they always compare the difference between the teacher's explanation and textbook content to help them better understand what was taught which majority 231 (77.0%) of the Junior High School students said it wasn't true of them.

In sum, the findings on the Table shows that the Junior High school students mostly adopt surface learning strategies while the senior high school students mostly adopt deep learning strategies.

Table 9- *Distribution of the Learning Strategies JHS and SHS adopt when being assessed with Multiple-choice questions in Integrated Science*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | True of me | Not True of me | True of me | Not True of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 60. I memorise concepts taught in class and from text books. | 260 (86.7) | 40 (13.3) | 255 (85.0) | 45 (15.0) |
| 61. I read my notes and text books carefully, paying attention to details. | 111 (37.0) | 189 (63.0) | 262 (87.3) | 38 (12.7) |
| 62. I don't spend much time learning things I think wouldn't be asked in the exam. | 209 (69.7) | 91 (30.3) | 137 (45.7) | 163 (54.3) |
| 63. I spend time finding more information on topics taught from other books. | 98 (32.7) | 202 (67.3) | 185 (61.7) | 115 (38.3) |
| 64. I learn some things by rote, going over and over until I know them "by heart" | 272 (90.7) | 28 (9.3) | 211 (70.3) | 89 (29.7) |
| 65. I join study groups for further explanation of concepts. | 69 (23.0) | 231 (77.0) | 148 (49.3) | 152 (50.7) |
| 66. I wait until it is very close to examination before I start preparing. | 206 (68.7) | 94 (31.3) | 109 (36.3) | 191 (63.7) |
| 67. I read my notes soon after the day's lesson for a better understanding. | 107 (35.7) | 193 (64.3) | 190 (63.3) | 110 (36.7) |

Source: Field survey, Adusei (2017)

Similarly, the results in Table 9 shows the learning strategies the JHS and SHS students adopt when they are assessed with multiple-choice items in Integrated Science tasks.

With the surface learning strategies, a higher majority 260 (86.7%) of the Junior High School students indicated that they memorise concepts taught in class and from text books while a smaller majority 255 (85.0%) of the Senior High School students said same. Interestingly, the majority 209 (69.7%) of the Junior High School said they don't spend much time learning things they think wouldn't be asked in the exam while majority 163 (54.3%) of the Senior High School students said it was not. The majority 272 (90.7%) of the Junior High School students confirmed they learn some things by rote, going over and over until I know them "by heart" compared to another majority 211 (70.3%) of the Senior High School students who said it was not true of them. Again, a high number 206 (68.7%) of the Junior High School students responded that they wait until it is very close to examination before I start preparing while another majority 191 (63.7%) of the Senior High School students said that attitude was not true of them.

In terms of the deep learning strategies, when asked whether they read their notes and text books carefully, and pay attention to details, the majority 262 (87.3%) of the Senior High School students said responded that it was true of them while the majority 189 (63.0%) of the Junior High School students said it was not. Also, the majority 185 (61.7%) of the Senior High School students said that they spend time finding more information on topics taught from other books while the majority 202 (67.3%) of the Junior High School students said it was not true of them. Unfortunately, with the issue of joining study groups for further explanation of concepts after class, a little more than the majority 152 (50.7%) of the Senior High School students said it was not true of them as compared to the higher majority of the Junior High School students who said it

was true of them. The majority 190 (63.3%) of the Senior High School students said that they read their notes soon after the day's lesson for a better understanding while another majority 193 (64.3%) of the Junior High School students said it was not true of them.

In sum, the findings on the Table shows that the Junior High school students mostly adopt surface learning strategies while the senior high school students mostly adopt deep learning strategies.

**Section 3**

**Research Question Two: What reasons do the JHS and SHS students assign for the learning strategies they adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?**

Items 12 to 16 (section B); 40 to 44 (section F) and 68 to 72 (section J) of the questionnaire asked students to indicate their reasons for adopting specific learning strategies in preparing for multiple-choice questions in English Language, Core Mathematics and Integrated Science respectively. Here, 5 items each (see *Appendix A*) were provided for respondents to indicate their reasons with respect to multiple-choice item format assessment. Respondents were asked to indicate their reasons for adhering to particular learning strategies by responding to either "Yes" or "No". The results are presented in Tables 10, 11 and 12.

Table 10- *Distribution of the reasons given by students for adopting specific learning strategies in preparing for Multiple-choice questions in English Language*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 12. I feel more confident that the strategies will help me pass. | 168 (56.0) | 132 (44.0) | 271 (90.3) | 29 (9.7) |
| 13. I feel less anxious when I learn in a particular way. | 140 (46.7) | 160 (53.3) | 140 (46.7) | 160 (53.3) |
| 14. I use the strategies because my colleagues used them and they excelled. | 167 (55.7) | 133 (44.3) | 153 (51.0) | 174 (49.0) |
| 15. I used the strategies previously and they were very helpful. | 198 (66.0) | 102 (34.0) | 226 (75.3) | 74 (24.7) |
| 16. I use the strategies in order to conform to the requirements of the exam format. | 171 (57.0) | 129 (43.0) | 215 (71.7) | 85 (28.3) |

Source: Field survey, Adusei (2017)

The data in the Table 10 clearly indicates the reasons for students adopting specific strategies in preparing for Multiple-choice questions in English language. To start with, a higher majority 271 (90.3%) of the Senior High School students said they feel more confident that the strategies will help them pass while smaller majority of 168 (56.0%) Junior High School students said same.

A little more than half 160 (53.3%) of both the Junior High School students and the Senior High School students said they do not feel less anxious when they learn in a particular way in preparing towards multiple-choice questions in English language. Surprisingly, a high majority 167 (55.7%) of the Junior High School students said they use the strategies because their colleagues

used them and they excelled as another majority of the Senior High School students said same.

The higher majority of 226 (75.3%) Senior High School students said they used the strategies previously and they were very helpful as a small majority 198 (66.0%) of the Junior High School students said same. Again, the high majority of 215 (71.7%) Senior High School students said they use the strategies in order to conform to the requirements of the exam format as another majority of 171 (57.0%) Junior High School students said same.

Table 11- *Distribution of the reasons given by students for adopting specific learning strategies in preparing for Multiple-choice questions in Core Mathematics*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 40. I am not really sure what is important in class, so I try to get down all I can. | 199 (66.3) | 101 (33.7) | 132 (44.0) | 168 (56.0) |
| 41. I feel less anxious when I learn in a particular way. | 260 (86.7) | 40 (13.3) | 161 (53.7) | 139 (46.3) |
| 42. I used the strategies previously and they were very helpful. | 285 (95.0) | 15 (5.0) | 230 (76.7) | 70 (23.3) |
| 43. I feel more confident that the strategies will help me pass. | 129 (43.0) | 171 (57.0) | 260 (86.7) | 40 (13.3) |
| 44. I used the strategies in order to conform to the requirements of exam format. | 127 (42.3) | 173 (57.7) | 207 (69.0) | 93 (31.0) |

Source: Field survey, Adusei (2017)

The data in the Table 11 shows the reasons for students adopting specific strategies in preparing for Multiple-choice questions in Core mathematics tasks.

The majority 199 (66.3%) of the Junior High School students said they are not really sure what is important in class, so they try to get down all they can while the majority 168 (56.0%) of the Senior High School students said they otherwise. When asked whether they feel less anxious when they learn in a particular way, the majority of 260 (86.7%) Senior High School students said yes, as the smaller majority 161 (53.7%) of the Senior High School students said same.

Again, the higher majority 285 (95.0%) of the Junior High School students said they used the strategies previously and they were very helpful as the smaller majority 230 (76.7%) of the Senior High School students said same. The majority of 207 (69.0%) Senior High School students said they used the strategies in order to conform to the requirements of exam format as another majority of 173 (57.7%) Junior High School students said otherwise.

Table 12- *Distribution of the reasons given by students for adopting specific learning strategies in preparing for Multiple-choice questions in Integrated Science*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 68. Because it mostly require recall. | 239 (79.7) | 61 (20.3) | 227 (75.7) | 73 (24.3) |
| 69. I feel less anxious when I learn in a particular way. | 151 (50.3) | 149 (49.7) | 159 (53.0) | 141 (47.0) |
| 70. I feel more confident that the strategies will help me. | 285 (95.0) | 15 (5.0) | 239 (79.7) | 61 (20.3) |
| 71. I use the strategies because my colleagues used them and they excelled. | 109 (36.3) | 191 (63.7) | 171 (57.0) | 129 (43.0) |
| 72. The multiple-choice questions do not demand much from me and so the strategies are good for it. | 116 (38.7) | 184 (61.3) | 192 (64.0) | 108 (36.0) |

Source: Field survey, Adusei (2017)

The data on the Table 12 clearly indicates the reasons for students adopting particular strategies in preparing for multiple-choice questions in Integrated science.

First and foremost, the higher majority 159 (53.0%) of the Senior High Schools students said they feel less anxious when they learn in a particular way as a smaller majority 151 (50.3%) of the Junior High School students said same. Again, the higher majority 285 (95.0%) of the Junior High School students said they feel more confident that the strategies will help them as the smaller majority 239 (79.7%) of the Junior High School students said same.

Furthermore, the majority 171 (57.0%) of the Senior High School students responded "yes" to the statement "I use the strategies because my colleagues used them and they excelled" while the majority 191 (63.7%) of the Junior High School students said "no". In addition, the majority 192 (64.0%) of the Senior High School students said the multiple-choice questions do not demand much from them and so the strategies are good for it as compared to the majority 184 (61.3%) of the Junior High School students who said no.

**Section 4**

**Research Question Three: What age differences exist in the learning strategies adopted by JHS and SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?**

The third question of the study examined the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science. Age differences in learning strategies of the Junior and Senior High School students were assessed using cross tabulations and chi-square tests. Items 4 to 11 (section A); 32 to 39 (section E) and 60 to 67 (section I) of the questionnaire were used in answering this research question. Tables 13, 14 and 15 display the students' age differences of the learning strategies for multiple-choice items in English Language, Core Mathematics and Integrated Science respectively.

Table 13- *Summary of Ages of student and the Learning Strategies they adopt when assessed with Multiple-choice items in English Language Chi-square test*

| Statement | Age-range | True of Me | Not true of Me | df | $\chi^2$ | *P* |
|---|---|---|---|---|---|---|
| | | Freq. (%) | Freq. (%) | | | |
| 4. I tend to read very little beyond what is actually required to pass | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 88 (80.7)<br>86 (63.7)<br>159(51.5)<br>31 (66.0) | 21 (19.3)<br>49 (36.3)<br>150(48.5)<br>16 (34.0) | 3 | 30.45* | .00 |
| 5. I do a thorough reading and make very sure I understand every concept | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 59 (54.1)<br>67 (45.6)<br>244(79.0)<br>37 (78.7) | 50 (45.9)<br>68 (50.4)<br>65 (21.0)<br>10 (21.3) | 3 | 49.99* | .00 |
| 6. I memorise the meaning of words and their opposite in past questions and pamphlets | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 51 (46.8)<br>103(76.3)<br>184(59.5)<br>25 (53.2) | 58 (53.2)<br>32 (23.7)<br>125(40.5)<br>22 (46.8) | 3 | 23.84* | .00 |
| 7. I search for meaning of words and their opposite in the dictionary and on the internet when I come across in past questions and pamphlets | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 59 (54.1)<br>48 (35.6)<br>186(60.2)<br>24 (51.1) | 50 (45.9)<br>87 (64.4)<br>123(39.8)<br>23 (48.9) | 3 | 23.02* | .00 |
| 8. I memorise new words taught in class to be able to recall them during exams | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 50 (45.9)<br>121(89.6)<br>237(76.7)<br>35 (74.5) | 59 (54.1)<br>14(10.4)<br>72 (23.3)<br>12 (25.5) | 3 | 62.87* | .00 |
| 9. I use the new words taught in class in my daily conversation to help me identify them during exams. | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 59 (54.1)<br>57 (42.2)<br>222(71.8)<br>29 (61.7) | 50 (45.9)<br>78 (57.8)<br>87 (28.2)<br>18 (38.3) | 3 | 37.51* | .00 |
| 10. I answer past questions alone | 10-12 yrs<br>13-15 yrs | 52 (47.7)<br>94 (69.6) | 57 (52.3)<br>41 (30.4) | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| and memorise the answers | 16-19 yrs<br>20yrs and over | 182(58.9)<br>28 (59.6) | 127(41.1)<br>19 (40.4) | 3 | 12.06* | .01 |

Table 13 (continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| 11. I compare my class notes and past questions and seek further assistance from colleagues and teachers where necessary. | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 59 (54.1)<br>41 (30.4)<br>164(53.1)<br>19 (40.4) | 50 (45.9)<br>94 (69.6)<br>145(46.9)<br>28 (59.6) | 3 | 22.59* | .00 |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=600

The data on Table 13 shows the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with multiple-choice items in English Language tasks.

With the surface learning strategies, the percentage of students that tend to read very little beyond what is actually required to pass examinations differed by age, $\chi^2$ (3, N=600) = 30.45, $p < 0.05$. Also, the percentage of students that memorise the meaning of words and their opposite in past questions and pamphlets differed by age, $\chi^2$ (3, N=600) = 23.84, $p < 0.05$. Furthermore, the percentage of students that memorise new words taught in class to be able to recall them during exams differed by age $\chi^2$ (3, N=600) = 62.87, $p < 0.05$. The percentage of students that answer past questions alone and memorise the answers differed by age $\chi^2$ (3, N=600) = 12.06, $p < 0.05$.

With the deep learning strategies, the percentage of students that do a thorough reading and make very sure they understand every concept differed by age, $\chi^2$ (3, N=600) = 49.99, $p < 0.05$. There is significant difference in the ages of students that search for meaning of words and their opposite in the dictionary and on the internet when they come across in past questions and pamphlets, $\chi^2$

(3, N=600) = 23.02, $p < 0.05$. The percentages of students that use the new words taught in class in their daily conversation to help them identify the words during exams differed by age, $\chi^2$ (3, N=600) = 37.51, $p < 0.05$. Also, the percentage of students that compare their class notes and past questions and seek further assistance from colleagues and teachers where necessary differed by age, $\chi^2$ (3, N=600) = 22.59, $p < 0.05$.

In sum, the younger students (from age 10 to 12 years and 13 to 15 years) recorded high percentages on almost all the surface learning strategies while the older ones (from 16 to 19 years and 20 years and over) recorded high on almost all the deep learning strategies.

Table 14- *Summary of Ages of student and the Learning Strategies they adopt when assessed with Multiple-choice items in Core Mathematics Chi-square test*

| Statement | Age-range | True of Me | Not true of Me | df | $\chi^2$ | *p* |
|---|---|---|---|---|---|---|
| | | Freq. (%) | Freq. (%) | | | |
| 32. I memorize the important and key maths formulae to remind me of the important parts of my math class | 10-12 yrs | 108(99.1) | 1 (0.9) | 3 | 47.78* | .00 |
| | 13-15 yrs | 122(90.4) | 13 (9.6) | | | |
| | 16-19 yrs | 230(74.4) | 79 (25.6) | | | |
| | 20yrs and over | 31 (66.0) | 16 (34.0) | | | |
| 33. I study the class notes and textbook again and again. | 10-12 yrs | 11 (10.1) | 98 (89.9) | 3 | 166.69* | .00 |
| | 13-15 yrs | 60 (44.4) | 75 (55.6) | | | |
| | 16-19 yrs | 238(77.0) | 71 (23.0) | | | |
| | 20yrs and over | 37 (78.7) | 10 (21.3) | | | |
| 34. I read through the class notes and mark up contents that have been dropping in the past questions and specialise on them. | 10-12 yrs | 100(91.7) | 9 (8.3) | 3 | 45.19* | .00 |
| | 13-15 yrs | 107(79.3) | 28 (20.7) | | | |
| | 16-19 yrs | 238(77.0) | 71 (23.0) | | | |
| | 20yrs and over | 37 (78.7) | 10 (21.3) | | | |
| 35. I link the class notes to textbook examples to | 10-12 yrs | 12 (11.0) | 97 (89.0) | | 157.20* | .00 |
| | 13-15 yrs | 54 (40.0) | 81 (60.0) | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| improve my understanding. | 16-19 yrs<br>20yrs and over | 234(75.7)<br>34 (72.3) | 75 (24.3)<br>13 (27.7) | 3 | | |

Table 14 (continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| 36. I just accept the math theory conclusions and memorise them | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 99 (90.8)<br>93 (68.9)<br>126(40.8)<br>25 (53.2) | 10 (9.2)<br>42 (31.1)<br>183(59.2)<br>22 (46.8) | 3 | 51.83* | .00 |
| 37. I use real examples to confirm the math theory conclusions. | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 12 (11.0)<br>39 (28.9)<br>192(62.1)<br>32 (68.1) | 97 (89.0)<br>96 (71.1)<br>117(37.9)<br>15 (31.9) | 3 | 111.31* | .00 |
| 38. I only stick to what the teacher teaches me in class | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 99 (90.8)<br>111(82.2)<br>120(38.8)<br>24 (51.1) | 10 (9.2)<br>24 (17.8)<br>189(61.2)<br>23 (48.9) | 3 | 128.90* | .00 |
| 39. I always compare the difference between the teacher's explanation and textbook content | 10-12 yrs<br>13-15 yrs<br>16-19 yrs<br>20yrs and over | 12 (11.0)<br>24 (17.8)<br>214(69.3)<br>29 (61.7) | 97 (89.0)<br>111(82.2)<br>94 (30.4)<br>18 (38.3) | 3 | 170.68* | .00 |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=600

The data on Table 14 shows the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with multiple-choice items in Core Mathematics tasks.

