DEVELOPMENT AND VALIDATION OF AFFECTIVE INSTRUMENT FOR SENIOR SECONDARY SCHOOL GEOGRAPHY STUDENTS IN NORTH CENTRAL NIGERIA

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ABSTRACT

The importance of factor analysis in obtaining empirical construct validity makes it an essential step in the affective instrument development process. This research developed and validated the instrument for evaluation of affective domain in Geography students. To achieve this, four research objectives with corresponding four research questions were raised. Instrumentation research design was employed for this study. The population of the study comprised all the 111,699 SS II Geography students from both public and private senior secondary schools in North Central Nigeria and the sample consisted of 1177 students from an intact class of SS II Geography students from 43 co-educational secondary schools in North Central Nigeria including the FCT. Multistage sampling procedure was used to select the sample size along state, local government area and school type. The instrument used for data collection was a developed instrument for Evaluation of Affective Domain in Geography (IEADG). It was face validated based on content and appropriateness of language by five experts and construct validity done using principal component factor analysis. The results showed that nine major factors emerged from the instrument for evaluation of affective domain in Geography namely: receiving, honesty, organization, self-control, characterization, responding, perseverance, valuing, and imitativeness levels were extracted and 45 isolated items with a minimum factor loading of 0.40 were selected and the rotation converged at 53 iteration. Reliability coefficient of 0.896 was also established for the developed instrument. Thus, it was concluded that the instrument which yielded more than originally known 5 levels of affective domain by Bloom (1956) is reliable and valid and can be used for its purpose in Nigerian Secondary Schools. Based on the finding and conclusions, the researcher made the following recommendations among others: the refined instrument for evaluation of affective domain in Geography (IEADG) should be used in North Central Nigeria and it should be used as a guide to develop the same type of instrument in other subjects. Since the final instrument for evaluation of affective domain in Geography student is valid and reliable, it should serve as a template for developing and validating other affective domain evaluation instruments in other subjects especially in the area of sampling adequacy, factor extraction, rotation convergence, factor rotation and item selection.

Introduction

The act of imparting knowledge to the learner in the classroom situation aimed at understanding and application of knowledge, concept and processes is referred to as teaching. To teach is to engage students in learning; thus teaching consists of getting students involved in the active constructions of knowledge. A teacher requires not only knowledge of subject matter, but knowledge of how students learn, what makes them learn and how to transform them into active learners. Teaching-learning is a combined processes where an educator assesses learning objectives, develops teaching and learning strategies, implement plan of work and evaluates the outcomes of the instructions.

Evaluation of specific learning outcomes therefore, assumes a prominent position in classroom instruction. It is a systematic process of collecting, analyzing and interpreting information to determine the extent to which students are achieving instructional objectives. It is thus, at the central core of teaching and learning. In teaching, evaluation is mainly concerned with assessing the effectiveness of teaching strategies, methods and techniques. It provides feedback to the teachers about their teaching and the learners about their learning outcome.

Learning, however, is not just a cognitive (thinking) function, but also attitudes, emotions, behaviours, feelings and physical skills. These different categories create three domains of learning which are: cognitive (knowledge), psychomotor (skills), and Affective (attitudes).

On the focus of the present study, most people think of learning as an intellectual or mental function. But, learning is not just only a cognitive (mental) function. One can also learn attitudes, behaviours, and physical skills. The focus of this study affective domain involves our feelings, emotions and attitudes. This domain includes the manner, in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivation and attitudes. This domain is categorized into five levels which include: Receiving, Responding, valuing, organization and characterization. As a result of these categories of learning, the assessment of learning outcome is also based on the three categories of domains hence, the need for an effective instrument that can assess the three domains including affective domain as the central of all domains.

The West African Examination Council (2007) also affirmed that assessment of students' learning behaviour is expected to be carried out in totality. That is assessing the students in all the cognitive, psychomotor and affective domain. However, Rahman, Pasongli and Purwati (2018) reviewed that social science teachers Geography inclusive have not be able to formulate an affective character evaluation plan and do not inform students of affective assessment plans which includes indicators of assessment techniques and ruptured ratings. The study also revealed that social science teachers are still focused on cognitive assessment and the affective tend to be neglected. In accordance with the planning the affective assessment is ignored. The study further revealed that the affective assessment techniques chosen by teachers are observation techniques in the form of observation sheets. In developing the assessment instrument in the form of an observation sheet, the teacher still has limited abilities such that in the assessment of the attitude of massive students it is narrative. According to Rahman, Pasognli, & Purwati (2018). The implementation of teachers' assessment is considered not objective because it has not been based on existing assessment criteria.

