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# STUDENTS' ACADEMIC BACKGROUND AND THEIR CHOICE OF PHYSICS IN SENIOR SECONDARY SCHOOLS

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## ABSTRACT

*For sometime now observations have shown that, at the end of the junior secondary school, most of the students freely drifted to non-science course (subjects) with a view of not choosing physics as one of their subjects in the senior secondary school. Statistics show that in 13 randomly selected secondary schools in Akwa Ibom state, using 120 students per school from those who took the Junior Secondary School Certificate Examination, only 359 (representing 23%) offered physics in their senior secondary schools. This study examined the effect of students' background on their choice of physics in the senior secondary school. Data generated in the study using the students' continuous assessment booklet were analysed using chi square ( $\chi^2$ ) contingency correlation (c). The influence of the students' knowledge of mathematics, and professions of parent were investigated together with their choice of physics in the senior secondary school. The result of the study shows a significant relationship in all the cases and students' choice of physics*

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## INTRODUCTION

The success of any educational system depends largely on the quality, quantity and commitment of the teachers engaged in the system as well as students' personal efforts among other factors. Particularly, in this era of technological advancement, the realization of a nation's lofty goals and objectives of science education depends very much on the innovative methodology, teacher effectiveness and management of Science, Technology and Mathematics (STM) classroom environments.

The National Policy on Education (1990) places much emphasis on science and technology education, thus giving it much prominence in the entire education system. Despite government's deliberate policy and huge investment in education, Nigeria is yet to occupy its rightful position among committee of nations in scientific and technological break-through (Denga, 1997). More disturbing is the ever decreasing enrolment of students in senior secondary school physics. Several reasons have been advanced for the observed trend. Onwioduokit (1996) attribute this to insufficient equipment, poor attitude of

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students, poor understanding of scientific concepts and insufficient number of competent teachers. Ogunniyi (1985), Ivowi (1997), Egbugara (1989), Ogunleye (1993) and Oladiran (1998), also relate the poor enrolment of students in physics to lack of good background and understanding of the science concepts. The attendant consequence of this low enrolment in physics in the senior secondary school is a corresponding low enrollment in engineering, technology and related disciplines in the Nigerian universities. Since physics has a central role in the nation's current technological development, crucial areas such as transportation and aviation, health, human leisure, agriculture, industry and communications are greatly affected (Ogunleye, 1996).

Denga (1997) opines that perhaps the fundamental problem in fostering mathematics education is the fact that the name "mathematics" scares students. He further contends that students dread mathematics like a hydrogen or chemical bomb. Many do fail it even before they write the examinations, and Denga attributes this to poor pedagogical approach. Also in his words: mathematics as a facilitator of other science subjects can hardly be contested. The whole subject called physics needs mathematics. Commenting on the role jointly played by English and Mathematics, Oladiran (1998) asserts that the selection of appropriate English language vocabulary easily translates to mathematical equations. The end is learning and understanding of physics concepts. Abdullahi (1982), writing on inquiring through the use of mathematics and science teaching in Nigeria, stresses the need to use mathematics in science, agreeing that mathematics is used to explain relationship between variables such as volumes, pressure, temperature, to extrapolate and interpolate data, interpreting scientific laws and theories, etc; reported in Jegede (1989). Satisfied with the investigation of aspects of students' problem solving difficulties in physics, Egbugara (1989) reports that as a subject that deals with physical quantities and mathematical expectations, all branches of it deal inevitably with problems, whose solutions are often envisaged to benefit humanity.

The influence of parents' profession on their wards choice of physics in senior secondary school cannot be over stressed. Denga (1997) gives insight that the professions of parents influence their wards' choice of subjects in the senior secondary school. According to him, these factors are, knowledge of science, preference for science-related disciplines, mode of exposure, and availability of science materials and relevant textbooks. One of the cardinal points in basic sciences is the interest of the students, the ability to solve problems and the special interest they have for physics as the most fundamental science. Adeniyi (1999) derives its argument as a difficult subject primary from its dominant problem solving nature. One of the goals of science teaching is the improvement of student's interest for problem solving. According to Akpan (1986), using 180 junior secondary school students from six secondary schools, he concluded that enhancing students' interest for science with co-operative problem solving



strategy will help in improving students' choice of physics in senior secondary school.

