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Effect of Learning Activity Package (LAP) and Teachers' Motivation on Students' Academic Achievement in Physics

By

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Abstract

The study was carried out to find out the effect of LAP and teachers' motivation on secondary school students academic achievement in Physics. Three research questions guided the study and three Null hypotheses were tested at .05 level of significance. A Quasi-experimental pre-test post-test and survey design was adopted for the study. A sample of 395 SSII Physics students drawn by simple random sampling techniques from four single sex secondary schools in Ethiope East L.G.A of Delta state that was used for the study. The students were assigned to experimental and control groups respectively using simple random sampling. Two parallel instruments (Pre-PAT and Post-PAT) and a questionnaire on teachers' motivational scale (TMS) were developed, The research questions were answered using mean, while the null hypothesis were tested at .05 level of significance using analysis of co-variance (ANCOVA) independent t-test and PPMC. The results of the study revealed that there was a significant difference between the mean achievement scores of the LAP group and control group. Females students used for this study achieved higher than their male counterparts and significant negative relationship exist between teachers' motivation and students' academic achievement in physics. Based on the findings, it was concluded that Learning Activity Package (LAP) and teachers' motivation is of great effects to teaching and learning of Physics. It was study recommended among others that LAP should be used in teaching Physics in Secondary schools.

Education is the primary agent of transformation towards sustainable development since it increases people's capacities to transform their visions into reality. Education not only provides scientific and technical skills, it also provides the motivation, justification, and social support for pursuing and applying them. (Akpokiniovo, and Odebala, 2105). The international community now strongly believes that we need to foster, through education, the values, behaviour and lifestyles required for a sustainable future. The current shift in emphasis in science curricula objectives reflecting student-centred process approach to science is a radical departure from the traditional emphasis on the teacher-centred product approach. This new trend requires that students' should be activitely involved in the learning process through adequate and meaningful hands-on-activities during every classroom instruction in science (Onifade, 2001).

In Nigeria, the study of science is of great importance, that a lot of emphasis has been laid on the teaching and learning of science with the major aim of science education, as contained in the National Policy on Education, being to equip students to live effectively in this modern age (FME, 2013). This can be achieved by the inculcation in the learners the necessary scientific skills and attitudes. The inculcation of scientific skills and attitudes in students can only be achieved through the proper teaching of the various science subjects, which include Biology, Chemistry, Physics, Mathematics, Health Science, Agriculture and so on. Attainment of these objectives depends on teacher factors and pedagogical approaches, it is apparent that physics cannot thrive without using appropriate instructional teaching strategies to teach the students. This is because future development of any nation in the fields of science and technology depends on how well physics is taught (Nnadi, 2002).

According to Chudi-Orji (2013), any nation that wants to be recognized as a developed country must build its human resources firmly. Hence, a country is said to be technologically developed if majority of her populace are well educated. Thus, those that impart the needed knowledge or those that build and mould character must be motivated adequately because motivation is the key to performance and improvement. Thus, it is believed that a motivated teacher always complete the tasks set for him, even when such tasks or assignments are difficult or seen uninteresting. Motivation involves a number of psychological factors that start and maintain activities towards the achievement of personal goals. Motivation in education can have several effects on how students learn and their behaviour towards the subject matter being taught. Motivation of teachers and students in the teaching and learning process can direct behaviour towards particular goals, leads to increase effort and energy, enhance cognitive processing, increase initiation of and persistence in activities, determine what consequences are reinforcing and it can also lead to improved performance (Osayomwanbor, Uhunmwangho and Amoren, 2014).

Despite the prime importance of physics in this contemporary world of science and technology, students still perform poorly in physics. The low achievement as

reported in various science tests is evident in most science subjects in general. This is pointed out by the report of the Registrar, Joint Admission and Matriculation Board (2013) who indicated that the performance of candidates in the University Matriculation Examination (UME) over the last three years has shown a steady decline. Thus, there is this need therefore to evaluate the method of teaching Science and motivation of teachers especially in the area of Physics.