Considering the surface learning strategies, the percentage of students that memorize the important and key maths formulae to remind them of the important parts of my math class differed by age, $\chi^2$ (3, N=600) = 47.78, $p < 0.05$. Also, the percentage of students that read through the class notes and mark up contents that have been dropping in the past questions and specialise on them differed by age, $\chi^2$ (3, N=600) = 45.19, $p < 0.05$. Furthermore, the percentage

of students that just accept the math theory conclusions and memorise them differed by age $\chi^2$ (3, N=600) = 51.83, $p < 0.05$. The percentage of students that only stick to what the teacher teaches them in class differed by age $\chi^2$ (3, N=600) = 128.90, $p < 0.05$.

In terms of the deep learning strategies, the percentage of students that study the class notes and textbook again and again differed by age, $\chi^2$ (3, N=600) = 166.69, $p < 0.05$. There is significant difference in the ages of students that link the class notes to textbook examples to improve their understanding, $\chi^2$ (3, N=600) = 157.20, $p < 0.05$. The percentages of students that use real examples to confirm the math theory conclusions differed by age, $\chi^2$ (3, N=600) = 111.31, $p < 0.05$. Again, the percentage of students that always compare the difference between the teacher's explanation and textbook content differed by age, $\chi^2$ (3, N=600) = 170.68, $p < 0.05$.

In sum, the younger students (from age 10 to 12 years and 13 to 15 years) recorded high percentages on almost all the surface learning strategies while the older students (from 16 to 19 years and 20 years and over) show high percentages on almost all the deep learning strategies.

Table 15- *Summary of Ages of student and the Learning Strategies they adopt when assessed with Multiple-choice items in Integrated Science Chi-square test*

| Statement | Age-range | True of Me | Not true of Me | df | $\chi^2$ | *p* |
|---|---|---|---|---|---|---|
| | | Freq. (%) | Freq. (%) | | | |
| 60. I memorise concepts taught in class and from text books | 10-12 yrs | 108(99.1) | 1 (0.9) | 3 | 20.17* | .00 |
| | 13-15 yrs | 114(84.4) | 21 (15.6) | | | |
| | 16-19 yrs | 256(82.8) | 53 (17.2) | | | |
| | 20yrs and over | 37 (78.7) | 10 (21.3) | | | |
| 61. I read my notes and text books carefully, paying attention to details | 10-12 yrs | 12 (11.0) | 97 (89.0) | 3 | 249.75* | .00 |
| | 13-15 yrs | 51 (37.8) | 84 (62.2) | | | |
| | 16-19 yrs | 271(87.7) | 38 (12.3) | | | |
| | 20yrs and over | 39 (83.0) | 8 (17.0) | | | |
| 62. I don't spend much time learning things I think wouldn't be asked in the exam | 10-12 yrs | 100(91.7) | 9 (8.3) | 3 | 87.46* | .00 |
| | 13-15 yrs | 91 (67.4) | 44 (32.6) | | | |
| | 16-19 yrs | 131(42.4) | 178(57.6) | | | |
| | 20yrs and over | 24 (51.1) | 23 (48.9) | | | |
| 63. I spend time finding more information on topics taught from other books | 10-12 yrs | 11 (10.1) | 98 (89.9) | 3 | 129.78* | .00 |
| | 13-15 yrs | 38 (28.1) | 97 (71.9) | | | |
| | 16-19 yrs | 206(66.7) | 103(33.3) | | | |
| | 20yrs and over | 28 (59.6) | 19 (40.4) | | | |
| 64. I learn some things by rote, going over and over until I know them "by heart" | 10-12 yrs | 100(91.7) | 9 (8.3) | 3 | 33.69* | .00 |
| | 13-15 yrs | 124(91.9) | 11 (8.1) | | | |
| | 16-19 yrs | 226(73.1) | 83 (26.9) | | | |
| | 20yrs and over | 33 (70.2) | 14 (29.8) | | | |
| 65. I join study groups for further explanation of concepts | 10-12 yrs | 11 (10.5) | 98 (89.9) | 3 | 78.30* | .00 |
| | 13-15 yrs | 27 (20.0) | 108(80.0) | | | |
| | 16-19 yrs | 154(49.8) | 155(50.2) | | | |
| | 20yrs and over | 25 (53.2) | 22 (46.8) | | | |
| 66. I wait until it is very close to examination before I start preparing | 10-12 yrs | 97 (89.0) | 12 (11.0) | 3 | 106.63* | .00 |
| | 13-15 yrs | 89 (65.9) | 46 (34.1) | | | |
| | 16-19 yrs | 115(37.2) | 194(62.8) | | | |
| | 20yrs and over | 14 (29.8) | 33 (70.2) | | | |
| 67. I read my notes soon after the day's lesson for a better understanding | 10-12 yrs | 11 (10.1) | 98 (89.9) | 3 | 118.80* | .00 |
| | 13-15 yrs | 51 (37.8) | 84 (62.2) | | | |
| | 16-19 yrs | 211(68.3) | 98 (31.7) | | | |
| | 20yrs and over | 24 (51.1) | 23 (48.9) | | | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=600

The data on Table 15 shows the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with multiple-choice items in Integrated Science tasks.

With the surface learning strategies, the percentage of students that memorise concepts taught in class and from text books differed by age, $\chi^2$ (3, N=600) = 20.17, $p < 0.05$. Also, the percentage of students that don't spend much time learning things they think wouldn't be asked in the exam differed by age, $\chi^2$ (3, N=600) = 87.46, $p < 0.05$. Furthermore, the percentage of students that learn some things by rote, going over and over until they know them "by heart" differed by age $\chi^2$ (3, N=600) = 33.69, $p < 0.05$. The percentage of students that wait until it is very close to examination before they start preparing differed by age $\chi^2$ (3, N=600) = 106.63, $p < 0.05$.

Concerning the deep learning strategies, the percentage of students that read their notes and text books carefully, paying attention to details differed by age, $\chi^2$ (3, N=600) = 249.75, $p < 0.05$. There is significant difference in the ages of students that spend time finding more information on topics taught from other books, $\chi^2$ (3, N=600) = 129.78, $p < 0.05$. The percentages of students that join study groups for further explanation of concepts differed by age, $\chi^2$ (3, N=600) = 78.30, $p < 0.05$. Also, the percentage of students that read my notes soon after the day's lesson for a better understanding differed by age, $\chi^2$ (3, N=600) = 118.80, $p < 0.05$.

In sum, the younger students (from age 10 to 12 years and 13 to 15 years) recorded high percentages on almost all the surface learning strategies while the older students (from 16 to 19 years and 20 years and over) recorded high on almost all the deep learning strategies.

## Section 5

**Research Question Four: What gender differences exist in the learning strategies of JHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?**

The forth question of the study examined the gender differences in the learning strategies the JHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science. Gender differences in learning strategies of the Junior High School students were assessed using cross tabulations and chi-square tests. Items 4 to 11 (section A); 32 to 39 (section E) and 60 to 67 (section I) of the questionnaire were used in answering this research question. Tables 16, 17 and 18 display the JHS students' gender differences of the learning strategies for multiple-choice items in English Language, Core Mathematics and Integrated Science respectively.

Table 16- *Summary of Gender of JHS students and the Learning Strategies they adopt when assessed with Multiple-choice items in English Language Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 4. I tend to read very little beyond what is actually required to pass | 117(60.6) | 76 (39.4) | 74 (69.2) | 33 (30.8) |
| | $\chi^2 = 2.17$ | df = 1 | $p = .14$ | |
| 5. I do a thorough reading and make very sure I understand every concept | 133(68.9) | 60 (31.1) | 41 (38.3) | 66 (61.7) |
| | $\chi^2 = 26.45$* | df = 1 | $p = .00$ | |
| 6. I memorise the meaning of words and their opposite in past questions and pamphlets | 108(56.0) | 85 (44.0) | 91 (85.0) | 16 (15.0) |
| | $\chi^2 = 26.08$* | df = 1 | $p = .00$ | |
| 7. I search for meaning of words and their opposite in the dictionary and on the internet when I come across in past questions and pamphlets | 115(59.6) | 78 (40.4) | 31 (29.0) | 76 (71.0) |
| | $\chi^2 = 25.82$* | df = 1 | $p = .00$ | |
| 8. I memorise new words taught in class to be able to recall them during exams | 123(63.7) | 70 (36.3) | 95 (88.8) | 12 (11.2) |
| | $\chi^2 = 21.76$* | df = 1 | $p = .00$ | |
| 9. I use the new words taught in class in my daily conversation to help me identify them during exams. | 130(67.4) | 63 (32.6) | 42 (39.3) | 65 (60.7) |
| | $\chi^2 = 22.23$* | df = 1 | $p = .00$ | |
| 10. I answer past questions alone and memorise the answers | 97 (50.3) | 96 (46.7) | 83 (77.6) | 24 (22.4) |
| | $\chi^2 = 21.39$* | df = 1 | $p = .00$ | |
| 11. I compare my class notes and past questions and seek further assistance from colleagues and teachers where necessary. | 105(54.4) | 88 (45.6) | 36 (33.6) | 71 (66.4) |
| | $\chi^2 = 11.91$* | df = 1 | $p = .00$ | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 16 shows the gender differences in the learning strategies of JHS students when assessed with multiple-choice items in English Language tasks.

With the surface learning strategies, the percentage of students that tend to read very little beyond what is actually required to pass examinations did not differ by gender, $\chi^2$ (1, N=300) = 2.17, $p > 0.05$. Also, the percentage of students that memorise the meaning of words and their opposite in past questions and pamphlets differed by gender, $\chi^2$ (1, N=300) = 26.08, $p < 0.05$. Furthermore, the percentage of students that memorise new words taught in class to be able to recall them during exams differed by gender $\chi^2$ (1, N=300) = 21.76, $p < 0.05$. The percentage of students that answer past questions alone and memorise the answers differed by gender $\chi^2$ (1, N=300) = 21.39, $p < 0.05$.

With the deep learning strategies, the percentage of students that do a thorough reading and make very sure they understand every concept differed by age, $\chi^2$ (1, N=300) = 26.45, $p < 0.05$. There is significant difference in the ages of students that search for meaning of words and their opposite in the dictionary and on the internet when they come across in past questions and pamphlets, $\chi^2$ (1, N=300) = 25.82, $p < 0.05$. The percentages of students that use the new words taught in class in their daily conversation to help them identify the words during exams differed by age, $\chi^2$ (1, N=300) = 22.23, $p < 0.05$. Also, the percentage of students that compare their class notes and past questions and seek further assistance from colleagues and teachers where necessary differed by age, $\chi^2$ (1, N=300) = 11.91, $p < 0.05$.

In sum, with the exception of the first item which showed no significant difference in the adoption of the surface learning strategies with respect to the

gender of the students, the female students recorded high percentages. Also, the male students recorded high percentages on all the deep learning strategies.

Table 17- *Summary of Gender of JHS students and the Learning Strategies they adopt when assessed with Multiple-choice items in Core Mathematics Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 32. I memorize the important and key maths formulae to remind me of the important parts of my math class | 185(95.9) | 8 (4.1) | 93 (86.9) | 14 (13.1) |
| | $\chi^2 = 8.09$* | df = 1 | $p$ =.00 | |
| 33. I study the class notes and textbook again and again | 80 (41.5) | 113(58.5) | 37 (34.6) | 70 (65.4) |
| | $\chi^2 = 1.37$ | df = 1 | $p$ = .24 | |
| 34. I read through the class notes and mark up contents that have been dropping in the past questions and specialise on them | 162(83.9) | 31 (16.1) | 89 (83.2) | 18 (16.8) |
| | $\chi^2 = .03$ | df = 1 | $p$ =.87 | |
| 35. I link the class notes to textbook examples to improve my understanding | 65 (33.7) | 128(66.3) | 37 (34.6) | 70 (65.4) |
| | $\chi^2 = .03$ | df = 1 | $p$ =.88 | |
| 36. I just accept the math theory conclusions and memorise them | 147(76.2) | 46 (23.8) | 80 (74.8) | 27 (25.2) |
| | $\chi^2 = .07$ | df = 1 | $p$ =.79 | |
| 37. I use real examples to confirm the math theory conclusions | 67 (34.7) | 126(65.3) | 28 (26.2) | 79 (73.8) |
| | $\chi^2$ =2.32 | df = 1 | $p$ =.13 | |
| 38. I only stick to what the teacher teaches me in class | 140(72.5) | 53 (27.5) | 86 (80.4) | 21 (19.6) |
| | $\chi^2 = 2.27$ | df = 1 | $p$ =.13 | |
| 39. I always compare the difference between the teacher's explanation and textbook content | 49 (25.4) | 144(74.6) | 20 (18.7) | 87 (81.3) |
| | | $\chi^2 = 1.74$ | df = 1 | $p$ =.19 |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 17 shows the gender differences in the learning strategies the JHS students adopt when they are assessed with multiple-choice items in Core Mathematics tasks.

Considering the surface learning strategies, the percentage of students that memorize the important and key maths formulae to remind them of the important parts of my math class differed by gender, $\chi^2$ (1, N=300) = 8.09, $p <$ 0.05. Also, the percentage of students that read through the class notes and mark up contents that have been dropping in the past questions and specialise on them did not differ by gender, $\chi^2$ (1, N=300) = .03, $p >$ 0.05. Furthermore, the percentage of students that just accept the math theory conclusions and memorise them did not differ by gender $\chi^2$ (1, N=300) = .07, $p >$ 0.05. The percentage of students that only stick to what the teacher teaches them in class did not differ by gender $\chi^2$ (1, N=300) = 2.27, $p >$ 0.05.

In terms of the deep learning strategies, the percentage of students that study the class notes and textbook again and again did not differ by gender, $\chi^2$ (1, N=300) = 1.37, $p >$ 0.05. There is no significant difference in the gender of students that link the class notes to textbook examples to improve their understanding, $\chi^2$ (1, N=300) = .03, $p >$ 0.05. The percentage of students that use real examples to confirm the math theory conclusions did not differ by gender, $\chi^2$ (1, N=300) = 2.32, $p >$ 0.05. Again, the percentage of students that always compare the difference between the teacher's explanation and textbook content did not differ by gender, $\chi^2$ (1, N=300) = 1.74, $p >$ 0.05.

In sum, the results from the Table clearly shows that apart from the first item which indicates that male students adopt more surface learning strategies compared to their female colleagues, the remaining three items show no

significant difference in their adoption of the surface learning strategies. In addition, the results show no significant difference in the adoption of the deep learning strategies by students with respect to their gender.

