Issues in Contemporary Evaluation

Edited by

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Contents

Contents

Chapter 8

Construction of Non-cognitive Instruments

Eugenia A. Okwilagwe

Introduction

The term non-cognitive is used to refer to a person's behaviour that is affective in nature. Such behaviours are associated with the person's personality characteristics and other traits. Obemeata (1984, p.309) described them as 'qualities of character and temperament'. These behaviours are termed non-cognitive because they do not clearly measure a person's intellectual or cognitive abilities like knowing, comprehending, application etc. Examples of non-cognitive variables are interest, attitudes, motives, emotions, values etc. Obemeata (1984), however, sees the term non-cognitive as used to describe these behaviours as a misnomer because most non-cognitive variables like attitude, interest etc. have cognitive components. Other social psychologists such as Oppenheim (1984) seem to be in agreement with this view. However, measuring these behaviours is sometimes difficult for teachers.

Domains of learning have been classified into three: cognitive, affective and psychomotor. Achievement which is the measurement of students' cognitive abilities is usually measured by the means of pencil and paper tests and recently, these tests are administered to students via the computer. In a teaching-learning situation, the teacher should not only be interested in the academic achievement of students but also in their affective development. According to Okwilagwe (2002) and Obemeata (1984), the teacher should show interest in the affective variables like the cognitive variables of their students because to a very large extent the former influences their performance in the latter. Many empirical studies abound to confirm this. For example, positive attitudes according to research findings influence students' achievement in school subjects. These findings are linked to studies as those of Astin (1993), Price and Williams (1998) and Ogunwuyi (2000).

The learning environment according to Okwilagwe (2002) plays an important role in the formation of good non-cognitive behaviours. The knowledge of affective traits and how to measure them, therefore, are germane to a teacher's understanding of the students' put under their care. Also, teachers are better equipped to handle various negative behaviours students display during the teaching process. It also, provides information on the teacher's extent of teaching effectiveness. In view of these reasons, this chapter reviews some non-cognitive behaviour and presents the essential principles and techniques of constructing instruments to measure them for the benefit of persons who are novices in the art of constructing assessment or evaluation instrument.

Roles of Non-Cognitive Assessments in Education

Non-cognitive assessment at whatever level of education plays significant roles in education. Such roles as identified by Obemeata (1984) are highlighted here:

- Modification of anti-social behaviours in learners through a well - planned and carefully executed affective education that ensures that set philosophical goals enunciated in the National Policy of Education are carefully achieved and evaluated.
- Use of outcomes of non-cognitive assessment in education for selection and placement especially at the lower and middle rungs of the educational ladder, to ensure that learners are allocated to courses for which they are best fit in terms of their interest, motivation, attitudes and aptitude.
- It also plays the role of guiding learners on the right choice of subjects, courses, occupation or career.
- Non-cognitive assessment provide useful basis for diagnosing learning strengths and weakness that engender in teachers how to seek for ways to remediate the observed weakness.

Types of Non-Cognitive Behaviours

There are many non-cognitive behaviours that are within the affective domain which the education system in Nigeria should seek to inculcate in learners. These include: good attitudes, values, interests, social relations, emotional adjustments, among others. Non-cognitive measurements sometimes called personality tests are tests that are

presumed to be over underlying behaviour over time (Kaplan and Saccuzo, 2005).

Interest is seen as a preference for one thing over another, whereas attitude is the preference for an object, phenomenon or group of things. On the other hand, values are more of abstractions but attitude, values, and interest are sometimes used interchangeably by some psychologists. This observation is confirmed by Allport (1935) in Sax and Newton (1997) and Obemeata (1984). However, in this chapter a distinction has been made. Attitudes and values are predispositions to behave in a particular way whereas interests have to do with preferences without any commitment to behave in a manner that conforms to these preferences (Sax and Newton, 1997). For example; a positive attitude to schooling will predispose a learner or his/her guardian to like studying as well as actively participating in things that can lead to knowledge acquisition, whereas, interest in or preference for cooking may not actually involve the person's active participation.

Techniques for Instrument Development

Making value judgement on whether set goals are attained is an important decision teachers make during the teaching and learning process. Obtaining relevant information in terms of information gathering is essential in the making of such judgement. How can this information be gathered? There are many techniques open to school teachers, school administrators and research individuals. Some of these techniques are simple while others are a bit complex to construct. Only the construction of some of these instruments such as the rating scale, checklist, interest inventories, attitude scale, questionnaire and observation schedules are discussed here.

Rating Scale

This is used when finer discrimination of an attribute or a thing is needed and used to indicate the quality of a trait or attribute. Rating scales are used to systematically record the presence of a trait or behaviour. Mehrens and Lehmann (1976) assert that rating scales should be constructed to measure specified outcomes or goals of education that are identified to be significant or important to the teachers. They should be tools used to obtain information and not used to evaluate outcomes. They can be used in activities that involve skills development, personal-

social development, products and procedures. Rating scales can also be used to evaluate course content or teaching effectiveness of teachers.

