

# Students' Performances in Physics Theory and Calculation Questions at Federal College of Education Zaria, Nigeria

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## ABSTRACT

*The study aimed comparatively the performances of physics students in theory and calculation questions. The sample for the study consisted of 100 students randomly drawn from consecutive five-year physics students of the Federal College of Education, Zaria. Statistical percentage and average were used to analyse the data obtained from the calculation and theory questions gotten from the scripts of the sampled students. The study revealed that students performed better in theory than in calculation questions as well as male students performing better in calculation than their females counterparts. In addition, the knowledge of language of instruction as well as sound background in mathematics aided the understanding of physics generally. Carrer counsellors are encouraged not to seize effort in counselling the female students in particular to ensure that they level up with their male counterparts in the aspect of calculations which is not limited to physics only.*

*Keywords: Physics, theory, calculation, questions students' performance*

## INTRODUCTION

The study of Physics is man's attempt to understand and manipulate the matters in the environment to suit his basic needs as regards energy. No effort would be too small or much when it is directed towards the improvement of science teaching and learning, physics inclusive. Mani (1981) has opined that the mandate for physics teachers in schools should be intellectual, social and personal developments of pupils. Personal experience by the researcher during his teaching of physics at post-primary level and, presently, at post-secondary level confirmed that some students usually develop phobia for theory questions while some do for calculation questions. Olatunji (1990) confirms that poor knowledge of language of instruction hinders the understanding of physics questions. Consequently, lack of understanding of the physics questions could be caused by the poor language proficiency of the learner. Zinibardo and Ebberson (1970) have reported a strong relationship between the knowledge of mathematics and the understanding of physics. This could mean that a good background in mathematics would enhance proper understanding of physics calculations. From whatever angle this is looked at, it is clear that students develop baseless fear for physics as a difficult subject. It is clear that students' backgrounds in language of instruction and mathematics, among other causes, influence their performances in physics. From the above, students' performances in physics theory and calculation questions are at variance going by their varying stands in the language of instruction and mathematics abilities;

thus the variation worth investigating. Hence, this study is to find out and compare the extents of students' performances in physics theory and calculation questions. The study also examined the extent of the influence that gender, good Mathematics and English language background have on the students' performances in theory and calculation of the questions in physics. To achieve these, the study was designed to test the following hypotheses:

- (i) There is no significant difference between pupils' performance in physics theory and calculation questions.
- (ii) Male and female students perform equally in physics theory and calculation questions.
- (iii) The knowledge of mathematics and English language by students has no effects on the understanding of physics.

Results of the above will in no small measure help students in the area of self-understanding as well as the teachers and education policy makers in the area of planning.

### **METHOD**

The study adopted the survey research design. The population for this study was 803 N.C.E. 1,2 and 3 physics students of Federal College of Education, Zaria. A sample of 100 students comprising of male and female physics students representing 12.5% of the population, was selected randomly from five-year (2001 - 2005) sets. The criteria used for the selection include available results with up-to-date records, gender subject combinations (Table 1). Other subjects combined with physics excluding mathematics are computer, chemistry and integrated science. Percentage and averages of various parameters were used to present for the data collected for this study. Marked scripts of the sampled students over 5 years were used. The scores for theory and calculation questions were obtained from the scripts, tabulated for males and females in the sample and were analysed carefully. Altogether 100 students (that is, 12.5% of the population) consisting of 67 males and 33 females took part in the research (Table 1). For each year the number of the theory and calculation questions in a particular examination was itemized. The number of correct and wrong scores in both theory and calculation for each of the twenty students in a year were tabulated and the percentage calculated separately for each of the five years.

### **RESULTS AND DISCUSSION**

The table 1 above reveals the total number of male and female students that were sampled during the study. Table 2 above is a clear indication that students generally perform better in theory questions than calculation question. Table 3 shows that both male and female students performed at the same level in theory questions. However, the table reveals that male students excelled in calculation questions more than their female counterparts. In testing for the effect of the mathematics abilities on the pupils' performances, their correct scores in theory and calculation questions were tabulated against their combinations. The performances of those who combined mathematics with physics were compared with the performances of those who combined subjects other than mathematics; the results are shown on table 4.

