ASSESSMENT OF SENIOR SECONDARY SCHOOL PHYSICS EXAMINATION QUESTIONS: IMPLICATIONS FOR PROPER TIME ALLOTMENT

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Abstract

Answer Scripts of Senior Secondary School Mock examination question papers in physics were analyzed to find out the percentage of students who had attempted all the test items of each question paper made up of four sets. The time required to attempt all the test items of each paper was also determined. Result showed that the time required for attempting all the test items of each question paper was inversely proportional to the percentage of students who attempted all the test items of that paper. Extrapolation of the graph (results) also revealed that if the percentage of students who attempted all the items of the paper was nearly 50, the paper could be considered useable in terms of time allotment. The findings of this paper can be used as feed back for setting question papers for other examinations.

Introduction

Many factors have been attributed to the high rate of failure in physics examinations. These include, attitudinal factors, language of physics, unqualified physics teachers, lack of necessary skill, lack of interest by students, non availability of laboratory equipments among others (Alio, 1997). With studies already carried out on students cognitive styles (Obioma, 1987), teachers effectiveness (Igbokwe, 1997), poor enrolment in physics, emphasis is also being placed on test items construction and development (Ubani, 1983) It is believed from these studies that test administered in schools both for continuous assessment purposes and for end of term/year placement purposes ought to be valid and reliable. Ubani (1983) in Ubani and Obioma (1997), has shown that, teacher-made tests results could be used as an indicator of the level of students' performance in public examinations. A proper analysis of evaluation data can throw light on the suitability of the curriculum, the effectiveness of teaching - learning materials and methods, the efficiency of learning objectives and the efficiency of the evaluation instrument itself.

Consequently, a number of examination bodies such as WAEC, JAMB, NECO have made remarkable efforts to meet all characteristics of a good question paper in their examinations that is, in areas of its validity, reliability and useability. While there are presently different methods developed to test the validity and reliability (Eisner, 1985) of a test, and in the area of the useability of a question paper most aspects of it are managed at organizational level, it is quite regrettable to note that despite all the advancement in test development and with the recognition that evaluation forms an integral part of the teaching - learning process (Ash Ford, 1975), a main aspect concerned with the time allotted to a

question paper still remains a problem in the absence of any tangible research study in it. It is not unusual to see pupils and students generally complain that the question paper was too lengthy to be attempted in the allotted time.

This paper is therefore, aimed at assessing the senior secondary school physics question paper in terms of time allotment. The findings will no doubt give a feed back for selecting the proper test items for question paper for subsequent examinations.

Objectives of the Study

1. To find out the time required for answering different types of items set in senior secondary school physics question paper.
2. To find out the percentage of students that could attempt all items of each of the physics question paper.
3. To correlate the time required for answering the test items with the percentage of students who could attempt all the items of each question paper.

Research Questions

1) What is the time required for answering different types of items set in the senior secondary school physics question papers?
2) What is the percentage of students that could attempt all items of the physics question papers?
3) Is there any relationship between time and the percentage of students that attempt all the items of the question paper?

Hypothesis

The following null hypothesis was formulated for the study. These is no relationship between the time required for attempting all the test items of a physics question paper and the percentage of students who attempted all the items of that paper.

Methodology

All the Governmet Senior Secondary Schools in Ogba-Egbema-Ndoni Local Government Area of Rivers State of Nigeria including the Demonstration Secondary School of the Federal College of Education (Technical), Omoku were used for the study. From the secondary schools, four were purposively selected based on availability of qualified physics teachers and well equipped physics laboratories from which four sets of physics question papers A, B, C, D of their West African School Certificate Mock Examination for the 2005/2006 academic year were used for determining the time required for attempting all the test items of each question paper.

For finding out the percentage of students who attempted all questions of each set of question paper, 305 answer scripts comprising paper A = 78. paper B = 72, paper C = 78 and paper D 77 were randomly selected and used.