They could also be used to assess many 'aspects of life' e.g. honesty and dedication of staff to duty or the introduction of an innovation or training. Rating scales could either be numerical, graphical rating or comparative rating scales. Respondents are requested to rate the appropriate response that shows the level to which they agree with the statements describing the traits. The response frame in a rating scale could vary from three to five e.g. very honest (5); honest (4); not sure (3); dishonest (2) and very dishonest or (1) Satisfactory (2) Good (3) Excellent.

An example of a numerical rating scale is presented below:
Example: To rate a teacher on the **'Level of honesty at work'**- for instance, sub-components of this attribute could be sampled or measured as follows:

Uses of Rating Scale
- Assesses personal characteristics that are social in nature e.g. punctuality, neatness, carefulness and cooperation.
- It is also used to rate practical work e.g. cooking, moulding, sewing and typing.

Advantages of Rating Scale
- Easy to construct and to complete.
- Specific traits and behaviours can be rated.
- Flexible to use and can be used in natural and simulated settings.
- The quantitative scale provides the basis for rating students on same set of categories.

Disadvantages of Rating Scale
- It may be difficult to generate comprehensive traits that adequately assess the behaviour of interest.
- Raters may have difficulty in having the same understanding of the stated traits.
- Susceptible to the problem of 'halo effect' a situation when a rater's general impression of a trait influences his/her ratings.
- Raters may be strict, lenient or take a neutral position.

Table 8.1: Scale of Teachers' Level of Honesty at Work

A. Faithfulness	1	2	3	4	5
Punctual at reporting at work.					
Devoted to assignment at hand.					
Do not care about work activities.					
Patriotic at handling activities at work					
B. Sincerity					
Sincere in dealing with both superiors / subordinates.					
Sincere at recording time of arrival at work.					
Do not make unnecessary excuses to skip work.					
Provide false doctor's report to skip work					
Not interested in reporting objectivity.					
C. Probity					
Is objective in decision making.					
Steadfast in handling assignments.					
Is transparent in presentation of reports at work.					
Does not lie to gain favour from superiors.					
Dedicated to assigned work.					
D. Accountability					
Is diligent at executing assigned work.					
Responsible for all assigned duties.					
Does not shy away from responsibilities at work.					
Believes that resources are not wasted.					
Is loyal to constituted authority.					
E. Transparency					
Gives clear statement of account at work.					
Communicates in the language everyone understands.					
Gives vague response to questions/query.					
Highly secretive in official matters.					
Believes in team work.					
F. Reliability					
Highly confident when reporting executed assignments.					
Carefree in handling official matters.					
Highly confident when executing assignments.					
Get recommendations for executing specific tasks;					
Finds execution of tasks difficult.					

Interest Inventories

Three approaches have been identified by Sax and Newton (1997) for constructing interest inventories. These are:

- Rational approach: Interest is chosen on a logical basis for categorising persons and items are written to measure each area.
- Internal-consistency Approach: Items are constructed from a logical basis, but items in each area of interest are so constructed and scaled to be internally-consistent. Factor analysis is used to ensure such internal consistency by ensuring that one factor exists in each sub-scale.
- Empirical approach: This is more research oriented. The pool of items constructed should distinguish or discriminate between successful persons in the field of interest and other persons (men or women) in general.

Uses of Interest Inventories

Interest Inventories are important for the following purposes:
- Selection: Interest inventories are useful means for selection purposes even though some experts strongly feel against this because of their subjectivity.
- Classification: They can be used to classify students into vocational or academic goals or interests as such inventories guide students to study certain courses.
- Remediation: subjects with learning problems could be identified early in a training programme and assisted to improve or overcome their learning problems by providing special attention to them or use their identified areas of interest to expose them to those areas they dislike.

Types of Interest

Interest can be classified into three:
- Expressed interest in which a person shows preference for one activity over another. For example medicine, engineering, law or aeronautic engineering.
- Manifest interest is the type of interest in which a person demonstrates a voluntary participation in an activity without any form of coercion.

- Inventoried Interests: These are interests that have been measured through inventories that compares interest in different activities. Example is the preference for joining Boys Scout and Girls Guide activities by boys and girls. These inventories assist students or young adolescents to choose from varied trades, professional and semi-professional occupations and recreational activities. An example of a student's interest in school inventory is shown below.

Table 8.2: Interest in School Inventory

	Statement	Like	Indifferent	Dislike
1.	Going to school.			
2.	School is fun.			
3.	Playing at school sometimes.			
4.	Learning many school subjects.			
5.	Making friends at school.			
6.	School is an interesting place to be.			
7.	Doing school assignments on time after school.			