Overview of Learning Activity Package

Learning activity package (LAP) is a student centered activity oriented teaching strategy where the teacher acts as a facilitator of learning, guiding the students through a series of activities and problems which may help learners to achieve highly (Abu, 2001). In LAP, learning materials are broken into small steps that are arranged sequentially from known to unknown and in an increasing order of difficulty. In solving the students' problems of poor achievement in Physics, there is need to shift from the conventional methods of teaching to a more innovative method - a method that should seek for a way of making teaching more precise, while at the same time adjusting both the objective and methods of learning to the needs and characteristics of the individual learners. Learning activity package may involve a number of instructional strategies, depending upon the instructional objectives of the unit or module. A web page or site may be effectively utilized by teachers developing learning activity packages as a wide variety of instructional strategies may be incorporated. The web page or site may contain instructional content (text, audio and video) links to other sites, interactive activities (tutorials, simulations and experiments etc), assignments, evaluation guides and any other required content (Njoku and Akamobi 2015).

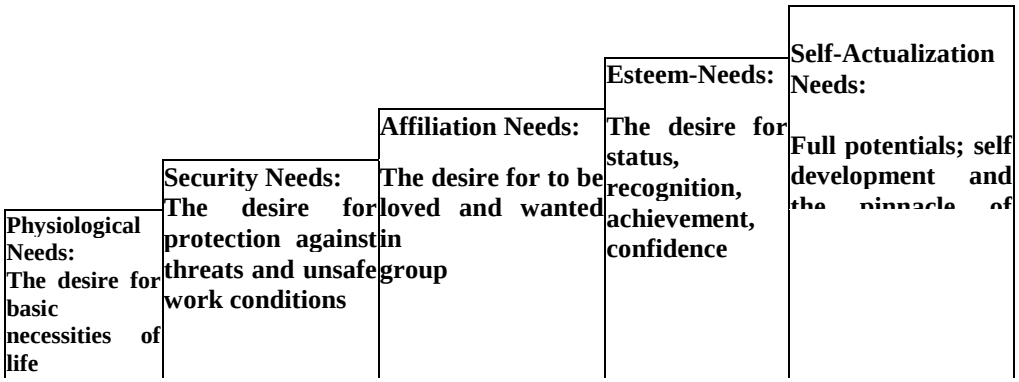
According to Abu (2001), LAP consists of the following components: topic and sub-topics, rationale, behavioural objectives, pre-test, learning activity, unit activities and post test. LAP is a learner centered activity that leads to individualization of instruction which leads to higher academic achievement. Learning activity packages are comparatively recent development in programmed instruction. A LAP is a "modular instructional unit designed to facilitate the individualization of instruction". A specific advantage of the LAP is that it allows the student a wide variety of choices in how he will achieve the behavioural objectives, thus allowing for differences in past achievement and in style of learning. Learning Activity Package is an innovative approach that acts as a vehicle that makes for individualization in learning. It is an adaptation of the programming of instruction.

Concept of Teachers Motivation

Motivation comes from the Latin word "movers", which means to move. So motivation can mean the process of arousing the interest of an individual to take a move towards a certain goal. Herzberg (1978) as cited by Draft (2006) defined motivation as all those phenomena which are involved in the stimulation of actions

toward particular objectives where previously, there was little or no movement towards those goals. Hanson (2003) defined motivation as, "an inner state that energizes, moves, channels and sustains behaviour towards a goal". Motivation includes a set of internal as well as external forces that activate the speed of doing any task until the aim is achieved (Draft, 2006). Furthermore, Draft (2006) defines the word "Teachers Motivation" in the following way, "Motivation is a set of processes concerned with a force that energizes behaviour and directs it towards achieving some specific goals". A motivated teacher has the consciousness of the objectives of the organization and works hard to achieve those objectives.