Table 18- *Summary of Gender of JHS students and the Learning Strategies they adopt when assessed with Multiple-choice items in Integrated Science Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 60. I memorise concepts taught in class and from text books | 178(92.2) | 15 (7.8) | 82 (76.6) | 25 (23.4) |
| | $\chi^2$ = 14.48* | df = 1 | $p$ =.00 | |
| 61. I read my notes and text books carefully, paying attention to details | 70 (36.3) | 123(63.7) | 41 (38.3) | 66 (61.7) |
| | $\chi^2$ = .12 | df = 1 | $p$ =.73 | |
| 62. I don't spend much time learning things I think wouldn't be asked in the exam | 129(66.8) | 64 (33.2) | 80 (74.8) | 27 (25.2) |
| | $\chi^2$ = 2.05 | df = 1 | $p$ =.15 | |
| 63. I spend time finding more information on topics taught from other books | 66 (34.2) | 127(65.8) | 32 (29.9) | 75 (70.1) |
| | $\chi^2$ =.58 | df = 1 | $p$ =.45 | |
| 64. I learn some things by rote, going over and over until I know them "by heart" | 169(87.6) | 24 (12.4) | 103(96.3) | 4 (3.7) |
| | $\chi^2$ = 6.15* | df = 1 | $p$ =.01 | |
| 65. I join study groups for further explanation of concepts | 55 (28.5) | 138(71.5) | 14 (13.1) | 93 (86.9) |
| | $\chi^2$ =9.23* | df = 1 | $p$ =.00 | |
| 66. I wait until it is very close to examination before I start preparing | 129(66.8) | 64 (33.2) | 77 (72.0) | 30 (28.0) |
| | $\chi^2$ = .84 | df = 1 | $p$ =.36 | |
| 67. I read my notes soon after the day's lesson for a better understanding | 73 (37.8) | 120(62.2) | 34 (31.8) | 73 (68.2) |
| | $\chi^2$ = 1.10 | df = 1 | $p$ =.30 | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 18 shows the gender differences in the learning strategies the JHS students adopt when they are assessed with multiple-choice items in Integrated Science tasks.

With the surface learning strategies, the percentage of students that memorise concepts taught in class and from text books differed by gender, $\chi^2$ (1, N=300) = 14.48, $p < 0.05$. Also, the percentage of students that don't spend much time learning things they think wouldn't be asked in the exam did not differ by gender, $\chi^2$ (1, N=300) = 2.05, $p > 0.05$. Furthermore, the percentage of students that learn some things by rote, going over and over until they know them "by heart" differed by gender $\chi^2$ (1, N=300) = 6.15, $p < 0.05$. The percentage of students that wait until it is very close to examination before they start preparing did not differ by gender $\chi^2$ (1, N=300) = .84, $p > 0.05$.

Concerning the deep learning strategies, the percentage of students that read their notes and text books carefully, paying attention to details did not differ by gender, $\chi^2$ (1, N=300) = .12, $p > 0.05$. There is no significant difference in the gender of students that spend time finding more information on topics taught from other books, $\chi^2$ (1, N=300) = .58, $p > 0.05$. The percentage of students that join study groups for further explanation of concepts did not differ by gender, $\chi^2$ (1, N=300) = 9.23, $p < 0.05$. Also, the percentage of students that read my notes soon after the day's lesson for a better understanding did not differ by gender, $\chi^2$ (1, N=300) = 1.10, $p > 0.05$.

In sum, two of the surface learning strategies show that there is no significant difference. The male and female students recorded high percentages on the second and last surface learning strategies listed on the Table respectively. On the other hand, with the exception of one deep learning strategy

which shows a high percentage of males compared to the females adoption of the deep learning strategies, the remaining three deep learning strategies shows no significant difference.

## Section 6

**Research Question Five: What gender differences exist in the learning strategies of SHS students when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science?**

The fifth question of the study examined the gender differences in the learning strategies the SHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science. Gender differences in learning strategies of the Senior High School students were assessed using cross tabulations and chi-square tests. Items 4 to 11 (section A); 32 to 39 (section E) and 60 to 67 (section I) of the questionnaire were used in answering this research question. Tables 19, 20 and 21 display the SHS students' gender differences of the learning strategies for multiple-choice items in English Language, Core Mathematics and Integrated Science respectively.

Table 19- *Summary of Gender of SHS students and the Learning Strategies they adopt when assessed with Multiple-choice items in English Language Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 4. I tend to read very little beyond what is actually required to pass | 74 (50.3) | 73 (49.7) | 99 (64.7) | 54 (35.3) |
| | $\chi^2 = 6.34$* df = 1 $p$ =.01 | | | |
| 5. I do a thorough reading and make very sure I understand every concept | 119(81.0) | 28 (19.0) | 114(74.5) | 39 (25.5) |
| | $\chi^2 = 1.79$ df = 1 $p$ =.18 | | | |
| 6. I memorise the meaning of words and their opposite in past questions and pamphlets | 81 (55.1) | 66 (44.9) | 83 (54.2) | 70 (45.8) |
| | $\chi^2 = .02$ df = 1 $p$ =.88 | | | |
| 7. I search for meaning of words and their opposite in the dictionary and on the internet when I come across in past questions and pamphlets | 85 (57.8) | 62 (42.2) | 86 (56.2) | 67 (43.8) |
| | $\chi^2 = .08$ df = 1 $p$ =.78 | | | |
| 8. I memorise new words taught in class to be able to recall them during exams | 118(80.3) | 29 (19.7) | 107(69.9) | 46 (30.1) |
| | $\chi^2 = 4.27$* df = 1 $p$ =.04 | | | |
| 9. I use the new words taught in class in my daily conversation to help me identify them during exams. | 88 (59.9) | 59 (40.1) | 107(69.9) | 46 (30.1) |
| | $\chi^2 = 3.34$ df = 1 $p$ =.07 | | | |
| 10. I answer past questions alone and memorise the answers | 83 (56.5) | 64 (43.5) | 93 (60.8) | 60 (39.2) |
| | $\chi^2 = .58$ df = 1 $p$ =.45 | | | |
| 11. I compare my class notes and past questions and seek further assistance from colleagues and teachers where necessary. | 79 (53.7) | 68 (46.3) | 63 (41.2) | 90 (58.8) |
| | $\chi^2 = 4.75$* df = 1 $p$ =.03 | | | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 19 shows the gender differences in the learning strategies of SHS students when assessed with multiple-choice items in English Language tasks.

With the surface learning strategies, the percentage of students that tend to read very little beyond what is actually required to pass examinations differed by gender, $\chi^2$ (1, N=300) = 6.34 $p < 0.05$. Also, the percentage of students that memorise the meaning of words and their opposite in past questions and pamphlets did not differ by gender, $\chi^2$ (1, N=300) = .20, $p > 0.05$. Furthermore, the percentage of students that memorise new words taught in class to be able to recall them during exams differed by gender $\chi^2$ (1, N=300) = 4.27, $p < 0.05$. The percentage of students that answer past questions alone and memorise the answers did not differ by gender $\chi^2$ (1, N=300) = .58, $p > 0.05$.

With the deep learning strategies, the percentage of students that do a thorough reading and make very sure they understand every concept did not differ by age, $\chi^2$ (1, N=300) = 1.97, $p > 0.05$. There is no significant difference in the ages of students that search for meaning of words and their opposite in the dictionary and on the internet when they come across in past questions and pamphlets, $\chi^2$ (1, N=300) = .80, $p > 0.05$. The percentage of students that use the new words taught in class in their daily conversation to help them identify the words during exams did not differ by age, $\chi^2$ (1, N=300) = 3.34, $p > 0.05$. Also, the percentage of students that compare their class notes and past questions and seek further assistance from colleagues and teachers where necessary differed by age, $\chi^2$ (1, N=300) = 4.75, $p < 0.05$.

In sum, apart from the first and the third items on the Table which shows that male and female students mostly adopt surface learning strategies

respectively, the remaining two items show there is no significant difference. Moreover, with the deep learning strategies, the first three items shows no significant difference while the last item shows that male students mostly adopt deep learning strategies compared to their female counterparts.

Table 20- *Summary of Gender of SHS students and the Learning Strategies they adopt when assessed with Multiple-choice items in Core Mathematics Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 32. I memorize the important and key maths formulae to remind me of the important parts of my math class | 117(79.6) | 30 (20.4) | 96 (62.7) | 57 (37.3) |
| | $\chi^2 = 10.33$* df = 1 | | $p$ =.00 | |
| 33. I study the class notes and textbook again and again | 121(82.3) | 26 (17.7) | 108(70.6) | 45 (29.4) |
| | $\chi^2 = 5.71$* df = 1 | | $p$ =.02 | |
| 34. I read through the class notes and mark up contents that have been dropping in the past questions and specialise on them | 94 (63.9) | 53 (36.1) | 78 (51.0) | 75 (49.0) |
| | $\chi^2 =$ 5.15* df = 1 | | $p$ =.02 | |
| 35. I link the class notes to textbook examples to improve my understanding | 114(77.6) | 33 (22.4) | 118(77.1) | 35 (22.9) |
| | $\chi^2 = .01$ df = 1 | | $p$ =.93 | |
| 36. I just accept the math theory conclusions and memorise them | 62 (42.2) | 85 (57.8) | 54 (35.3) | 99 (64.7) |
| | $\chi^2 = 1.50$ df = 1 | | $p$ =.22 | |
| 37. I use real examples to confirm the math theory conclusions | 99 (67.3) | 48 (32.7) | 81 (52.9) | 72 (50.3) |
| | $\chi^2 =6.48$* df = 1 | | $p$ =.01 | |
| 38. I only stick to what the teacher teaches me in class | 52 (35.4) | 95 (64.6) | 76 (49.7) | 77 (50.3) |
| | $\chi^2 = 6.27$* df = 1 | | $p$ =.01 | |
| 39. I always compare the difference between the teacher's explanation and textbook content | 107(72.8) | 40 (27.2) | 103(67.3) | 49 (32.0) |
| | $\chi^2 = 1.87$ df = 1 | | $p$ =.39 | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 20 shows the gender differences in the learning strategies the SHS students adopt when they are assessed with multiple-choice items in Core Mathematics tasks.

Considering the surface learning strategies, the percentage of students that memorize the important and key maths formulae to remind them of the important parts of my math class differed by gender, $\chi^2$ (1, N=300) = 10.33, $p < 0.05$. Also, the percentage of students that read through the class notes and mark up contents that have been dropping in the past questions and specialise on them did differed by gender, $\chi^2$ (1, N=300) = 5.15, $p < 0.05$. Furthermore, the percentage of students that just accept the math theory conclusions and memorise them did not differ by gender $\chi^2$ (1, N=300) = 1.50, $p > 0.05$. The percentage of students that only stick to what the teacher teaches them in class differed by gender $\chi^2$ (1, N=300) = 6.27, $p < 0.05$.

In terms of the deep learning strategies, the percentage of students that study the class notes and textbook again and again differed by gender, $\chi^2$ (1, N=300) = 5.71, $p < 0.05$. There is significant difference in the gender of students that link the class notes to textbook examples to improve their understanding, $\chi^2$ (1, N=300) = .01, $p > 0.05$. The percentage of students that use real examples to confirm the math theory conclusions differed by gender, $\chi^2$ (1, N=300) = 6.48, $p < 0.05$. Again, the percentage of students that always compare the difference between the teacher's explanation and textbook content did not differ by gender, $\chi^2$ (1, N=300) = 1.87, $p > 0.05$.

In sum, apart from the third item on the Table which shows that there is no significant difference in the surface learning strategies with respect to their gender, two of the remaining items indicate that male students mostly adopt

surface learning strategies compared to their female counterparts. In addition to the above, the last item shows that female students mostly adopt surface learning strategies compared to the male students. With the deep learning strategies, the data on the Table shows that with the exception of two of the items which shows no significant difference in the students' adoption, the remaining two shows that the male students mostly adopt deep learning strategies compared to their female counterparts.

Table 21- *Summary of Gender of SHS students and the Learning Strategies they adopt when assessed with Multiple-choice items in Integrated Science Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 60. I memorise concepts taught in class and from text books | 122(83.0) | 25 (17.0) | 133(86.9) | 20 (13.1) |
| | $\chi^2 = .91$ | df = 1 | $p = .34$ | |
| 61. I read my notes and text books carefully, paying attention to details | 133(90.5) | 14 (9.5) | 129(84.3) | 24 (15.7) |
| | $\chi^2 = 2.57$ | df = 1 | $p = .11$ | |
| 62. I don't spend much time learning things I think wouldn't be asked in the exam | 73 (49.7) | 74 (50.3) | 64 (41.8) | 89 (58.2) |
| | $\chi^2 = 1.90$ | df = 1 | $p = .17$ | |
| 63. I spend time finding more information on topics taught from other books | 86 (58.5) | 61 (41.5) | 99 (64.7) | 54 (35.3) |
| | $\chi^2 = 1.22$ | df = 1 | $p = .27$ | |
| 64. I learn some things by rote, going over and over until I know them "by heart" | 99 (67.3) | 48 (32.7) | 112(73.2) | 41 (26.8) |
| | $\chi^2 = 1.23$ | df = 1 | $p = .27$ | |
| 65. I join study groups for further explanation of concepts | 67 (45.6) | 80 (54.4) | 81 (52.9) | 72 (47.1) |
| | $\chi^2 = 1.63$ | df = 1 | $p = .20$ | |
| 66. I wait until it is very close to examination before I start preparing | 56 (38.1) | 91 (61.9) | 53 (34.6) | 100(65.4) |
| | $\chi^2 = .39$ | df = 1 | $p = .53$ | |
| 67. I read my notes soon after the day's lesson for a better understanding | 84 (57.1) | 63 (42.9) | 106(69.3) | 47 (30.7) |
| | $\chi^2 = 4.76^*$ | df = 1 | $p = .03$ | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 21 shows the gender differences in the learning strategies the SHS students adopt when they are assessed with multiple-choice items in Integrated Science tasks.

With the surface learning strategies, the percentage of students that memorise concepts taught in class and from text books did not differ by gender, $\chi^2$ (1, N=300) = .91, $p > 0.05$. Also, the percentage of students that don't spend much time learning things they think wouldn't be asked in the exam did not differ by gender, $\chi^2$ (1, N=300) = 1.9, $p > 0.05$. Furthermore, the percentage of students that learn some things by rote, going over and over until they know them "by heart" did not differ by gender $\chi^2$ (1, N=300) = 1.23, $p > 0.05$. The percentage of students that wait until it is very close to examination before they start preparing did not differ by gender $\chi^2$ (1, N=300) = .39, $p > 0.05$.

Concerning the deep learning strategies, the percentage of students that read their notes and text books carefully, paying attention to details did not differ by gender, $\chi^2$ (1, N=300) = 2.57, $p > 0.05$. There is no significant difference in the gender of students that spend time finding more information on topics taught from other books, $\chi^2$ (1, N=300) = 1.22, $p > 0.05$. The percentage of students that join study groups for further explanation of concepts did not differ by gender, $\chi^2$ (1, N=300) = 1.63, $p > 0.05$. Also, the percentage of students that read my notes soon after the day's lesson for a better understanding did not differ by gender, $\chi^2$ (1, N=300) = 4.76, $p > 0.05$.

In sum, the data on the Table shows that there is no significant difference in the male and female students' adoption of the surface learning strategies. On the other hand, with the deep learning strategies, with the exception of the last item which shows that female students mostly adopt deep learning strategies compared to their male counterparts, the remaining three items show no significant difference between the male and female students.

## Section 7

**Research Question Six: What learning strategies do JHS and SHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science?**

Items 18 to 25 (section C); 46 to 53 (section G) and 74 to 81(section k) of the questionnaire asked students to indicate the learning strategies they adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science respectively. Again, 8 items on each table (4 depicting surface strategies and the other 4 depicting deep strategies, *Appendix A*) were provided for respondents to indicate the degree to which those statements apply to them with respect to essay item format assessment. Respondents were asked to indicate the learning strategies they adhere to by responding to either "True of me" or "Not true of me". The results are presented in Tables 22, 23 and 24.

Table 22- *Distribution of the Learning Strategies JHS and SHS students adopt when being assessed with Essay questions in English Language*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | True of me | Not True of me | True of me | Not True of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 1. I concentrate on learning just those bits of information I have to know to pass. | 233 (77.7) | 67 (22.3) | 204 (68.0) | 96 (32.0) |
| 2. I make sure I read deeply to understand every topic taught. | 111 (37.0) | 189 (63.0) | 213 (71.0) | 87 (29.0) |
| 3. I memorise essay samples in pamphlets and reproduce them in exams. | 194 (64.7) | 106 (35.3) | 166 (55.3) | 134 (44.7) |
| 4. I read novels to help me develop good English essays. | 114 (38.0) | 186 (62.0) | 169 (56.3) | 131 (43.7) |
| 5. I only write essays during examinations. | 189 (63.0) | 111 (37.0) | 136 (45.3) | 164 (54.7) |
| 6. I try my hands on several essay questions and ask my colleagues and teachers to mark and do corrections for me. | 60 (20.0) | 240 (80.0) | 116 (38.7) | 184 (61.3) |
| 7. I concentrate on the topics I understood and ignore the difficult ones. | 203 (67.7) | 97 (32.3) | 137 (45.7) | 163 (54.3) |
| 8. When I meet English concepts I do not understand, I join study groups for further explanation. | 83 (27.7) | 217 (72.3) | 159 (53.0) | 141 (47.0) |

Source: Field survey, Adusei (2017)

Table 22 clearly shows that majority of the Senior High School students adopt deep learning strategies as compared to the Junior High School students who adopt surface learning strategies when assessed with essay questions in English language tasks.