Procedure

The time required for attempting each item of the question paper was assigned on the basis of findings made by the teachers during the secondary Physics examination and also by the author on a small sample of students. Consequently:

a) Time required by an average student for writing 50 words for short answer type items in learning objectives of knowledge (K) and understanding (U) was found by the teachers during the examination to be nearly 5 minutes. On this basis, one minute duration for 10 words was adopted for general calculations.

b) For application type questions (A) of short answer type items of about 60 words it was found by the teachers during the examination to be 12 minutes and so a duration of 2 minutes for 10 words was adopted for calculations. This is based on the fact that much time is often required for items that require calculations. In addition to the student writing down and understand fact, concepts principle and processes of physics the student has to also apply his/her knowledge to understand unfamiliar situations.

c) For the case of drawing and labeling as often found in physics examinations, the time required as found by the teachers was 8 minutes. To take care of drawing supporting diagrams, for understanding and application type items (A) 4 minutes duration was allocated.

d) The total time required for attempting all the test items of each question paper was calculated keeping in view the types of item set, the scope of answering the items (range of words was giving in paper A and maximum limit of words was giving in papers B, C, and D), the answers of items supported with diagrams and the drawing and labeling of diagrams. Wherever the combination of two objectives was involved, the time required was adjusted accordingly.

The number of students who attempted all the test items of each question paper was recorded from the analysis of answer scripts of students. From which the percentage of students who attempted all the list items of each question paper was calculated.

In answering the research questions the following tables were used.

Table 1: Showing 1 "inie Required for g Question Paper A

Type of test Item	No. of test Items	Range of Words	Max limit of words	Time/item (min)	Total time (min)
K	7	25-30	30	3.0	**21.0**
K	3	50-60	60	6.0	**18.0**
U	3	50-60	60	6.0	**18.0**
u	2	50-60	150	**15.0**	**30.0**
K+U	1	150	60	6.0	**6.0**

U+SD	2	150	150	19.0	38.0
A	1	50-60	60	12.0	12.0
S	1	50-60	60	8.0	8.0
Total	20				151.0 Mins

The Table 1 above, shows the time required for attempting question paper A. It shows that the time required for attempting Knowledge type items within the range 25-30 of maximum of 30 words was 21.0 minutes. For other 3 test items of knowledge type it was 18 minutes. In the case of understanding type items it was 18 minutes. The next understanding type items of 150 words the time required was 30 minutes. The time required for attempting Knowledge and understanding type item of maximum 60 words was 6.0 minutes. For understanding and supporting diagram type items the time was 38 minutes. The application type items of maximum word limit of 60 words was 12 minutes while skill type items took 8 minutes. On the whole, the total time taken to attempt question paper A was 151 minutes.

Table 2: Showing Time Required for Attein [Ring Question Paper B

Type of test item	**No. of test items**	**max limit of words**	**Time/item(min)**	**Total time (min)**
K	6	25	2.5	15.0
K	2	50	5.0	10.0
U	2	25	2.5	5.0
U	4	50	5.0	20.0
u	3	150	15.0	45.0
K+U	2	50	5.0	10.0
U+SD	1	150	19.0	19.0
A	1	50	10.0	10.0
Total	20			134.0 Mins.

Table 2 above, shows the time taken for attempting question paper B. The two knowledge type test items of 6 and 2 with maximum limits of words 25 and 50 gave a total time of 15 minutes and 10 minutes respectively. The three understanding type of test items comprising 2, 4 and 3 items gave a total time of 5,20and 45 minutes respectively. For the 2 items set for knowledge and understanding type of maximum of 30 words took a total time 10 minutes. In the case of understanding and supporting diagram type it took the students a total time of 19 minutes. The only application type test item of maximum of 50 words was 10 minutes duration. From the analysis of this table, the total time taken to answer question paper B was 134 minutes.

