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EVALUATION OF LEARNING ACTIVITIES AND CHAPTER SUMMARIES OF APPROVED PHYSICS TEXTBOOKS IN EBONYI STATE SECONDARY SCHOOLS IN NIGERIA

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ABSTRACT

The study evaluated learning activities and chapter summaries of approved physics textbooks in Ebonyi State of Nigeria. Two research questions and one hypothesis guided the study. The study employed evaluation research design. Eighteen secondary schools and eighteen teacher were drawn from the three education zone through simple random sampling and stratified random sampling respectively. A 5-point quantitative approach for content evaluation of science textbooks (QACEST) was used as the instrument for data collection. It adopts a set of 5 criteria which includes topical coverage, learning activities, study questions, illustration and chapter summary. The QACEST formula was used to answer the research questions while the hypothesis was tested using chi-square test of goodness-of-fit. The findings revealed among others that only one out of four physics textbooks in Ebonyi state secondary schools had adequate learning activity index. Thus the physics textbooks in Ebonyi State secondary schools do not have adequate learning activity and appropriate chapter summary. Based on these findings, conclusions were drawn and recommendations made.

KEYWORDS: Physics, Learning Activity, Chapter Summary, Adequacy, Appropriateness, QACEST

INTRODUCTION

Physics by American heritage dictionary of student 2014 is the scientific study of matter, energy and the relations between them. Physics is crucial for effective living in the modern age of science and technology. Given its application in industry and many other professions, it is necessary that every student is given an opportunity to acquire some of its concepts, principles and skills (NRDC, 2008).

Unfortunately, the teaching and learning of physics has been taught with challenges which prevent many students from performing well in external examinations. The philosophy, objectives and content of the physics curriculum have been adjudged by professionals in the field to be satisfactory but its implementation has fallen short of expectation because of lack of sufficient number of qualified teachers, inadequate equipment to ensure the performance of related student activities which are aimed at enhancing meaningful learning, and the nature of the subject that appears to evoke difficult (NERDC, 2008). Consequently, the general objectives of the physic curriculum, as earlier accepted, remain to provide basic literacy in physics for functional living in the society; acquire basic concepts and principles as a preparation for further studies; acquire essential skills and attitude as a preparation for technological application of physics and stimulate and enhance creativity.

Physics curriculum evolves round six themes which includes; interaction of matter, space and time, conservation principles, waves-motion without material transfer, field at rest and in motion, energy quantization and duality of matter and physics in technology.

In order to stimulate creativity and develop process skills and correct attitudes in students, the course must be student-activity oriented with emphasis on experimentation, questioning discussion and problem-solving (NERDC, 2008).

Learning activity yields an estimate of the degree to which a text provides for those activities (intellectual or otherwise) which will ensure optimal participation or involvement of the learner. It is defined operationally as the difference between the proportion of sentences which require on the part of the learner, activity and those which require passivity or more reception learning activities are of two categories. Category one are factual statements, stated conclusions and generalizations, definitions, questions asked but answered immediately by the text. Category two are statement requiring students to analyze data, formulate their own conclusion, perform and analyze some activities, solve some problems, provide answers to questions whose answers are not immediately provide by the text.

Chapter summary provide an estimate of the extent to which the chapter summaries promotes a more permanent understanding of the content of the text. Chapter summary is of two categories. Category one include sentences which raise extra questions/issues focusing on the maternal not covered in the chapter. Category two are sentences which raise questions/issues whose answers can be obtained from the chapter. Franklin (1993) put forward that education is the best investment and books are the basic tools of study, an examination of textbooks probably are very good method of determining the actual changes in the curriculum. Nworgu (1991) pointed out that there are knowledge gaps in science textbooks. The reasons for such gap in science textbooks are understandable. Elgood (1997) stated that most science textbooks are written by local authors in order to produce atypical version of an existing and commercially successful textbooks. To that effect, such books needs to be evaluated in order to ascertain their learning activities and chapter summaries.

PURPOSE OF THE STUDY

The purpose of the study is to evaluate physics textbooks in Ebonyi State secondary schools. Specifically, the study seeks to;

- Determine the adequacy of the learning activities of each physic textbooks.
- Determine the appropriateness of the textbook chapter summary.

Research Questions

The following research questions guided the study.

