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Difficulty and Discriminating Indices of Junior Secondary School Mathematics Examination; A Case Study of Oriade Local Government, Osun State

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Abstract: This study examined Difficulty and Discriminating Indices of Junior Secondary School Mathematics Examination in Osun State; A Case Study Of Oriade Local Government. Two Schools were selected through random sampling from Oriade Local Government of Osun State. The sample of the study consisted of sixty respondents that were drawn from the population of the study. Hypotheses were formulated the study through the stated objectives for the study. Pre and post- test was developed to validate the method used for data collection and analysis. The data collected were analyzed using t-test statistics and analysis of variance (ANOVA) at 0.05 level of significance. The findings revealed that the difficulty indexes of the JSSCE were good for 59 out of the 60 items in the examination while 1 item requires modification as the question might have been unclear or misunderstood by the students. Also, discriminatory indexes were considered appropriate for 59 out of the 60 items in the examination while 1 item was found inappropriate and thus does not fit into the set of questions for the JSSCE unless it is rewritten for better clarity. The study also revealed that students' gender, age, class and school type have no significant influence on their academic performance in the JSSCE. Based on the findings of the study, test measurement and evaluation experts should emphasize and also ensure that proper test analysis are carried out on test items before they are administered to students especially in national examinations.

Keywords: Junior Secondary School Mathematics, Oriade Local Government, Osun State, Difficulty and Discriminating Indices, JSSCE Examination

1. Introduction

Mathematics is the bedrock of all sciences; hence mathematics is the brain behind all sciences. [8]. Mathematics is considered by many people, institutions, and employers of labour, among others, as very important. Mathematicsis considered indispensable because it has substantial use in all human activities including school subjects such as in Introductory technology, Biology, Chemistry, Physics including Agricultural science. Its unique importance explains why the subject is given priority as a school subject. In fact, the International Association for the Evaluation of Educational Achievement [9] has also associated the learning of mathematics with basic preparation for adult life.

Also, mathematics is used for analyzing and communicating information and ideas to address a range of practical tasks and real-life problems [34]. Again, employers in the engineering, construction, pharmaceutical, financial and retail sectors, have all expressed their continuing need for people with appropriate mathematical skills [13]. This situation demands that every child should be included in mathematics instruction right inside the classrooms [12, 33], at the secondary school level of education.

There is ample evidence to show that all over the world, majority of Secondary School students' performance in mathematics have been variously reported by individuals and group of persons to be generally poor. For instance, at the

international scene, the situation reported by the National Research Council [17, 18] in the late 1980s is of the view that students study of mathematics is getting worse worldwide especially with regard to the enrolment and performance of minority groups in mathematics/science courses [20]. Locally, similar reports on students' poor performance on mathematics were noted (Chief Examiners' report, 1993-2000; [15, 23, 35]). It is unfortunate that the general performance of students in mathematics has been observed to be poor [24, 42, 44]. This situation cannot be allowed to continue escalating without proper check. Several reasons including [10, 15, 16, 40], have offered reasons for these consistent poor performance in mathematics.

Some noted that it was associated with poor teaching of the subject (mathematics) by teachers. Specifically, accusing fingers have been pointed at the way mathematics is taught in schools, and the lack of relevance of mathematics content to the student's real life experiences [20]. Some reported that students detest mathematics, suggesting that the students are not working hard enough or learning the subject seriously. For instance, the inability of students to change to a thinking mode suitable for the particular problem, for example, to alter between a numeric, graphic, or symbolic form of representing mathematical ideas deterred them from solving a wide range of mathematical problems [11].

Other researchers [10, 19, 23] have also examined the incidence of errors as determinant of students' achievement in mathematics. Among these errors are the process errors committed by students while solving mathematical problems. Teachers inability to diagnose these process errors among other factors according to [23, 41] has contributed to the poor performance of students in both internal and external examinations over the years. Therefore, if poor performance of the students in mathematics is to be halted, these errors or weaknesses relating to the process skills should be identified among JS 3 students for further learning of mathematics in SS1 level. It becomes necessary, therefore to investigate the students specific areas ofweakness as indicated by the process errors they committed.