Table 111: Showing Time Required for Attempting Question Paper C

Type of test item	No. of test items	max limit of words	Time/item(min)	Total time (min)
K +U	2	50	5.0	10.0
K +U	1	150	15.0	15.0
K	3	25	2.5	7.5
K	3	50	5.0	15.0
U	5	25	2.5	12.5
U •	3	50	5.0	15.0
u	2	150	15.0	30.0
U +SD	1	150	19.0	19.0
Total	20			124.0 Mins

For the Table 3 above, the knowledge and understanding type of test items were 2 and 1 of maximum limit of words 50 and 150 which were attempted in 10 and 15 minutes respectively. For the knowledge type test items of maximum limit of words 25 and 50 it took a duration of 7.5 and 15 minutes respectively. With various understanding type test items with different maximum limit of words as shown in the table , the total time was 12.5 , 15 and 30 minutes respectively. For understanding and supporting diagram type test items, it took 19 minutes duration to answer only one test item of maximum limit of words 150. On the whole the total time taken to answer question paper C was 124 minutes.

Table 4: Showing Time Required for Attem pting Question Paper D

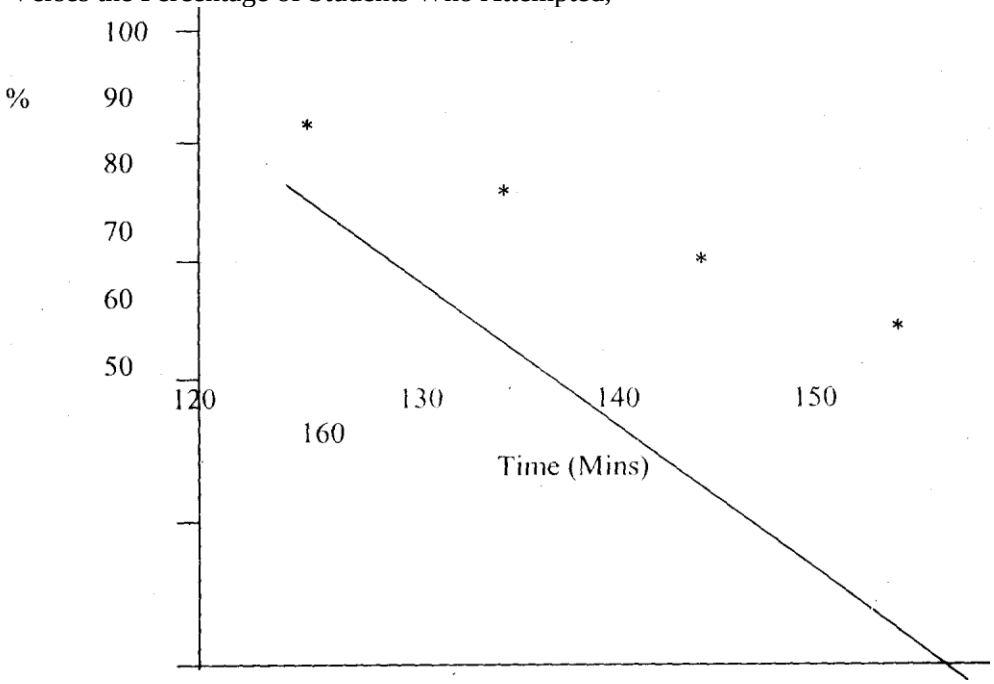
Type of test item	No. of test items	Max limit of words	Time/item (min)	Total time (min)
K	7	**25**	**2.5**	**17.5**
K	2	**50**	**5.0**	**10.0**
U	**1**	**25**	**2.5**	**2.5**
U	2	**50**	**5.0**	**10.0**
u	3	**150**	**15.0**	**45.0**
K+U	2	**50**	**5.0**	**10.0**
U + SD	2	**50**	**9.0**	**18.0**
A	1	**150**	**30.0**	**30.0**
Total	20			**143.0 Mins.**

The Table 4 above, shows the time required for attempting question paper D. For the K type test items comprising 7 and 2 items of maximum limit of words 25 and 50, the total time required was 17.5 and 10.0 minutes respectively. The 1,2 and 3 test items of understanding type of items of different maximum limit of words took 2.5, 10 and 45.0 minutes to answer. For the Knowledge and understanding type of test items the total time was 10.0 minutes. For the application type of test items of maximum limit of words 150 it took a total time of 30 minutes. The total time therefore, required to answer all the questions in question paper D was 143.0 minutes.

*Note: K - knowledge; K + U - knowledge and understanding U - understanding, U +SD - understanding and supporting diagram. A - Application, S - skill.

