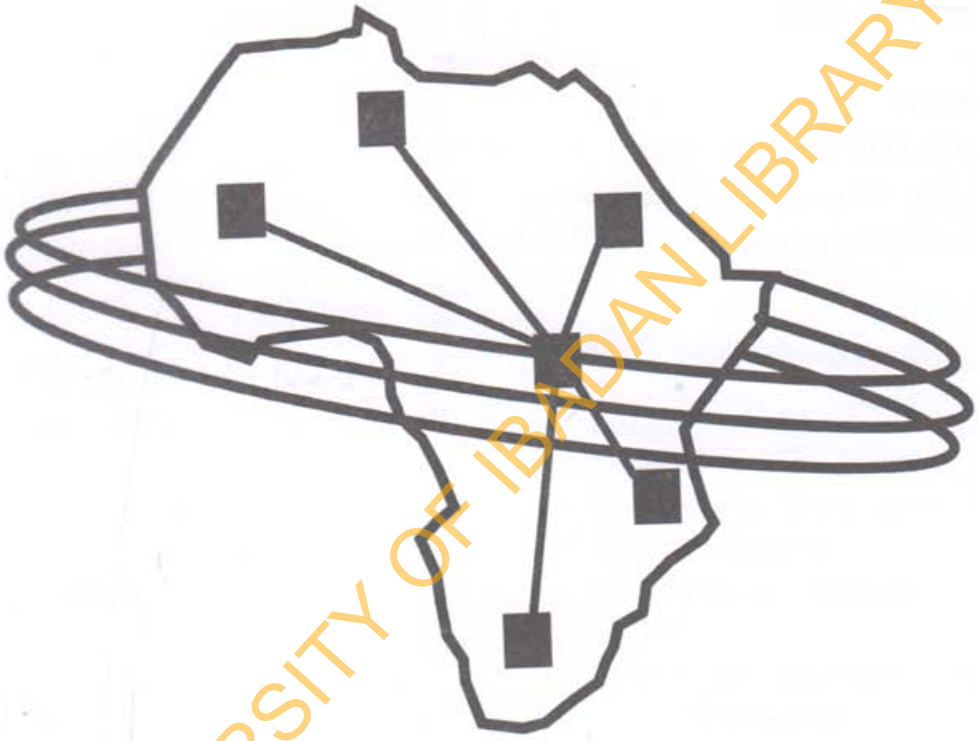
AFRICAN JOURNAL OF THEORY AND PRACTICE OF EDUCATIONAL ASSESSMENT (AJTPEA)

ISSN: 2545-5834 VOL. 6, June 2018



AFRICAN JOURNAL OF THEORY AND PRACTICE OF EDUCATIONAL ASSESSMENT (AJTPEA)

ISSN: 2545-5834

Vol 6, June 2018

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EDITORIAL COMMENT

1. The African Journal of Theory and Practice of Educational Assessment (AJTPEA) is one of the Journals of Educational Assessment and Research Network in Africa (EARNiA). The focus of the journal is to publish research findings in Test Theories and Practices; Classroom Assessment; Zonal or Local Government and State Assessments; National and International assessments; ICT in Assessment and Innovations in Assessment. The first edition (Volume 1, 2014) of the Journal was launched at the first conference organised in Cameroon in 2015. The second was launched at the second international conference in Nigeria (University of Calabar). The third (June 2016) and fourth (November, 2016) are launched at the third international conference in Nigeria (Benue State University and Federal University of Agriculture, Makurdi, Nigeria) while the fifth (November, 2017) and the sixth (June, 2018) were launched at the University of Cape Coast, Ghana.
2. The Journal encourages research papers that move away from the orthodox researches to ones that breaks new grounds in terms of methodology and findings. The Journal also documents research findings presented at the Educational Assessment and Research Network in Africa (EARNiA) annual conferences.
3. The Journal was published once in a year between 2014 and 2015. From 2016, the journal is published twice. The first in June and the second in November and are presented and launched at the EARNiA annual conferences.
4. In this volume, ten papers scale through eye of the needle of the Editor-in-Chief. The papers were subjected to plagiarism, peer assessment for content assessment. Thereafter the services of professional editors are employed to proof read the papers and for spell check, sentence agreement, use of the right tenses, etc. The focus of the papers in the volume varies from author to another. For example:

Ariyo, The first paper focuses on the assessment of the pattern of SS1 students pre-level mathematics cognitive and content. The authors, using a total of 355 samples drawn from six public secondary schools across two randomly selected local governments in Ibadan Metropolis in Oyo State, indicate that students performed poorly on questions that required higher order thinking. They therefore conclude that teachers should identify areas of mathematics that demand more efforts for improved performance.

Akinsola The second paper focuses on a survey of assessment literacy among basic education teachers in the Federal Capital Territory, Abuja. Using a sample of the authors 450 basic education teachers consisted of 180 primary school teachers and 270 junior secondary school teachers, the authors find that basic education teachers need to increase the level of their assessment literacy in order to ensure effective assessment in the schools. They conclude that fund should be provided in the primary and junior secondary

schools to enable the teachers attend seminars/workshops and conferences where the teachers will acquaint themselves of basic new ideas/skills on assessment process and practices.

Bichene The third paper focuses on item difficulty indices of multiple choice test instrument for senior secondary schools' mock examinations in cross River State-Nigeria as it relates to quality assessment. The authors, using a sample of 1,475 scripts find that item difficulty indices for most items were inconsistent with recommendation in extant literature. They recommend that test experts should always be recruited to help develop and assist in the administration of Mock Examinations instruments in Cross River State.

Opateye The fourth paper focuses on gauging chemistry teachers' assessment literacy and perceived skills for applying classroom assessment concepts in Southwest, Nigeria. the author, using 180 chemistry teachers finds that more experienced chemistry teachers had higher assessment literacy and were more skilful in applying assessment concepts in the classroom and there exists significant difference in assessment literacy and perceived skills for applying classroom assessment between male and female teachers. the author concludes that educational policy makers should give adequate training to female and less experienced chemistry teachers to boost their assessment literacy.

Garba The fifth paper focuses on strategies for empowering education stakeholders through assessment in Universities in Africa. The authors show the enormity of work that is involved in assessment, which requires the involvement of various stakeholders namely. They proffered strategies for empowering the stakeholders to overcome those challenges

Akpen-Ade, Peter The next paper focuses on continuous assessment: a requisite for motivation and creativity in visual art education. The authors appraise existing evaluative tools, methods, challenges and the way forward through which assessment will nurture motivation and creativity in visual art education

Tobih The next paper focuses on the analysis of students' performance in the conduct of computer based and paper based examinations. The author, using a sample of 10,493 students, finds that there is no significant difference in the mean performance of students examined through PBT and CBT and recommends that cognisance should be taken to the challenges faced by students in the administration of CBT examinations.

Danlami The next paper focuses on the role of school principals in linking school based assessment to senior secondary school certificate examinations. The author reviews roles of principals in general assessment of students' learning outcome, reasons for decline in the influence of school based assessment and finds the reliability of school based assessments is usually contentious and mostly controversial. The authors then concludes that the intervention of school principals on issues concerning formative assessment are very paramount than ever

Udoudoh The next paper focuses on literacy on modern trends in educational assessment. Using 300 postgraduate students the authors find that the most preferred areas of assessment were criterion based testing, formative evaluation and the used of multiple measures. They recommend that workshops and symposiums should be organized for stakeholders in education to assist in the area of acquiring skills to deal assessment of students.

Odo The last paper is on the assessment of effectiveness of on-the-job training for acquisition of relevant skills among students of technology education for employment and technological development. The author, using a total of 106 students, finds that student attitudes affect on-the-job training; on-the-job training educates the students on the procedural method of carrying out workshop laboratory work, creative and manipulative skills, and makes the students confident in themselves. The author concludes that a successful on-the-job training process makes the students confident in themselves.