Taneri (2017) also revealed that there are numerous affective competencies that are essential for teachers to develop such as having positive attitudes towards the teaching profession, developing empathy, sensitivity, love, self-esteem and self concept, but none of the teacher education programs fully address all the affective needs of teachers. The implication is that, teachers have little or no idea on how to develop instrument that can assess students' affective domain. Offorma, Esere & Idowu as cited by Nworgu (2014), revealed that continuous assessment has continued to focus only on the cognitive domain to the exclusion of the affective and psychomotor domains. This is in line with popham's view cited by Umakalu, (2016) that most classroom teachers do not devote attention directly to students' affective constructs, and even greater number of teachers fails to assess the affective construct in all subjects including Geography.

In addition, it was also observed by Ajuonuma (2010) that many teachers do not assess students in affective and psychomotor domain for the purpose of achieving the construction and implementation of continuous assessments policy. This findings therefore, necessitated the present study on development and validation of Affective Domain Instrument.

Bloom (1956) seemed to place the definition of affective domain opposite cognitive by associating the cognitive domain with thinking skills and the affective domain with emotions and feelings. One definition of the affective domain is the internal part of a student that reflects the students behaviours, conditions, principles and standards, which is more commonly known as his or her attitude, creativity, self-development and motivation (Valkenburg, & Holden, 2004).

The affective domain which includes the feelings, emotion, and attitudes of an individual is categorized into: receiving phenomena; responding to phenomena; valuing; organization; and characterization (Anderson, Krathishl, Airasian, cruckdhank, Mayer, Pintrich, Raths, & Wittrock, 2011). The sub domain of receiving phenomena creates the awareness of feeling and emotions as well as the ability to utilize selected attention. This can include listening

attentively to lessons in class. Sub domain of responding to phenomena involves active participation of the learner in class or during group discussion (Cannon & Feinstein, 2005). Valuing involves the ability to see the worth of something and express it. This includes the ability of a learner to share their views and ideas about various issues raised in class. The ability of the student to prioritize a value over another and create a unique value system is known as organization. This can be assessed with the need to value one's academic work as against their social relationships. Characterization explains the ability to internalize values and let them control the bahaviour of individual. In view of this, a student considers the academic work highly important as it plays an important role in deciding the career path chosen rather than what may be available. (https://isme.ac.uk/blog/thethreedomin).

Given the importance placed on the affective domain in the classroom it is necessary for teachers to take interest on this domain because teachers are good providers of good learning environment therefore it is important for teachers to understand the importance of affective domain and its assessment. It is also noted that interpersonal skills are necessary skills for teachers in managing their classes effectively. These skills are associated with encouraging students in the class and making teaching and learning interesting by motivating students and developing positive emotions, feelings and attitude towards learning, (Russell, 2004) cited in (White, 2014).

In school there is a general agreement that both teachers and students behaviour contribute to classroom atmosphere. Although the two groups (teachers and students) did not necessarily share the same concerns or attribute importance to the same behaviours. However, both teachers and students believed that classroom behaviour is at least partly attributable to personal issues the individuals concerned brought into school with them. In other words, a lot that happen in classroom are perceived to have its origins elsewhere, hence teachers and majority of students agreed that the behavior of students in class are highly significant; they believed that students behavior can make or break a class therefore the need for a proper assessment instrument to assess this affective domain becomes very necessary (Russell, 2004) cited in (White, 2014).

Since affective assessment is the responsibility of all teachers in the school. The teacher should provide representative and comprehensive assessment tools for potential affective that will support children learning achievement as narrated. It is observed that affective problems are felt very important to teachers, in order to motivate students toward learning generally and help in controlling students emotions and feelings but the implementation is still lacking (Rabindin; Enos Taroh & Mursalin, 2018). This is as a result of literatures indicating most people working on cognitive instrument instead of affective and the few works on affective domain do not reflect the five levels of affective domain.