The students' choice of science (physics), technology and mathematics has continued to occupy significant portions in reported literature. Akpan (1986) reports that the problem of participation and enrollment in STM is as a result of the swing away from science. Powl (1993) laments by opining that this trend has become two obvious and has become a source of worry and concern to many workshops and conferences. Such conferences include, among others, STAN (1999), on evaluating STM education, Kaduna, 23-28 August; NIP (1999), on physics in the development of agriculture, Akure, 15-18 September and STAN workshop (1999) on strategies for the effective teaching of electricity and modern physics, Calabar 10-15 May. Focusing on the problem of poor choice and low enrolment in physics. Ogunleye (1999) developed and proposed some strategies for effective teaching of physics in school and consequently improving on the results of physics to encourage fresh students to choose physics as one of the subjects in senior secondary school.

### **STATEMENT OF THE PROBLEM**

Each year the enrolments of students in the Senior Secondary School (SSS) physics continue to be on the decline, despite the efforts made by Government and other professional bodies. Previous studies made by Egbugara (1989) Powl (1993): Ogunnleye (1993), Igwebuikie (1996), Denga (1997) and Oladiran, (1998) obtained results in support of this trend. This study hoped to examine the causes of this trend in our educational system.

### **PURPOSE OF THE STUDY**

This study aimed at investigating the relationship between junior secondary students' academic background and their choice of physics as a subject in the senior secondary schools. The essence of this is to be able to proffer possible solutions that will enhance enrolment in physics. Specifically, the areas of academic, environment considered areas students knowledge of mathematics, parents professions previous results of physics and non-physics in the school (this is with the understanding that professions of parents could affect students' choice of subjects in the school more than others).

### **RESEARCH QUESTIONS**

The following questions were answered in the study:

- i What influence has the students' knowledge of mathematics on their choice of physics in the senior secondary school?
- ii To what extent does the profession of parents influence the students' choice of physics in the senior secondary school?

## **RESEARCH HYPOTHESES**

Regarding the purpose of this study, the following hypotheses were tested:

1. There is no significant relationship between students' knowledge of mathematics and students' choice of physics at the senior secondary schools.
2. There is no significant relationship between students' choice of physics at the senior secondary school and their parents' professions or professional inclinations.

## **RESEARCH METHOD**

This study adopted an *ex post facto*, since the dependent variable involved was not manipulated. It was carried out using 120 randomly selected students from 13-selected public secondary schools in Akwa Ibom State, giving a total of one thousand, five hundred and sixty students. One research instrument, namely Students' Continuous Assessment Booklet (SCAB) was adapted and used by the researchers. SCAB provide information on results of mathematics, and results of other subjects and the information on the parents' professions. The instrument was developed by Akwa Ibom Ministry of Education for use by all the public schools in the state. The reliability and validation of the instrument was carried out by a team of experts in the Science Education Department of the University of Uyo.

## **DATA COLLECTION AND ANALYSIS**

The collection of the data using the above instruments were personally carried out by the researchers and the frequencies from each of the schools were tabulated. The data generated in the study were analyzed using chi square ( $X^2$ ) and contingency correlation. (C).