Table 4 shows a better performance in calculation for students with mathematics combination. In the same vein, there is a narrow margin of performance for mathematics students against non-mathematics students in theory questions. Furthermore, the higher performance by non-mathematics students in theory questions could be an indication of their better linguistic background which some of them could have possessed over the mathematics students. From the results it was found that students performed better generally in physics theory than they did in the calculation questions, in the ratio 76.6% to 57.7%. This could be an indication of poor background of students in mathematics. It is therefore, necessary for students wishing to have complete ability in physics to be battle ready for the knowledge of mathematics as well as that of the language of instruction, which is English language, necessary for the understanding of theory questions.

Although both gender performed almost equally in theory, yet, male students excelled in calculations over their female counterparts in the ratio 61% to 54%. This downthrown performance by the females in calculations could be due to lack of courage towards calculations, lack of adequate orientations, shoddy social ways of living that take much of females' times, domestic works and natural dislike attitude being exhibited by most females students towards calculation courses. The higher performance of 71.4% in theory questions by the group of students that combined subjects other than mathematics might probably be an indication of their language abilities, explained by Fafunwa (1990). But a higher performance of 65.8% in calculation questions by the mathematically inclined students equally synchronized with the assertion of Fatokun (1986).

**Table 1:** Characteristics of the Research Sample

Year	Gender		Math Combination		Other Combination	
	Male	Female	Male	Female	Male	Female
2001	12	8	6	2	6	6
2002	14	6	4	2	10	4
2003	19	1	8	0	11	1
2004	13	7	5	2	8	5
2005	9	11	3	6	6	5
<b>Total</b>	<b>67</b>	<b>33</b>	<b>26</b>	<b>12</b>	<b>41</b>	<b>21</b>

**Table 2:** Yearly Percentage Comparison of Performances in theory and Calculation Questions

Year	Theory		Calculation	
	Correct (%)	wrong (%)	Correct (%)	wrong (%)
2001	82	18	71	29
2002	85	15	64	36
2003	81	19	45	55
2004	49	51	36	64
2005	86	14	72.5	27.5
<b>Average</b>	<b>57.7</b>	<b>42.3</b>	<b>76.6</b>	<b>23.4</b>

**Table 3:** Gender consideration on performance in theory and Calculation questions

Year	Correct Calculation Questions (%)		Correct theory Questions (%)	
	Male	Female	Male	Female
2001	73	68	83	79
2002	64	63	86	83
2003	45	43	81	77
2004	35	38	48	50
2005	89	59	83	90
<b>Average</b>	<b>61</b>	<b>54</b>	<b>76</b>	<b>76</b>

**Table 4:** Effect of mathematics background on the performance of the Students

Year	Correct Calc. Question%		Correct theory question %	
	Math.	Other	Math.	Other
	Combination	Combination	Combination	Combination
2001	60	58	68	69
2002	68	52	67	70
2003	60	56	70	73
2004	67	63	71	72
2005	74	57	70	73
<b>Average</b>	<b>65.8</b>	<b>57.2</b>	<b>69.2</b>	<b>71.4</b>

## CONCLUSION

It is finally established in this findings that pupils performed better in theory than calculation questions. Male students performed better than female counterparts in physics calculation. Furthermore, it was found that there is a positive relationship between the knowledge of the language of instruction and good mathematics background aids the ability of the students in solving physics theory and calculation problems. Students, teachers and educational policy makers are therefore advised to pay equal attentions to theory and calculation aspects of physics by making necessary provisions available to make it easy to learn both aspects of the subject. Physics students are advised to pay special attentions to mathematics and English language from the inception of their educational carriers. Carrer counsellors are encouraged not to seize effort in counselling the female students in particular to ensure that they level up with their male counterparts in the aspect of calculations which is not limited to physics only.

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