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1. The West African Journal of Education (WAJE) pioneered academic/ professional publishing in the sub-region in the late 1950s. It has also nurtured and mentored a good number of academic journals that have helped to broaden the scope of educational research and information exchange over the years. WAJE, in its revived current form, has the goal of becoming the most widely cited educational journal in the sub-region, in view of current efforts that are being made to enhance the quality of report and other discourses published in it.
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   (b) Encouraging the exchange of profound innovative ideas capable of generating creative practices in educational research and practice
   (c) Disseminating information on educational development that are not usually easily available to academics and practitioners.
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(b) ESSAYS AND ISSUES PAPERS are analytically sound, presenting solidly original ideas that can positively influence change in educational thought, research and practice.

(c) The manuscript, which should include title, abstract, text, tables, figures, where necessary, should be typewritten on A4 size paper, with double-spacing and should not exceed 15 pages.

(d) The abstract should not be more than 250 words.

(e) Authors should use the latest Publication manual of the American Psychological Association (APA) format.

(f) Papers which should be written on only one side should be submitted in triplicate (hard copies)

(g) Papers are blind peer-reviewed, each paper attracts an assessment fee of N2000.00 or $20.00.

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(i) The editor and the editorial board will not enter into correspondence with authors over rejected articles.

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EFFECT OF COGNITIVE ENTRY CHARACTERISTICS ON STUDENTS' AFFECTIVE OUTCOME IN BEARING IN MATHEMATICS

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Abstract

Several studies have confirmed poor attitude of students towards mathematics and the attracted consequences. Since attitude is confirmed to be alterable, efforts of researchers are expected to be directed towards improvement of students' attitude toward this dreaded subject. This informed the investigation of the main and interaction effects of the cognitive entry characteristics (CEC), aptitude and gender on students' attitude towards Bearing in Mathematics. The study adopted a quasi-experimental pretest-posttest research design. Three hundred and thirty two SS 2 students were involved in the study. The sample was drawn using multi-stage sampling technique from public co-educational secondary schools in three of five local government areas in Ibadan Metropolis. The instruments used for data collection were the Test of Spatial Reasoning adopted from Barrett and Williams, (1997) (r = 0.92), Numerical Reasoning Test adapted from Barrett and Williams, (1997) (r = 0.75), Bearing Attitude Scale (r = 0.81) and Diagnostic Tests. The data collected were analysed using ANCOVA and MCA. CEC has significant main effect (P<0.05) but gender and aptitude had no significant main effects on students' attitudes toward bearing. Also, there were no first and second order interactions effects of CEC, aptitude and gender, on students' attitudes toward bearing. Cognitive Entry Characteristics accounted for a high degree of variation in students' affective outcome in Bearing. This has implications for education, especially the curriculum experts and classroom teachers, particularly on the need for learning sequence and enhancement activities which have been found to promote better attitude to mathematics learning in the classroom

1.1 Background to the Study

Mathematics is a fundamental subject which plays a major role in understanding and applying concepts in the sciences as well as in grappling with, the complexities of modern technology useful to mankind. As useful as Mathematics is in this modern days of technology, many students are still negatively disposed to the learning of the subject. West Africa Examination Council Chief examiners' reports (1997, 1999, and 2000) identified Geometry and trigonometry as the areas in which most of the students performed most poorly from year to year. The poor performance could be the product of negative attitude many students have towards mathematics in general and towards geometry in particular.