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   first, secondly, *or* first, second (but not *firstly*)
   interpretative (not interpretive)
   analyse (not analyze)

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Books

Pike, K. L. (1967), Language in Relation to a Unified Theory of the Structure of Human Behaviour (revised edn). The Hague: Mouton.

Makkai, A. and Lockwood, D. G. (1973), Stratificational Linguistics: A Reader. Tuscaloosa: University of Alabama Press.

Veltman, R. (1982), 'Comparison and intensification: an ideal but problematic domain for systematic functional theory', in J. Benson and W. Greaves (eds), Systematic Perspectives on Discourse. Norwood, NJ: Ablex, pp. 15–32.

Journals

Halliday, M. A. K. (1961), 'Categories of the theory of grammar'. Word, 17, 241–92.

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Lamb, S. M. (1964), 'The sememic approach to structural semantics', American Anthropologist, 66, (3), Part 2, 57–78 (reprinted in Pike, 1967).

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Professor Johnson H. Nenty the Editor-in-Chief through earnia13@gmail.com.

TABLE OF CONTENTS

ASSESSMENT OF THE PATTERN OF SS1 STUDENTS PRE-LEVEL MATHEMATICS COGNITIVE AND CONTENT ACHIEVEMENT

J. O. Adeleke
and
S. O. Ariyo

Abstract

This study investigates cognitive and content pattern of SS1 students' pre-level Mathematics achievement. The study also investigated gender roleon the pattern of cognitive and content of SS1 pre-level mathematics achievement.A total of 355participants weredrawn from six public secondary schools across two randomly selected local governments in Ibadan Metropolis in Oyo State. The instrument has a reliability of 0.74. Three researchquestions wereanswered. Results obtained indicated that SS1 students demonstrated highest strength in geometry and mensuration ($\bar{x}$ = 46.45) algebraic processes ($\bar{x}$ = 37.05), statistics and probability ($\bar{x}$ = 33.27) are the contents that students are still finding most difficult. Students performed poorly on questions that required higher order thinking ($\bar{x}$ = 40.04) but found questions that tested recall ability quite easy ($\bar{x}$ = 45.35). The way both male and female SS1 students performed based on content and levels of cognition does not differ significantly at 0.05 level of significance. Teachers should explore the findings to identify areas of mathematics that demand more efforts for improved performance.

Keywords: Cognitive, Content and Pre-level

INTRODUCTION

A common problem faced by teachers in teaching process is that students lack important pre-level knowledge and skills needed when they enter higher classes in their education career. The pre-level knowledge forms the foundation on which higher learning can stand. When students have faulty pre-level knowledge especially in a subject like mathematics, it will not only be difficult for students to learn but also incapacitate effective teaching. Students come to the classroom with a broad range of pre-level knowledge, skills. beliefs, and attitudes, which influence how they attend to, interpret

and organize in-coming information. How they process and integrate new information will, in turn, affect how they remember, think, apply, and create new knowledge. New knowledge and skill are dependent on pre-level knowledge and skill as well.Therefore, having useful information on acquired knowledge and skills students come into the classroom with, may give direction of efforts to the teacher. The same may likelyassista teacher to craft instructional activities that will support optimal achievement.

It is true that the extent to which students will learn new content is dependent on certain factors such as the skill of the teacher, the interest of the student, and the complexity of the content.Compelling fact is that what students *already know* which are connected to the new contentcan support them to attain mastery. Commonly, researchers and theorists refer to what a person already knows about a topic as "background knowledge." Studies have confirmed the relationship between background knowledge and achievement (Dochy, Segers, andBuehl, 1999; Tobias, 1994).

Dochy, De Ridjt andDyck (2002) define pre-level knowledge as a multidimensional and hierarchical entity that is dynamic in nature and consists of different types of knowledge and skills. Pre-level knowledge has the tendency to influence learning and student achievement. Inadequate or fragmented pre-level knowledge is an important issue to consider because if there is a mismatch between the teachers' expectations of student knowledge and the students' actual knowledge base, learning may be hampered from the start of the studies. Learning concept without having adequate pre-level knowledge or, worse, having misconceptions, may result in rote memorization.