According to Maslow's Hierarchy theory of Needs several factors are believed to affect a person's desire to perform work or behave in a certain way. The theory of needs explains teachers' motivation as a phenomenon that occurs intrinsically or within an individual teacher. Anderson (1991) maintained that if schools improve teaching to affirm high academic performance and motivated teachers, there will be no room for enormous cases of school dropouts, hence motivated teachers can create a good social and psychological knowledge of Physics in the classroom. According to this theory, a teacher has five fundamental needs: physiological, security, affiliation, esteem, and self-actualization. The physiological needs include pay, food, shelter, clothing, good and comfortable work conditions. The security needs include the need for safety, fair treatment, protection against threats and job security. Affiliation needs include the needs of being loved and accepted as part of a group. Whereas esteem needs include the need for recognition, respect, achievement, autonomy and independence. Finally, self-actualization needs, which are the highest in the level of Maslow's need theory, include realizing teachers' full potential or self development. According to Maslow, once a need is satisfied it is no longer a need. It ceases to motivate employees' behaviour and they are motivated by the need at the next level up the hierarchy as shown in figure 1.



Source: Maslow's Hierarchy of Needs

Statement of the Problem

Many secondary schools claim to offer physics as a subject, but a visit to these schools by the researcher reveals that majority of them only offer physics without any practical activities involved. This may result to low retention of what is taught and subsequently poor achievement. Various methods are used by Physics teachers in teaching physics in order to bring about a meaningful learning, this includes lecture method, demonstration, project, field trip etc, but the most commonly used is the lecture method. The lecture method has failed to recognize the uniqueness of the inquiry base nature of physics and the learners' individuality and the various practical activities. It is in respect of this clamour for change that many innovative strategies were developed for teaching and learning and also bring about improvements in physics. Those strategies include Analogy, concept mapping, peer tutoring, inquiry learning, learning activity package (LAP) and so on. Another problem lies on the fact that when teachers' are not highly motivated, they may also finds it difficult to implement the right method and attitude to teach. The question here is that, will learning activity package and teachers motivation have more effects on students' achievement than the normal lecture method? It is against this backdrop that the present paper investigated the effects of Learning activity package (LAP) and teachers' motivation on the academic achievement of physics students.

Research Questions

The following research questions were raised based on the problem stated.

1. Will there be any difference on the mean achievement score of physics students taught with learning activity package and those taught using lecture method?

2. Will there be any difference on the mean achievement score of male and female physics students taught with learning activity package?
3. Will there any relationship between teachers' motivation and students academic achievement in physics?

Hypotheses

The following hypotheses were tested at .05 level of significance.

1. There is no significant difference on the mean achievement score of physics students taught with learning activity package and those taught using lecture method.
2. There is no significant difference on the mean achievement score of male and female physics students taught with learning activity package.
3. There is no significant relationship between teachers' motivation and students academic achievement in physics

Methodology

The study adopted quasi-experimental of the pretest-posttest control group and survey design. There will be no randomization of subjects in this study. Intact classes will be randomly assigned to the experimental and control groups respectively. It is a quasi- experimental study because non-randomized intact class was used for the study and employing the experimental group (EG) and control group (c). The independent variables are:

- Learning Activity Package
- Lecture method
- Teachers' Motivation

The dependent variable is the achievement score of the students. The design matrix is represented below

Grouping	Pre-test	Treatment	Post-test
Experimental group	O_1	X	O_3
Control group	O_2	x	O_4

Where EG = Experimental Group CG = Control Group

1 = Pre Achievement Test
2 = Post Achievement Test
O_1 = Lecture method Test Scores
X1 = Experimental Treatment
X2 = control Treatment

The variables for this study are the instructional methods, teachers' motivation and students' achievement. The instructional methods – learning activity package is treatment, while lecture method is the control. Thus, the survey design was adopted to investigate the effects of teachers' motivation on the dependent variable. The population of study comprised of all the Public senior secondary schools class two (SSII) Physics students in Ethiope East Local Government Area of Delta State. Single