Check list

Check lists are simple record keeping tools that help the school teacher, administrator or a researcher keep track of events, school learning, materials or staff. Depending on the non-cognitive aspect of teaching one is interested in assessing, a comprehensive listing of traits/items is done, and the administrator, teacher or researcher simply checks in the traits as they are present, or exhibited in the event by the teacher or learner. An example of how to draw up a check list is as follows.

Advantages of Check list
- Easy to construct and to complete.
- Specific traits and behaviours can be assessed.
- It is flexible, and can be modified when the need arises.

Table 8.3: A Check list of Laboratory Instruments

Materials in Science Lab.	Available/No	Not Available	In good Condition/No	Not in good Condition/No
1. Conical flask				
2. Round bottom flask				
3. Pipette				
4. Burette				
5. Bunsen burner				
6. Clamp				
7. Clamp holder etc.				

Disadvantages of Check list
- The teacher might leave out important traits inadvertently.
- It could be subjective.
- It cannot be used in isolation.

Attitude Scale Construction

Attitude is a personality trait. There seems to be a consensus among social psychologists that attitude is "a state of readiness, a tendency to act or react in a certain manner to stimuli". Attitudes are positive or negative feelings about something and are expressed when we speak or when the object of the attitude is aroused. Otherwise they are usually dormant in the person. Attitudes often attract strong feelings. According to Oppenheim (1984) attitudes are reinforced beliefs which mean that they have cognitive components. Also, they often attract strong feelings which are the emotional components, and they lead to particular forms of behaviour representing the action or behaviour tendency components.

Other qualities or characteristics of attitudes include:
- attitudes are abstractions even though they are real to the individual who holds them.
- they may or may not be present in the sample a researcher is interested in.
- attitudes cut across many of human endeavours such as politics, war, peace, marriage, religion, education, child bearing, food habits and others.

- they are not entirely expressed or measured in a continuum or straight line, but this is done only to make attitude measurement easy.
- attitudes once held are difficult to change, though not impossible to change.

Attributes of Attitudes

- Attitudes have intensity e.g. stronger feeling or lesser feeling. U-Shaped relationships are observed between attitude of intensity and of content. More extreme attitudes are held with vehemence while neutral attitudes are held with less intensity.
- Some attitudes are more enduring than others. For instance, political and religious beliefs may be found more stable over time than attitudes to electronics, automobiles, television watching.
- Attitudes are related to one another 'across' the same level e.g. racial/ethnic prejudice against one minority group, is usually associated with prejudice against several other groups, and glorifying your own group over others. This is common in a pluralistic environment where many sub-cultures exist.

Measuring Attitudes

Attitude scales consist of between twelve to twenty-four items or more to which a respondent is asked to agree or disagree (Oppenheim, 1984). This is because these statements have been carefully selected from a larger number of items using some criteria. Measuring attitude is most often problematic, so to collect good and usable data, there is need to do the following:

- Careful planning
- Conduct pilot work. Pilot work may be in the form of free interview intended to achieve respondent's good instrumentation.
- Explore the origin, complexities and ramifications of the attitude in question;
- To device vivid expression from such attitudes from the respondents so as to make them suitable for use as items. For example, to measure attitude to school, there is the need to explore why/what keep pupils out of schools; home or personal reasons behind this etc.

Guidelines for Writing Attitude Statements

- Do not use double barrel statements e.g. "A mother is one who loves her children but can sometimes show displeasure when they misbehave";
- Avoid double negatives e.g. "None but fools say there is no God"
- Attitude statement should be short, not windy so as not to confuse respondents.
- Do not use jargons or proverbs and well known sayings.
- Sometimes we may not want the purpose of our inquiry to be obvious. The way out is to avoid statements that are too direct, and write, indirect or oblique statements. Example – 'attitude to using the library'. A direct statement is "I hate going to the library". An oblique statement is a better statement "I wish the library did not have so many silly rules and regulations". Note that the second statement is more subtle than the first. Another example: "I don't always trust the doctors in this hospital" better still write: "I wish my own doctor could look after me here."
- Balance the number of positive and negative items.
- Do not write too many items to cover mostly the extreme ends of strongly agree and strongly disagree.
- Randomly place the items in the list before using them.
- Put some inoffensive items first. These could help to motivate an unwilling respondent to respond to your instrument.

Questionnaire

Questionnaire is a self-reporting instrument, used to collect information on attitude, opinion or interest of the individual. The response format could be open-ended or closed. It consists of a list of questions that the respondent responds to either in writing or orally.

Table 8.4: Attitude to Healthy Eating Habits

Instruction: Respond to these statements using these keys; **SA**=Strongly Agree; **A**= Agree; **D**=Disagree; **SD**=Strongly Disagree. There are no wrong or right answers.