Geometry is an essential part of mathematics. Unfortunately, according to results evaluations of mathematics learning, such as the National Assessment of Educational Progress (NAEP), college grade two students in Alexandria fail to understand basic geometric concepts and develop adequate geometric problem-solving skills (Carpenter, Thomas , Mary, Corbitt, Henry, Kepner, Mary, Lindquist, and Robert, Reys, 1980; Fey, James, William, Atchison, Richard, Good, Kathleen, Jerry, Mary, Kantowski, Linda, and Rosen, 1984; Kouba, Vicky , Catherine, Brown, Thomas, Carpenter, Mary, Lindquist, Edward, Silver, Jane and Swafford, 1988). This poor performance may be due, partly, to the lack of cognitive entry characteristics which focus on recognizing and naming geometric shapes and learning to write the proper symbols for simple geometric concepts (Carpenter et al. 1980; Flanders [1987]). "In contrast, we believe that elementary geometry should be the study of objects, motions, and relationships in a spatial environment" (Clements and Battista 1992). First, students' experiences with geometry should emphasize informal study of physical shapes and their properties and have as their primary goal the development of students' intuition and knowledge about their spatial environment. Subsequent experiences should involve analyzing and abstracting geometric concepts and relationships in increasingly formal settings. This is necessary to equip them adequately with cognitive entry characteristics needed to achieve meaningfully in geometry topics. Implicit in this is the need for openness and willingness to learn a new task as suggested by Bloom, (1976)

Bloom, (1976) after an extensive review of literature, drew attention to an alterable variable that he believes may accounts for most learning outcomes. He referred to this as Cognitive Entry Characteristics (CEC). His analysis points to the fact that CEC account for 50% of the variations in learning outcome. What then is the Cognitive Entry Characteristics (CEC)? Bloom defines cognitive entry characteristics as the specific knowledge, abilities, or skills which are essential pre-requisites for the learning of a particular school subject or a particular learning task.

Bloom (1976) regards the affective outcome as a compound of interests and attitudes toward the subject matter of the learning task, and more deep-seated self-concepts and personality characteristics. He explains that some of these components may be highly changeable. He says while it is not impossible for a learner to achieve

mastery on a learning task, if he has negative affective characteristics, it is very difficult. Operationally, according to Bloom, what is sought is openness to the new learning task, a willingness to make the effort required, and sufficient confidence in the self to strive to overcome real or imagined obstacles in the learning.

Affective characteristics seem to be a stable cause of failure that cannot be easily overcome, students who believe their ability to be low withhold effort rather than risk failing and confirming their low opinion of their ability. After all, doing poorly in a class which one "blows off" a whole term is to be expected, but making a sincere effort and failing anyway can be devastating to the ego (Arkin & Baumgardner, 1985; Berglas, 1985). Success is not particularly rewarding for students who do not attribute this success to ability. Even if these students expect to and do perform well in certain classes, they attribute this success to luck, the low level of difficulty of the class, or leniency on the part of the teacher (Tapasak, 1990).

Students who believe that they will receive a good grade in a particular class, but who do not believe that they are capable of learning and understanding the concepts in the class, are not strongly motivated to persist in their work in that class. (Lent, Lopez & Bieschke, 1993; Siegel, Galassi & Ware, 1985; Wheeler, K. G., 1983).If expectations of future successes are low, or if these successes are discounted, students will withhold effort and will avoid contact with the subject in the future (Weiner, 1986). The decision to continue in mathematics is crucial to a student's continued success, both academically and professionally.

Does aptitude also predict affective outcome in mathematics? As regards students' attitude, Bloom, (1981) speculates that if cognitive entry characteristics are identified and enhanced, aptitude ceases to predict learning outcome. He explained further that general intelligence, aptitude and other predictors will predict outcome on a learning task to the extent to which they include indices of relevant entry characteristics. That is, scholastic aptitude tests predicts students' attitude, because they are useful general indicators of the relevant entry characteristics.

A characteristic difference is noticed from person to person as well as from group to group. This difference also seems to be noticed in the Mathematical performances among Male than Female students. If girls are more likely than boys to attribute success to external causes and to attribute failure to internal causes, then they would be expected to feel less pride in their success and more shame in response to failure (Stipek & Gralinski, 1991; Weiner, 1986). Wikipedia encyclopedia, (2005) submitted that male are said to have high self-esteem, while females are not as confident. Can this difference noticed traceable to level of cognitive entry characteristics possessed and aptitude of each of the gender groups? Further research findings on gender differences also, on student's attitude towards school subjects have attracted the interest of many researchers and educators in the recent time (McGinnis and Pearsall, 1998; Popoola 2002; Adegoke, 2003; Kelly, 2003). In spite of the existence of many of such studies, more investigations are being undertaken in this area. This is because a definite and stable picture of gender differences in students' attitude is yet to emerge. According, to Smith,(1998) this level of CEC and aptitude are likely to cause gaps in mathematics