sex schools were used to avoid gender interaction. The number of students in these schools that offer Physics is 951 (Source: Office of the Secretary, Post-Primary Education Board, Asaba 2015). Two boy's school and two girl's school were purposely selected through random sampling method. A total of 395 SSII Physics students drawn from four schools were used as research subjects. The assignment of intact classes to both LAP and lecture group was done randomly using a simple ballot system. The LAP group had 194 students while the lecture method group had 201 students. The instrument used for data collection is Physics Achievement Test (PAT) and Teachers' Motivational Scale (TMS) developed by the researcher. For the PAT, the Items were developed from SSII Physics curriculum. It contains 50 multiple choice test items. The teachers' motivational scale was used to elicit information from the teachers' in the sampled schools. The teachers' motivational scale is in two sections: Section A and B. Section A focuses on demographic information; Section B focuses on six items on teachers' motivation. Responses to TMS will be categorized according to four point-scales of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) which will be scored 4, 3, 2 and 1 point respectively. Both the PAT and TMS was subjected to both face and content validation by an expert in the Department of Curriculum and Integrated Science and 2 other experts in Measurement and Evaluation in Delta State University, Abraka. The content validating was ensured using the table of specification. The reliability of the instrument was established through trial testing of the instrument on a group of SSII students not used in the study. The internal consistency of PAT (Pre PAT & Post PAT) was determined using Kuder Richardson formula 20 (K-R 20) with internal consistency coefficient of .69 and 78 obtained respectively, while that of TMS was determine using the PPMC with co-efficient of .64.

Treatment Procedure

Before the on-set of the experiment, Permission was obtained from principals of the selected schools. Physics teachers who were used as research assistants were trained. The research subjects were given the pre- PAT by the trained teachers. Two treatment groups were used. The experimental group was taught using the LAP while the control group was taught using lecture method. This lasted for six weeks. To reduced the error that may arise as a result of teacher differences, the same teacher that had been teaching the subject taught both groups in their schools for the study, after the treatment, the Post PAT was administered to the subject in both the experimental & control groups. The post-PAT contained the same test items as the pre-PAT. The data on students' achievement in Physics from the two treatment groups were kept separately and used to answer the research questions and to test the hypothesis that guided the study.

Method of Data Analysis

Mean and standard deviation were used to answer the research questions, For research question 3, the rule of thumb by Kerlinger was introduced, a mean of 2.50 or above indicated that the respondents agreed with the items statement, while a mean below 2.50 indicated that the respondents disagree with the items statement. The analysis of covariance (ANCOVA) and independent t-test were used to test hypothesis 1 and 2 while Pearson Product Moment Correlation (PPMC) was used to test hypothesis 3 at .05 level of significance.

Results

The analysis and presentation of results are organized around the research questions and its corresponding hypotheses.

Research Question One: Will there be any difference on the mean achievement score of physics students taught with learning activity package and those taught using lecture method?

Table 1: Mean Achievement Scores of Students Taught With LAP and Lecture Method

Group	Type of Test	Mean	N
LAP	Pre test	19.81	
	Post test	21.22	
		6.31	**194**
Lecture method	Pre-test	18.23	
	Post-test	22.35	
	Mean Gain	5.32	**201**

From the table above, the LAP group obtained the mean of 19.81 and 21.22 in pre-PAT and Post-PAT and thus had the Mean gain of 5.21 after the treatment, while the lecture method group had the mean of 18.23 and 22.35 in both pre-PAT and post – PAT respectively and had the Mean gain of 5.32. The results indicated that the LAP group achieved higher than the lecture method group both in Pre-PAT and post-PAT scores.

Research Question Two: Will there be any difference on the mean achievement score of male and female physics students taught with learning activity package

Table 2: Mean achievement scores of male and female students taught using LAP

Group	Test	Mean	N
Male	Pre test	71.53	
	Post test	87.95	
		2.42	**231**
Female	Pre-test	78.51	
	Post-test	103.89	
	Mean Gain	4.26	**164**

Data in table 2 shows that the male group obtained the mean scores of 71.53 and 87.95 in the pre test and post test respectively and had a mean gain score of 2.42 on the other hand, the female group had mean scores of 68.51 and 103.89 in the pre and post PAT test, and had mean gain score of 4.26. The results indicated that the females had higher achievement scores than the male groups; the female also had a higher mean gain score when compared with the male group.