Through assessments, the teacher will come to know the extent to which students' pre-level knowledge is accurate or inaccurate. In the instances when pre-level knowledge is inaccurate, teachers will need to spend some time helping students to come to terms with their misconceptions before they can go on to help the students build new knowledge. Again, the ease or difficulty of such a task will lie in students' making a conscious or unconscious decision to hold on to such misconceptions. In such a case, the inadequate and inaccurate pre-level knowledge will tend to hinder learning. Therefore, as indicated earlier on, the teacher will benefit from spending some time to determine the extent and nature of students' pre-level knowledge and skills.

Efforts are consistently ongoing in research on gender issues following the millennium declaration of September 2000 (United Nations, 2000) which has as its goal, the promotion of gender equity, the empowerment of women and the elimination of gender inequality in basic and secondary education by 2005 and at all levels by 2015.Most researchers have found boys performing better than girls (Fennema and Sherman, 1978) especially on higher order knowledge, a few others saw girls out-performing boys while some others established no significant difference particularly during early education.

Feminist researchers have tried to make meaning of the experiences of girls and boys in the mathematics classrooms, and to interpret male-female power relations (Jungwirth, 1991; Waiden andWalkerdine, 1985). Their findings revealed that girls are often marginalized and given subordinate status in the mathematics class. The findings suggest that perceptions of teachers are that girls' performances in mathematics are dependent on rote learning, hard work and perseverance rather than natural talent, flexibility and risk taking which are the learning styles of boys. Some international literature however, document that female students perform better than male students (Arnot, David & Weiner 1999; Hydea andMertzb, 2009). A large scale study in the U.S.A. by Hydea andMertzb (2009) revealed that girls have reached parity with boys in mathematics performance, including at high school where a gap existed in earlier decades. They affirmed that girls are doing better than boys even on tasks that require complex problem solving.Perie, Moran, and Lutkus (2005) found that the gap has been narrowing in the United States of America.

Research in Australia indicates that gender differences in mathematics achievement are reducing and shifting (Forgasz, Leder, and Vale, 2000). Vale (2009) found that many studies conducted between 2000 and 2004 in Australia showed no significant differences in achievement in mathematics between male and female students, though males were more likely to obtain higher mean scores.Gender differences in mathematics teaching, learning and achievement have also been explained on the basis of cognition and brain lateralization (Fennema andLeder, 1990). In Nigeria, gender-achievement studies include Abiam and Odok (2006) who found no significant relationship between gender and achievement in number and numeration, algebraic processes and statistics. They however found the existence of a weak significant relationship in geometry and trigonometry.

In Nigeria, secondary school education is divided into two: junior secondary and senior secondary. Junior secondary education knowledge is the pre-level knowledge for senior secondary education especially in a subject like mathematics where contents taught at junior secondary schoolform the foundations for contents taught at senior secondary school. It is imperative to establish the strength and weakness of students in their pre-level knowledge so as to help them with their area of weakness and also build a stronger foundation for their final external examination.On this background, this study investigated the pattern of SS1 students' pre-level mathematics cognitive and content achievement.

Objectives of the Study

The following objectives were stated and directed the study. The study intended to:

I. investigate the pattern **of SS1 pre-level knowledge in the mathematics cognitive and content areas.**

ii. **establish gender differences existing in SS1 pre-level knowledge in the mathematics cognitive and content areas.**

Research Questions

The following questions were raised and answered.

1. **What is the pattern of SS1 pre-level knowledge in the mathematics cognitive areas?**
2. **What is the pattern of SS1 pre-level knowledge in the mathematics contentareas?**
3. **Does gender play a significant role in the pattern of SS1pre-level knowledge in Mathematics content and cognitive achievement?**

Method

The target population for the study comprises of S.S.1 Students in Ibadan, Oyo State.Ibadan Metropolis comprises elevenLocal Governments Areas (LGAs). A multi-stage sampling technique was used in the selection of sample for this study. Stratifiedsampling technique was adopted to put the LGAs in Ibadan Metropolis into strata. One LGA was selected from each of the stratum(Rural and Urban). Three co–educational senior secondary schools were randomly selected from each of the local government to makesix sample schools. A total of 355 SS1 students from the six schools made the sample.