On the need to develop and validate an instrument in affective domain, Nnamani and Oyibe (2016) are of the opinion that the assessment of character, attitudes, behaviours, values, feelings, emotions and other variables that constitutes the affective domain is important as these traits are exhibited by the learner not just within the school environment but also affect teaching and learning of the learner resulting to either negative or positive performance in the subject of learning.

Also Dockrell (1980) argue that affective domain in students should be assessed by teachers for three reasons: the first is that affective domain are integral part of the educational system in most countries, secondly it is also included in Nigeria educational curricula and students dossier. Finally, there is a case to be made for teachers assessment in the affective domain because of their predictive validity. While it is observed that there are three important reasons for teachers making assessment in the affective domain the researcher share the position of Ingenkamp (2014). When he concludes that there is a disquieting situation in the way and manner teachers make their judgement of affective domain which are often regarded as the most important. This disquieting situation could be because of teachers knowledge and application of the methods including the proper validation of instrument to be used in assessing the affective domain (Nwarime, 2018). Thus, the need for a valid instrument for the evaluation of students affective domain in Geography. Margado, Meireles, Neves, Amaral, & Ferreira (2017) also agreed that affective domain instrument development process involves complex and systematic procedures that require theoretical and methodological rigor by teachers. According to these authors, the affective domain instrument development process can be carried out in three basic steps which are item generation, theoretical analysis and psychometric analysis.

Development is the systematic use of scientific and technical knowledge to meet specific objectives or requirements. According to National Council of Techers of Mathematics (2007) cited in Iorbee (2020), instrument development can occur in a variety of ways. It might involve the construction of wholly new items of an instrument from its basic components or it might involve the substantial modification of an existing instrument. Finally, it might involve the integration of two or more existing instruments into a new combined one. Thus, this research adopted the method of construction of wholly new items.

Objectives of the Study
This study developed and validated affective instrument for senior secondary schools Geography students in North Central Nigeria.
Specifically, this study addressed:

i.   Determine the factor structure and the underlie factors of the developed instrument for evaluation of affective domain in geography.

ii.   Find out the major levels (dimensions) of the affective domain that emerged from the factor analysis of the items of instrument for evaluation of affective domain in geography.

iii.   Ascertain the construct validity of the developed instrument

iv.   Determine the reliability of the developed instrument

Research Questions
The following research questions were raised to guide the study:

i.   What is the factor structure that underlie the developed instrument for evaluation of affective domain in Geography?.

ii.   How many major levels (dimensions) of affective domain that emerged from the factor analysis of the items of instrument for evaluation of affective domain in Geography.

iii.   What is the construct validity of the developed instrument for evaluation of affective domain in Geography (IEADG)?

iv.   How reliable is the developed "instrument for evaluation of affective domain in Geography" (IEADG)?

Methodology
This section presents the method used in carrying out the study under the following subheadings: research design, population of the study, sample and sampling technique, instruments for data collection, validation of the instrument, reliability of the instrument, method of data collection and data analysis techniques.

Research Design
This study was an instrumentation research design. According to International Centre for Educational Evaluation, cited in Anyanwu (2012) reported that instrumentation research is a study aimed at introduction of new or modified content, procedure, technologies or instruments for educational practice. The reason for the choice of this research design as being appropriate for the study is that, instrumentation, research design make observations for various variables, that is, the primary data are collected; recorded, analyzed and interpreted to develop a special tool referred to as instrument and the systematic procedure for the selection and development of this tool is known as instrumentation (Pangaro & Shea, 2015)

Population of the Study
All the 111,699 SS II Geography Students from both Public and Private Senior Secondary Schools in North Central Nigeria Constituted the population for this Study (FCT and state Ministries of Education, 2020). According to various State Ministries of Education Resource centres of North Central Nigeria and the FCT, there are 10611 senior secondary schools with a population of 111,699 SS II Geography Students in the zone distributed as follows:

Benue having 2343 secondary schools, 21612 Geography students. Kogi have 1392 schools and 11,824 Geography students while Kwara have 2682 secondary schools with 29,234 Geography students. Nasarawa State also have 906 secondary schools with 11,584 Geography students and Niger having 1398 schools with 12296 students. Finally, Plateau have 1410 schools with students population of 14,282 and the FCT having 480 secondary schools with a population of 10,867 Geography students.