To test the null hypothesis a graph of time required for attempting all the test items against the percentage of students who attempted was plotted and represented in the Figure 1 below.

Figure I: Showing a Graph of lime Required for Attempting all the test Items Verses the Percentage of Students Who Attempted,



The number of students who attempted all the test items of each question paper was recorded from the analysis of answer scripts of students. From this, the percentage of students who attempted all the list items of each question paper was calculated.

Results and Discussion

Table 1, 2, 3, and 4 show respectively, the time required for attempting all the test item (20) of all the four sets of question papers. The percentage of students who had attempted all the test item of each question paper were, A 60.1% B, 80% C, 88% D, 68%.

Comparism between the time required and the percentage of students who attempted all the items for each paper indicates that there is a postive and close relationship between the time and the percentage . This finding agrees with the study of Sindhu and Sharma (1959), who found that as the time required to attempt all the items of each set of paper decresses, the percentage of decrease, the percentage of students attempting all the items increases.

Fig 1 shows the relationship of time required for a paper and the percentage of students who attempted all the item of that paper. A straight line indicates that the variables are inversely proportional to each other. This negates the null hypothesis framed. Which makes it rejected.

On extrapolation of the line of the graph as in Figure 1, the time required for a question paper corresponding to 50% of students attempting all the term items is 157 minutes which is very close to the standard time (180min) given for attempting all the test items. The rest of the remaining time (180-157=23min) will be used for rechecking the answers and other

examination formalities such as signing examination sheets, collecting supplementary sheet, etc.

Recommendations

It is recommended based on the findings of this study that physics educators should always record the percentage of students who attempted all the test items of question papers at the end of awarding marks. This is because the findings can act as a feed back for future examinations.

1. Proper considerations have to be given to the scope of each test item, percentage of test items of each learning objective or skill in drawing diagrams.
2. Physics evaluators should give enough time to students to answer physics questions such that it will accommodate rechecking of answers and other examination formalities.
3. Physics examiners and educators should constantly be made to attend workshops and seminars to improve their testing skills.

Conclusion

The study was the assesment of four senior secondary school physics mock examination question papers for 2005/2006 whose objective was to find out the time required for answering different types of test items set in the examination and to also determine the percentage of students that could attempt all items of each of the physics question papers. The relationship between the time required for answering the test items with the percentage of students who could attempt all the items was also found for each of the 20 items set in the four question papers of the examination. Three questions and a null hypothesis were formulated for the study.

All the Government senior secondary schools and the Demonstration Secondary School of the Federal College of Education Technical Omoku in Ogba /Egbema/ Ndoni Local Government Area of Rivers State were considered for the study based on availability of teachers of physics and laboratory facilities. One the whole 305 answer scripts were analysed, ft was found that:

1. time required for attempting all the test and items of all the four sets of question paper were 151, 134 124 and 143 minutes.
2. The percentage of students who had attempted all the test items of each question paper were 60.1%,80%, 88% and 68% respectively.
3. the relationship between the time required and the percentage of students who attempted all the items for each paper indicates that there is a positive and close relationship between the time and the percentage of students thus, negating the null hypothesis.
4. from the analysis the time required for a question paper corresponding to 50% of students attempting all the items is 157 minutes which was close to the standard time of 180 minutes given for attempting all the test items. Thus, the question paper with respect to its test items was a model question paper.

Implications of Study

The implication of this is that a paper where all the test items are attempted by nearly 50% students of a suitable sample should be considered as

model question paper with respect to its test items.

At the time of awarding marks, the percentage of students who attempted all the test item of question paper can be recorded by the examiner or evaluator. The finding can act as a feedback for future examination. If the percetage is not nearly 50 it can be concluded that proper consideration has not been given to the scope of the test item, percentage of test items of each learning objective or skill in drawing diagram.

Limitation of Study

This study should not be generalised too far because, the study was under taken for Physics discipline which is a science disciple that requires different time for different type of test items. In other disciples that are not science in nature, test items like numerical problem, drawing and labelling are rarely found. This assement procedure may not be valid for non-science disciplines.

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