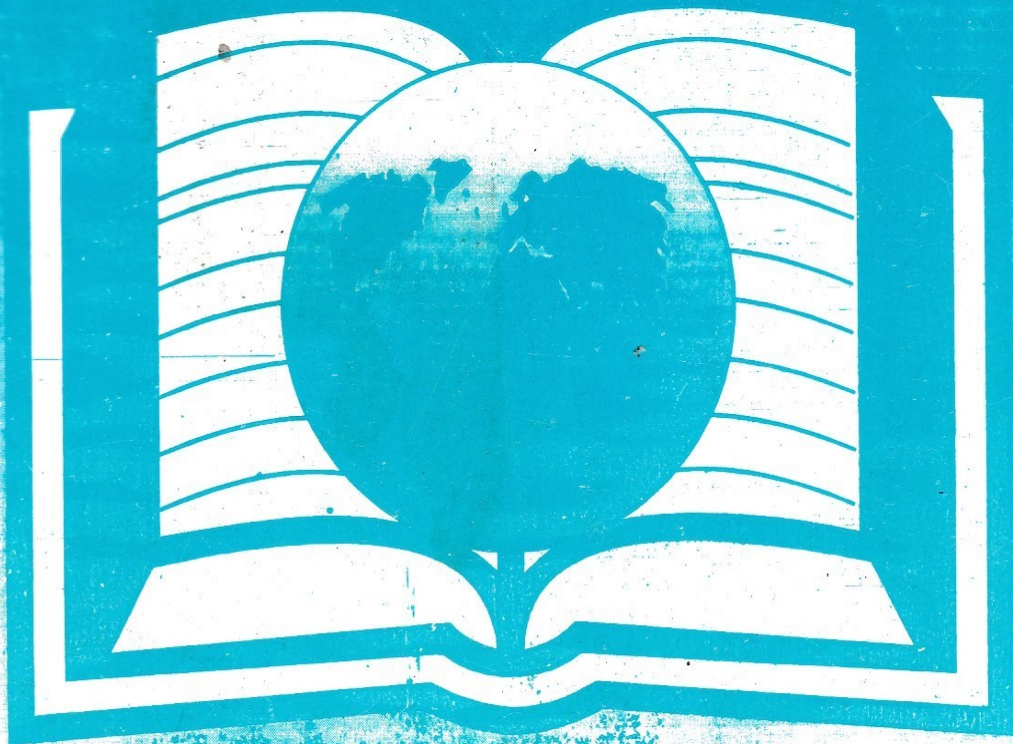


ISSN 1119-7498

INTERNATIONAL JOURNAL of Educational Development (IJED)

VOL. 2 NO. 1, SEPTEMBER, 1999



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UNIVERSITY OF UIYO

THE LABORATORY AND THE AFFECTIVE DOMAIN OF PHYSICS STUDENTS

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ABSTRACT

The influence of practical work on students' attitude toward interest in and value for physics was investigated. The data analysed showed a significant influence of practical work on students' attitude toward and interest in physics. The influence of practical work on students' value for physics as a subject was, however, not found significant as .05 alpha level. It is therefore suggested that practical work in physics be vigorously carried out to change students' attitude and interest, positively, thereby enhancing the environment in physics with hitherto is poor.

INTRODUCTION

Of all the three domains of educational objectives, the objectives at the affective domain are the least achieved. Even in the teaching of science there is always the temptation of reducing every concept to theoretical and be so taught. This probably proffer reasons for the dislike of science subjects, especially, physics among school students. Until now, physics is still being considered as a very difficult subject. This basically suggests a problem in achieving the educational objectives in the affective domain.

Considering the role of the laboratory in the teaching of science, it is suspected that students' affective domain can be influenced, positively, through effective and skillful use of the laboratory.

Research studies, Lee, 1978, Anderson, 1978; Shuaibu and Otuka, 1981; and Onwioduokit, 1992) have shown that the laboratory helps in:

- (i) enhancing students' attitude towards science;
- (ii) enabling students appreciate the methods of science;
- (iii) arousing and maintaining interest, attitude, satisfaction, open-mindedness and curiosity in science, among others.