learning outcomes of male and female. Though Popoola (2002) concluded that there is no effect of student gender on learning outcomes in algebra aspect of mathematics yet this study investigated whether gender have effect on students' attitudes toward geometry. Against these backgrounds, the aptitude and gender of the students were controlled for in this study while looking at the effect of cognitive entry characteristics on students' affective outcomes in bearing. The investigation of this study was extended to how cognitive entry characteristics cause variations in cognitive achievement and attitude towards mathematics among males and females as well as among low, moderate and high aptitude students when taken as groups. This informed the test of interaction effects in this study.

Research Questions

The following research questions were answered in this study.

1. What is the main effect of (a) CEC (b) gender (c) aptitude on students' attitude towards bearing?
2. What is the 2-way interaction effect of (a) CEC and gender (b) CEC and aptitude and (c) gender and aptitude on students' attitude towards bearing?
3. What is the 3-way interaction effect of CEC, gender and aptitude on students' attitude towards bearing?

Methodology

Research design

This study adopted a non-randomized (since the intact classes were used) pretest and post test control group quasi experimental design.

Outline of design

The outline of the design is as follows:

Experimental group 1	-	O1 X1 O2 O3
Experimental group 2	-	O1 X2 O2 O3
Control group	-	O1 X3- O2 O3

Where

O1 - represent pretest measure.
O2 - represent diagnostic tests (formative test)
O3 - represent post test .(Summative test).

x1 - Group instruction → diagnostic test → feedback corrective → next unit, M

NM

* **NM = Non Master; M = Master**

x2 - Group instruction → diagnostic test → feedback corrective → next unit,

x3 conventional method of instruction.

Factorial Design

Table1-Showing 3x2x 3 Factorial Designs.

Treatment variable	Gender	Aptitude		
		H	M	L
Highly Enhanced	Male	4	18	11
CEC	Female	7	25	3
Partially Enhanced	Male	14	13	10
CEC	Female	10	24	5
Conventional method	Male	4	16	12
Instruction	Female	1	2	0

Factors: Treatment, Aptitude and Gender

Dependent Variables: Attitudes towards mathematics

Independent Variable: treatment

(i) Highly Enhanced CEC
(ii) Partially Enhanced CEC
(iii) Control

Moderator Variables:

(a) Gender is an attribute variable at two levels namely
  (i) Male
  (ii) Female

(b) Aptitude group measured at three levels as:
  (i) High (Students with aptitude scores above 75th percentile)
  (ii) Moderate (Students with aptitude scores between 25th percentile and 75th percentiles)
  (iii) Low. (Students with aptitude scores below 25th percentile)

Sample

The study used multi-stage sampling technique. Three Local Government Areas (LGAs) were randomly selected from the five existing ones in Ibadan metropolis. Cluster sampling was also employed and all the co-educational senior secondary schools in each of the selected LGAs formed a cluster. Two schools were randomly selected from each of the three clusters. An intact science class was randomly selected and used from each of the selected schools.

Table 2: Distribution of Schools and students used for the Experiment

Ibadan LGA	Total No of Senior co-educational sec. schools	No of selected co-educational schools	No. of selected Students
North	23	2	108
North East	11	2	105
South West	19	2	119
Total	**53**	**6**	**332**

Instrumentation

Instruments:

Four instruments were used for this study. They are:

(1) Test of Spatial reasoning
(2) Numerical Reasoning Test.
(3) Questionnaire on Attitude Towards Learning Bearing (QATLB)
(4) Unit diagnostic tests.

(1) **Test of Spatial Reasoning:** This is a 75-item test with yes or no response format adopted from Barrett and Williams, (1997). It tests student's aptitude on manipulation of shapes and figures in space. Construct validity of the instrument was established using factor analysis. Principal Component analysis revealed that each of the items in the Spatial Reasoning Test is meaningfully loaded (factor loadings ranged between 0.339 and 0.669) towards one of the seven identified sub components of the test. Also the reliability coefficient of 0.92 for the instrument was established by the researcher using Reliability Alpha Analysis, thus the internal consistency of the instrument was ensured. A sample of 97 SSII students from a coeducational school similar to the target sample was used for the validation exercise.