Research Question Three: Will there be any relationship between teachers' motivation and students' academic achievement in physics

Table 3 Analysis of response on Teachers Motivational Scale

S/N	ITEMS	SA	A	D	SD	Mean	Decision
1	Regular promotion and implementation of arrears highly motivate me to work	256	56	43	40	3.01	Agree
2	Good monetary reward gives me motivation to teach.	119	99	101	76	2.51	Agree
3	Prompt salary payment motivates me to work hard	218	76	45	56	3.11	Agree
4	Availability of learning facilities motivates me to teach.	98	179	73	45	3.34	Agree
5	Provision of in-service training to teachers increases their motivation to teach	89	196	21	89	2.67	Agree
6	Approval of study leave for teachers will in no doubt motivate them to teach	77	184	64	70	2.57	Agree
	CLUSTER MEAN	**2.86**					**Agree**

The table above show the response on teachers motivational scale, from the analysis done on item 1-6 having a mean 3.10, 2.51, 3.11, 3.34, 2.67 and 2.57 respectively,

having a cumulative mean of 2.86, it was agreed that regular promotion of teachers and implementation of arrears as at when due, good monetary reward, prompt salary payment, availability of learning facilities, provision of in-service training among others are the major factors that motivate classroom teachers.

Test of Hypotheses

HO_1: There is no significant difference on the mean achievement score of physics students taught with learning activity package and those taught using lecture method.

Table 4: Analysis of covariance of students mean achievement scores in PAT (LAP and Lecture method)

S = significant; NS =Not significant 395; <0.05

Table 4 shows that the calculated F-value for the effect of treatment (method) on students' achievement in PAT is 4.26 significant at 0.04 level of significance, which is less than 0.05 set for the study. The null hypothesis is therefore rejected. This means that a significant difference exists in the mean achievement scores of Physics students taught with LAP and those taught with lecture method.

Table 5: t-Test Analysis of students mean achievement scores in PAT (LAP and Lecture method)

Source of Variable	Group	N	Mean x	df	t-cal	t-crit.	P-value	P-crit.	Remark
Pretest	Experimental Control	194 201	19.81 21.22	393	2.36 4.56	1.973 1.973	0.00	0.05	Reject Null Hypothesis
Posttest	Experimental Control	194 201	18.23 22.35						

Source of Variation	Type of Sum of Square	df	Mean Square	F-cal	Sig	Decision
Corrected Model	6294.81	11	572.26	27.99	0.00	S
Intercept	1739.56	1	1737.56	85.00	0.00	S
Pretest (covariate)	466.57	1	466.57	22.82	0.00	S
LAP	48.25	2	24.13	1.18	0.31	NS
Lecture Method	86.98	1	86.98	4.26	0.04	S
Error	6234.89	383	20.44			
Total	130721.00	395				

Data presented in table 5 also reveals that the t-cal. of 2.36 is greater than the t-crit. of 1.973 the null hypothesis is therefore rejected. This implies that significant difference exists in the mean achievement scores of Physics students taught with LAP and those taught with lecture method.

HO_2: There is no significant difference on the mean achievement score of male and female physics students taught with learning activity package.

Table 6: t-test Analysis of mean achievement score of male and female physics students taught with learning activity package

Source of Variable	Group	N	Mean (x)	df	t-cal	t-crit.	P-value	P-crit.	Decision
Male	Pretest Posttest	231	71.53 87.95	393	2.42	1.863	0.00	0.05	Reject Null
Female	Pretest Posttets	164	78.51 103.89		4.26	1.863			Hypothesis

Data presented in table 6 reveals that the t-cal. of 2.42 is greater than the t-crit. of 1.863 the null hypothesis is therefore rejected. This implies that there is a significant difference on the mean achievement score of male and female physics student taught with LAP.