The mathematics readiness test (MATHRET) indicates the frequency of these process errors, from which one can find out the extent students entering the senior secondary school possess the knowledge of the Js 3 mathematics curriculum contents in readiness for senior secondary school mathematics work. This situation demands that a mathematics readiness test (MATHRET) need to be developed with which to know whether the JS 3 student's posses the background learning experiences that can enable them cope with SS1 mathematics work. [14] developed and validated mathematics readiness test for JS 1 students. Also, [45] identified mathematical readiness levels of JS1 entrants. Both studies were centred on pupils of primary six intending to resume new mathematics programme in JS1 level. This and the paucity of instrument for determining the readiness level of JS 3 students intending to resume new mathematics programme in SS1 level and remedying mathematics deficiencies of Nigerian secondary school students and for the improvement of the teaching and learning of the subject motivated this researcher to develop and validate a mathematics readiness test for senior secondary school students.

Readiness is a condition, which reflects possession of particular subject-matter knowledge, or adequate subject-matter sophistication, for further or increasingly learning complex tasks [21]. More still, the quality of education received, in other words is a significant determinant of the pupils developmental readiness, as well as of subject- matter readiness, for further learning [21]. Lack of readiness in a given task, therefore signals failure in such. More so, when a pupil is prematurely exposed to a learning task before he is adequately ready for it, he not only fails to learn the task in question (or learns it with undue difficulty), but also learns on this experience to fear, dislike, and avoid the task [21]. Thus, readiness becomes an essential factor in any learning, which involves acquisition of sequential skills [26, 43]. Lack of prerequisite skills in a given task invariably inhibits acquisition of subsequent related skills. This is particularly so with Mathematics [15] because of the nature of its structure [29-31] the sequential procedure used in its instruction [27, 28] and the hierarchical pattern of its organization [15]. Thus, effective teaching and learning of Mathematics may achieve with reliable assessment of readiness as based on diagnostic information (the process errors students commit in solving mathematics problems). Readiness test has been defined as test that determines the possession of prerequisite knowledge for further learning task [21].

Diagnostic test has been defined as test that analyzes sand locates specific strengths and weaknesses and sometimes suggests causes [25]. Achievement test on the other hand, measures what students have learned [37], and so cannot determine students' specific areas of strength and weaknesses (process errors). It becomes necessary to investigate the students' specific areas of weaknesses as indicated by the process errors they committed. Process skills are thought processes that are related to cognitive development. They are commonly brought into use while performing mathematical operations. The errors resulting from the violation or wrong use of these skills are referred to as process errors [38, 41] classified theseerrors which students commit in geometrical theorems as conceptual, logical, and drawn/ construction, translation and applied errors. Other researchers have also carried out investigation on the process errors students committed in some other aspects of mathematics. Some of these include inequalities [22], longitudeandlatitude [6], sequencesand series [10] and simultaneous linear equations [19].

Process errors which marred students' readiness levels for senior secondary school mathematics programme, according to [7, 10, 23] could be influenced by the sex and school location of the students. Hence, the need to investigate whether the readiness level of the JS3 students is likely to be influenced by the sex and school location of the students. Such investigation focused on whether Urban or rural, and the type of school attended considering whether public or privately owned. Rural inhabitants work with people they know well and are accustomed to relationships of great

intimacy, whereas Urban dwellers know each other in narrow segmented ways that have little to do with family or friendship [42]. For the purpose of this study, schools located in places where the inhabitants of such places are accustomed to relationships of great intimacy and work with people they know well are classified as rural schools. More so, urban school will be classified as schools located where the dwellers know each other in narrow, segmented ways that have little to do with family or friendship. A private school was defined as one rightly owned and cared for by an individual, group of people, or public organizations such as higher institutions, army, police or road safety. A public school was defined as one owned and cared for by a government, normally through its agency charged with the responsibility of administration and supervision of educational system.

Mathematics is the foundation for the economic and technological development of any nation. It has been asserted that without mathematics there cannot be any modern developed Society [1]. This accounts for the reason why Mathematics is made a compulsory subject at the Primary and Secondary School levels in Nigeria [5]. Thus, mathematics is expected to help in accelerating social, economic and technological progress of any Society. But these, in the final analyses, depend on the effective teaching and learning of mathematics in schools. The Primary school level is very important in any educational system because any default at this level would permeate to other levels of the educational system. To realize the objectives of teaching mathematics at any level of the educational system in the Society, there is need to monitor and maintain the quality of the educational processes and products. One major way of monitoring the quality and standards of the teaching and learning of mathematics in schools is through the assessment of the learning outcome of the pupils. The essence of using tests and other evaluation instruments during the instructional process is to guide, direct, and monitor students' learning progress towards the attainment of the course objectives [2, 4].