These underscore the influence of the laboratory on the affective domain of the learner. In Nigeria, unexpectedly, the number of students offering physics at the SSC Examination

has not increased appreciably in spite of that practical (laboratory) work is emphasized in schools. The non appreciable increase in the enrolment of students in physics could be attributed to the lack of sustained interest and liking for the subject.

This suggests that the objectives of physics teaching at the affective domain are hardly achieved.

It is therefore the purpose of this study to investigate the effects of the laboratory on the affective domain of physics students. This is with the suspicion that the laboratory may not have been properly utilized in schools. The areas of affective domain considered in the study are attitude, interest and values. Attitude is an acquired disposition to respond in a certain way towards an object or situation (Derville, 1981). In this study it is measured as indicated by students' responses to physics as a subject, predisposed by an exposure to practical work in physics or lack of it.

Interest has to do with the propensity to like or dislike something or someone. For instance, without many predisposing conditions, one may like or dislike something or someone at the first sight. In the study, interest is measured as the liking or disliking for physics as determined by students' exposure (or non exposure) to practical work. It is interesting to note that similar to attitude, one's interest is subject to change.

Value is the importance one attaches to a thing. Something is considered very valuable if it is of great importance. In the study, the measure of how students value physics as a subject both in the immediate as well as perceived.

RESEARCH QUESTIONS

For a thorough investigation of the issues involved answers to the following questions will be attempted.

1. To what extent does students' exposure to practical work in physics influence their attitude towards the subject?
2. What is the extent of the influence of practical work in physics on students' interest in the subject?
3. What relationship exists between students' exposure to practical work in physics and their value for the subject?

RESEARCH HYPOTHESES

In order to test the null hypotheses stated in the study a population consisting of all Senior Secondary 1 students in the four (4) non-missionary but government owned schools in Uyo municipality, was used. The missionary schools were excluded because being the oldest

schools in the area, it is expected that they have well equipped physics laboratories and that they conduct practical works regularly and skillfully. Because of the nature of the study, it is necessary to use schools that are not well founded in practical works.

Out of the four (4) schools two (2) were chosen for the study using cluster sampling technique. All students (SSI) in the two chosen clusters therefore constituted the sample used in the study. This was 94 in size.

The research instrument was developed by the research but face-validated by a team of experts. The instrument entitled ‘Students Questionnaire on Affective Domain (SUQAD:’ had three sections, viz, attitude, interest and values, beside the demographic items. The reliability indices of the sections were 0.78 for attitude, 0.83 for interest and 0.79 for value. Each section had five (5) items designed to indicate the level of students’ attitudes, interests and values, respectively in physics. Two (2) lesson notes were prepared and taught on the concepts of Archimede’s principle and the transfer of heat.

While the experimental group was taught the two concepts through practical work, the control group was taught without exposing the students to practical work. Teacher demonstration was however used in the control group.

The treatment commenced after the administration of the pretest and lasted for two weeks. Immediately after the treatment the posttest was administered.

Chi square as well as t-test tests were employed in analysing the data generated in the study.

DATA ANALYSIS AND RESULTS

Data analysed in the study and the corresponding results are as shown in the tables below:

Table 1: X² Analysis of the influence of practical work on students attitude to physics.

Experimental Condition	Positive	Negative	Total	X ²	Decision at P<.05
Practical	f ₀ 38	10	48		
	f ₀ 29.62	18.38			
No practical	f ₀ 20	26	46	12.65	*
	f ₀ 28.38	17.62		(3.84)	
Total	58	36	94		
	∅ =	0.36			

*Significant at P<.05

Chi Square value in bracket is the Critical value

The analysis of data shown in table 1 shows a significant influence of the practical work on the attitude of physics students toward the subject. The table also shows a significant index of relationship, using phi (ϕ) statistic, between the involvement in practical work and the attitude of students.

Table 1: χ^2 Analysis of the influence of Practical Work On Students Attitude to Physics.

Experimental Condition	Positive	Negative	Total	χ^2	Decision at $P < .05$
Practical	f_0 40	08	48		
	f_0 27.57	20.43			
No Practical	f_0 14	32	46	26.9	*
	f_0 26.43	19.57		(3.84)	

$\phi = 0.53$

• Significant at $P < .05$

Chi Square in bracket is the critical value

Table 2 shows that there exists a significant relationship ($\phi = 0.53$) between students participation in practical work and their interest in physics. Practical work therefore has a significant influence on the interest of students in physics as a subject.