(2) **Numerical Reasoning Test:** This is a 21-item multiple choice test. It tests student's quantitative reasoning. It was adapted from Barrett and Williams, (1997). Construct validity of the instrument was also established using factor analysis. Principal Component analysis revealed that each of the items in the Numerical Reasoning Test is meaningfully loaded (factor loadings ranged between 0.415 and 0.627 towards one of the four identified sub components of the test . The reliability coefficient is 0.75 using Cronbach Alpha reliability analysis (equivalence of Kuder Richardson 20), thus the internal consistency of the instrument was ensured. The same sample used to validate Spatial Reasoning Test was also used.

(3) **Questionnaire on Attitude towards Learning Bearing (QATLB)**

This instrument was developed and validated by the researchers to measure the students' attitudes toward Bearing. It comprises two sections: section A consists of

items that seek personal information from the respondents. Section B consists of 25 items on students' attitude to Bearing. The Likert response format was used in this section i.e. SA- Strongly Agreed; A- Agreed; D- Disagreed; SD-Strongly Disagreed. Questionnaire on Attitude towards Learning Bearing (QATLB) reliability coefficient is 0.81, established using Cronbach Alpha Reliability analysis. Through the internal consistency of the instrument was ascertained. Factor analysis was used to establish the construct validity of QATLB. All the items were found to be measuring the intended construct (students' attitude to Bearing). The factor loadings of the items ranged between 0.523 and 0.781. A sample of 97 SSII students from a coeducational school who have completed bearing as topic in their syllabus and similar to the target sample was used for the validation

(4) **Diagnostic Test.**

There are eight diagnostic tests used for the study. Each is a 10-item formative test of 4 options scale that was used to measure learning difficulty after each of the following units of instruction: Fraction, Decimal and Algebraic Fraction, Algebraic process, Angles and triangle, Trigonometry, Specifying bearing, Presentation of bearing with diagram, Cosine rule and Sine rule. The tests were constructed by the researcher.

Procedure for the Experiment

The following steps were taken to carry out the experimental:

- The authorities of the selected schools were met for permission which was given and the researchers gave the detail on how the work would be carried out.
- At first, contact familiarization lecture was given to the selected students where the purpose of the study was explained,
- Tests of Spatial and Numerical Reasoning were administered to the SS2 students sampled for the study and their total scores were used to classify them into aptitude groups.
- Scores for all the students were rank ordered, from the highest to the lowest. The scorers above the upper quartile were the high aptitude group; those ones below the lower quartile were the low aptitude group while the remaining formed the moderate aptitude group.
- Questionnaire on Attitude Towards Learning Bearing (QATLB) was also administered to determine the attitude of students towards Trigonometry before the treatment.

The treatments were randomly assigned to selected LGAs.

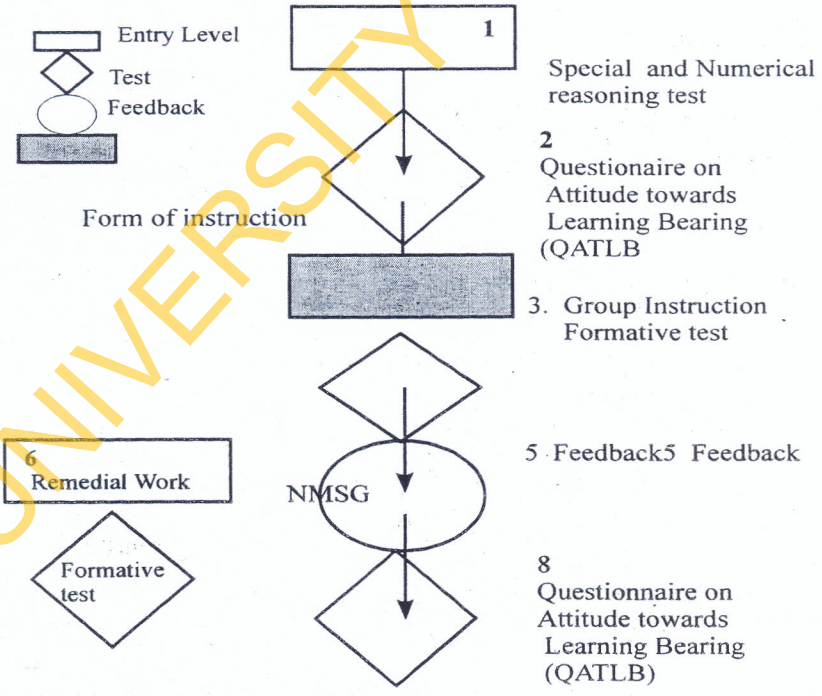
Apart from the general procedures discussed above, the treatment packages for the three groups are presented below:

Treatment

Highly Enhanced Cognitive Entry Characteristics Group (HECECG):

For this group, group instruction was given using the prepared module on the validated units of the CEC, after which formative tests were used to diagnose the learning difficulties. The scripts were scored as soon as each unit test was over. This provided immediate feedback to the learners. The test was then reviewed giving the correct options. Peer tutoring was used to provide remediation for non mastery learners. Those learners that scored above 80% were classified as peer tutors while those who scored below average were classified as slow learners. The peer tutors were paired with non-master for peer tutoring. Pairing of non-master students with peer tutors sometime did not visible especially when the peer tutors were few during the teaching of any unit. When such situation occurred, the teacher in charge used to do the enhancement. Eighty percent of the learners attained mastery on a unit before moving forward to the next unit.

At the end of teaching the units that were identified as CEC, the students took the Questionnaire on Attitude towards Learning Bearing (QATLB) again before the final instructional task which is bearing. The Schematic representation for the above stated procedures is presented below in fig.1.



MSG Mastery Group; NMSG Non Mastery Group

Fig 1. Schematic Representation of the experimental procedure: Highly Enhanced Cognitive Entry Characteristics Group (HECECG)

Adapted From Falaye 1995

Partially Enhanced Cognitive Entry Characteristics Group (PECECG)
This group was taught using the prepared module on the identified units of the CEC. Each unit taught was followed with a formative test. The test was marked and immediate feedback was given. There was no planned corrective feedback either from the teacher or the peers. The class then moved to the next unit. Questionnaire on Attitude towards Learning Bearing (QATLB) was administered before the final task i.e bearing was taught. Fig.2 below presents the schematic representation for the procedures used for Cognitive Entry Characteristics Group (CECG)

CONTROL GROUP

- **Subjects in this group received instruction on bearing but they were taught using the conventional method.**
- **Questionnaire on Attitude towards Learning Bearing (QATLB) was given again after the prerequisites learning activities but before the final target task which is bearing was taught.**
- **The Mathematics Achievement Test (Post test) was administered after all the units have been taught**