HO_3: There is no significant relationship between teachers' motivation and students' academic achievement in physics

Table 7: **Summary of Pearson Product Moment Correlation between teacher motivation and student academic achievement in Physics.**

Variable	Number	Means	Std Dev	r	p	R
TMS	395	80.40	8.02	-0.10	<0.05	Not significant
SAPR	979	57.94	9.90			

TMS = Teacher Motivation Scale; SAPR = Student Academic Achievement Rating

Table 8: Simple regression analysis of teachers' motivation and students' academic Achievement in Physics

Model Summary

Model R	R Square	Adjusted R S	Std Error	Observation
0.086	0.007	0.006	0.083	395

ANOVA

	Sum of S	df	Mean S	F	Sig
Regression	0.050	1	0.050	7.308	0.007
Residual	6.717	394	0.007		
Total	6.767	395			

Variables in the Equation

Unstandardized Coefficients

	B	Std Error	t-stat	Sig
(Constant)	1.828	0.027	68.401	0.000
TMS	-0.001	0.0003	-2.703	0.007

Predictor: Teachers' Motivational Scale (TMS);

Dependent Variable: Students' Academic Achievement

Table 9 shows that there is a very weak negative correlation between teachers' motivation and students' academic Achievement. Table 4 shows that teachers' motivation contributed only 0.7% (R squared = 0.007; $p<0.05$) to the variance in student academic achievement. This contribution is significant with a negative t value

(t=-2.7; p<0.05). Thus, the null hypothesis was discarded and it was concluded that there is a significant negative relationship between teachers' motivation and students' academic achievement in physics. It is note worthy that 99.7% of the variance in students' academic achievement in this study is attributed to non teacher motivation

Discussion of Results

This study investigated the effects of learning activity package (LAP) and teachers' motivation on the academic achievement of secondary school physics students'. The findings from research question one indicated that the LAP group achieved higher than the lecture method group both in Pre-PAT and post-PAT scores. In the same vein, the result obtained from hypothesis one also showed that this implies that significant difference exists in the mean achievement scores of Physics students taught with LAP and those taught with lecture method. The result was in agreement with that of Njoku and Akamobi 2105 who stated that Learning Activity Package (LAP) was found to be more effective than conventional lecture method on students' achievement. This can be more noticed from the fact that learning activity package focused mainly on students achievement through active participation especially in practical physics.

The second research question investigated the difference on the mean achievement score of male and female physics students taught with learning activity package. The findings from table 2 indicated that the females had higher achievement scores than the male groups; the female also had a higher mean gain score when compared with the male group. In the same vein, hypothesis two also revealed that there is a significant difference on the mean achievement score of male and female physics student taught with LAP. The findings of this hypothesis concord with the results of the experiment conducted by Onoh (2005) which showed that females returned better than males in both his experimental and control groups and that the difference in retention scores for each group is significant.

The third research question investigated the relationship between teachers' motivation and students' academic achievement, the findings from analysis carried out on table 3, and the hypothesis tested in table 7, revealed that there is a significant negative relationship between teachers' motivation and students' academic achievement in physics. It is not worthy that 99.7% of the variance in students' academic achievement in this study is attributed to non teacher motivation. It is also noteworthy that the mean achievement of students in this study was higher than the mean effectiveness rating of the teachers' motivation. This shows that the teachers are not significantly motivated than what the academic achievement of physics students indicate. In this regards therefore, Chudi-Orji (2013), supported this view that any nation that wants to be recognized as a developed country must build its human resources firmly. Hence, a country is said to be technologically developed if majority of

her populace are well educated.

Conclusion

Learning Activity Package (LAP) and teachers' motivation is of great effects to teaching and learning of Physics. Females students used for this study achieved higher than their male counterparts. It is worthy to note here that conclusion is unrelated to the societal and cultural beliefs, it has close link with the importance attached to gender related roles of male and female children which is based on culture.

Recommendations

Based on the findings and conclusion made above, the following were recommended.

1. Physics teacher should make use LAP especially when it comes to the area of practical so as to increase the academic achievement of students.
2. Teachers' should be highly motivated because motivation is the key to achievement and improvement in education.
3. Seminars, workshops should be organized by various stakeholders to educate teachers on the use of LAP in teaching and learning of Physics.

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