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THE USE OF OBSERVATIONAL TECHNIQUES IN EVALUATING LEARNING OUTCOMES IN SCIENCE AND VOCATIONAL EDUCATION

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ABSTRACT

Evaluation is the end product of Test, measurement, and Assessment. Learning outcomes in skill areas and behaviour changes in personal social development are especially difficult to evaluation with the usual paper and pencil test. The aim of this paper is to examine the various methods to be adopted by a classroom teacher in evaluating learning outcome and development of science and vocational Education. The paper further discusses the use of observation techniques (Anecdotal Records, rating scale, and Checklist) as the instrument for measuring non-cognitive domain of any learning outcomes. The paper also recommend that science and vocational teachers, school administrator,Crriculum planners, and different examination bodies should inculcate the spirit of using the Checklist, Rating scale and Anecdotal techniques in evaluating learning and development of science and vocational Education.

Introduction

The world is in a scientific and technological age. Science is the developmental bedrock of any nation and has become an integral part of human life as the products and processes of science affect what we eat, what we see, what we do as work or as play, what we think, what we feel, even how we are born and how we die (Aledejana, 2000). Science Education shall emphases the teaching and learning of Science process and principles. This will lead to fundamental and applied research in Sciences at all levels of Education.

The National Policy on Education (2004) listed the following goals of science Education:

i. Cultivate inquiring, knowing and rational mind for the conduct of a good life and democracy,
ii. Produce scientists for national development
iii. Service studies in technology and the cause of technological development and
iv. Provide knowledge and understanding of the complexity of the physical world, the forms and the conduct of life.

Technical and Vocational Education is used as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of Technologies and related Science and the acquisition of practical skills in various sectors of economic and social life (National Policy on Education 2004). The General Conference of the United Nations Educational, Scientific and Cultural Organization, meeting at Paris from 17 October 1989 to 16 November 1989 at its twenty-fifth session recognizing that the development of Technical and Vocational Education should contribute to the safeguarding of peace and friendly understanding among nations.

There is a wealth of assessment methods used in higher education to assess students' achievement in both cognitive and non-cognitive domain, but how to choose an approprate method is a problem during the teaching/learning process. The primary objective of this study is to choose a method, which most effectively assesses the objectives of the unit of study. In addition, choice of Assessment methods should be aligned with the overall aims of the program, and may include the development of disciplinary skills (such as critical evaluation or problem solving) and support the development of vocational competencies (such as particular communication or team skills) (Oxford Brooks University, 2005). Eight methods of Assessment are suggested by Oxford Brokers University:

i. Thinking critically and making judgments
ii. Solving problems and developing plans
iii. Performing procedures and demonstrating techniques
iv. Managing and developing oneself
v. Accessing and managing information
vi. Demonstrating knowledge and understanding
vii. Communicating

Evaluation of learning outcomes from effective teaching is a process of arriving at value judgment in respect of an observation after a logical consideration of a number of measurement and assessment (Adesokan, 2003). Evaluation can be formative or summative, it is also the process by which relevant data are collected

and transferred into information for decision making (Ogunmakin and Popoola, 2003).

Jaja, (2007) pointed out that observations is a techniques for assessing non – cognitive learning outcomes the non – cognitive learning outcomes are affective and psychomotor traits in learners which can be measure by using various tests and techniques. A large number of leaning outcomes are measured by paper and pencil tests. This is especially of knowledge, understanding and thinking skills in.

There are a number of importantt behaviour changes that require the use of other procedures. It is difficult to depend only on use of paper and pencil test both in primary, post primary and post secondary school in order to get an objectives record of the most meaningful behavioral. It can be greatly facilitated through the use of such techniques as the tools and techniques pointed out by Jaja. (2007), which include Rating scale, Checklist, and Anecdotal record, etc.

This paper will provide comprehensive knowledge for the professional teachers at primary, post-primary, and tertiary institution the method that is appropriate for evaluating non-cognitive domain of learner and to provide the basic skill in utilising the tool mentioned in this paper.

Procedure for observation techniques

Observation should be carried out objectively. To be able to achieve this objectivity. There is a standard procedure for observation.