With the surface learning strategies, a higher majority 233 (77.7%) of the Junior High School students said they concentrate on learning just those bits of information they have to know to pass while a smaller majority 204 (68.0%) of the Senior High School students said same. Also, a higher majority 194 (64.7%) of the Junior High School students said memorising essay samples in pamphlets and reproducing them in exams was true of them as compared to the smaller majority 166 (55.3%) of the Senior High School students who gave the same response. With the strategy of only writing essays during examination periods, the majority 189 (63.0%) of the Junior High School students said that it was true of them as compared to the minority 136 (45.3%) of the Senior High School students responded same.

With the deep learning strategies, the majority 213 (71.0%) of the Senior High School students said they make sure they read deeply to understand every topic taught while majority 189 (63.0%) of the Junior High School students said it wasn't true of them. When asked if they read novels to help me develop good English essays, the majority 169 (56.3%) of the Senior High School students said it was true of them as compared to the minority 114 (38.0%) of the Junior High School students said the same. The majority 203 (67.7%) of the Junior High School students said they concentrate on the topics they understood and ignore the difficult ones while the majority 163 (54.3%) of the Senior High School students said it wasn't true of them. Furthermore, a little more than half 159 (53.0%) of the Senior High School students said when they meet English concepts they do not understand, they join study groups for further explanation which majority 217 (72.3%) of the Junior High School students said it wasn't true of them.

In sum, the findings on the Table shows that the Junior High school students mostly adopt surface learning strategies while the senior high school students mostly adopt deep learning strategies.

Table 23- *Distribution of the Learning Strategies JHS and SHS students adopt when being assessed with Essay questions in Core Mathematics*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | True of me | Not True of me | True of me | Not True of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 1. I differentiate the easy and hard questions of every exam and specialise on the easy ones. | 227 (75.7) | 73 (24.3) | 153 (51.0) | 147 (49.0) |
| 2. I make sure I understand both the easy and difficult concepts. | 113 (37.7) | 187 (62.3) | 227 (75.7) | 73 (24.3) |
| 3. In studying maths, I repeatedly practice similar question types. | 260 (86.7) | 40 (13.3) | 201 (67.0) | 99 (33.0) |
| 4. I try my hands on different question types and make sure I understand them. | 113 (37.7) | 187 (62.3) | 216 (72.0) | 84 (28.0) |
| 5. I always concentrate on my class notes only. | 187 (62.3) | 113 (37.7) | 102 (34.0) | 198 (66.0) |
| 6. I learn my class notes and other external materials to understand the maths concepts very well. | 112 (37.3) | 188 (62.7) | 218 (72.6) | 82 (27.3) |
| 7. I only learn the definitions of terms and the explanations of maths concepts. | 227 (75.7) | 73 (24.3) | 97 (32.3) | 203 (67.7) |
| 8. I read other books or materials on what has been taught in order to understand the concepts very well. | 119 (39.7) | 181 (60.3) | 226 (75.3) | 74 (24.7) |

Source: Field survey, Adusei (2017)

Table 23 shows that majority of the Senior High School students adopt deep learning strategies when preparing for multiple-choice questions in Core Mathematics as compared to majority of the junior high students who adopt the surface learning strategies.

With the surface learning strategies, majority 227 (75.7%) of the Junior High School students said they differentiate the easy and hard questions of every exam and specialise on the easy ones as the smaller majority 153 (51.0%) of the Senior High School students said it was true of them. A higher majority 260 (86.7%) of the Junior High School students said in studying maths, they repeatedly practice similar question types as a smaller majority 201 (67.0%) of the Senior High School students said same. With respect to the habit of always concentrating on class notes only the majority 187 (62.3%) of the Junior High School students said it was true of them as compared to another majority 198 (66.0%) of the Senior High School students who said it was not. The majority 225 (75.0%) of the Junior High School students said they only learn the definitions of terms and the explanations of maths concepts as compared to another majority 203 (67.7%) of the Senior High School students who said it was not true of them.

Concerning the deep learning strategies, the majority 227 (75.7%) of the Senior High School students said they make sure they understand both the easy and difficult concepts in preparing towards the multiple-choice aspect of the core mathematics tasks while the majority 187 (62.3%) of the Junior High School students said do not. With the issue of trying hands on different question types for understanding, the majority 216 (72.0%) of the Senior High School students said it was true of them while another majority 187 (62.3%) also said

it was true of them. A higher majority 218 (72.6%) of the Senior High School students said they learn their class notes and other external materials to understand the maths concepts very well as compared to another majority 188 (62.7%) of the Junior High School students who said it was not true of them. Regarding the reading of other books or materials on what has been taught in order to understand the concepts very well, a higher majority 226 (75.3%) of the Senior High School students said it was true of them as compared to another majority 181 (60.3%) of the Junior High School students who said it was not true of them.

In sum, the findings on the Table shows that the Junior High school students mostly adopt surface learning strategies while the senior high school students mostly adopt deep learning strategies.

Table 24- *Distribution of the Learning Strategies JHS and SHS students adopt when being assessed with Essay questions in Integrated Science*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | True of me | Not True of me | True of me | Not True of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 1. I only memorise contents the teacher promise to set questions on. | 213 (71.0) | 87 (29.0) | 175 (58.3) | 125 (41.7) |
| 2. I deeply read all contents of what is taught in the term. | 77 (25.7) | 223 (74.3) | 200 (66.7) | 100 (33.3) |
| 3. When learning new science concepts, I only try to recall from the teachers explanations. | 252 (84.0) | 48 (16.0) | 192 (64.0) | 108 (36.0) |
| 4. When learning new science concepts, I connect them to my previous experience. | 86 (28.7) | 214 (71.3) | 204 (68.0) | 96 (32.0) |
| 5. I am not used to reading external materials other than what I was given at school. | 223 (74.3) | 77 (25.7) | 114 (38.0) | 186 (62.0) |
| 6. When I do not understand a science concept, I find relevant resources that will help me. | 98 (32.7) | 202 (67.3) | 206 (68.7) | 94 (31.3) |
| 7. I learn using clues (e. g abbreviations, acronyms and mnemonics). | 229 (76.3) | 71 (23.7) | 155 (51.7) | 145 (48.3) |
| 8. During the learning processes, I attempt to make connections between the concepts that I learn. | 122 (40.7) | 178 (59.3) | 222 (74.0) | 78 (26.0) |

Source: Field survey, Adusei (2017)

Similarly, Table 24 shows that majority of the Senior High School students adopt deep learning strategies as compared to the Junior High School

students who adopt surface learning strategies when assessed with multiple-choice questions in Integrated science tasks.

From the results on Table 21, with the surface learning strategies, a higher majority 213 (71.0%) of the Junior High School students indicated that they only memorise contents the teacher promise to set questions on while a smaller majority 175 (58.3%) of the Senior High School students said same. The higher majority 252 (84.0%) of the Junior High School said when learning new science concepts, they only try to recall from the teachers explanations as the smaller majority 192 (54.3%) of the Senior High School students said same. The majority 223 (74.3%) of the Junior High School students confirmed they are not used to reading external materials other than what they were given at school compared to another majority 186 (62.0%) of the Senior High School students who said it was not true of them. Again, a high number 229 (76.3%) of the Junior High School students responded that they learn using clues (e.g, abbreviations, acronyms and mnemonics) while another majority 155 (51.7%) of the Senior High School students said same.

In terms of the deep learning strategies, when asked whether they deeply read all contents of what is taught in the term, the majority 200 (66.7%) of the Senior High School students responded that it was true of them while the majority 223 (74.3%) of the Junior High School students said it was not. Also, the majority 185 (61.7%) of the Senior High School students said that when learning new science concepts, they connect them to their previous experience while the majority 202 (67.3%) of the Junior High School students said it was not true of them. Also, the majority 206 (68.7%) of the Senior High School students said that when they do not understand a science concept, they find

relevant resources that will help them while another majority 202 (67.3%) of the Junior High School students said it was not true of them. The majority 222 (74.0%) of the Senior High School students said that during the learning processes, they attempt to make connections between the concepts that they learn while another majority 178 (59.3%) of the Junior High School students said it was not true of them.

In sum, the findings on the Table shows that the Junior High school students mostly adopt surface learning strategies while the senior high school students mostly adopt deep learning strategies.

**Section 8**

**Research Question Seven: What reasons do the JHS and SHS students give for the learning strategies they adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science?**

Items 26 to 30; 54 to 58 and 82 to 86 of the questionnaire asked students to indicate their reasons for adopting specific strategies in preparing for essay questions in English Language, Core Mathematics and Integrated Science respectively. Here, 5 items on each table (*Appendix A*) were provided for respondents to indicate their reasons with respect to essay item format assessment. Respondents were asked to indicate their reasons for adhering to particular learning strategies by responding to either "Yes" or "No". The results are presented in Tables 25, 26 and 27.

Table 25- *Distribution of the reasons given by students for adopting specific learning strategies in preparing for Essay questions in English Language*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 1. The requirements of the exams help me to learn this way to be able to attempt all the questions in a particular section. | 193 (64.3) | 107 (35.7) | 243 (81.0) | 57 (19.0) |
| 2. I always use the strategies to score high marks in order to be part of the best students in class. | 197 (65.7) | 103 (34.3) | 219 (73.0) | 81 (27.0) |
| 3. I use the strategies because the previous one did not help me to excel in the exam. | 154 (51.3) | 146 (48.7) | 169 (56.3) | 131 (43.7) |
| 4. My academic counsellor advised me to prepare in a particular way. | 141 (47.0) | 159 (53.0) | 171 (57.0) | 129 (43.0) |
| 5. I feel less anxious when I learn in a particular way. | 197 (65.7) | 103 (34.3) | 150 (50.0) | 150 (50.0) |

Source: Field survey, Adusei (2017)

Table 25 clearly indicates the reasons for students adopting the strategies in preparing for essay in English language.

From the results on the Table, the higher majority 243 (81.0%) of the Senior High School students said the requirements of the exams help them to learn in a particular way to be able to attempt all the questions in a particular section as the lower majority 193 (64.3%) of the Junior High School students said same. Furthermore, the higher majority 219 (73.0%) of the Senior High School students said they always use the strategies to score high marks in order to be part of the best students in class as the lower majority 197 (65.7%) of the Junior High School students said same.

Again, the higher majority 169 (56.3%) of the Senior High School students said they use the strategies because the previous one did not help them to excel in the exam as the lower majority 154 (51.3%) of the Junior High School students said same. Also, more than half of the Senior High School students said their academic counsellors advised them to prepare in a particular way while a little more than half of the Junior High School students said otherwise. The higher majority 197 (65.7%) of the Junior High School students said they feel less anxious when they learn in a particular way as exactly half 150 (50.0%) of the Senior High School students said same.

Table 26- *Distribution of the reasons given by students for adopting specific learning strategies in preparing for Essay questions in Core Mathematics*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 1. My teachers advised me to learn in a particular way. | 219 (73.0) | 81 (27.0) | 219 (73.0) | 81 (27.0) |
| 2. My previous experience motivates me to learn in a particular way. | 104 (34.7) | 196 (65.3) | 233 (77.7) | 67 (22.3) |
| 3. I feel less anxious when I learn in a particular way. | 70 (23.3) | 230 (76.7) | 143 (47.7) | 157 (52.3) |
| 4. I used the strategies in order to conform to the requirements of exam format. | 252 (84.0) | 48 (16.0) | 206 (68.7) | 94 (31.3) |
| 5. My academic counsellor advised me to prepare in a particular way. | 214 (71.3) | 86 (28.7) | 187 (62.3) | 113 (37.7) |

Source: Field survey, Adusei (2017)

Table 26 shows the reasons for students adopting particular strategies in preparing for essay questions in Core mathematics tasks.

The same number 219 (73.0%) of both junior and high school students said their teachers advised them to learn in a particular way. The majority 233 (77.7%) of the Senior High School students said their previous experience motivate them to study in a particular way as compared to the majority 196 (65.3%) of the Junior High School students who said otherwise.

When asked if they used the strategies in order to conform to the requirements of exam format, the higher majority 252 (84.0%) of the Junior High School students said yes as the lower majority 206 (68.7%) said same. The higher majority 214 (71.3%) of the Junior High School students said their academic counsellor advised them to prepare in a particular way as the lower majority 187 (62.3%) of the Senior High School students said same.

Table 27- *Distribution of the reasons given by students for adopting specific learning strategies in preparing for Essay questions in Integrated Science*

| Statement | JHS | | SHS | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 1. The strategies give me freedom to attend to other important issues during examination period. | 274 (91.3) | 26 (8.7) | 242 (80.7) | 58 (19.3) |
| 2. I am very hopeful that the strategies will enable me come out with success. | 280 (93.3) | 20 (6.7) | 249 (83.0) | 51 (17.0) |
| 3. Though studying using the strategies has not being helpful, however, it is the only way of learning I know. | 216 (72.0) | 84 (28.0) | 163 (54.3) | 137 (45.7) |
| 4. My counsellor advised me to use a particular strategy when preparing for essay exams. | 85 (28.3) | 215 (71.7) | 168 (56.0) | 132 (44.0) |
| 5. I feel less anxious when I learn in a particular way. | 120 (40.0) | 180 (60.0) | 169 (56.3) | 131 (43.7) |

Source: Field survey, Adusei (2017)

Table 27 clearly shows the reasons for students adopting specific strategies in preparing for essay in Integrated Science.

From the results on the Table, the higher majority 274 (91.3%) of the Junior High School students said the strategies give them freedom to attend to other important issues during examination period as was supported by the lower majority 242 (80.7%) of the Senior High School students. Furthermore, the higher majority 280 (93.3%) of the Junior High School students said they were very hopeful that the strategies will enable them come out with success as was also supported by the lower majority 249 (83.0%) of the Senior High School students.

The higher majority 168 (56.0%) of the Senior High School students said that their counsellors advised them to use a particular strategy when preparing for essay exams though the higher majority 215 (71.7%) of the Junior High School students disagreed. Again, the higher majority 169 (56.3%) of the Senior High School students said that they feel less anxious when they learn in a particular way as was disagreed by the higher majority 180 (60.0%) of the Junior High School students.

## Section 9

**Research Question Eight: What age differences exist in the learning strategies adopted by JHS and SHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?**

The eighth question of the study examined the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science. Age differences in learning strategies of the Junior and Senior High School

students were assessed using cross tabulations and chi-square tests. Items 18 to 25 (section C); 46 to 53 (section G) and 74 to 81(section k) of the questionnaire were used in answering this research question. Tables 28, 29 and 30 display the students' age differences of the learning strategies for essay items in English Language, Core Mathematics and Integrated Science respectively.

Table 28- *Summary of Ages of students and the Learning Strategies they adopt when assessed with essay items in English Language Chi-square test*

| Statement | Age-range | True of Me | Not true of Me | df | $\chi^2$ | *p* |
|---|---|---|---|---|---|---|
| | | Freq. (%) | Freq. (%) | | | |
| 18. I concentrate on learning just those bits of information I have to know to pass | 10-12 yrs | 100(91.7) | 95 (70.4) | | | |
| | 13-15 yrs | 95 (70.4) | 40 (29.6) | | | |
| | 16-19 yrs | 211(68.3) | 98 (31.7) | 3 | 24.47* | .00 |
| | 20yrs and over | 31 (66.0) | 16 (34.0) | | | |
| 19. I make sure I read deeply to understand every topic taught | 10-12 yrs | 11 (10.1) | 98 (89.9) | | | |
| | 13-15 yrs | 53 (39.3) | 82 (60.7) | | | |
| | 16-19 yrs | 225(72.8) | 84 (27.2) | 3 | 148.38* | .00 |
| | 20yrs and over | 35 (74.5) | 12 (25.5) | | | |
| 20. I memorise essay samples in pamphlets and reproduce them in exams | 10-12 yrs | 99 (90.8) | 10 (9.2) | | | |
| | 13-15 yrs | 86 (63.7) | 49 (36.3) | | | |
| | 16-19 yrs | 155(50.2) | 154(49.8) | 3 | 62.35* | .00 |
| | 20yrs and over | 20 (42.6) | 27 (57.4) | | | |
| 21. I read novels to help me develop good English essays | 10-12 yrs | 11 (10.1) | 98 (89.9) | | | |
| | 13-15 yrs | 52 (38.5) | 83 (61.5) | | | |
| | 16-19 yrs | 194(62.8) | 115(37.2) | 3 | 107.92* | .00 |
| | 20yrs and over | 26 (55.3) | 20 (42.6) | | | |
| 22. I only write essays during examinations | 10-12 yrs | 100(91.7) | 9 (8.3) | | | |
| | 13-15 yrs | 83 (61.5) | 52 (38.5) | | | |
| | 16-19 yrs | 115(37.2) | 194(62.8) | 3 | 100.87* | .00 |
| | 20yrs and over | 27 (57.4) | 20 (42.6) | | | |
| 23. I try my hands on several essay questions and ask my colleagues and teachers to mark and do corrections for me | 10-12 yrs | 10 (9.2) | 99 (90.8) | | | |
| | 13-15 yrs | 20 (14.8) | 115(85.2) | | | |
| | 16-19 yrs | 131(42.4) | 178(57.6) | 3 | 60.68* | .00 |
| | 20yrs and over | 15 (31.9) | 32 (68.1) | | | |
| 24. I concentrate on the topics I understood and ignore the difficult ones | 10-12 yrs | 99 (90.8) | 10 (9.2) | | | |
| | 13-15 yrs | 83 (61.5) | 52 (38.5) | | | |
| | 16-19 yrs | 132(42.7) | 177(57.3) | 3 | 77.59* | .00 |
| | 20yrs and over | 26 (55.3) | 21 (44.7) | | | |
| 25. When I meet English concepts I do not understand, I join study groups for further explanation. | 10-12 yrs | 10 (9.2) | 99 (90.8) | | | |
| | 13-15 yrs | 36 (26.7) | 99 (73.3) | | | |
| | 16-19 yrs | 173(56.0) | 136(44.0) | 3 | 87.36* | .00 |
| | 20yrs and over | 23 (48.9) | 24 (51.1) | | | |

Source: Field survey, Adusei (2017) *Significant, $p < 0.05$ N=600

The data on Table 28 shows the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with essay items in English Language tasks.