This monitoring of learning achievements in mathematics involves the processes of testing, measurement, assessment and evaluation. A test is set of questions, tasks or problems intended to measure an individual's knowledge, skill, aptitude, intelligence etc. Testing is therefore a systematic procedure of presenting a set of questions, tasks, or problems to testes and expecting them to respond to the items either orally or written, and sometimes by performance within a specified time schedule. Measurement is the assignment of numbers or marks to observed event or response to testing. Assessment is the process of using the results from measurement to take decisions about the object of assessment. Evaluation is a systematic process of determining the extent towhich the learners have achieved the stated instructional objectives. Assessment provides the logic and justification for the judgmental stance of evaluation [3].

Assessment is an integral part of the teaching learning process and is expected to contribute to students' learning. If assessment does not contribute to the teaching learning process, then it is not necessary to assess the students.

Indeed, evaluation is an important aspect of good teaching and learning process because no matter how efficient the teacher, how intelligent the pupils, how adequate the audio-visual equipment, if no provision is made for some evaluation of progress, the teaching may be invalidated. Unfortunately some teachers see assessment as an isolated activity from the teaching and learning processes. Hence, some teachers haphazardly carry out the assessment processes of the pupils without utilizing the goals and benefit of assessment in the classroom. Some of the teachers see assessment mainly for the purpose of grading the pupils. In the Nigerian educational system, Continuous Assessment was introduced in 1982 for the assessment of students at all the levels of the educational system. This replaced the one-shot, or end of course only summative evaluation practiced in the past. Under this system, teachers are to evaluate the learners using written tests, assignments, projects and other assessment instruments during the course and at the end of the term or session. The continuous assessment given during the course accounts for about 30-40 percent, while the end of term assessment accounts for 60-70 percent of a pupil's scores. This gives teachers the opportunity to monitor and assess the learning progression of the pupils in his class.

1.1. Statement of the Problems

The first three years of secondary education in Nigeria is known as the Junior Secondary School, which is normally rounded up with a uniform examination taken by those who attain that level. The State and Federal Ministries of Education conducts this examination called the Junior School Certificate Examination (JSCE). The Osun State Ministry of Education is solely responsible for the conduct of the JSCE in both public and private secondary schools in the state.

The National Policy on Education (1998 revised) classified mathematics as one of the core subjects to be offered by all students from primary to senior secondary school level of education. Since the inceptionof the junior secondary school certificate examinations in Osun State, student's performance in mathematics has not been quite encouraging. Every year the number of students who write the resit examination in the subject are on the increase despite the fact that the subject is taught everyday in schools and as stated by [36] that the teachers in Osun State appear appreciably satisfied with their job and their task performance was relatively high. This is due to the fact that their conditions of service are fairly good, salaries and promotions are regular.

With the emphasis placed on the teaching and learning of mathematics as well as the usefulness of the subject and the good condition of service of Osun State teachers, it is expected that not fewer than 90% of the students should perform above average in the JSCE mathematics. However, this is not the case. Several factors have been advanced as reasons for poor academic performance in Mathematics in secondary schools, generally. Among them are lack of interest in the subject, the nature of the subject, the subject itself, teacher related factors etc.

Could the nature of the questions asked in the JSCE Mathematics be responsible for students' poor performance and for the subject tagged "difficult"? Therefore, there is the need to investigate the level of validity of the items difficulty and discrimination in dices of the Osun State JSCE mathematics multiple choice test items in year 2017.

1.2. Research Questions

The following research questions were generated to guide the study:

i. Is there any different between the achievement of male and female students when assessed with the JSSCE?
ii. Is there any difference between the achievement of private and public school students when assess with the JSSCE?
iii. Is there any different between the achievement of students in different classes when assessed with JSSCE?
iv. Is there any difference between the achievement of students in different age group when assessed with the JSSCE?