Ojerinde and Falayayo (1984) pointed out the following procedure.

- Identification of the quality or behaviour which is to be observed in children e.g. leadership quality.
- Determination of appropriate activities which could make the children exhibit the quality e.g. rotation of class captainship to be able to observe leadership traits in the children.
- Determination of method of observation for example direct observation by the class teacher, use of a participant as an observer, use of a psychological laboratory to observe the pupils(this is rather sophisticated and expensive or absenteeism) to observe the children's record in the case of a new teacher or headmaster in the school.
- Conclusion in respect of observation. This conclusion should be based on several observations. This means that the observer has to observe the respondent in as many situations as possible and establish regularity of the behaviour before making any conclusion.

Observation techniques in Science and Vocational Education

The principal ways of getting information are either by experiencing something directly or by having someone tells us what happened. In observational Techniques three instruments or tool are more appropriate for collecting information, they are:

i. Anecdotal Record
ii. Rating Scales and
iii. Checklist
(Source: Norma,1976)

A large number of learning outcome are measured by paper and pencil tests. This is especially true of outcomes in the cognitive domain, such as those pertaining to knowledge, understanding and thinking skills, but we must be careful in evaluating learning outcome in science and Vocational Education by solely depending on paper-and-pencil test. There are a number of important behavioural changes that require the use of other procedures. It is difficult to depend only on use of paper and pencil test in Science and Vocational Course both in post-primary and post-secondary school. In order to get an objective record of the most meaningful behavioural, it can be greatly facilitated through the use of such techniques as (1) Anecdotal records (2) Rating scales and (3) Checklist (Norma, 1976).

Anecdotal Records

Anecdotal records can be used for obtaining data pertinent to a variety of learning outcomes and to many aspects of personal and social development. The potential usefulness of the anecdotal method can be revealed by reviewing the various areas of learning outcomes. The problem in using anecdotal records is not so much what can be evaluated, but rather what should be evaluated with this method.

What behaviour to observe and record should be based on the following points?

i. Confining our observations to those areas of behaviour that cannot be evaluated by other means.
ii. Limiting our observations of all pupils at any given time to just a few types of behaviour.
iii. Restricting the use of extensive observations of behaviour to those few pupils who are most in need of special help. The most important advantage of anecdotal records is that they provide a description of actual behaviour in natural situations. The old adage that "action speaks louder than words"

has direct applications here. If pupil want to show good knowledge of health practices, but not use a handkerchief when he/she sneezes or coughs, when approach his/her laboratory work in a haphazard and uninterested fashion

The major limitation of anecdotal records is the amount of time require in maintaining an adequate system of records. Though this can be offset somewhat by limiting observations. It is time-consuming task by taking care of individual at each stage of observation carried out by the teacher. In carrying out Anecdotal records in evaluating learning outcome in Science and Vocational Courses, the outcome of the observation should be recorded on the anecdotal record form. The form can be in this form.

The table shows the report of teacher in a physics Laboratory.

Class:_____ Pupil
Name:_____
Date:_____
Place/Class:_____
Observer
Name:_____
Subject/Course:_____
Time/Duration:_____

Incidence:

As the class is about to start Esther asked if she can set up a Science equipment to measure the focal length of coverging lens, she set up the apparatus by setting the ray box first without taking the initial length between the lens holder (Lens) and the ray box and the screen, an initially the lens was not placed on the lens holder and she spend more than the require time and the ray of the light does not centralised.

Interpretation:

Esther is interested in carrying out practical in Physical Laboratory but she have problem in getting the accurate distance before setting the apparatus and she does not know the usefulness of the lens holder

(Source: Gilbert, 1974)

This Anecdotal record form can only be provided for each pupil after carrying out a certain behavioural test and should be prepared immediately after the practical work. Norma (1976) listed the positive ways for the effectiveness of Anecdotal Records as following:

1. Determine the advance what to observe, but be alert for unusual behaviour.
2. Observe and record enough of the situation to make the behaviour meaningful.

3. Make a record of the incident as soon after the observation as possible
4. Limit each anecdote to a brief description of a single specific incident.
5. Keep the factual description of the incident and your interpretation of it separate.
6. Record both positive and negative behavioural incidents
7. Collect a number of anecdotes on a pupil before drawing influences concerning typical behaviour
8. Obtain practice in writing anecdotal records.