Statement	SA	A	D	SD
1. I love eating well cooked dishes.				
2. Whenever I see good food, I find my mouth watering.				
3. Eating anything that comes one's way could be harmful to health.				
4. I eat only when I am hungry.				
5. It is a good habit to always eat a balanced diet.				
6. Children should be taught good eating habits from a young age.				
7. Eating every uncooked food can sometimes be harmful.				
8. I eat to stay alive.				
9. Eating freshly cooked meals is enjoyable.				
10. I hardly ever have time to sit to eat a good meal.				
11. Eating outside of home is unappealing.				
12. I am mindful of where I eat.				

Guidelines for Writing a Good Questionnaire
- Know the objective of the questionnaire.
- Decide on the response format.
- Break down the content of the issue of interest into relevant components.
- Write good items on each of the components.
- Give the questions to another person/teacher/colleague to review them.
- Revise the items/questions in the light of criticism/suggestions made.
- Test the instruments on a sample of respondents, analyze and select only the good items.

Advantages
- It easy to construct.
- It could be administered on a large sample with ease.
- It is used to access students' affective behaviours.
- It assures anonymity of respondents.
- Appropriate for use with learners who are proficient in the language used.

Disadvantages
- Easily susceptible to falsehood.
- Refusal to respond to some items.
- Tendency to respond in a particular direction e.g. ticking 'undecided' or 'disagree'

Classroom Observation: This technique enables the interaction between teacher and students in the classroom to be measured. Their work habit, performance skills, products, personal-social adjustment, attainment of programme objectives, difficulties encountered and so on can be measured. Observation can also be conducted in a natural or simulated setting. Observation instruments require systematic observation and administration. They also require that the constructor takes care in identifying all the relevant components and attributes to be observed. A good example of a classroom observation scale is the simplified Classroom Interaction Sheet (CIS) presented in Table 5.

Other Techniques: Other non-cognitive techniques or tools that teachers, school administrators and research individuals can use to gather relevant information are, sociometry, anecdotal records, peer appraisal and self-evaluation.

Table 8.5: Classroom Interaction Sheet (CIS)

Date:................................   School:..
Subject:...............................
Class:.............................   Period:...
Teacher:.............................

Behaviour Category	Specific Behaviour	Tally of behaviour Occurrence
A. Individual student Work	1. Observing 2. Writing 3. Questioning 4. Manipulating	
B. Student group Activity	5. Observing 6. Writing 7. Manipulating	
C. Teacher prompting Learning	8. Questioning 9. Aiding slow learning 10.Demonstrating 11. Explaining 12.Reinforcing correct Response	
D. Monologue	13.Teacher talking non-Stop	
E. Teacher not facilitating learning	14. Punishing 15.Distracting attention 16.Using negative Reinforcement 17. Giving notes	
F. Confusion	18. Noise 19. Students playing 20 Class disorganized	
G. Others		

Source: *Okpala, Onocha and Oyedeji (1993). Measurement and Evaluation in Education*

Instruction for Recording:
Make a tally (i.e. code) in the appropriate cell to show the occurrence of any specific behaviour every 3 seconds.

General Procedures for Constructing Non-Cognitive Instruments
The development of non-cognitive instruments requires the adoption of some basic procedures. These procedures are discussed below:

- Translate the indicators into observable and measureable entities. Observability and measurability of the indicators enhance the reliability, validity and objectivity of the instruments. These qualities also render the data so obtained with the instrument analysable.
- Determine the most appropriate format(s) for the instrument. Determine if the instrument will require scaling and the appropriate scaling to use. It should be noted that not all instruments are scaled. However, a given instrument might adopt a variety of formats.
- The instrument should not be too long or too sketchy. Too long an instrument may be too boring to respondents and may not be completed within the available time. Too sketchy an instrument may contain only skeletal information. Following the rule of thumb of 1-3 pages may suffice.
- The stem of each item should be specific and unambiguous. Avoid double-barrel statements, as these will give rise to difficulty in the analysis of ensuing data. Data obtained from double-barrel statements may also be confounding.
- The proposed mode of data analysis should reveal the structure of the items. While preparing instruments, the proposed mode of data analysis should be borne in mind. If this is not taken into account, the ensuing data may not be analysable.
- Include plausible filters where applicable. This is necessary especially where responses require options. Since it is usually possible to include the universe of filters, provision is made for the respondents to indicate other possibilities.
- Keep the language simple and easy to comprehend. Assumptions should not be made about the respondents since you may not be physically present to guide them.

- Always leave space for additional comments, because item options, where these are applicable, might in fact not be exhaustive. This is most applicable for the questionnaire checklist construction.
- The name and the signature of the respondents may be required.

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