1.3. Hypothesis

Four hypothesis were formulated from the four research questions above:

1. There is no significant difference between the achievement of male and female students when assessed with JSSCE.
2. There is no significant difference between the achievement of private and public school students when assessed with JSSCE.
3. There is no significant difference between the achievement of students in different classes when assessed with the JSSCE.
4. There is no significant difference between the achievement of students in different age group when assessed with JSSCE.

1.4. Design of the Study

Research design is the blue print of the study. The study shall adopt sample survey as it is capable of capturing the relevant impact and interrelationship of social and psychological variables from the given population of study. Survey aids the study of large population through small populations by selecting and studying samples chosen from the population to discover the relative incidence and distribution. Also, this study shall involve both public and private secondary school in Oriade Local Government of Osun State.

1.5. Population for the Study

The population of this study was students in junior secondary school JSS1, JSS2 and JSS3 in Oriade local government area. The choice of junior secondary class students was guided by the assumption that the students have attained the formal operational stage of cognitive development. At this stage students can be taught new kinds of thinking, which are abstract, formal and logical. Thinking symbolically at this stage is necessary if one should be able to deal with the mathematical problems solved at their level of education. The study specifically consists of the whole of the students that offered mathematics JSS1, JSS2 and JSS3 and sixty of the Mathematics students are selected schools in the area.

2. Research Instrument for the Study

The study will involve the use of a questionnaire and the FGDs; hence, a combination of instruments shall be used to gather data.

Questionnaire: It shall contain two sections, tagged A to B. The section A comprises basic information about the respondents such as, Name of school, sex, age rages, year of the examination while section B centres on the 60 objective questions which has option A to E of which students are expected to pick the right option.

2.1. Tables and Results

General Question 1: What is the difficulty index of each item of the JSSCE?

Table 1. *Mean difficulty index for the Junior Secondary School Examination.*

Items	R	W	T	Difficulty Index = R/T	Remark
1	50	10	60	0.83	Good
2.	4	11	6	0.82	Good
3.	49	11	60	0.82	Good
4.	46	14	60	0.77	Good
5.	43	17	60	0.72	Good
6.	31	29	60	0.52	Good
7.	35	25	60	0.58	Good
8.	40	20	60	0.67	Good
9.	47	13	60	0.78	Good
10.	44	16	60	0.73	Good
11.	34	26	60	0.57	Good
12.	42	18	60	0.70	Good
13.	45	15	60	0.75	Good
14.	37	23	60	0.62	Good
15.	39	21	60	0.65	Good
16.	46	14	60	0.76	Good

Items	R	W	T	Difficulty Index = R/T	Remark
17.	38	22	60	0.63	Good
18.	28	32	60	0.47	Good
19.	41	19	60	0.68	Good
20.	46	14	60	0.77	Good
21.	47	13	60	0.78	Good
22.	43	17	60	0.71	Good
23.	44	16	60	0.73	Good
24.	37	23	60	0.62	Good
25.	41	19	60	0.68	Good
26.	40	20	60	0.67	Good
27.	49	11	60	0.81	Good
28.	23	37	60	0.38	Good
29.	52	8	60	0.87	Good
30.	33	27	60	0.55	Good
31.	46	14	60	0.76	Good
32.	34	26	60	0.56	Good
33.	38	22	60	0.63	Good
34.	20	40	60	0.33	Good
35.	33	27	60	0.55	Good
36.	39	21	60	0.65	Good
37.	38	22	60	0.63	Good
38.	7	53	60	0.11	Low
39.	39	21	60	0.65	Good
40.	41	19	60	0.68	Good
41.	35	25	60	0.58	Good
42.	56	4	60	0.93	Good
43.	40	20	60	0.67	Good
44.	41	19	60	0.68	Good
45.	36	24	60	0.60	Good
46.	41	19	60	0.68	Good
47.	42	18	60	0.70	Good
48.	32	28	60	0.53	Good
49.	39	21	60	0.65	Good
50.	48	12	60	0.80	Good
51.	47	19	60	0.68	Good
52.	35	25	60	0.58	Good
53.	32	28	60	0.53	Good
54.	35	25	60	0.58	Good
55.	47	13	60	0.78	Good
56.	44	16	60	0.73	Good
57.	46	14	60	0.76	Good
58.	46	14	60	0.76	Good
59.	43	17	60	0.71	Good
60.	42	18	60	0.70	Good

R = Number of students who answered item correctly.
W = Number of students who answered item wrongly.
T = Total number of students tested.