Rating Scale:

A rating scale consists of a set of characteristics or qualities to be judges and some type of scale for indicating the degree to which each attribute is present. The rating scale should be constructed in accordance with the learning outcomes to be evaluated and its used should be confined to those areas where there is a sufficient opportunity to make the necessary observation.
Rating scale serves several functions in evaluating learning in Science and Vocational Education.

i. It directs observation toward specific and clearly defined aspects of behaviour
ii. It provides a common frame of reference for comparing all pupils on the same set of characteristics and
iii. It provides a convenient method for recording judgement of the observers.

Rating scales is of various form (i) Numerical Rating Scale (ii) Graphic Rating Scale (iii) Description Graphic Rating Scale

Numerical Rating Scale: This is one of the simplest types of rating scale that involves the rater to checks or circle a number to indicate the degree to which a characteristic is present.

Examples

Instruction: indicate by rating the degree to which pupil involves in carrying out experiment in the rectilinear propagation of light let the following numbers represent the degree of involvement 5-excellent, 4-above average, 3-average 2-below average and 1-unsatisfactory.

(1) The degree at which the student arrange the apparatus in accordance with the diagram presented by the teacher is 1 2 3 4 5

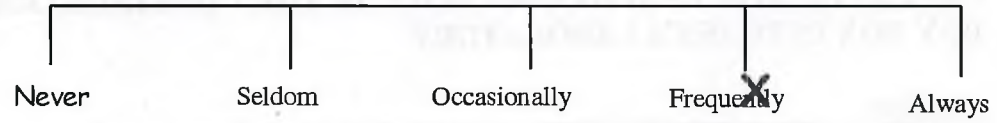
(2) the degree at which light travel through the hole of the four cardboard set by the Pupils is (1) 2 3 4 5

Graphic Rating Scale: Rating is made by placing a check on the line. Typically a set of categories identifies specific position along the line, but the rater is free to check between these points if he desires.

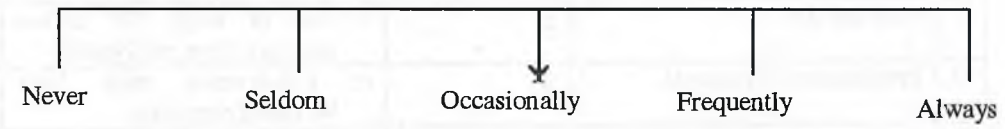
Example

Instruction: Indicate by rating the degree to which pupils participated in Physics practical in the laboratory by placing and X anywhere along the horizontal line under each item:

1. To what extent does pupil participated in carrying out practical in Physics after the topics have been taught by the teacher.



2. To what extent does the laboratory attendance assist in arranging the apparatus in Physics Laboratory?



Descriptive Graphic Rating Scale: - This technique is difference from the other two discuss because it involves a descriptive phrases to identify the points on a graphic scale.

Example

Instruction: Indicate by rating the degree to which pupils participated in Physics in the laboratory by placing an X anywhere along the horizontal line under each item.
To what extent does pupil participated in carrying out practical work in Physics after the topic have been taught by the teacher.

Never participated depend on other pupils work and passive

Participated as other group member but is a dependant

Participated fully is an independent student.

(Source: Norman1976)

CHECKLIST:

Checklists are especially useful in evaluating those performance skills that can be divided into a series of clearly defined, specific actions, it is basically a method of recording whether a characteristic is present or absent, or whether an action was taken the learning behaviour of pupil in the construction of Ray Box in Physics Laboratory. The responsibility of teacher is to indicate the pupil's sequence of actions by numbering them in the order in which they occur and the other aspect can be ticking the appropriate statement as applicable.