One instrument was used for this study which was developed by the researcher: Mathematics Achievement Test (MAT). Mathematics achievement test comprises of all the junior secondary 1 to 3 mathematics curricula contents. A total of 150 items were generated and 82 items survived the validation process. The psychometric property of the instrument was ensured with reliability co-efficientof r = 0.73. This was established using Kuder Richardson 20 (KR -20)formula.The 82 items weresystematically divided into three parts to include the same content and cognition and administered three times over an interval of two weeks. The data collected was coded and analyzedusing SPSS software version 17. The statistical tools used for the analysis are: Descriptive Statistics (mean and percentage) and t-test.

4. Results

Research Question 1 : What is the pattern of SS1 pre-level knowledge in the mathematics content areas?

Table 1.**Summary of Descriptive analysis of mean pattern of the content and cognition of SS1 students' performance in diagnostic assessment**

	items	N Statistic	mean	Mean*		Std. Deviation	Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
TOTAL	82	355	34.39	41.934	0.68218	12.8533	1.033	0.129	1.104	0.258
CONTENT										
Number and Numeration	20	355	9.29	46.4507	0.87959	16.5727	0.252	0.129	-0.34	0.258
Algebraic Processes	31	355	11.49	37.0559	0.76071	14.3329	0.759	0.129	0.222	0.258
Geometry and Mensuration	22	355	10.93	48.2458	0.92924	17.5083	0.534	0.129	-0.147	0.258
Statistics and Probability	9	355	2.99	33.2707	0.85262	16.0645	0.901	0.129	1.973	0.258
COGNITION										
KNOWLEDGE	8	355	3.63	45.3521	1.09304	20.5945	0.239	0.129	-0.27	0.258
UNDERSTANDING	20	355	9.14	45.6761	0.96895	18.2565	0.228	0.129	-0.641	0.258
THINKING*	54	355	21.62	40.0417	0.67623	12.7411	1.199	0.129	2.064	0.258
Valid N (listwise)		355								

Mean*= The transformed mean value to percentage for comparison purpose.

Thinking* = application +analyse + evaluate + create

Table 1.1a showed the summary of analysis of mean pattern of each content of SS1 students' performance in the diagnostic assessment. The table showed total mean of 41.93which showed that the general performance of SS1 students in pre-level knowledge in mathematics was below average.The table showed the mean of each content: number and numeration ($\bar{x}$ = 46.45), algebra ($\bar{x}$ = 37.06), geometry ($\bar{x}$ = 48.25) and statistics and probability ($\bar{x}$ = 33.27). It shows that students had the highest mean scoresof 48.25 in geometry and the lowest mean of 33.27 in Statistics and Probability. Figure 1.1 further compares the total means with the meanson each content areas.