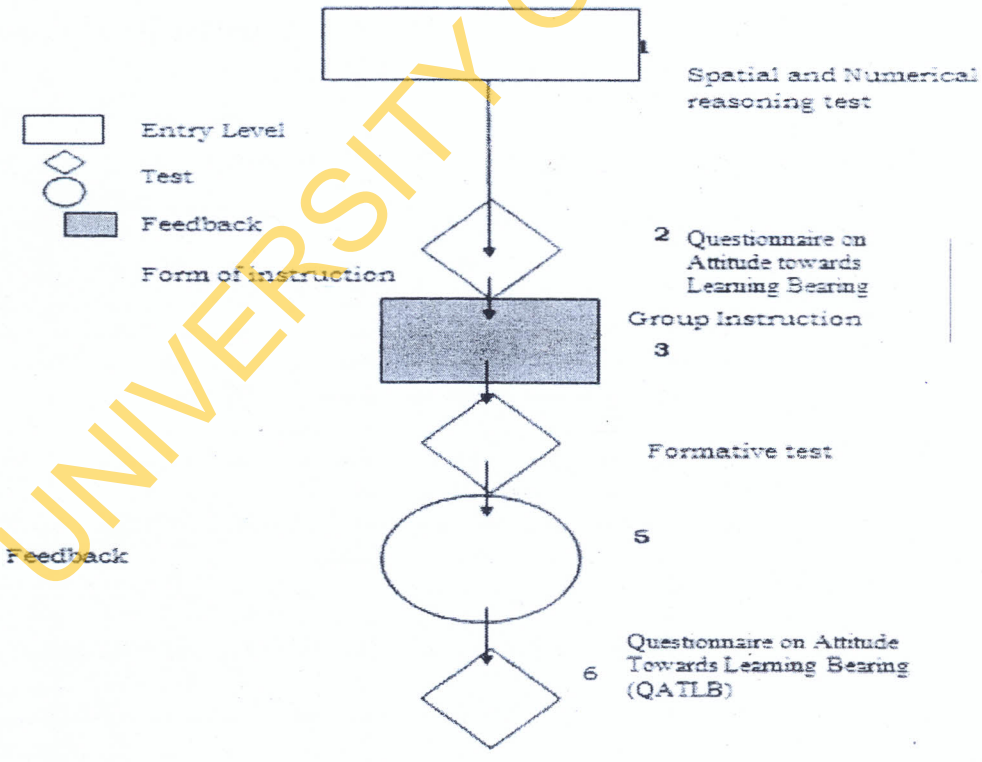


Fig 2. Schematic Representation of the experimental procedure: Partially Enhanced Cognitive Entry Characteristics Group (PECECG) Adapted From Falaye 1995

Data Collection

Each of the six selected schools was designated as an experimental group or control group. All the students in a randomly selected SS2 science class in the school took part in the experiment. The teachers used for both the experimental and control groups were the mathematics teachers teaching the class normally but each of them has at least B.Ed mathematics. This was done to control for some extraneous variables that may be introduced as a result of using one teacher for all the three groups or the researcher handling the groups by himself. However the teachers for experimental groups were trained on how to use the modules prepared by the researcher but the teachers for the control group proceeded in the normal way in which they teaches. Data collection last for 9 weeks.

Data Analysis

ANCOVA and MCA were used to establish the effects of treatment, aptitude and gender on students, attitude scores in Bearing. However, complete scores on Numerical and Spatial aptitude tests, Pre and post attitude tests obtained from the sample were included in ANCOVA analysis.

RESULT

Research Question One:

What is the main effect of (a) CEC, (b) Gender and (c) Aptitude on students' attitude towards bearing?

Table 3: ANCOVA: Effects of CEC, Gender and Aptitude on Students' Attitude Toward Bearing.

	Experimental Method			
	Sum of Squares	df	Mean Square	F
POSTATUD Covariates	784.872	1	784.872	12.117
PREATUDE	582.976	5	116.595	*
Main Effects (Combined)	434.265	2	217.133	1.800
Treatment	49.643	1	49.643	3.352*
Gender	22.915	2	11.457	.766
Level of Aptitude	620.753	8	77.594	.177
2-Way Interactions (Combined)	336.392	2	168.196	1.198
Treatment * Gender	191.523	4	47.881	2.597
Treatment * Aptitude	11.000	2	5.500	.739
Gender * Level of Aptitude				.085
3- Way Interactions Treatment	303.269	4	75.817	
* Gender * Aptitude	2291.871	18	127.326	1.170
Model	9262.629	143	64.774	1.966*
Residual	11554.50	161	71.767	
Total	0			

***- Significant at 0.05 significant level.**

The effect of CEC as shown in Table 3 is found to be significant on students' attitude towards bearing. Gender on the other hand as shown in the same table (Table 3) has no significant main effect on students' attitudes toward bearing. Also, Table 3

shows that Aptitude does not have significant effect on students' attitude toward bearing. Out of the three independent variables (CEC, Gender and Aptitude) only CEC is found to have significant effect on students' attitude towards bearing.