- How adequate are the learning activities of each physics textbooks in Ebonyi state secondary schools?
- How appropriate are the chapter summaries of physics textbooks in Ebonyi State junior secondary schools?

Hypothesis

The following null hypothesis was tested at the alpha level of 0.05

- The learning activities of each physics textbooks in Ebonyi State secondary schools do not significantly depend on the specification of the core curriculum.

METHODS

The study employed evaluation research design. Evaluation study according to Ali (2006) is the type of design that makes value judgment on programme or projects based on certain pre-determined criteria. The researcher found this design very useful because it involves making value judgment about physics textbooks in Ebonyi state secondary schools.

Eighteen secondary schools were drawn from the three education zones through simple random sampling. Eighteen teachers were drawn from eighteen (18) sampled schools through stratified random sampling.

A 5-point quantitative approach for content evaluation of science textbooks (QACEST) was used as the instrument for data collection. The instrument was developed by Nworgu (1988). It adopts a set of 5 criteria which includes topic coverage, learning activities, study questions, illustration and chapter summary.

The researcher did not find it necessary to subject the model to any other validation procedure. The QACEST was assessed for reliability using Kendall's coefficient of concordance "W" for the various textbooks used, the coefficient of .67, .65 and .61 was obtained for SSI, SSII, and SSIII respectively.

Data were collected using QACEST physics teachers were trained on how to use the manual of the QACEST to determine the indices of learning activities and chapter summary. QACEST formula was used to answer the two (2) research questions, while the hypothesis was tested at 0.05 level of significance using chi-square test for goodness-of-fit.

RESULTS

Based on the result from the data collected, the learning activity index (LAI) was calculated and presented on the table 1 below.

Table 1: Learning Activity Index

S/N	Textbooks		A	P	Index
1.	New school physics for senior secondary schools by M.W. Anyakoha	1 2 3	263 265 219	29 32 19	0.80 0.78 0.84
2.	TONAD essential physics for senior secondary schools by O.E. Farinde, H.E. Ehimetalor & S.K. Dada	1 2 3	No learning activities but worked example		
3.	Basic physics for senior secondary schools by P.N. Odume	1 2 3	No learning activities but worked example		
4.	Senior secondary physics by P.N. Okeke, F.N. Okeke & S.F. Akande	1 2 3	No learning activities but worked example		

The data on the table 1 showed LAI for the four (4) physics textbooks evaluated. For new school physics for senior secondary schools by M.W. Anyakoha, the learning activity index (LAI) was 0.80, 0.78 and 0.84 for SS I, SS III and

SS III respectively.

For TONAD essential physics for senior secondary schools by O.E. Farinde, H.E. Ehimetalor and S.K. Dada had no learning activity index but worked examples.

For basic physics for senior secondary schools by P.F. Odume, had learning activity index but worked examples.

For senior secondary physics by P.N. Okeke, F.N. Okeke and S.F. Akande, had no learning activity index but worked examples.

The chapter summary index for the four (4) physics textbooks are presented

Table 2: Chapter Summary Index

S/N	Textbooks		N	R	Index
1.	New school physics for senior secondary schools by M.W. Anyakoha	1 2 3	56 42 44	12 10 10	0.64 0.61 0.63
2.	TONAD essential physics for senior secondary schools by O.E. Farinde, H.E. Ehimetalor & S.K. Dada	1 2 3	No summary index		
3.	Basic physics for senior secondary schools by P.N. Odume	1 2 3	50 48 45	12 15 11	0.61 0.52 0.60
4.	Senior secondary physics by P.N. Okeke, F.N. Okeke & S.F. Akande	1 2 3	50 43 47	9 11 9	0.69 0.59 0.68

The data on the Table 2 above showed the chapter summary index (CSI) for four (4) physics textbooks in Ebonyi State secondary schools. For new school physics for senior secondary schools by M.W. Anyakoha, the chapter summaries index (CSI) for SS I, SS II, and SS III was 0.64, 0.61 and 0.63 respectively

For TONAD essential physics for senior secondary schools by O.E. Farinde, H.E. Ehimetalor and S.K. Dada, The chapter summaries index was O, ie no summary index at all.

For basic physics for senior secondary schools by P.N. Odume, the CSI was 0.61, 0.52 and 0.60 for SSI, SSII and SSIII respectively.