Table 1 shows the difficulty index for the Junior Secondary School Certificate Examination. The Table shows that the test had difficulty index between 0.11 and 0.93. Out of the 60 items, 59 items were considered good in terms of their difficulty index. However, 1 item was considered low and therefore will need modification before they can be used in any assessment.

In addition, Table 1 shows the difficulty index Item difficulty of the Junior Secondary School Certificate Examination is thus categorized as follows: 0.0 - 0.20; very difficult, 0.21 - 0.49; difficult, 0.50 - 0.79; middle difficult, 0.80 - 0.89; easy, 0.90 - 1.00; very easy. Hence, item 38 is very difficult or not understood by the students. Items 18, 28, and 34 are difficult, items 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19 20, 21, 22, 23, 24, 25, 26, 30, 31, 32, 33, 35, 36, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60 are middle difficult, items 1, 2, 3, 27, 29, 50 are easy and items 42 is very easy.

General Question 2: What is the discriminatory index of each item of the JSSCE?

Table 2. *Mean discriminatory index of the JSSC Examination.*

Items	RU	RL	½ T	RU-RL	*RU-RL½* T	Remark
1	19	3	30	16	0.53	Appropriate
2	20	2	30	18	0.60	Appropriate
3	24	3	30	21	0.70	Appropriate

Items	RU	RL	½ T	RU-RL	*RU-RL½* T	Remark
4	18	3	30	15	0.50	Appropriate
5	19	3	30	16	0.53	Appropriate
6	11	2	30	9	0.30	Appropriate
7	14	1	30	13	0.43	Appropriate
8	19	2	30	14	0.47	Appropriate
9	18	2	30	16	0.53	Appropriate
10	20	0	30	20	0.67	Appropriate
11	12	1	30	11	0.37	Appropriate
12	18	1	30	17	0.57	Appropriate
13	18	1	30	17	0.57	Appropriate
14	14	2	30	12	0.40	Appropriate
15	17	1	30	16	0.40	Appropriate
16	13	4	30	9	0.30	Appropriate
17	20	2	30	18	0.60	Appropriate
18	10	2	30	8	0.27	Appropriate
19	15	3	30	12	0.40	Appropriate
20	19	2	30	17	0.57	Appropriate
21	15	4	30	11	0.37	Appropriate
22	17	3	30	14	0.47	Appropriate
23	18	1	30	17	0.57	Appropriate
24	15	1	30	14	0.47	Appropriate
25	15	0	30	15	0.50	Appropriate
26	13	1	30	12	0.40	Appropriate
27	16	4	30	12	0.40	Appropriate
28	6	1	30	5	0.17	Appropriate
29	15	3	30	12	0.40	Appropriate
30	10	2	30	8	0.26	Appropriate
31	17	1	30	16	0.53	Appropriate
32	13	1	30	12	0.40	Appropriate
33	14	1	30	13	0.43	Appropriate
34	13	1	30	12	0.40	Appropriate
35	11	1	30	12	0.40	Appropriate
36	14	2	30	12	0.40	Appropriate
37	13	1	30	12	0.40	Appropriate
38	5	0	30	5	0.16	Inappropriate
39	12	4	30	8	0.26	Appropriate
40	18	2	30	16	0.53	Appropriate
41	17	1	31	16	0.53	Appropriate
42	20	3	30	17	0.53	Appropriate
43	18	3	30	15	0.56	Appropriate
44	16	3	13	13	0.50	Appropriate
45	16	3	13	13	0.43	Appropriate
46	15	2	30	13	0.43	Appropriate
47	18	1	30	17	0.56	Appropriate
48	16	3	30	13	0.45	Appropriate
49	19	0	30	19	0.63	Appropriate
50	17	4	30	13	0.43	Appropriate
51	18	1	30	17	0.56	Appropriate
52	18	1	30	18	0.60	Appropriate
53	13	0	30	13	0.43	Appropriate
54	15	0	30	15	0.50	Appropriate
55	17	1	30	16	0.53	Appropriate
56	19	2	30	17	0.56	Appropriate
57	19	1	30	18	0.60	Appropriate
58	18	3	30	15	0.50	Appropriate
59	19	0	30	19	0.63	Appropriate
60	16	2	30	14	0.46	Appropriate

RU - The number in the upper group who get the item right.
RL - The number in the lower group who get the item right.
1/2 T - One half of the total number of students included in the item analysis.