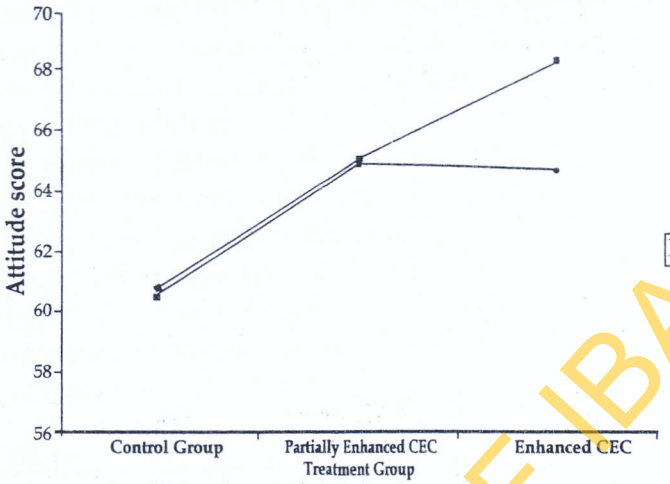


Fig. 3: Performance of the Three Study Groups on the Pre-attitude and Post-Attitude Test

Fig. 3 Presents the picture of the effect of CEC on students' attitude towards learning of bearings The students in the partially enhanced CEC group had the highest mean score in the pre-attitude test. Whereas after the treatment, the highly enhanced CEC group showed best attitude towards learning of bearings In fact the gain scores of students in the enhanced CEC group in attitude score towards bearing is very large in comparison with partially enhanced and control group. In fact the difference in gain scores of the partially enhanced and control group is insignificant when their attitude scores are compared with their starting points. The assistance received by the enhanced CEC group affected their attitude towards bearing positively. The reason for this might be they were sufficiently assisted on their learning difficulties which eventually affected their openness to learning of bearing.

MCA (Table 4) being part of the ANCOVA shows the effect of each of the conditions before and after, while differences in aptitude and gender were controlled for.

Table 4: MCA: Attitude towards Bearing by CEC.

Variable Category. CEC	+N	Unadjusted Dev	Eta	Adjusted for Independents	Beta
Enhanced CEC	42	2.93		2.77	
Partially Enhanced CEC	60	-0.32	.22	-0.76	.20
Control	60	-1.73		-1.19	
Multiple R. Square					.12
Multiple R.					.34

Grand Mean = 65.5

The column as shown in table 4 on un-adjustment deviation shows that before adjustment were made for aptitude and gender, the effect of enhanced CEC, CEC and control levels on attitude were 2.93, -0.32 and 1.73 respectively. After adjustment had been made, the effects became 2.77, -0.76 and 1.19 respectively. That is, that the higher the level of CEC, the positively higher the target task. Particularly, table 4 revealed the eta value of 0.22 showing that when adjustments were not made for the covariates (pre-attitude scores in BAS), CEC accounted for 4.84 percent of the variation in affective outcome. When the attitude scores were adjusted, CEC accounted for about 4 percent of the variation in affective outcome in bearing. CEC and other entry variables (aptitude and gender) jointly accounted for 12 (Multiple R2) percent of the variation in affective outcome.

Since significant main effect of treatment was found on students' attitudes towards bearing, further post hoc analysis to check the mean difference between pairs of the groups was presented in table 5

Table 5: Post Hoc

Group	Mean Difference
Highly Enhanced CEC and Partially enhanced CEC	3.142*
Highly Enhanced CEC and Control Group	3.573*
Partially enhanced CEC and Control Group	.431

***. The mean difference is significant at the .05 level**

Table 5 shows that there is a significant mean difference in students' attitude toward bearing as a topic in mathematics between enhanced group and CEC group and between the enhanced group and control group but there is no significant mean difference of attitude between the CEC and the Control group at 0.05 alpha level of significance.

Research Question Two

What are the 2-way interaction of (a) CEC and Gender (b) CEC and Aptitude and (c) Gender and aptitude on students' attitudes towards bearing?

Table 3 shows that there is no significant 2-way interaction effect of CEC and Gender on students' attitudes toward bearing. Also there is no 2-way interaction effect of CEC and aptitude on students' attitudes toward bearing. The table also shows that Gender and aptitude do not have significant 2-way interaction effect on students' attitudes towards bearing. This implies that effect of each of the independent variables (CEC, aptitude and gender) on cognitive achievement is not significant across the levels of others.

Research Question Three

Will there be 3-way interaction effect of CEC, Gender and aptitude on students' attitudes toward bearing.