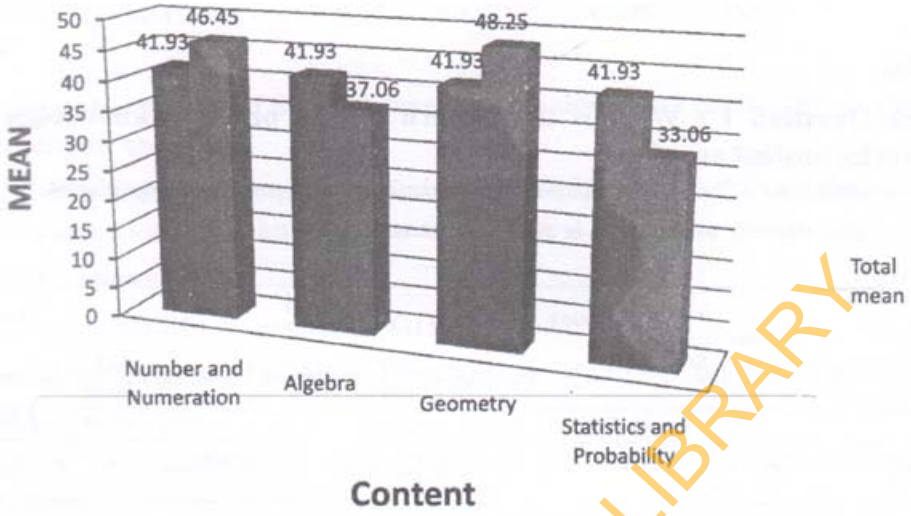

Fig 1. Comparing mean pattern of each content with total mean of SS1 student's performance in diagnostic assessment

Research Question 2 : What is the pattern of SS1 pre-level knowledge in the mathematics cognitive areas?

Table 2showed the pattern ofmean scores on the diagnostic test, estimated on different levels of cognition among SS1 students'. The table showed total mean of 41.9 while the mean scores on the three levels of cognition are thus presented: knowledge ($\bar{x}$ = 45.35), understanding ($\bar{x}$ = 45.68) and thinking ($\bar{x}$ = 40.04). It further showed that understanding has the highest mean of 45.68 and thinking has the lowest mean of 40.04. Figure 1.2 further shows the pattern of performance of SS1 students in the diagnostic test on differentcognitive areas.

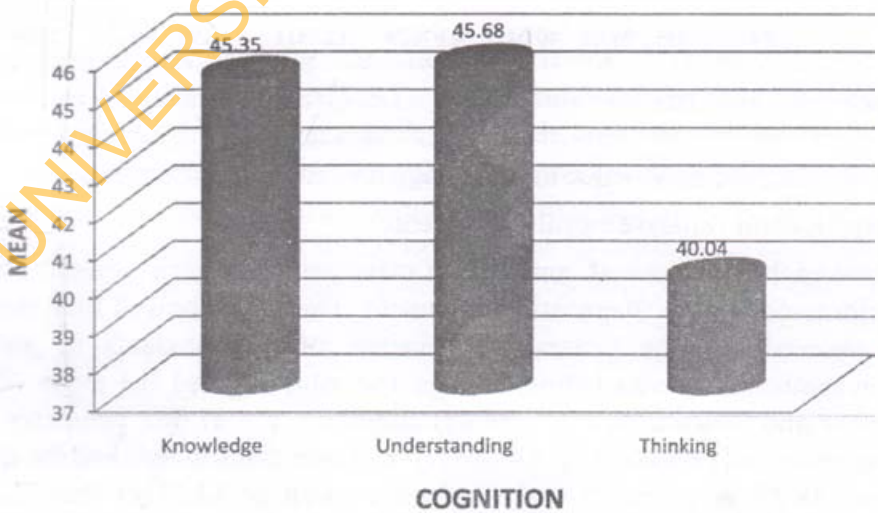

Fig. 2. SS1 students Pattern of performance in differentlevels of cognition'

Research Question 3: **Does gender play a significant role in the pattern of SS1 pre-level knowledge in Mathematics content and cognitive achievement?**

Table 2:Content and Cognitive mean difference between male and female students

	SEX	N	Mean	Std. Deviation	t	df	p
Content							
Number and Numeration	MALE	173	46.47	17.50	.026	353	.979
	FEMALE	182	46.43	15.69			
Algebraic Process	MALE	173	37.01	14.65	-.055	353	.956
	FEMALE	182	37.10	14.07			
Geometry and Mensuration	MALE	173	48.71	18.30	.489	353	.625
	FEMALE	182	47.80	16.76			
Statistics and Probability	MALE	173	33.53	15.55	.292	353	.771
	FEMALE	182	33.03	16.58			
Cognition							
Knowledge	MALE	173	45.38	21.82	.021	353	.983
	FEMALE	182	45.33	19.41			
Understanding	MALE	173	44.88	18.55	-.796	353	.426
	FEMALE	182	46.43	17.99			
Thinking	MALE	173	40.55	12.92	.730	353	.466
	FEMALE	182	39.56	12.59			

Tables 2 showed the content and cognitive mean scores and correlated sample t-test of the pre-level SS1 mathematics achievement respectively. In the content, table 2 showed that male students performed better in number and numeration, geometry and mensuration and statistics and probability with ($\bar{x}$ = 45.38, SD=21.82) and ($\bar{x}$ = 40.55, SD=39.56). Whereas, female students performed better in understanding ($\bar{x}$ = 46.43, SD=18.55). Though, an independent t-test showed that the differences between the two groups were not statistically significant.