Table 2 shows the discriminator index of the Junior Secondary School Certificate Examination. The discriminatory index as shown in the table ranges between 0.16 and 0.70. The result showed that 59 out of the 60 items are appropriate in terms of their discriminatory index. However, 1 out of the 60 items is inappropriate and therefore need further modification before they can be useful.

2.2. HypothesisTesting

Hypothesis 1: There is no significant difference in the student performance when assessed with the JSSCE.

Table 3. *T-test analysis of male and female students' achievement.*

Variables	N	Mean	SD	Df	t_{cal}	t_{tab}	Decision
Male	33	39.15	8.45	58	0.82	1.96	NS
Female	27	40.67	5.12				

P<0.05 level of significance. NS = Not Significant.

The t-test analysis in Table 3 showed that t_{cal} (0.82) was less than t_{tab} (1.96) at $p < 0.05$ level of significant which implies that there is no significant difference between the achievement of male and female students when assessed with the JSSCE. Hence, the null hypothesis was upheld.

Hypothesis 2: There is no significant difference between the achievement of students in private and public schools when assessed with the JSSCE.

Table 4. *T-test analysis ofstudents' achievement in private and public schools.*

Variables	N	Mean	SD	Df	t_{cal}	t_{tab}	Decision
Private	30	38.63	7.89	58	1.31	1.96	NS
Public	30	41.03	6.18				

P< 0.05 level of significance. NS = Not Significant.

The t-test analysis in Table 4 showed thatt$_{cal}$ (1.31) was less than t_{tab} (1.96) at $p < 0.05$ level of significant which implies that there is no significant difference between the achievement of private and public school students when assessed with the JSSCE. Hence, the null hypothesis was upheld.

Hypothesis 3: There is no significant difference between the achievements of students in different classes when assessed with the JSSCE.

Table 5. *ANOVA of students' achievement by classes.*

Score							
	Sum of squares	Df	Mean square	F_{cal}	F_{tab}	Sig.	Decision
Between Groups	67.406	2	33.703	0.656	3.35	0.523	NS
Within Groups	2930.927	57	51.402				
Total	2998.333	59					

P< 0.05 level of significance. NS = Not Significant.

The result of the analysis in Table 5 shows the differences between the performance of students in different classes. The analysis of variance revealed that F_{cal} (0.66) was less than F_{tab} (3.35) at $p < 0.05$ level of significance. This means that there is no significant difference between the achievements of students in different classes when assessed with the JSSCE. The null hypothesis was therefore upheld.

Hypothesis 4: There is no significant difference between the achievements of students in different age group when assessed with the JSSCE.

Table 6. *ANOVA of students' achievement by age group.*

Score							
	Sum of squares	Df	Mean square	F_{cal}	F_{tab}	Sig.	Decision
Between Groups	117.624	2	58.812	1.16	3.35	0.392	NS
Within Groups	2880.710	57	50.539				
Total	2998.333	59					

P< 0.05 level of significance. NS = Not Significant.

The result of the analysis in Table 6 shows the differences between the performance of students in different age group. The analysis of variance revealed that F_{cal} (1.16) was less than F_{tab} (3.35) at $p < 0.05$ level of significance. This means that there is no significant difference between the achievements of students in different age group when assessed with the JSSCE. The null hypothesis was upheld.

3. Discussion of Findings

The first finding revealed that 59 out of the 60 items in the Junior Secondary School Certificate Examination (JSSCE) are appropriate in terms of difficulty index. However, it was shown in the study that 1 out of the 60 items are not appropriate, hence, will require further modification before they can be used. This finding has shown that the JSSCE is very appropriate and useful for the assessment of students' Junior Secondary School Certificate Examination in the cognitive domain.

The second finding showed that 59 out of the 60 items in the Junior Secondary School Certificate Examination (JSSCE) are appropriate in terms of discriminatory index while 1 other need modification in order for them to be useful in the assessment of students.