**RESULTS**

**TABLE 1: KNOWLEDGE OF MATHEMATICS AND STUDENTS' CHOICE OF PHYSICS**

SCHOOL			PHYSICS	NON-PHYSICS	TOTAL	$\chi^2$	G	DECISION AT P < 0.05
1	GKM	Fo	50	10	60	42.56	0.51	*
		Fe	28.96	31.04	60			
	PKM	Fo	15	45		67.27	0.60	*
		Fe	28.96	31.04				
2	GKM	Fo	45	5	50	20.17	0.38	*
		Fe	24.13	25.87	70			
	PKM	Fo	10	60		42.68	0.51	*
		Fe	33.79	36.21				
3	GKM	Fo	48	17	65	20.17	0.38	*
		Fe	31.37	33.63	55			
	PKM	Fo	20	35		42.68	0.51	*
		Fe	26.55	28.45				
4	GKM	Fo	50	4	54	42.68	0.51	*
		Fe	26.07	27.93	66			
	PKM	Fo	30	36		42.68	0.51	*
		Fe	31.86	34.14				
5	GKM	Fo	30	10	40	40.37	0.50	*
		Fe	19.31	20.69	80			
	PKM	Fo	15	65		16.46	0.35	*
		Fe	38.58	41.38				
6	GKM	Fo	29	9	38	16.46	0.35	*
		Fe	18.34	19.66	82			
	PKM	Fo	30	52		26.11	0.42	*
		Fe	39.59	42.42				
7	GKM	Fo	18	12	30	26.11	0.42	*
		Fe	14.48	15.52	90			
	PKM	Fo	20	70		26.11	0.42	*
		Fe	43.44	46.56				
8	GKM	Fo	30	15	45	12.80	0.31	*
		Fe	21.72	23.28	75			
	PKM	Fo	25	50		12.80	0.31	*
		Fe	36.20	38.80				
9	GKM	Fo	25	7	32	12.32	0.31	*
		Fe	15.45	16.55	88			
	PKM	Fo	38	50		12.32	0.31	*
		Fe	42.48	45.52				
10	GKM	Fo	45	5	50	35.70	0.48	*
		Fe	24.13	25.52	70			
	PKM	Fo	30	40		35.70	0.48	*
		Fe	33.79	36.21				
11	GKM	Fo	15	10	25	29.56	0.45	*
		Fe	12.07	12.93	95			
	PKM	Fo	20	75		29.56	0.45	*
		Fe	45.86	49				
12	GKM	Fo	45	13	58	20.22	0.38	*
		Fe	28.00	30.00	62			
	PKM	Fo	33	30		20.22	0.38	*
		Fe	29.93.07	32.07				
13	GKM	Fo	18	10	28	28.81	0.44	*
		Fe	13.52	14.48	92			
	PKM	Fo	20	72		28.81	0.44	*
		Fe	44.41	47.59				
<b>TOTAL</b>		<b>753</b>	<b>807</b>	<b>1560</b>	<b>394.0</b>	<b>0.45</b>	<b>*</b>	

**NOTE:** GKM = Good knowledge of Mathematics  
 PKM = Poor knowledge of Mathematics  
 Fo = Frequency observed  
 Fe = Expected frequency

From Table 1, it shows that the overall calculated C – value of 0.45 is greater than the critical C-value of 0.17, indicating that students' knowledge of Mathematics influence their choice of physics in the senior secondary school. This, as shown in the table is same for all schools under study.

TABLE 2: PROFESSION OF PARENTS AND STUDENTS' CHOICE OF PHYSICS

1	SCHOOLS	Fo	PROFESSIONS OF PARENTS						TOTAL	X <sup>2</sup>	C	Decision at P<0.05
			1	2	3	4	5	6				
	NSCP	15	8	17	12	5	6	63	26.02	0.42	*	
	NSNCP	10.70	10.09	8.88	10.05	10.90	11.11	57				
		5	12	3	8	15	14		8	0.40	*	
	NSCP	9.68	9.86	8.04	9.50	9.87	10.05	68				
	NSNCP	13	10	14	13	3	15	52	54.48	0.56	*	
		9.85	10.04	8.18	9.67	10.04	10.22	52				
		7	10	6	7	17	7	66	40.17	0.50	*	
	NSCP	10.58	10.73	8.74	10.33	10.73	11.63	54				
	NSNCP	18	6	18	16	1	7	66	21.17	0.39	*	
		11.21	11.45	9.31	11.00	11.42	11.63	54				
		2	14	2	4	19	13	74	32.73	0.46	*	
	NSCP	9.17	9.35	7.62	9.00	9.35	9.52	68				
	NSNCP	19	7	19	15	8	6	74	10.83	0.29	*	
		12.57	12.81	10.44	12.33	12.81	13.04	46				
		1	13	1	5	12	14	60	20.21	0.38	*	
	NSCP	7.81	7.96	6.49	7.67	7.96	8.11	60				
	NSNCP	12	3	16	12	9	8	60	32.47	0.46	*	
		10.19	10.38	8.46	10.00	10.38	02.58	60				
		8	17	4	8	11	12	60	26.30	0.42	*	
	NSCP	10.19	10.38	8.46	10.00	10.38	10.58	60				
		11	8	19	17	7	6	68	11.17	0.29	*	
	NSCP	11.5	11.77	9.59	11.33	11.77	11.99	52				
	NSNCP	9	12	1	3	13	14	56	20.21	0.38	*	
		8.83	9.00	7.33	8.67	9.00	9.17	64				
		10	7	6	15	6	12	56	32.47	0.46	*	
	NSCP	9.51	9.69	7.90	9.33	9.69	9.87	64				
	NSNCP	10	13	4	10	14	13	64	11.17	0.29	*	
		10.87	11.08	9.03	10.67	11.08	11.28	61				
		17	9	7	14	9	5	61	30.64	0.45	*	
	NSCP	10.36	10.59	8.60	10.17	10.69	10.75	59				
	NSNCP	8	13	3	6	14	15	59	17.38	0.36	*	
		10.02	11.08	8.32	9.83	11.08	10.40	72				
		18	6	13	17	10	8	72	26.30	0.42	*	
	NSCP	12.23	12.46	10.15	12.00	12.46	12.69	48				
	NSNCP	2	14	7	3	10	12	48	11.17	0.29	*	
		8.15	8.31	6.77	8.00	8.31	8.46	72				
		14	8	17	15	4	9	67	26.30	0.42	*	
	NSCP	11.38	11.60	9.45	11.17	11.60	11.81	53				
	NSNCP	6	12	3	5	16	11	53	11.17	0.29	*	
		9.00	9.17	7.47	8.83	9.17	9.34	59				
		12	10	6	13	12	6	59	11.17	0.29	*	
	NSCP	10.02	10.21	8.32	9.83	10.21	10.40	61				
	NSNCP	8	15	2	7	13	14	61	30.64	0.45	*	
		10.36	10.56	8.60	10.17	10.56	10.75	59				
		20	13	19	18	9	10	89	17.38	0.36	*	
	NSCP	15.12	15.40	12.55	14.83	15.40	15.69	31				
	NSNCP	5.27	7	1	2	11	13	31	17.38	0.36	*	
		5.37	4.37	5.17	5.37	10.05	10.05	57				
		13	7	7	9	8	13	57	17.38	0.36	*	
	NSCP	9.68	9.86	8.04	9.50	9.50	10.05	63				
	NSNCP	7	13	3	6	6	17	63	17.38	0.36	*	
		10.70	10.90	8.88	10.50	10.90	11.11	57				
<b>TOTAL</b>			<b>265</b>	<b>270</b>	<b>220</b>	<b>260</b>	<b>270</b>	<b>275</b>	<b>1560</b>	<b>345.85</b>	<b>0.43</b>	<b>*</b>