With respect to the surface learning strategies, the percentage of students that concentrate on learning just those bits of information they have to know to pass differed by age, $\chi^2$ (3, N=600) = 24.47, $p < 0.05$. Also, the percentage of students that memorise essay samples in pamphlets and reproduce them in exams differed by age, $\chi^2$ (3, N=600) = 62.35, $p < 0.05$. Furthermore, the percentage of students that only write essays during examinations differed by age $\chi^2$ (3, N=600) = 100.87, $p < 0.05$. The percentage of students that concentrate on the topics they understood and ignore the difficult ones differed by age $\chi^2$ (3, N=600) = 77.59, $p < 0.05$.

Considering the deep learning strategies, the percentage of students that make sure they read deeply to understand every topic taught differed by age, $\chi^2$ (3, N=600) = 148.38, $p < 0.05$. There is significant difference in the ages of students that read novels to help them develop good English essays, $\chi^2$ (3, N=600) = 107.92, $p < 0.05$. The percentage of students that try their hands on several essay questions and ask their colleagues and teachers to mark and do corrections for them differed by age, $\chi^2$ (3, N=600) = 60.68, $p < 0.05$. Again, the percentage of students that when they meet English concepts they do not understand, they join study groups for further explanation differed by age, $\chi^2$ (3, N=600) = 87.36, $p < 0.05$.

Similarly, the younger students (from age 10 to 12 years and 13 to 15 years) recorded high percentages on almost all the surface learning strategies

while the older students (from 16 to 19 years and 20 years and over) shown high percentages on almost all the deep learning strategies.

Table 29- *Summary of Ages of students and the Learning Strategies they adopt when assessed with essay items in Core Mathematics Chi-square test*

| Statement | Age-range | True of Me | Not true of Me | df | $\chi^2$ | *p* |
|---|---|---|---|---|---|---|
| | | Freq. (%) | Freq. (%) | | | |
| 46. I differentiate the easy and hard questions of every exam and specialise on the easy ones | 10-12 yrs | 105(96.3) | 4 (3.7) | | | |
| | 13-15 yrs | 97 (71.9) | 38 (28.1) | | | |
| | 16-19 yrs | 154(49.8) | 155(50.2) | 3 | 82.60* | .00 |
| | 20yrs and over | 24 (51.1) | 23 (48.9) | | | |
| 47. I make sure I understand both the easy and difficult concepts | 10-12 yrs | 11 (10.1) | 98 (89.9) | | | |
| | 13-15 yrs | 59 (43.7) | 76 (56.3) | | | |
| | 16-19 yrs | 237(76.7) | 72 (23.3) | 3 | 159.54* | .00 |
| | 20yrs and over | 33 (70.2) | 14 (29.8) | | | |
| 48. In studying maths, I repeatedly practice similar question types | 10-12 yrs | 98 (89.9) | 11 (10.1) | | | |
| | 13-15 yrs | 112(83.0) | 23 (17.0) | | | |
| | 16-19 yrs | 222(71.8) | 87 (28.2) | 3 | 23.68* | .00 |
| | 20yrs and over | 29 (61.7) | 18 (38.3) | | | |
| 49. I try my hands on different question types and make sure I understand them | 10-12 yrs | 12 (11.0) | 97 (89.0) | | | |
| | 13-15 yrs | 55 (40.7) | 80 (59.3) | | | |
| | 16-19 yrs | 227(73.5) | 82 (26.5) | 3 | 145.97* | .00 |
| | 20yrs and over | 35 (74.5) | 12 (25.5) | | | |
| 50. I always concentrate on my class notes only | 10-12 yrs | 99 (90.8) | 10 (9.2) | | | |
| | 13-15 yrs | 81 (60.0) | 54 (40.0) | | | |
| | 16-19 yrs | 89 (28.8) | 220(71.2) | 3 | 134.02* | .00 |
| | 20yrs and over | 20 (42.6) | 27 (57.4) | | | |
| 51. I learn my class notes and other external materials to understand the maths concepts very well | 10-12 yrs | 12 (11.0) | 97 (89.0) | | | |
| | 13-15 yrs | 51 (37.8) | 84 (62.2) | | | |
| | 16-19 yrs | 237(76.7) | 72 (23.3) | 3 | 161.67* | .00 |
| | 20yrs and over | 30 (63.8) | 17 (36.2) | | | |
| 52. I only learn the definitions of terms and the explanations of maths concepts | 10-12 yrs | 97 (89.0) | 12 (11.0) | | | |
| | 13-15 yrs | 92 (68.1) | 43 (31.9) | | | |
| | 16-19 yrs | 120(38.8) | 189(61.2) | 3 | 102.44* | .00 |
| | 20yrs and over | 15 (31.9) | 32 (68.1) | | | |
| 53. I read other books or materials on what has been taught in order to understand the concepts very well | 10-12 yrs | 11 (10.1) | 98 (89.9) | | | |
| | 13-15 yrs | 57 (42.2) | 78 (57.8) | | | |
| | 16-19 yrs | 246(79.6) | 63 (20.4) | 3 | 176.34* | .00 |
| | 20yrs and over | 31 (66.0) | 16 (34.0) | | | |

Source: Field survey, Adusei (2017)

*Significant, $p < 0.05$ N=600

The data on Table 29 shows the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with essay items in Core Mathematics tasks.

Considering the surface learning strategies, the percentage of students that differentiate the easy and hard questions of every exam and specialise on the easy ones differed by age, $\chi^2$ (3, N=600) = 82.60, $p < 0.05$. Also, the percentage of students that studying maths, they repeatedly practice similar question types differed by age, $\chi^2$ (3, N=600) = 23.68, $p < 0.05$. Furthermore, the percentage of students that always concentrate on their class notes only differed by age $\chi^2$ (3, N=600) = 134.02, $p < 0.05$. The percentage of students that only learn the definitions of terms and the explanations of maths concepts differed by age $\chi^2$ (3, N=600) = 102.44, $p < 0.05$.

With the deep learning strategies, the percentage of students that they make sure they understand both the easy and difficult concepts differed by age, $\chi^2$ (3, N=600) = 159.54, $p < 0.05$. There is significant difference in the ages of students that try their hands on different question types and make sure they understand them, $\chi^2$ (3, N=600) = 145.97, $p < 0.05$. The percentage of students that learn their class notes and other external materials to understand the maths concepts very well differed by age, $\chi^2$ (3, N=600) = 161.67, $p < 0.05$. Again, the percentage of students that read other books or materials on what has been taught in order to understand the concepts very well differed by age, $\chi^2$ (3, N=600) = 176.34, $p < 0.05$.

In sum, the younger students (from age 10 to 12 years and 13 to 15 years) showed high percentages on almost all the surface learning strategies while the

older students (from 16 to 19 years and 20 years and over) shown high percentages on almost all the deep learning strategies.

Table 30- *Summary of Ages of students and the Learning Strategies they adopt when assessed with essay items in Integrated Science Chi-square test*

| Statement | Age-range | True of Me | Not true of Me | df | $\chi^2$ | *p* |
|---|---|---|---|---|---|---|
| | | Freq. (%) | Freq. (%) | | | |
| 74. I only memorise contents the teacher promise to set questions on | 10-12 yrs | 106(97.2) | 3 (2.8) | | | |
| | 13-15 yrs | 99 (73.3) | 36 (26.7) | | | |
| | 16-19 yrs | 158(51.1) | 151(48.9) | 3 | 82.56* | .00 |
| | 20yrs and over | 25 (53.2) | 22 (46.8) | | | |
| 75. I deeply read all contents of what is taught in the term | 10-12 yrs | 12 (11.0) | 97 (89.0) | | | |
| | 13-15 yrs | 38 (28.1) | 97 (71.9) | | | |
| | 16-19 yrs | 198(64.1) | 111(35.9) | 3 | 116.30* | .00 |
| | 20yrs and over | 29 (61.7) | 18 (38.3) | | | |
| 76. When learning new science concepts, I only try to recall from the teachers explanations | 10-12 yrs | 99 (90.8) | 10 (9.2) | | | |
| | 13-15 yrs | 121(89.6) | 14 (10.4) | | | |
| | 16-19 yrs | 196(63.4) | 113(36.6) | 3 | 56.21* | .00 |
| | 20yrs and over | 28 (59.6) | 19 (40.4) | | | |
| 77. When learning new science concepts, I connect them to my previous experiences. | 10-12 yrs | 12 (11.0) | 97 (89.0) | | | |
| | 13-15 yrs | 25 (18.5) | 110(81.5) | | | |
| | 16-19 yrs | 218(70.6) | 91 (29.4) | 3 | 182.79* | .00 |
| | 20yrs and over | 35 (74.5) | 12 (25.5) | | | |
| 78. I am not used to reading external materials other than what I was given at school | 10-12 yrs | 98 (89.9) | 11 (10.1) | | | |
| | 13-15 yrs | 98 (72.6) | 37 (27.4) | | | |
| | 16-19 yrs | 126(40.8) | 183(59.2) | 3 | 106.16* | .00 |
| | 20yrs and over | 15 (31.9) | 32 (68.1) | | | |
| 79. When I do not understand a science concept, I find relevant resources that will help me. | 10-12 yrs | 11 (10.1) | 98 (89.9) | | | |
| | 13-15 yrs | 44 (32.6) | 91 (67.4) | | | |
| | 16-19 yrs | 212(68.6) | 97 (31.4) | 3 | 144.03* | .00 |
| | 20yrs and over | 37 (78.7) | 10 (21.3) | | | |
| 80. I learn using clues (e.g, abbreviations, acronyms and mnemonics) | 10-12 yrs | 100(91.7) | 9 (8.3) | | | |
| | 13-15 yrs | 103(76.3) | 32 (23.7) | | | |
| | 16-19 yrs | 162(52.4) | 147(47.6) | 3 | 74.57* | .00 |
| | 20yrs and over | 19 (40.4) | 28 (59.6) | | | |
| 81. During the learning processes, I attempt to make connections between the concepts that I learn. | 10-12 yrs | 11 (10.1) | 98 (89.9) | | | |
| | 13-15 yrs | 59 (43.7) | 76 (56.3) | | | |
| | 16-19 yrs | 239(77.3) | 70 (22.7) | 3 | 165.93* | .00 |
| | 20yrs and over | 35 (74.5) | 12 (25.5) | | | |

Source: Field survey, Adusei (2017)

*Significant, $p < 0.05$ N=600

The data on Table 30 shows the age differences in the learning strategies the JHS and SHS students adopt when they are assessed with essay items in Integrated Science tasks.

Considering the surface learning strategies, the percentage of students that only memorise contents the teacher promise to set questions on differed by age, $\chi^2$ (3, N=600) = 82.56, $p < 0.05$. Also, the percentage of students that when learning new science concepts, only try to recall from the teachers explanations differed by age, $\chi^2$ (3, N=600) = 56.21, $p < 0.05$. Furthermore, the percentage of students that are not used to reading external materials other than what they were given at school differed by age $\chi^2$ (3, N=600) = 106.16, $p < 0.05$. The percentage of students that learn using clues (e.g, abbreviations, acronyms and mnemonics) differed by age $\chi^2$ (3, N=600) = 74.57, $p < 0.05$.

In terms of the deep learning strategies, the percentage of students that deeply read all contents of what is taught in the term differed by age, $\chi^2$ (3, N=600) = 116.30, $p < 0.05$. There is significant difference in the ages of students that when learning new science concepts, they connect them to their previous experiences, $\chi^2$ (3, N=600) = 182.79, $p < 0.05$. The percentage of students that when they do not understand a science concept, they find relevant resources that will help them differed by age, $\chi^2$ (3, N=600) = 144.03, $p < 0.05$. Again, the percentage of students that during the learning processes, they attempt to make connections between the concepts that they learn differed by age, $\chi^2$ (3, N=600) = 165.93, $p < 0.05$.

In sum, the younger students (from age 10 to 12 years and 13 to 15 years) recorded high percentages on almost all the surface learning strategies while the

older students (from 16 to 19 years and 20 years and over) shown high percentages on almost all the deep learning strategies.

**Section 10**

**Research Question Nine: What gender differences exist in the learning strategies of JHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?**

The ninth question of the study examined the gender differences in the learning strategies the JHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science. Gender differences in learning strategies of the Junior High School students were assessed using cross tabulations and chi-square tests. Items 18 to 25 (section C); 46 to 53 (section G) and 74 to 81(section k) of the questionnaire were used in answering this research question. Tables 31, 32 and 33 display the JHS students' gender differences of the learning strategies for essay items in English Language, Core Mathematics and Integrated Science respectively.

Table 31- *Summary of Gender of JHS students and the Learning Strategies they adopt when assessed with essay items in English Language Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 18. I concentrate on learning just those bits of information I have to know to pass | 148(76.7) | 45 (23.3) | 85 (79.4) | 22 (20.6) |
| | $\chi^2 = .30$ | df = 1 | $p = .58$ | |
| 19. I make sure I read deeply to understand every topic taught | 77 (39.9) | 116(60.1) | 34 (31.8) | 73 (68.2) |
| | $\chi^2 = 1.95$ | df = 1 | $p = .16$ | |
| 20. I memorise essay samples in pamphlets and reproduce them in exams | 119(61.7) | 74 (38.3) | 75 (70.1) | 32 (29.9) |
| | $\chi^2 = 2.14$ | df = 1 | $p = .14$ | |
| 21. I read novels to help me develop good English essays | 79 (40.9) | 114(59.1) | 35 (32.7) | 72 (67.3) |
| | $\chi^2 = 1.98$ | df = 1 | $p = .16$ | |
| 22. I only write essays during examinations | 117(60.6) | 76 (39.4) | 72 (67.3) | 35 (32.7) |
| | $\chi^2 = 1.31$ | df = 1 | $p = .25$ | |
| 23. I try my hands on several essay questions and ask my colleagues and teachers to mark and do corrections for me | 46 (23.8) | 147(76.2) | 14 (13.1) | 93 (86.9) |
| | $\chi^2 = 4.97^*$ | df = 1 | $p = .03$ | |
| 24. I concentrate on the topics I understood and ignore the difficult ones | 126(65.3) | 67 (34.7) | 77 (72.0) | 30 (28.0) |
| | $\chi^2 = 1.40$ | df = 1 | $p = .24$ | |
| 25. When I meet English concepts I do not understand, I join study groups for further explanation. | 63 (32.6) | 130(67.4) | 20 (18.7) | 87 (81.3) |
| | $\chi^2 = 6.70^*$ | df = 1 | $p = .01$ | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 31 shows the gender differences in the learning strategies of JHS students when assessed with essay items in English Language

tasks.