CHECKLIST FOR EVALUATING SKILL IN THE CONSTRUCTION OF RAY BOX IN PHYSICS LABORATORY

Example

	STUDENT'S ACTION	SEQUENCE OF ACTION	SKILL IN WHICH STUDENT FURTHER TRAINING	ACTION
A	Sketch the size of the ray box	1		
B	Draw to scale	2	a. Sketch and draw to size	√
C	State the cost	4	b. Set of angle 90^0 before applying Glue and Nailing	√
D	Procurement of materials	5	c. Constructed with light Wooding materials	
E	Cut to size	6	d. Means of electrification is provided	√
F	Arrangement of require size	9	e. Use of Emory cloth for finishing	-
G	Uses of Try-square for setting	10	f. Good finishing	-
H	Nailing together	13	g. Tested after construction	√
I	Creating a slit	7		
K	Creating an open end	8		
L	Installation of electric bulb	14	**NOTICEABLE CHARACTERISTICS OF STUDENT'S BEHAVIOUR**	
M	Finishing by painting	15	a. Too slow and deliberate	-
N	Selection of materials	3	b. Very fast	
O	Apply glue before nailing	11	c. Does not take the work serious	-
P	Apply gum		d. He can only work under supervision	√

Q	Allow it to set before Nailing	12	e. Always angry and disturb when comes to practical work	-
			f. Obviously satisfied with his unsuccessful effort	-
			g. Always late to the laboratory for practical work	-

(Source: William and Irvin,1978)

Apart from the other three technique discussion Ranking methods is another technique of evaluating learning in Science Education. Ranking methods does not require a printed scale. The teacher can decide to rank the participation of each student in practical work by assigning a numeral / number in front of the name indicating the one who is highest in participation, then the one who is lowest, then the one who is next highest, next lowest and so on, until a complete ranking is obtained.

Recommendation

Science and Vocational teachers, school administrator and different examination bodies should inculcate the spirit of using the observation techniques (checklist, Rating scale and Anecdotal) in evaluating learning outcome in Science and Vocational Education. Pencil and paper test should be introduce when the examiner want to measure some aspect of the cognitive domain such as recall of fact and to ascertain a particular behaviour only. The curriculum planner should inculcate Observational Techniques into the curriculum of science and vocational education so that the curriculum can address the need and aspiration of the learner.

Conclusion

In conclusion, the teaching and learning of Science and Vocational Education can be assessed by the teacher by using the Rating scale, anecdotal and checklist. Only the cognitive aspect of the domain that should involve the use of pencil and paper test. The result obtained from evaluating learning outcome in Science Education can be used to assess the teacher performance and help the teacher to plan his lesson, carry out instructions, maintain right atmosphere and achieve effective learning process. Despite the fact that assessment of each student can be biased but the skill acquired by individual pupils should be determined after presentation of the content and to reduce the levels of difficulty, friction and compositeness.

REFERENCES

Adesokan, B. (2003): Principles of Evaluating Students' Achievement for Educators and Trainers, Osogbo, Grapheal Printing and Publishing Co. Ltd.

Aladejana, F. O. (2000): An Assessment of Science Classroom Learning Environment. *Journal of Behavioural Research*, **2** (1& 2): 82 - 88.

Gilbert, S. (1974): *Principles of Educational Measurement and Evaluation*, California: Wadsworth Publishing Company.

Jaja, C. A. (2007): "School – Based Assessment in Social Studies in the Context of Universal Basic Education", National Association of Evaluators and Researchers 9th National Conference Proceedings.

National Policy on Education (2004): Federal Republic of Nigeria, Lagos: Nigerian Educational Research and Development Council (NERDC).

Norman, E. G. (1976): *Measurement and Evaluation in Teaching*, (3rd Edition), London: Collier Macmillan Publishers.

Ogunmakin, A. O. & Popoola, T. A. (2003): Introduction to Test and Measurement, Akure, Layo-Ola Printers.

Ojerinde, D. & Falayayo, W. (1984): Continuous Assessment A New Approach, Ibadan: Published by University Press Limited.

Oxford Brooks University (2005): Selection Methods of Assessment, Wheatley Campus.

United Nations Educational, Scientific and Cultural Organization Convention on Technical and Vocational Education, (1989): (Update: 21 March 2002). Convention on Technical and Vocational Education, Paris.

William, A. M. & Irvin, J. L. (1978): *Measurement and Evaluation in Education and Psychology* (2nd Edition) New York: Holt Rinehart and Winston.