Table 3: χ^2 Analysis of the influence of practical Work on students' value for Physics as a Subject.

Experimental Condition	Much Value	No. Value	Total	χ^2	Decision at $< .05$
Practical	f_0	29	19	48	
	F_e	27.57	20.43		
No Practical	f_0	25	21	46	0.34 NS
	f_e	26.43	19.57		(3.84)
Total		54	40	94	

$\phi = 0.06$

NS = not significant at $P < .05$

The Chi Square Value in bracket in the critical value

As shown in Table 3 above, practical work is found to exert no significant influence on students' value for physics at .05 alpha level. This implies, from the phi statistic ($\phi = 0.06$), that there exist no significant relationship between students' participation in practical work and the value they attach to physics as a course.

Table 4: t-test comparison of the mean responses of experimental and control groups to pretest

Measures	Comparison	N	X	S ²	t	Decision at P<.05
Attitude	Experimental	48	3.38	1.72		NS
	Control	46	3.25	1.68		
Interest	Experimental	48	2.05	1.70	0.37	NS
	Control	46	1.95	1.93		
Value	Experimental	48	3.25	1.38	1.14	NS
	Control	46	2.98	1.45		

As shown in Table 4, there exists no significant different between the pre-treatment mean scores of students in experimental and control groups. This suggests that the two groups were comparable at the beginning.

Table 5: t-test comparison of mean scores of Experimental and control group based on the Post-test.

Measures	Comparison	N	X	S	t	Decision at P<.05
Attitude	Experimental	48	4.05	1.85		NS
	Control	46	2.74	1.25		
Interest	Experimental	48	4.45	1.72	0.37	NS
	Control	46	3.15	1.78		
Value	Experimental	48	3.34	1.38	1.69	NS
	Control	46	2.94	1.55		

Table 5 shows a significant influence of practical work on the attitude (t=5.25) and the interest (t=4.91) of the students in physics, since the experimental group was exposed to the practical work in physics. The table however shows no significant difference between the experimental and control group with respect to their value for physics as a subject.

Discussion of Results:

The Study investigated the influence of practical work on the attitudes, interests and values of students for physics as a subject. Analyses of data showed a significant influence of practical work on students' attitude and interest. This findings could be due to the fact that practical work entails doing something through manipulation of apparatus, eye-hand coordination, and observation and measurement of changes in variable involved, all these make practical work a worthy venture capable of altering one's attitude and interest

positively. This finding is in agreement with Anderson (1978), Jegede, Okebukola and Ajewola (1992).

The study, on the other hand shows no significant influence of the practical work on student's value of physics as a subject. This could be because most students, especially in the class used for the study (SSI) are still not sure of their future career. They may not, therefore have known the role physics could play in their future professions. Moreover, could also suggest that what changes one's value for a subject as physics goes beyond the practical work.

It is therefore recommended that factors capable of changing, positively, students' value placement for physics, be investigated.

Educational implications:

The fact that students attitude towards and interest in physics can be changed for better through practical work is an indication that physics teachers can check the persistent notion among students that physics is too difficult, and that it is mathematical. The problem in most schools has been that students are only exposed to practical work when the examination (SSCE) period is around the corner. Teachers prefer, sometimes, constrained by various reasons (including lack of apparatus) to expose the students to practical work a week or two to the examination date. Under such conditions, students hardly appreciate the worth of practical work. They will only associate it to a condition for passing the examination.

A skillful teacher can win the hearts of many students to study physics as well as encouraged those already offering the subject through resourceful and well articulated practical classes. Students appreciate physics more through practical works.

Where apparatus are not sufficient, a skillful teacher can arranged the practical class such that different small groups (of say 4 or 5) students work on different practical problems on rotational basis.

CONCLUSION:

Based on the findings of the study that practical work changes, positively students attitude toward and interest in physics it could be concluded that exposure practical work is one of the key ways of enhancing students' enrolment in physics.

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