With the surface learning strategies, the percentage of students that concentrate on learning just those bits of information they have to know to pass did not differ by gender, $\chi^2$ (1, N=300) = .30, $p > 0.05$. Also, the percentage of students that memorise essay samples in pamphlets and reproduce them in exams did not differ by gender, $\chi^2$ (1, N=300) = 2.14, $p > 0.05$. Furthermore, the percentage of students that only write essays during examinations did not differ by gender $\chi^2$ (1, N=300) = 1.31, $p > 0.05$. The percentage of students that concentrate on the topics they understood and ignore the difficult ones did not differ by gender $\chi^2$ (1, N=300) = 1.40, $p > 0.05$.

With the deep learning strategies, the percentage of students that make sure they read deeply to understand every topic taught did not differ by age, $\chi^2$ (1, N=300) = 1.95, $p > 0.05$. There is no significant difference in the ages of students that read novels to help them develop good English essays, $\chi^2$ (1, N=300) = 1.98, $p > 0.05$. The percentage of students that try their hands on several essay questions and ask their colleagues and teachers to mark and do corrections for them differed by age, $\chi^2$ (1, N=300) = 4.97, $p < 0.05$. Also, the percentage of students that when they meet English concepts they do not understand, join study groups for further explanation differed by age, $\chi^2$ (1, N=300) = 6.70, $p < 0.05$.

In sum, the female students recorded high percentages on almost all the surface learning strategies while the males recorded high on almost all the deep learning strategies.

Table 32- *Summary of Gender of JHS students and the Learning Strategies they adopt when assessed with essay items in Core Mathematics Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 46. I differentiate the easy and hard questions of every exam and specialise on the easy ones | 141(73.1) | 52 (26.9) | 86 (80.4) | 21 (19.6) |
| | $\chi^2$ =2.00 | df = 1 | *p* =.16 | |
| 47. I make sure I understand both the easy and difficult concepts | 76 (39.4) | 117(60.6) | 37 (34.6) | 70 (65.4) |
| | $\chi^2$ = .68 | df = 1 | *p* =.41 | |
| 48. In studying maths, I repeatedly practice similar question types | 169(87.6) | 24 (12.4) | 91 (85.0) | 16 (15.0) |
| | $\chi^2$ = .38 | df = 1 | *p* =.54 | |
| 49. I try my hands on different question types and make sure I understand them | 78 (40.4) | 115(59.6) | 35 (32.7) | 72 (67.3) |
| | $\chi^2$ =1.74 | df = 1 | *p* =.19 | |
| 50. I always concentrate on my class notes only | 117(60.6) | 76 (39.4) | 70 (65.4) | 37 (34.6) |
| | $\chi^2$ = .68 | df = 1 | *p* =.41 | |
| 51. I learn my class notes and other external materials to understand the maths concepts very well | 77 (39.9) | 116(60.1) | 35 (32.7) | 72 (67.3) |
| | $\chi^2$ = 1.52 | df = 1 | *p* =.22 | |
| 52. I only learn the definitions of terms and the explanations of maths concepts | 145(75.1) | 48 (24.9) | 82 (76.6) | 25 (23.4) |
| | $\chi^2$ = .09 | df = 1 | *p* =.77 | |
| 53. I read other books or materials on what has been taught in order to understand the concepts very well | 80 (41.5) | 113(58.5) | 39 (36.4) | 68 (63.6) |
| | $\chi^2$ = .72 | df = 1 | *p* =.40 | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 32 shows the gender differences in the learning strategies of JHS students when assessed with essay items in Core Mathematics tasks.

With the surface learning strategies, the percentage of students that differentiate the easy and hard questions of every exam and specialise on the easy ones did not differ by gender, $\chi^2$ (1, N=300) = 2.00, $p > 0.05$. Also, the percentage of students that in studying maths, repeatedly practice similar question types did not differ by gender, $\chi^2$ (1, N=300) = .38, $p > 0.05$. Furthermore, the percentage of students that always concentrate on their class notes only did not differ by gender $\chi^2$ (1, N=300) = .68, $p > 0.05$. The percentage of students that only learn the definitions of terms and the explanations of maths concepts did not differ by gender $\chi^2$ (1, N=300) = .99, $p > 0.05$.

With the deep learning strategies, the percentage of students that make sure they understand both the easy and difficult concepts did not differ by gender, $\chi^2$ (1, N=300) = .68, $p > 0.05$. Also, the percentage of students that try their hands on different question types and make sure they understand them did not differ by gender, $\chi^2$ (1, N=300) = 1.74, $p > 0.05$. Furthermore, the percentage of students that learn their class notes and other external materials to understand the maths concepts very well did not differ by gender $\chi^2$ (1, N=300) = 1.52, $p > 0.05$. The percentage of students that read other books or materials on what has been taught in order to understand the concepts very well did not differ by gender $\chi^2$ (1, N=300) = .72, $p > 0.05$.

In sum, the data on the Table shows no significant difference in the adoption of both the surface and deep learning strategies by the students with respect to their gender.

Table 33- *Summary of Gender of JHS students and the Learning Strategies they adopt when assessed with essay items in Integrated Science Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 74. I only memorise contents the teacher promise to set questions on | 138(71.5) | 55 (28.5) | 75 (70.1) | 32 (29.9) |
| | $\chi^2 = .07$ | df = 1 | $p = .80$ | |
| 75. I deeply read all contents of what is taught in the term | 58 (30.1) | 135(69.9) | 19 (17.8) | 88 (82.2) |
| | $\chi^2 = 5.45$* | df = 1 | $p = .02$ | |
| 76. When learning new science concepts, I only try to recall from the teachers explanations | 157(81.3) | 36 (18.7) | 95 (88.8) | 12 (11.2) |
| | $\chi^2 = 2.83$ | df = 1 | $p = .09$ | |
| 77. When learning new science concepts, I connect them to my previous experiences | 68 (35.2) | 125(64.8) | 18 (16.8) | 89 (83.2) |
| | $\chi^2 = 11.41$* | df = 1 | $p = .00$ | |
| 78. I am not used to reading external materials other than what I was given at school | 147(76.2) | 46 (23.8) | 76 (71.0) | 31 (29.0) |
| | $\chi^2 = .95$ | df = 1 | $p = .33$ | |
| 79. When I do not understand a science concept, I find relevant resources that will help me | 61 (31.6) | 132(68.4) | 37 (34.6) | 70 (65.4) |
| | $\chi^2 = .28$ | df = 1 | $p = .60$ | |
| 80. I learn using clues (e.g, abbreviations, acronyms and mnemonics) | 154(79.8) | 39 (20.2) | 75 (70.1) | 32 (29.9) |
| | $\chi^2 = 3.59$ | df = 1 | $p = .06$ | |
| 81. During the learning processes, I attempt to make connections between the concepts that I learn. | 80 (41.5) | 113(58.5) | 42 (39.3) | 65 (60.7) |
| | $\chi^2 = .14$ | df = 1 | $p = .71$ | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 33 shows the gender differences in the learning strategies of JHS students when assessed with essay items in Integrated Science tasks.

With the surface learning strategies, the percentage of students that only memorise contents the teacher promise to set questions on did not differ by gender, $\chi^2$ (1, N=300) = ..70, $p > 0.05$. Also, the percentage of students that i when learning new science concepts, only try to recall from the teachers explanations did not differ by gender, $\chi^2$ (1, N=300) = .2.83, $p > 0.05$. Furthermore, the percentage of students that are not used to reading external materials other than what they were given at school did not differ by gender $\chi^2$ (1, N=300) = .95, $p > 0.05$. The percentage of students that learn using clues (e.g, abbreviations, acronyms and mnemonics) did not differ by gender $\chi^2$ (1, N=300) = 3.59, $p > 0.05$.

With the deep learning strategies, the percentage of students that deeply read all contents of what is taught in the term differed by gender, $\chi^2$ (1, N=300) = 2.94, $p < 0.05$. Also, the percentage of students that when learning new science concepts, connect them to their previous experiences differed by gender, $\chi^2$ (1, N=300) = 1.56, $p < 0.05$. Furthermore, the percentage of students that when they do not understand a science concept, find relevant resources that will help them did not differ by gender $\chi^2$ (1, N=300) = .28, $p > 0.05$. The percentage of students that during the learning processes, attempt to make connections between the concepts they learn did not differ by gender $\chi^2$ (1, N=300) = .14, $p > 0.05$.

In sum, the data on the Table shows no significant difference in the students' adoption of surface learning strategies with respect to their gender. In terms of the deep learning strategies, with the exception of the last two, which

shows no significant difference in the male and female students' adoption, the first two shows that the male students mostly adopt deep learning strategies.

## Section 11

**Research Question Ten: What gender differences exist in the learning strategies of SHS students when assessed with essay items in English Language, Core Mathematics and Integrated Science?**

The tenth question of the study examined the gender differences in the learning strategies the SHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science. Gender differences in learning strategies of the Senior High School students were assessed using cross tabulations and chi-square tests. Items 18 to 25 (section C); 46 to 53 (section G) and 74 to 81(section k) of the questionnaire were used in answering this research question. Tables 34, 35 and 36 display the SHS students' gender differences of the learning strategies for essay items in English Language, Core Mathematics and Integrated Science respectively.

Table 34- *Summary of Gender of SHS students and the Learning Strategies they adopt when assessed with essay items in English Language Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 18. I concentrate on learning just those bits of information I have to know to pass | 100(68.0) | 47 (32.0) | 104(68.0) | 49 (32.0) |
| | $\chi^2$ = .00 | df = 1 | *p* =.99 | |
| 19. I make sure I read deeply to understand every topic taught | 96 (65.3) | 51 (34.7) | 117(76.5) | 36 (23.5) |
| | $\chi^2$ = 4.54* | df = 1 | *p* =.03 | |
| 20. I memorise essay samples in pamphlets and reproduce them in exams | 86 (58.5) | 61 (41.5) | 80 (52.3) | 73 (47.7) |
| | $\chi^2$ = 1.17 | df = 1 | *p* =.28 | |
| 21. I read novels to help me develop good English essays | 67 (45.6) | 79 (53.7) | 102(66.7) | 51 (33.3) |
| | $\chi^2$ =14.17* | df = 1 | *p* =.00 | |
| 22. I only write essays during examinations | 72 (49.0) | 75 (51.0) | 64 (41.8) | 89 (58.2) |
| | $\chi^2$ = 1.55 | df = 1 | *p* =.21 | |
| 23. I try my hands on several essay questions and ask my colleagues and teachers to mark and do corrections for me | 50 (34.0) | 97 (86.0) | 66 (43.1) | 87 (56.9) |
| | $\chi^2$ =2.63 | df = 1 | *p* =.11 | |
| 24. I concentrate on the topics I understood and ignore the difficult ones | 60 (40.8) | 87 (59.2) | 77 (50.3) | 76 (49.7) |
| | $\chi^2$ =2.73 | df = 1 | *p* =.10 | |
| 25. When I meet English concepts I do not understand, I join study groups for further explanation. | 75 (51.0) | 72 (49.0) | 84 (54.9) | 141(45.1) |
| | $\chi^2$ =.45 | df = 1 | *p* =.50 | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 34 shows the gender differences in the learning strategies of SHS students when assessed with essay items in English Language tasks.

With the surface learning strategies, the percentage of students that concentrate on learning just those bits of information they have to know to pass did not differ by gender, $\chi^2$ (1, N=300) = .00, $p > 0.05$. Also, the percentage of students that memorise essay samples in pamphlets and reproduce them in exams did not differ by gender, $\chi^2$ (1, N=300) = 1.17, $p > 0.05$. Furthermore, the percentage of students that only write essays during examinations did not differ by gender $\chi^2$ (1, N=300) = 1.55, $p > 0.05$. The percentage of students that concentrate on the topics they understood and ignore the difficult ones did not differ by gender $\chi^2$ (1, N=300) = 2.73, $p > 0.05$.

With the deep learning strategies, the percentage of students that make sure they read deeply to understand every topic taught differed by age, $\chi^2$ (1, N=300) = 4.54, $p < 0.05$. There is significant difference in the ages of students that read novels to help them develop good English essays, $\chi^2$ (1, N=300) = 14.17, $p < 0.05$. The percentage of students that try their hands on several essay questions and ask their colleagues and teachers to mark and do corrections for them did not differ by age, $\chi^2$ (1, N=300) = 2.63, $p >0.05$. Also, the percentage of students that when they meet English concepts they do not understand, join study groups for further explanation did not differ by age, $\chi^2$ (1, N=300) = .45, $p > 0.05$.

In sum, the data on the Table shows no significant difference in the students' adoption of surface learning strategies with respect to their gender. In terms of the deep learning strategies, with the exception of the last two, which

shows no significant difference in the male and female students' adoption, the first two shows that the female students mostly adopt deep learning strategies.

Table 35- *Summary of Gender of SHS students and the Learning Strategies they adopt when assessed with essay items in Core Mathematics Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 46. I differentiate the easy and hard questions of every exam and specialise on the easy ones | 75 (51.0) | 72 (49.0) | 78 (51.0) | 75 (49.0) |
| | $\chi^2$ =.00 | df = 1 | *p* =.99 | |
| 47. I make sure I understand both the easy and difficult concepts | 114(77.6) | 33 (22.4) | 113(73.9) | 40 (26.1) |
| | $\chi^2$ =.56 | df = 1 | *p* =.46 | |
| 48. In studying maths, I repeatedly practice similar question types | 104(70.7) | 43 (29.3) | 97 (63.4) | 56 (36.6) |
| | $\chi^2$ =1.83 | df = 1 | *p* =.18 | |
| 49. I try my hands on different question types and make sure I understand them | 109(74.1) | 38 (25.9) | 107(69.9) | 46 (30.1) |
| | $\chi^2$ =.66 | df = 1 | *p* =.42 | |
| 50. I always concentrate on my class notes only | 44 (29.9) | 103(70.1) | 58 (37.9) | 95 (62.1) |
| | $\chi^2$ =2.13 | df = 1 | *p* =.15 | |
| 51. I learn my class notes and other external materials to understand the maths concepts very well | 110(74.8) | 37 (25.2) | 108(70.6) | 45 (29.4) |
| | $\chi^2$ =.68 | df = 1 | *p* =.41 | |
| 52. I only learn the definitions of terms and the explanations of maths concepts | 47 (32.0) | 100(68.0) | 50 (32.7) | 103(67.3) |
| | $\chi^2$ =.02 | df = 1 | *p* =.90 | |
| 53. I read other books or materials on what has been taught in order to understand the concepts very well | 117(79.6) | 30 (20.4) | 109(71.2) | 44 (28.8) |
| | $\chi^2$ =2.81 | df = 1 | *p* =.09 | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 35 shows the gender differences in the learning strategies of SHS students when assessed with essay items in Core Mathematics tasks.

With the surface learning strategies, the percentage of students that differentiate the easy and hard questions of every exam and specialise on the easy ones did not differ by gender, $\chi^2$ (1, N=300) = .00, $p > 0.05$. Also, the percentage of students that in studying maths, repeatedly practice similar question types did not differ by gender, $\chi^2$ (1, N=300) = 1.83, $p > 0.05$. Furthermore, the percentage of students that always concentrate on their class notes only did not differ by gender $\chi^2$ (1, N=300) = 2.13, $p > 0.05$. The percentage of students that only learn the definitions of terms and the explanations of maths concepts did not differ by gender $\chi^2$ (1, N=300) = .02, $p > 0.05$.

With the deep learning strategies, the percentage of students that make sure they understand both the easy and difficult concepts did not differ by gender, $\chi^2$ (1, N=300) = .68, $p > .56$. Also, the percentage of students that try their hands on different question types and make sure they understand them did not differ by gender, $\chi^2$ (1, N=300) = .66, $p > 0.05$. Furthermore, the percentage of students that learn their class notes and other external materials to understand the maths concepts very well did not differ by gender $\chi^2$ (1, N=300) = .68, $p > 0.05$. The percentage of students that read other books or materials on what has been taught in order to understand the concepts very well did not differ by gender $\chi^2$ (1, N=300) = 2.81, $p > 0.05$.

In sum, the data on the Table shows no significant difference in the adoption of both the surface and deep learning strategies by the students with respect to their gender.