Discussions

The finding of this study reveals the pattern of performance of SS1 students in each of the contents highlighted: number and numeration, algebraic processes, geometry and mensuration and statistics and probability. The pattern of performance reveals that students performedbest in geometry and mensuration followed closely by number and numeration. They performed above the total average performance in these two contents.

The finding also shows that students performed poorly in the algebraic processes and statistics and probability, they performed below overall average performance in the contents. The result of this finding could be attributed to the nature of each content, which made it possible for students to do well in geometry and mensuration and number and numeration.

Geometry and mensuration has to do with shapes which are concrete object that can be seen, work with and thereby help them to remember. Number and numeration has to do with number and students prefer working with numbers than letters as in the case of algebraic processes.Students' dislike could be as a result of the perceived abstract nature of the two contents. For instance many students might find it difficult to understand the concept feasible in the real sense. This finding was contrary to Chief Examiner's report on students' areas of deficiency in school certificate examinations which showed that students least understood concept was geometry as shown by their achievement (WAEC, 2007). This finding corroboratesthe work of Amelink (2009) which indicated that students performed better in geometry and measurement.

The finding also shows that among the three levels of cognition, questions on understanding was bestmastered by student which was closely followed by questions on knowledge (recall). The finding shows that thinking related questions were not well understood by students. This finding was contrary to the study by Meece and Miller(1999) who found that some teachers expressed concern that their students showed mastery of skills and strategies on what they are taught but could not transfer those skills beyond the tests. They evaluated the 3rd grade assignments and found that most of them focused on individual skills, recall, and teacher control. This shows that they did well in knowledge(recall), but could not apply the knowledge. Meece and Miller(1999) found out that Low-achieving students were more motivated to do the thoughtful work than the one-word-answer drill work. This further analysis of Meece and Miller was in agreement with the finding of this study. This shows that if students receive adequate encouragement and motivation in various ways, they could have deep thought on what they are learning and apply easily.

The findings further show that gender did not play any significant role in the performance of students in both content and level of cognition. This shows that both male and female students are already reaching parity in the knowledge of mathematics. This finding was in agreement with the findings of Vale (2009) who found that many studies conducted between 2000 and 2004 in Australia showed no significant differences in achievement in mathematics between male and female students. Also in a study by Abiam and Odok (2006) who found no significant relationship between gender and achievement in number and numeration, algebraic processes and statistics. But this finding was contrary to the finding of (Arnot, David and Weiner 1999; Hydea andMertzb, 2009) who found that international literature suggests that female students perform better than male

students. With the result of this finding and other recent findings, it shows that the gender gap in mathematics is fading away.

Recommendation

The findings of this study have shown that students are not doing well in algebraic processes, statistics and probability. They further showed low performance level in thinking aspect of level of cognition. It is therefore necessary for government to organize and encourage teachers to attend workshops, seminars and conferences to help them fashion out better and appropriate ways to teach these topics.There is need for more studies on instructional strategies that can enhance better achievement in algebraic processes, statistics and probability.

Conclusion

This study investigatedthe cognitive and content pattern of SS1 students pre-level mathematics achievement. The findings indicated that two of the contents: algebraic processes and statistics and probability are difficult for students. At the same time, thinking related problems in the level of cognitionare also given students challenges.Findings further indicated that there was no gender difference in mathematics performance. The finding of this study gives direction to mathematics teachers on contentand cognition that require more effort to teach to ensure mastery.

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