**(PROFESSIONS OF PARENTS)**

NOTE	(1)	<i>Science teachers</i>
	(2)	<i>Non- science teachers</i>
	(3)	<i>Engineers</i>
	(4)	<i>Other science related professions</i>
	(5)	<i>Businessman</i>
	(6)	<i>Farmers ,Pastors and Traders</i>

NSCP	-	Number of students choosing Physics
NSNCP-		Number of students not choosing Physics
F <sub>o</sub>	-	Frequency observed
F <sub>e</sub>	-	Expected frequency

Table 2 shows that a calculated C-value of 0.43 is greater than the table value, 0.17. This indicates that the various professions of parents positively influenced the children's choice of physics in the senior secondary school. This finding was observed as shown in Table 2 to be same in all the schools considered for the study.

**DISCUSSION**

The findings of this work as shown in Table 1 shows that there was a significant influence of the students' knowledge of mathematics on their choice of physics in the senior secondary school. A contingency correlation index of 0.45 was obtained. The relationship existing between students' knowledge of mathematics and choice of physics for all the school used in the study. This support the view of Oladiran (1998), Abdullahi (1982) and Egbugara (1989). The observed relationship may have occurred as a resent of mathematics contents of physics. Although physics is not mathematics, some areas of physics contain quite a number of mathematical principles.

From Table 2, it is evident therein that the professions of parents influenced their wards' choice of physics in the senior secondary school (Denga 1997). This finding also tends to support Adeniyi (1999) and Akpan's (1986) opinions that enhancing students' interest for science and problem solving strategy will help in improving students' choice of physics in senior secondary school.

Based on the findings of this study, it is recommended that mathematics and physics teachers should as much as possible improve on their teaching methods so as to improve on the present level of students' understanding of mathematics concepts and performance in physics in external examination. Parents no matter their professions should encourage their wards to choose physics in this era of STM development. This is expected to boost student's enrolment in physics in the senior secondary school and consequently increase in enrolment in science and engineering courses in our universities.



## **CONCLUSION**

This study aimed at discovering a possible relationship existing between students' choice of physics at the senior secondary schools and their knowledge of mathematics as well as their parents' professional inclinations. It was discovered that a positive relationship existed between students' knowledge of mathematics on their choice of physics in the senior secondary schools. Similarly, the profession of parents also had a positive influence on their wards' choices of physics in the senior secondary schools.

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