Table 36- *Summary of Gender of SHS students and the Learning Strategies they adopt when assessed with essay items in Integrated Science Chi-square test*

| Statement | Males | | Females | |
|---|---|---|---|---|
| | True of me | Not true of me | True of me | Not true of me |
| | Freq. (%) | Freq. (%) | Freq. (%) | Freq. (%) |
| 74. I only memorise contents the teacher promise to set questions on | 86 (58.5) | 61(41.5) | 89 (58.2) | 64 (41.8) |
| | $\chi^2$ =.00 | df = 1 | $p$ =.95 | |
| 75. I deeply read all contents of what is taught in the term | 105(71.4) | 42 (28.6) | 95 (62.1) | 58 (37.9) |
| | $\chi^2$ =2.94 | df = 1 | $p$ =.09 | |
| 76. When learning new science concepts, I only try to recall from the teachers explanations | 92 (62.6) | 55 (37.4) | 100(65.4) | 53 (34.6) |
| | $\chi^2$ =.25 | df = 1 | $p$ =.61 | |
| 77. When learning new science concepts, I connect them to my previous experiences | 105(71.4) | 42 (28.6) | 99 (64.7) | 54 (35.3) |
| | $\chi^2$ =1.56 | df = 1 | $p$ =.21 | |
| 78. I am not used to reading external materials other than what I was given at school | 53 (36.1) | 94 (63.9) | 61 (39.9) | 92 (60.1) |
| | $\chi^2$ = .46 | df = 1 | $p$ =.50 | |
| 79. When I do not understand a science concept, I find relevant resources that will help me | 103(70.1) | 44 (29.9) | 103(67.3) | 50 (32.7) |
| | $\chi^2$ =.26 | df = 1 | $p$ =.61 | |
| 80. I learn using clues (e.g, abbreviations, acronyms and mnemonics) | 79 (53.7) | 68 (46.3) | 76 (49.7) | 77 (50.3) |
| | $\chi^2$ =.50 | df = 1 | $p$ =.48 | |
| 81. During the learning processes, I attempt to make connections between the concepts that I learn. | 112(76.2) | 35 (23.8) | 110(71.9) | 43 (28.1) |
| | $\chi^2$ =.72 | df = 1 | $p$ =.40 | |

Source: Field survey, Adusei (2017)
*Significant, $p < 0.05$ N=300

The data on Table 36 shows the gender differences in the learning strategies of SHS students when assessed with essay items in Integrated Science tasks.

With the surface learning strategies, the percentage of students that only memorise contents the teacher promise to set questions on did not differ by gender, $\chi^2$ (1, N=300) = .00, $p > 0.05$. Also, the percentage of students that i when learning new science concepts, only try to recall from the teachers explanations did not differ by gender, $\chi^2$ (1, N=300) = .25, $p > 0.05$. Furthermore, the percentage of students that are not used to reading external materials other than what they were given at school did not differ by gender $\chi^2$ (1, N=300) = .46, $p > 0.05$. The percentage of students that learn using clues (e.g, abbreviations, acronyms and mnemonics) did not differ by gender $\chi^2$ (1, N=300) = .50, $p > 0.05$.

With the deep learning strategies, the percentage of students that deeply read all contents of what is taught in the term did not differ by gender, $\chi^2$ (1, N=300) = 2.94, $p > 0.05$. Also, the percentage of students that when learning new science concepts, connect them to their previous experiences did not differ by gender, $\chi^2$ (1, N=300) = 1.56, $p > 0.05$. Furthermore, the percentage of students that when they do not understand a science concept, find relevant resources that will help them did not differ by gender $\chi^2$ (1, N=300) = .26, $p > 0.05$. The percentage of students that during the learning processes, attempt to make connections between the concepts they learn did not differ by gender $\chi^2$ (1, N=300) = .72, $p > 0.05$.

In sum, the data on the Table shows no significant difference in the adoption of both the surface and deep learning strategies by the students with respect to their gender.

## Discussion of Research Findings

In this section, the findings are discussed in relation to:

1. The learning strategies JHS and SHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
2. The reasons JHS and SHS students assign for the learning strategies they adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
3. The age differences in the learning strategies the JHS and SHS students adopt when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
4. The gender differences in the learning strategies the JHS students adopt when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
5. The gender differences in the learning strategies the SHS students adopt when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science.
6. The learning strategies JHS and SHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science.
7. The reasons JHS and SHS students give for the learning strategies they adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science.

8. The age differences in the learning strategies the JHS and SHS students adopt when assessed with essay items in English Language, Core Mathematics and Integrated Science.
9. The gender differences in the learning strategies the JHS students adopt when assessed with essay items in English Language, Core Mathematics and Integrated Science.
10. The gender differences in the learning strategies the SHS students adopt when assessed with essay items in English Language, Core Mathematics and Integrated Science.

**The learning strategies JHS and SHS students adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science**

The findings on Tables 7, 8, and 9 respectively shows that majority of the Senior High School students adopt deep learning strategies as compared to the Junior High School students who mostly adopt surface learning strategies when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science examinations. For instance, the findings on the students' learning strategies on multiple-choice items in English language clearly indicate that majority of the Senior High School students responded that almost all the deep learning strategies (i.e., "I do a thorough reading and make very sure I understand every concept", "I search for meaning of words and their opposite in the dictionary and on the internet when I come across in past questions and pamphlets" and "I use the new words taught in class in my daily conversation to help me identify them during exams") were true of them as the Junior High School students mainly indicated that almost all the

surface learning strategies (i.e., "I tend to read very little beyond what is actually required to pass", "I memorise the meaning of words and their opposite in past questions and pamphlets " and "I answer past questions alone and memorise the answers") were also true of them.

Similarly, the findings on the students' learning strategies on multiple-choice items in Core Mathematics also shows that most of the Senior High School students indicated the deep learning strategies (i.e., "I study the class notes and textbook again and again", "I link the class notes to textbook examples to improve my understanding", "I use real examples to confirm the math theory conclusions" and "I always compare the difference between the teacher's explanation and textbook content") were true of them while the Junior High School students indicated the surface learning strategies (i.e., "I memorize the important and key maths formulae to remind me of the important parts of my math class", "I read through the class notes and mark up contents that have been dropping in the past questions and specialise on them", "I just accept the math theory conclusions and memorise them", and "I only stick to what the teacher teaches me in class") were true of them.

Finally, the findings on the Table 9 shows that most of the Senior High School students adopts deep learning strategies (i.e., "I read my notes and text books carefully, paying attention to details", "I spend time finding more information on topics taught from other books", "I join study groups for further explanation of concepts", and "I read my notes soon after the day's lesson for a better understanding") when preparing for multiple-choice items in Integrated Science while the Junior High School students indicated that they mostly adopt the surface learning strategies (i.e., "I memorise concepts taught in class and

from text books", "I don't spend much time learning things I think wouldn't be asked in the exam", "I learn some things by rote, going over and over until I know them "by heart"", and "I wait until it is very close to examination before I start preparing").

This finding corroborates with a study by Baeten, Kyndt, Struyven, and Dochy (2010) who discovered that age is one of the reasons for students' choice of specific learning strategies. In their study, they contended that older students, mostly, adopt deep learning strategies while younger students tended to focus on the intake of knowledge and adopt surface learning strategies. The findings of the present study is in disagreement with the findings of Scouller (1998) who researched into the influence of assessment method on student learning strategies paying particular attention to multiple-choice item format and that of essay item format and found that students significantly employed surface learning strategies more when preparing for multiple-choice examination than when preparing for essay examination. This difference in Scouller's finding and the present study could be due to the fact that his study employed only one academic group since the various levels of study is seen as a contributory factor of students' choice of particular learning strategies. The findings from this study implies that as students' progress to a higher academic level they tend to adopt deep learning strategies. That notwithstanding, teachers at the lower levels like the junior high schools should still craft test items that are able to target all the behavioural areas to encourage students to adopt both surface and deep learning strategies in their preparation when necessary.

**The reasons JHS and SHS students assign for the learning strategies they adopt when they are assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science**

Most of the students from the two levels of education (Junior High School and Senior High School) have confidence that the choice of particular learning strategies in preparing for multiple choice items in English Language, Core Mathematics and Integrated Science examinations will help them to pass. This finding is in agreement with a study by Nota et al., (2004) which found that effective learning strategies promote academic success and the tendency to continue one's education. Again, most of the students from the two levels of education adopt particular learning strategies due to the excellent outcome when used in their previous examinations. This finding largely agrees with suggestions from other researchers (e.g, Chau, 2005; Oxford & Nyikos, 1989 and Watanabe, 1992) that learners' prior experience of tests may play a powerful role in shaping their learning strategies. With this, it can therefore be concluded that students will always adopt learning strategies which helped them to excel and put an end to those strategies which were not helpful. Also, majority of the students from the two levels indicated they adopt particular learning strategies in order to conform to the requirements of the exam format which is in agreement with a study by Andrew et al., (2002). Their study investigated the Hong Kong Advanced Supplementary 'use of English' oral examination. They, however, found out that the learning outcomes for different students varied significantly, which they added that the test may have led to improved performance (for some), but in others, only a superficial learning outcome, such as the ability to conform to the requirements of exam format, or to produce

memorised phrases. This study indicated that test takers' awareness of the changed test format did directly lead to a change in their performance. This implies that students, despite their academic level always adopt particular learning strategies they think will help them to excel.

Last but not least, students at the two levels of education indicated that they feel less anxious when they learn in a particular way with respect to multiple-choice items in Core Mathematics and Integrated Science, though, most of them indicated they do not feel anxious with English Language examinations. Soresi (2000) emphasized that for students to control anxiety and fear about exams and tests, connecting new ideas with previous knowledge bases, they use learning strategies to facilitate study activities. This, therefore, implies that students' adoption of specific learning strategies in preparing for examinations helps them to reduce any form of examination tensions and fears.

**The age differences in the learning strategies the JHS and SHS students adopt when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science**

The findings from the Tables 13, 14, and 15 shows that the younger students (from age 10 to 12 years and 13 to 15 years) recorded high percentages on almost all the surface learning strategies while the older ones (from 16 to 19 years and 20 years and over) recorded high percentages on almost all the deep learning strategies.

With respect to the multiple-choice items in the three core subjects (English Language, Core Mathematics and Integrated Science) the data on the Tables 13, 14 and 15 clearly confirms that the junior high school students who mostly fall within the age range of 10 years to 15 years mainly adopt surface

learning strategies while the senior high school students who fall within the age range of 16 years to 19 years mostly adopt deep learning strategies.

The difference in the learning strategies between the students at the two levels of education corroborates with Baeten et al., (2010) study that age is one of the reasons for students' choice of specific learning strategies. Which they contended in their study that older students, mostly, adopt deep learning strategies while younger students tend to focus on the intake of knowledge and adopt surface strategies. This implies that questions from teachers at the lower levels may not be challenging and so teachers should therefore set questions to cover the higher level behaviours to enable students to adopt deep learning strategies in their preparation.

**The gender differences in the learning strategies the JHS students adopt when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science**

In general, apart from English Language where female students adopt more surface learning strategies while male students adopt more deep learning strategies, there was no difference in the students' adoption of the learning strategies in multiple-choice items in Core Mathematics and Integrated Science tasks. This finding is in disagreement with Marrs and Sigler (as cited in Wang, 2013) study which found that among American colleges, female students tended to adopt deeper strategies to learning than males. This implies that there is no clear cut difference between males and females in their choice of particular learning strategies.

**The gender differences in the learning strategies the SHS students adopt when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science**

The result clearly indicates that apart from surface learning strategies in Core Mathematics where males mostly dominate, there was no gender difference in the deep learning strategies coupled with the learning strategies in English Language and Integrated Science. Similarly, this finding disagrees with Marrs and Sigler (as cited in Wang, 2013) finding that among American colleges, female students tended to adopt deeper strategies to learning than males. Still, there seem to be no difference in the adoption of learning strategies with respect to the gender of students.

**The learning strategies JHS and SHS students adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science**

The findings on Tables 19, 20, and 21 respectively shows that majority of the Senior High School students adopt deep learning strategies as compared to the Junior High School students who mostly adopt surface learning strategies when assessed with essay items in English Language, Core Mathematics and Integrated Science examinations. With respect to the essay items in English Language examinations, the Table 19 shows that most of the Senior High School students indicated they adopt the deep learning strategies (i.e., "I make sure I read deeply to understand every topic taught", "I read novels to help me develop good English essays" and "When I meet English concepts I do not understand, I join study groups for further explanation.") while most of the Junior High School students indicated they mostly adopt the surface learning

strategies (i.e., “I concentrate on learning just those bits of information I have to know to pass”, “I memorise essay samples in pamphlets and reproduce them in exams”, “I only write essays during examinations” and “I concentrate on the topics I understood and ignore the difficult ones”).

Similarly, the findings on the students’ learning strategies on essay items in Core Mathematics clearly shows that the Senior High School students mostly adopt the deep learning strategies (i.e., “I make sure I understand both the easy and difficult concepts”, “I try my hands on different question types and make sure I understand them”, “I learn my class notes and other external materials to understand the maths concepts very well” and “I read other books or materials on what has been taught in order to understand the concepts very well”) in preparing for essay items in Core Mathematics examinations unlike the Junior High School students who mostly adopt the surface learning strategies (i.e., “I differentiate the easy and hard questions of every exam and specialise on the easy ones”, “In studying maths, I repeatedly practice similar question types”, “I always concentrate on my class notes only” and “I only learn the definitions of terms and the explanations of maths concepts”).

Last but not least, the findings also show that similarly, the Senior High School students mostly adopt deep learning strategies (i.e., “I deeply read all contents of what is taught in the term”, “When learning new science concepts, I connect them to my previous experience”, “When I do not understand a science concept, I find relevant resources that will help me” and “During the learning processes, I attempt to make connections between the concepts that I learn”) when preparing for essay items in Integrated Science examinations as compared to the majority of the Junior High School students who mostly adopt

the surface learning strategies (i.e., "I only memorise contents the teacher promise to set questions on", "When learning new science concepts, I only try to recall from the teachers explanations", "I am not used to reading external materials other than what I was given at school" and "I learn using clues e.g., abbreviations, acronyms and mnemonics").

This finding still supports Baeten et al., (2010) finding that age is one of the reasons for students' choice of specific learning strategies. They added that older students, mostly, adopt deep learning strategies while younger students tend to focus on the intake of knowledge and adopt surface learning strategies. Nevertheless, the findings of the study disagrees with Scouller's (1998) finding that the students' significantly employed deep learning strategies more when preparing for their essay than when preparing for multiple-choice examination. This present finding makes it clear that the choice of particular learning strategy is not dependent on the item format but more importantly on the maturity level of the students. Though, Macaro (2000) mentioned that a handful of empirical studies (Chau, 2005; Oxford & Nyikos, 1989 and Watanabe, 1992) have suggested that item formats influence learners' choice of learning strategies. The findings in this present study still implies that students at high academic levels are more likely to employ deep learning strategies compared to those at the lower levels.

**The reasons JHS and SHS students give for the learning strategies they adopt when they are assessed with essay items in English Language, Core Mathematics and Integrated Science**

The results on the reasons for students' adoption of particular learning strategies when assessed with essay item format in English Language, Core

Mathematics and Integrated Science are somehow similar to the previous findings in this study. For instance, majority of the students from the two levels of education made it clear that they always use particular learning strategies to score high marks in order to be part of the best in class. This reason is, again, supported by a study by Nota et al., (2004) which found that effective learning strategies promote academic success and the tendency to continue ones' education. This assertion therefore implies that for a student to come out with flying colours in any examination, there is the need to adopt a learning strategy which will help him/her to easily understand and provide solutions to the available questions/problems. Moreover, most of the students from the two levels indicated they use particular learning strategies because the previous ones did not help them to excel in the exam. This finding, again, is in line with a study by Chau, 2005; Oxford & Nyikos, 1989 and Watanabe, 1992 which suggested that learners' prior experience of tests may play a powerful role in shaping their learning strategies. With this, the implication is that students' prior experience help them to evaluate the learning strategies they adopted previously and take an important decision in their studies as to whether to stop, modify or continue to use it.

**The age differences in the learning strategies the JHS and SHS students adopt when assessed with essay items in English Language, Core Mathematics and Integrated Science**

Similarly, with respect to the essay items in the three core subjects (English Language, Core Mathematics and Integrated Science) the data on the Tables 28, 29 and 30 clearly confirms that the junior high school students who mostly fall within the age range of 10 years to 15 years mainly adopt surface

learning strategies while the senior high school students who fall within the age range of 16 years to 19 years mostly adopt deep learning strategies.

The difference in the learning strategies between the students at the two levels of education confirms to Baeten et al., (2010) study that age is one of the reasons for students' choice of specific learning strategies. They found that younger students tend to concentrate more on recall and hence adopt surface learning strategies while older students mostly concentrate on deep learning strategies. In effect, teachers at the lower levels in constructing essay questions, should target the higher lever behaviours to challenge students to learn for in-depth understanding of the concepts.