The third finding revealed that there was no significant difference between the achievement of male and female students when assessed with the JSSCE. This finding seems to suggest that male students performed better than their female counterparts in the Junior Secondary School Certificate Examination but this difference is not significant. The fourth finding showed that there was no significant difference between the achievement of students from private and public schools when assessed with the JSSCE. The fifth finding showed that there was no significant difference between the achievements of students in different classes when assessed with the

JSSCE, the sixth finding revealed that there was no significant difference between the achievements of students in different age group when assessed with the JSSCE, the seventh finding revealed that there is a difference in their achievement when assessed with the JSSCE in favour of the JSS II students, And lastly, the eight findings revealed that there is a difference in their achievement when assessed with the JSSCE in favour of the "8 – 12 years" students.

3.1. Summary

The study was designed to determine the difficulty index and discriminatory index of the Junior Secondary School Certificate Examination (JSSCE) using Oriade local government area of Osun State as a case study with a view to making recommendations towards improvement. This becomes imperative in view of the dwindling performance of students observed in mathematics at both internal and external school examinations.

Thirty junior secondary school students were selected through purposive randomization from each of the two schools sampled for the study resulting in a total of sixty students. The instrument for the study consisted of 60 multiple choice questions selected from the 2017 edition of JSSCE.

The results of the findings revealed that 59 out of the 60 items in the Junior Secondary School Certificate Examination (JSSCE) are appropriate in terms of difficulty index. However, it was shown in the study that 1 out of the 60 items are not appropriate, hence, will require further modification before they can be used. This finding has shown that the JSSCE is very appropriate and useful for the assessment of students' Junior Secondary School Certificate Examination in the cognitive domain. Similarly, findings showed that 59 out of the 60 items in the Junior Secondary School Certificate Examination (JSSCE) are appropriate in terms of discriminatory index while 1 other needed modification in order for them to be useful in the assessment of students.

The test of hypotheses revealed that there was no significant difference between the achievement of male and female students when assessed with the JSSCE. There was no significant difference between the achievement of students from private and public schools when assessed with the JSSCE. That there was no significant difference between the achievement of students in different classes when assessed with the JSSCE. And lastly, there was no significant difference between the achievements of students in different age group when assessed with the JSSCE.

3.2. Conclusion

The study revealed that the difficulty indexes of the JSSCE were good for 59 out of the 60 items in the examination while 1 item requires modification as the question might have been unclear or misunderstood by the students. Also, discriminatory indexes were considered appropriate for 59 out of the 60 items in the examination while 1 item was found inappropriate and thus does not fit into the set of questions for the JSSCE unless it is rewritten for better clarity. The study also revealed that students' gender, age, class and school type have no significant influence on their academic performance in the JSSCE.

4. Recommendations

Based on the findings of the study, test measurement and evaluation experts should emphasize and also ensure that proper test analysis are carried out on test items before they are administered to students especially in national examinations. Curriculum planners should make adequate provision for instructional materials and teaching aid to enhance students' understanding of mathematical concepts thereby developing their confidence in mathematics. The relevant instructional materials should be made readily available to both teachers and students in order to enable them effectively utilize students' potentials in mathematics related subjects and help them overcome the anxiety usually experienced in mathematics tests and examinations.

The importance of mathematics as a tool in science and technology as well as nation building cannot be overemphasized hence students' perception of mathematics should be enhanced through teachers' genuine interest in developing their students' mathematical competences. Teachers should employ progressive teaching methods that position the students as the center of the teaching-learning process. Mathematics teachers should alleviate the fears of their students by emphasizing that mathematics is not a difficult subject and it could be fun learning mathematics.

Both state and federal ministries of education and NERDC should establish regular training and retraining of mathematics teachers as a way of equipping and updating them on new teaching strategies that can yield the required result of improved student's performances in mathematics examinations. Seminars should be organized for mathematics teachers especially before the introduction of new topic (s) in the mathematics curriculum to prepare them for the new tasks.

Environment has a great influence on the teaching-learning process hence government should provide conducive environment where teaching-learning can be effectively utilized. Teachers and students' perception of mathematics can be changed through the creation of an enabling environment in terms of infrastructures and other material that can enhance the teaching and learning of mathematics. Enhanced salary and other emoluments along side with conducive environments should be made available for teachers and students in both private and public secondary schools in the state and by federal ministry of education. These will motivate them to give their best to the teaching and learning of mathematics.

Conflicts of Interest

The authors do not have conflict of interest.

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