Table 3 shows that there is no 3-way significant interaction effect of CEC, Gender and aptitude on students' attitude to bearing. This implies that the effect of CEC on

cognitive achievement in bearing is not significant across the levels of aptitude and gender.

Discussion

Cognitive Entry Characteristics (CEC) is found to have significant main effect on students' attitude toward bearing. This finding corroborates that of Senemoglu and Fogelman (2000) that attitude of learners to learning among the highly enhanced CEC group is better compared with control group. Negative attitude to learning has become a common experience in secondary schools. It seems the stake holders themselves are tired of the situation. This study has provided a clue that is within the reach of teachers. If the students are really achieving in their school subjects, through the CEC enhancing strategies students will have openness and interest in those subjects as speculated by Bloom (1976). Both gender and aptitude were found not to have significant main effect on students' attitude toward bearing. Interaction effects among the CEC, gender and aptitude on students' attitude to bearing were not found to be significant. Difficulties in learning activities can affect students' attitude to learning. When such difficulties are identified and means are sought to help students overcome them, majority will likely have positive attitude to learning. This suggests one of the areas to be focused if students will be assisted to have positive attitude to an important subject like mathematics.

The finding of this study also reveals that students in the highly enhanced Cognitive Entry Characteristics group have positive attitude toward mathematics than the partially enhanced CEC and control groups (Table 5). This is in support of Bloom's (1981) theory that a student that possesses an adequate level of Cognitive entry characteristics for learning a particular learning task is likely to have willingness, openness, interest and positive attitude toward the target task. The positive attitude of students in enhanced CEC group might be associated with the diagnosis feedback strategy used on them which ensured that immediate knowledge of result was made to the students for the purpose of correcting their mistakes. When this purpose was achieved, it did not only lead to better Cognitive achievement but also positive attitude toward bearing, a topic identified to be difficult even by the WAEC chief examiners (WAEC Chief examiners' report 1997, 1999, 2000). Primarily, the purpose of CEC enhancement strategy was to ensure that students satisfy both the Cognitive and affective prerequisites for the next new units. The result of this study lent support to that of Abadom, (1993) that through appropriate remediation, and continuous reinforcement of the students' confidence therefore, that they could learn the new unit well because they have mastered the previous units to a high level, hence, the highly enhanced CEC group became more willing and interested and more efforts were put in the learning process than comparable partially enhanced CEC and control group that received little or no help.

Studies by Aghaduino (1992); Abadom (1993); Smith (1998); Olaleye (2004) lent support to this study that students supported through enhancement of Cognitive Entry Characteristics showed more positive attitude towards their subjects after

instruction. They expressed their openness, willingness and desire to learn new topics. The finding of this study did not lend support to the cultural belief of male superiority because significant difference was not observed between male and female attitude to bearing as a topic in mathematics. The significant difference observed might be explained by the CEC enhancement strategy than gender.

Conclusion

Enhancement of Cognitive Entry Characteristics is shown in this study to have improved students' attitude towards mathematics. If this strategy is being employed in schools and more students learn mathematics and mathematics related subjects better, the dream of technological advancement may likely come true for a developing Country as Nigeria. Teachers can sequence their instructional content to include needed Cognitive Entry Characteristics (CEC) for learning the new topic arising from the fact that changing the instructional method from traditional to modern has not been practically possible over the years. Workshops and Seminars should be organized for teachers where they will be exposed to efficacy of CEC. This is needful to assist every students possess adequate CEC that will lead to better attitude towards and preparedness for the next topic to be taught. The current curriculum that is in use in the secondary schools should be reviewed to include appropriate CEC for each topic. This will provide sufficient activities that will enhance learners' willingness to achieve meaningfully in a topic, and serve as enhancement strategy for assisting the slow learners

The results and findings of this study should go beyond being additional data for understanding Educational theories but as a new chapter in research endeavour suggesting the adoption of this strategy empirically proved to be facilitating learning for the majority of students and thus ensure positive attitude and success in the dreaded subject such as Mathematics in the West African School Certificate Examinations, National Examinations Council School Certificate Examinations and beyond.

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