**The gender differences in the learning strategies the JHS students adopt when assessed with essay items in English Language, Core Mathematics and Integrated Science**

The results on the students' adoption of learning strategies in English Language shows that female students mostly adopt surface learning strategies while male students mostly adopt deep learning strategies. Moreover, the results on Core Mathematics and Integrated Science shows no significant difference in the students' adoption of the learning strategies. Again, the findings of the current study opposes the findings of Marrs and Sigler (as cited in Wang, 2013) that indicated that among American colleges, female students tended to adopt deeper strategies to learning than males. Similarly, male and female students seem to adopt the same learning strategies in their preparation towards tests in the various item formats irrespective of the course.

**The gender differences in the learning strategies the SHS students adopt when assessed with essay items in English Language, Core Mathematics and Integrated Science**

The result clearly indicates that apart from deep learning strategies in English Language where females mostly dominate, there was no gender difference in the surface learning strategies coupled with the learning strategies in Core Mathematics and Integrated Science. Similarly, this finding disagrees with Marrs and Sigler (as cited in Wang, 2013) finding that among American colleges, female students tended to adopt deeper strategies to learning than males. Still, there seem to be no difference in the adoption of learning strategies with respect to the gender of students. This makes it very clear that the relationship between gender and learning strategies cannot be conclusively established as asserted by Baeten et., (2010).

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## Summary

### Overview of the Study

The study sought to compare the types of learning strategies Junior and Senior High School students adopt when they are assessed with different item formats (i.e., multiple-choice items and essay items) in English Language, Core Mathematics and Integrated Science examinations and their reasons for adopting the particular learning strategies. Efforts were also made to find out whether there are age and gender differences in the learning strategies adopted by the students from the two educational levels.

A descriptive survey was conducted in the Junior and Senior High Schools in the Komenda-Edina-Eguafo-Abirem (KEEA) District using an initial sample size of 660. The population for the study was students from the Junior and Senior High Schools in the Komenda-Edina-Eguafo-Abirem (KEEA) District. The Lottery method of the simple random sampling and a multi-level sampling technique were used in selecting the Junior and Senior High School students respectively. A questionnaire was the main instrument used for the study. Statistical procedures used in data analysis were frequency distributions, percentages and Chi-square tests.

### Key Findings

1. Senior High School students mostly adopt deep learning strategies as compared to the Junior High School students who mostly adopt surface

learning strategies when assessed with multiple-choice items in English Language, Core Mathematics and Integrated Science examinations.

2. Students at the two educational levels indicated some reasons like the decrease in test anxiety, their experience with specific learning outcomes, just to mention a few as their motivation for adopting specific learning strategies when assessed with multiple-choice items in the English Language, Core Mathematics and Integrated Science examinations.
3. The findings confirm that younger students mostly adopt surface learning strategies while older students mostly adopt deep learning strategies when preparing for examinations in multiple-choice items in the three core subjects.
4. In general, apart from English Language where female students adopt more surface learning strategies while male students adopt more deep learning strategies, there was no difference in the students' adoption of the learning strategies in multiple-choice items in Core Mathematics and Integrated Science tasks.
5. The result clearly indicates that apart from surface learning strategies in Core Mathematics where males mostly dominate, there was no gender difference in the deep learning strategies coupled with the learning strategies in English Language and Integrated Science.
6. Senior High School students adopt deep learning strategies as compared to the Junior High School students who mostly adopt surface learning strategies when assessed with essay items in English Language, Core Mathematics and Integrated Science examinations

7. Students at the two educational levels indicated their reasons for adopting specific learning strategies when assessed with essay items in the English Language, Core Mathematics and Integrated Science examinations.
8. The findings confirm that younger students mostly adopt surface learning strategies while older students mostly adopt deep learning strategies when preparing for examinations in essay items in the three core subjects.
9. The results on the students' adoption of learning strategies in English Language shows that female students mostly adopt surface learning strategies while male students mostly adopt deep learning strategies. Moreover, the results on Core Mathematics and Integrated Science shows no significant difference in the students' adoption of the learning strategies.
10. The result clearly indicates that apart from deep learning strategies in English Language where females mostly dominate, there was no gender difference in the surface learning strategies coupled with the learning strategies in Core Mathematics and Integrated Science.

## Conclusions

It is apparent from the study that, on the whole, Senior High School students adopt deep learning strategies towards both multiple-choice and essay item formats in all the three core subjects. In contrast, the Junior High School students who were identified as younger were seen to adopt surface learning strategies in preparing towards both items formats in all the three core subjects.

The results have also shown that students' adoption of specific learning strategies were based on several reasons.

The study has revealed the impacts of the two main item formats on students learning. Thus, the reasons for the adoption of specific learning strategies towards the various items formats from the perspective of the students is well understood.

## Recommendations

### Recommendations for Policy and Practice

Based on the findings of the study, the following recommendations are made for policy and practice in the Junior and Senior high schools:

1. The results show that, students from the Junior High Schools in preparing for almost all the core subjects in both multiple-choice and essay item formats mostly adopt the surface learning strategies which in actual sense might be as a result of the way teachers or test constructors go about constructing their test items at that level. I believe the nature of their items may be normally based on the lower level behaviour which mostly poses less challenge on the candidates to learn well. The Teacher Education Division of the Ghana Education Service in collaboration with the Faculty of Educational Foundations of the University of Cape Coast and the Department of Psychology and Education of the University of Education, Winneba, who have experts in this regard should organise in-service training for teachers on how to construct multiple-choice and essay items that measure outcomes beyond the knowledge level which will challenge students to adopt deep learning

strategies as well and therefore help them to excel in both internal and external examinations.

2. Again, school counsellors, teachers, school authorities and other stakeholders, like parents should expose students at the two educational levels to the appropriate ways of learning and also motivate them to excel on the various subjects taught at school.
3. The study has also revealed that, the quality of student learning could be enhanced by the careful selection of item formats. Thus, teachers must select assessment techniques that most effectively encourage good study strategies when assessing them.

**Suggestions for Future Research**

To further extend the literature on the type of learning strategies Junior and Senior High School students adopt when they are assessed with different item formats (i.e., multiple-choice items and essay items) in English Language, Core Mathematics and Integrated Science examinations and their reasons for adopting specific strategies in preparing towards these item formats, the following recommendations for further studies are made:

1. Students' learning strategies may be influenced by the programmes of study in the universities. A study to determine whether soft and hard academic disciplines of study might also influence students' learning strategies is suggested.
2. There seems to be a gap in the literature on a comparative study that looks at the learning strategies adopted by Junior and Senior High School students in preparing towards different item formats with respect

to their gender (males and females). A study in that regard will enhance the literature on students learning strategies.

3. A similar study should be carried out in other Junior and Senior High Schools from other districts in other regions so as to make the results and conclusions as well as generalizations of the study more evocative and applicable in a national context.

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# APPENDICES

**APPENDIX A**

**UNIVERSITY OF CAPE COAST**

**COLLEGE OF EDUCATION STUDIES**

**FACULTY OF EDUCATIONAL FOUNDATIONS**

QUESTIONNAIRE FOR THE JUNIOR HIGH AND SENIOR HIGH SCHOOL STUDENTS

This questionnaire is designed to find out the learning strategies you adopt when you are to be assessed with multiple choice and essay tests and your reasons for the choice of these strategies.

There is no single best or correct way of studying especially when preparing for examination. It depends on what suits your own learning style. Please answer the questions as frankly as you can. Whatever you say will be treated as confidential. Thank you in advance for your cooperation.

**BACKGROUND INFORMATION OF THE RESPONDENTS**

***Specify your response by writing or ticking (√) where appropriate.***

1. Name of School: .....
2. Sex of respondent: Male [ ] Female [ ]
3. Age of respondent: 10 – 12 [ ] 13 – 15 [ ]
   16 – 19 [ ] 20 and Above [ ]

**INSTRUCTIONS**

Read each statement and make sure you understand it. On the right side of each statement there is a row of boxes; **tick (√)** the most appropriate **box** that best describes your response to the statement and also write in your own words where appropriate.

SECTION A: LEARNING STRATEGIES STUDENTS ADOPT WHEN THEY ARE ASSESSED WITH MULTIPLE-CHOICE QUESTIONS IN **ENGLISH LANGUAGE**

| Statement | True of me | Not True of me |
|---|---|---|
| 4. I tend to read very little beyond what is actually required to pass | | |
| 5. I do a thorough reading and make very sure I understand every concept | | |
| 6. I memorise the meaning of words and their opposite in past questions and pamphlets | | |
| 7. I search for meaning of words and their opposite in the dictionary and on the internet when I come across in past questions and pamphlets | | |
| 8. I memorise new words taught in class to be able to recall them during exams | | |
| 9. I use the new words taught in class in my daily conversation to help me identify them during exams. | | |
| 10. I answer past questions alone and memorise the answers | | |
| 11. I compare my class notes and past questions and seek further assistance from colleagues and teachers where necessary. | | |

SECTION B: REASONS OF STUDENTS FOR ADOPTING THE STRATEGIES IN PREPARING FOR MULTIPLE CHOICE QUESTIONS IN **ENGLISH LANGUAGE**

| Statement | Yes | No |
|---|---|---|
| 12. I feel more confident that the strategies will help me pass | | |
| 13. I feel less anxious when I learn in a particular way | | |
| 14. I use the strategies because my colleagues used them and they excelled | | |
| 15. I used the strategies previously and they were very helpful | | |
| 16. I use the strategies in order to conform to the requirements of the exam format | | |

17. Please specify, if there is any other reason …….....

……..

……..

SECTION C: LEARNING STRATEGIES STUDENTS ADOPT WHEN THEY ARE ASSESSED WITH ESSAY QUESTIONS IN **ENGLISH LANGUAGE**

| Statement | True of me | Not True of me |
|---|---|---|
| 18. I concentrate on learning just those bits of information I have to know to pass | | |
| 19. I make sure I read deeply to understand every topic taught | | |
| 20. I memorise essay samples in pamphlets and reproduce them in exams | | |
| 21. I read novels to help me develop good English essays | | |
| 22. I only write essays during examinations | | |
| 23. I try my hands on several essay questions and ask my colleagues and teachers to mark and do corrections for me | | |
| 24. I concentrate on the topics I understood and ignore the difficult ones | | |
| 25. When I meet English concepts I do not understand, I join study groups for further explanation. | | |

SECTION D: REASONS OF STUDENTS FOR ADOPTING THE STRATEGIES IN PREPARING FOR ESSAY QUESTIONS IN **ENGLISH LANGUAGE**

| Statement | Yes | No |
|---|---|---|
| 26. The requirements of the exams help me to learn this way to be able to attempt all the questions in a particular section | | |
| 27. I always use the strategies to score high marks in order to be part of the best students in class | | |
| 28. I use the strategies because the previous one did not help me to excel in the exam | | |
| 29. My academic counsellor advised me to prepare in a particular way | | |
| 30. I feel less anxious when I learn in a particular way | | |

31. Please specify, if there is any other reason …….....

……..

……..

SECTION E: LEARNING STRATEGIES STUDENTS ADOPT WHEN THEY ARE ASSESSED WITH MULTIPLE-CHOICE QUESTIONS IN **CORE MATHEMATICS**

| Statement | True of me | Not True of me |
|---|---|---|
| 32. I memorize the important and key maths formulae to remind me of the important parts of my math class | | |
| 33. I study the class notes and textbook again and again. | | |
| 34. I read through the class notes and mark up contents that have been dropping in the past questions and specialise on them. | | |
| 35. I link the class notes to textbook examples to improve my understanding. | | |
| 36. I just accept the math theory conclusions and memorise them | | |
| 37. I use real examples to confirm the math theory conclusions. | | |
| 38. I only stick to what the teacher teaches me in class | | |
| 39. I always compare the difference between the teacher's explanation and textbook content | | |

SECTION F: REASONS OF STUDENTS FOR ADOPTING THE STRATEGIES IN PREPARING FOR MULTIPLE CHOICE QUESTIONS IN **CORE MATHEMATICS**

| Statement | Yes | No |
|---|---|---|
| 40. I am not really sure what is important in class, so I try to get down all I can. | | |
| 41. I feel less anxious when I learn in a particular way | | |
| 42. I used the strategies previously and they were very helpful | | |
| 43. I feel more confident that the strategies will help me pass | | |
| 44. I used the strategies in order to conform to the requirements of exam format | | |

45. Please specify, if there is any other reason …….....

……..

……..

SECTION G: LEARNING STRATEGIES STUDENTS ADOPT WHEN THEY ARE ASSESSED WITH ESSAY QUESTIONS IN **CORE MATHEMATICS**

| Statement | True of me | Not True of me |
|---|---|---|
| 46. I differentiate the easy and hard questions of every exam and specialise on the easy ones | | |
| 47. I make sure I understand both the easy and difficult concepts | | |
| 48. In studying maths, I repeatedly practice similar question types | | |
| 49. I try my hands on different question types and make sure I understand them | | |
| 50. I always concentrate on my class notes only | | |
| 51. I learn my class notes and other external materials to understand the maths concepts very well | | |
| 52. I only learn the definitions of terms and the explanations of maths concepts | | |
| 53. I read other books or materials on what has been taught in order to understand the concepts very well | | |

SECTION H: REASONS OF STUDENTS FOR ADOPTING THE STRATEGIES IN PREPARING FOR ESSAY QUESTIONS IN **CORE MATHEMATICS**

| Statement | Yes | No |
|---|---|---|
| 54. My teachers advised me to learn in a particular way | | |
| 55. My previous experience motivates me to learn in a particular way | | |
| 56. I feel less anxious when I learn in a particular way | | |
| 57. I used the strategies in order to conform to the requirements of exam format | | |
| 58. My academic counsellor advised me to prepare in a particular way | | |

59. Please specify, if there is any other reason …….....

……..

……..

SECTION I: LEARNING STRATEGIES STUDENTS ADOPT WHEN THEY ARE ASSESSED WITH MULTIPLE-CHOICE QUESTIONS IN **INTEGRATED SCIENCE**

| Statement | True of me | Not True of me |
|---|---|---|
| 60. I memorise concepts taught in class and from text books | | |
| 61. I read my notes and text books carefully, paying attention to details | | |
| 62. I don't spend much time learning things I think wouldn't be asked in the exam | | |
| 63. I spend time finding more information on topics taught from other books | | |
| 64. I learn some things by rote, going over and over until I know them "by heart" | | |
| 65. I join study groups for further explanation of concepts | | |
| 66. I wait until it is very close to examination before I start preparing | | |
| 67. I read my notes soon after the day's lesson for a better understanding | | |

SECTION J: REASONS OF STUDENTS FOR ADOPTING THE STRATEGIES IN PREPARING FOR MULTIPLE CHOICE QUESTIONS IN **INTEGRATED SCIENCE**

| Statement | Yes | No |
|---|---|---|
| 68. Because it mostly require recall | | |
| 69. I feel less anxious when I learn in a particular way | | |
| 70. I feel more confident that the strategies will help me | | |
| 71. I use the strategies because my colleagues used them and they excelled | | |
| 72. The multiple-choice questions do not demand much from me and so the strategies are good for it | | |

73. Please specify, if there is any other reason …….....

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……..

SECTION K: LEARNING STRATEGIES STUDENTS ADOPT WHEN THEY ARE ASSESSED WITH ESSAY QUESTIONS IN **INTEGRATED SCIENCE**

| Statement | True of me | Not True of me |
|---|---|---|
| 74. I only memorise contents the teacher promise to set questions on | | |
| 75. I deeply read all contents of what is taught in the term | | |
| 76. When learning new science concepts, I only try to recall from the teachers explanations | | |
| 77. When learning new science concepts, I connect them to my previous experiences. | | |
| 78. I am not used to reading external materials other than what I was given at school | | |
| 79. When I do not understand a science concept, I find relevant resources that will help me. | | |
| 80. I learn using clues (e.g, abbreviations, acronyms and mnemonics) | | |
| 81. During the learning processes, I attempt to make connections between the concepts that I learn. | | |

SECTION L: REASONS OF STUDENTS FOR ADOPTING THE STRATEGIES IN PREPARING FOR ESSAY QUESTIONS IN **INTEGRATED SCIENCE**

| Statement | Yes | No |
|---|---|---|
| 82. The strategies give me freedom to attend to other important issues during examination period. | | |
| 83. I am very hopeful that the strategies will enable me come out with success | | |
| 84. Though studying using the strategies has not being helpful, however, it is the only way of learning I know. | | |
| 85. My counsellor advised me to use a particular strategy when preparing for essay exams. | | |
| 86. I feel less anxious when I learn in a particular way | | |

87. Please specify, if there is any other reason …….....

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## APPENDIX B

Please I will attach the ethical consideration form here.

## APPENDIX C

**I will attach the introduction letter here**