For senior secondary physics by P.N. Okeke, F.N. Okeke and S.F. Akande, the CSI was SSI 0.69, SSII 0.59 and SSIII 0.68.

The learning activities of new school physics for senior secondary school textbook SSI, SSII and SSIII were matched with learning activities specified in the core-curriculum. The frequencies were subjected to a chi-square test of goodness-of-fit. The summary is presented in the table 3 below.

Table 3: Chi-Square Table on Significance of Correspondence of Learning Activities of New School Physics with

Specification of the Core Curriculum

Content	JSI	JSII	JSIII	χ^2cal	Alph	χ^2crit	Dec
Interaction of matter	49 (40)	46 (40)	26 (16)	43.23	0.05	18.31	Rejected
Conservation principles	40 (35)	46 (35)	20 (14)				
Waves	51 (39)	43 (43)	28 (17)				
Field at rest	42 (34)	50 (40)	22 (15)				
Energy quantization	46 (38)	47 (37)	24 (16)				
Physics in technology	46 (38)	57 (43)	24 (24)				

As shown in the table 3 above, the chi-square critical value at alpha level of 0.05 is 18.31 while the calculated value is 43.23. Based on the rule, the researcher rejects the null hypothesis and concludes that the learning activities of new school physics textbook significantly depend on the specification of the core-curriculum.

Table 4: Chi-square Table on Significance of Correspondence of Learning Activities of TONAD Essential Physics with Specification of the Core-Curriculum

Content	SSI	SSII	SSIII
Interaction of matter	No learning activities but worked examples		
Conservation principles			
Waves			
Field at rest			
Energy quantization			
Physics in technology			

As shown in the table above, no learning activities for TONAD essential physics.

Table 5: Chi-Square Table on Significance of Correspondence of Learning Activities of Basic Physics with the Specification of the Core-Curriculum

Content	SSI	SSII	SSIII
Interaction of matter	No learning activities		
Conservation principles			
Waves			
Field at rest			
Energy quantization			
Physics in technology			

As shown in the table above, no learning activities for basic physics.

Table 6: Chi-Square Table on Significance of Correspondence of Learning Activities of Senior Secondary Physics

with the Specification of the Core-Curriculum

Content	SSI	SSII	SSIII
Interaction of matter	No learning activities		
Conservation principles			
Waves			
Field at rest			
Energy quantization			
Physics in technology			

As shown in the table above, no learning activities for senior secondary physics.

DISCUSSIONS

From the results of the study, it can then be said that only one out of the four physics textbooks had high learning activity score i.e. new school physics by M.W. Anyakoha. SSI came first with LAI of 0.64 and SSII came last with 0.61. The other three physic textbooks had no learning activities on the books. The result of these findings is not in line with Omebe (2010). Her work revealed the eight integrated science textbooks she evaluated, had high learning activity index (LAI).

The data collected and the results in the tables 4, 5 and 6 showed that out of four (4) physic textbook evaluated, only one had learning activity index, other three do not have learning activity index at all. It should be recalled that Eze (1993) seem to have agreed with the above finding in his study, he found out that topical coverage and study questions were lacking in the different textbooks studied. He recommends revision of the text to include those areas.

CONCLUSIONS

Based on the findings of this study, the following conclusions were made.

- Only one out of four physics textbooks in Ebonyi State secondary schools had learning activity index. Thus the physics textbooks in Ebonyi State secondary schools do not have adequate learning activity index.
- Three out of four physics textbook in Ebonyi state secondary school evaluated had appropriate chapter summary, only one had no chapter summary. Therefore TONAD essential physics textbooks cannot be considered adequate in terms of learning activities and cannot be considered appropriate in terms of chapter summary.

RECOMMENDATION

Based on the finding and conclusion of this study, the following recommendations were made:

- Physics textbooks use for teaching students need to be periodically revised with the view to make them have adequate learning activities and appropriate chapter summaries

- Authors and publishers of physics textbooks should consult physics core curriculum in order to draw topics, performance objectives, learning activities and chapter summary from the said curriculum. That will ensure a good physic textbook coverage of the topics, good learning activities index, and satisfactory chapter summaries index.
- Selection and recommendation of physic textbooks for teaching and learning should be done by experts in the area i.e. physics teachers and other science teachers, curriculum experts and other relevant agencies.

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