Sample and Sampling Techniques
The sample for the study was 1177 students from an intact class of SS II Geography students from 43 co-educational secondary schools in North Central Nigeria including the FCT. The 43 secondary schools were selected using Multistage sampling procedure along state, Local Government Area, and school type.

Instruments for Data Collection
Instrument for Evaluation of Affective domain in Geography (IEADG) covering five levels of affective domain with a corresponding item numbers as follows: receiving (5), responding (28), valuing (18), Organization (11) and characterization (21) were first generated and used to collect data for factor analysis after which a refined instrument covering mainly nine levels of affective domain with corresponding item numbers as follow: Receiving (17), Honesty (4), organization (5), self control (6), characterization (3), Responding (4), Perseverance (3), Valuing (1) and imitativeness (2) was developed and used for data collection. The first section contain the variables to be study which are, gender and school type while the second section contained 83 items at the item generation stage and the refined instrument contained 45 items in affective domain with four point continuum response option rating scale; Strongly Agreed, Agreed, Disagreed and Strongly Disagreed.

Validation of the Instrument
The validation of this instrument was carried out in different stages. The instrument was first given to five experts two in Measurement and Evaluation and one from psychology from Joseph Sarwuan Tarka University, Makurdi. Also one

is Psychology from the Benue State University, Makurdi and a Geography teacher to determine the face and content validity. The experts checked the appearance and arrangement of the items under face validity. For the content validation, they vetted the items in terms of relevance to the subject matter in terms of different fields of Geography, coverage of the content areas based on the levels of affective domain, appropriateness of Language usage and clarity of the items, adequacy of the items in addressing the purpose of the study and the research questions. The experts checked and added some items. At the initial stage 72 items were generated by the researcher and 11 items were added after face and content validation increasing the items to 83. The Geography teacher specifically checked the geographical content. The experts also checked and eliminate the irrelevant items where necessary. The second stage was the establishment of construct validity. The retained items from face validation were trial tested on SS II Geography students and the data collected was subjected to exploratory factor analysis (EFA) which employed principal component matrix. The researcher employed exploratory factor analysis which help to know the number of levels of affective domain that emerged, and Quartimax rotation was used in rotating the axes (Field, 2005).

Reliability of the Instrument
To establish the internal consistency of the developed instrument, the instrument was administered on different schools and data collected were subjected to analysis of internal consistency to determine the reliability coefficient.

The reliability coefficient of 0.896 was established using Cronbach's Alpha. According to Gay and Peter (2000) if items have more than two scores, then Cronbach's Alpha should be used. Gay and Peter (2000) also said that if numbers are used to represent the response choice as it is in the four point response continues scale; analysis for internal consistency can be accomplished by using Cronbach's Alpha reliability (Gay & Peter, 2000). Cronbach's Alpha is commonly reported for the development of scales intended to measure affective constructs and where the reliability coefficient is above 0.70 it mean the instrument is highly reliable (Taber, 2016).

Method of Data Collection
The data for this study was collected three times from SS II student of Geography by the researcher and research assistant to ensure uniformity in instrument administration across the sample schools. To ensure a high percentage of immediate return of the completed instrument and smooth process of data collection a letter of notification and request to use the school and teachers was first sent to the school principals, see Appendix 6 in page 138 and at their approval the researcher visited the schools and used the research assistant to administer the generated affective domain instrument to an intact classes of SS II students in North Central Nigeria. Geography teachers, one from each of the schools were used as research assistant to help to administer the instrument and to retrieve it back from the students. The instrument was scored base on four point rating scale of Strongly Agreed, Agree, disagreed, and strongly disagreed. The response options weighted as 4, 3, 2 and 1 points respectively. After subjecting the data collected to factor analysis and ensuring that the instrument is valid the final form of the instrument was administered again on different group of students to determine the reliability of the instrument.

Data Analysis Techniques
Statistical package for the social sciences (SPSS) was used for data analysis. To answer research question one, two and three principal component factor analysis with Quartimax rotation statistical tool was used to determine the factor loading of the items of IEADG. First, the data collected were subjected to Kaiser – Meyer – Olkin (KMO) and Bartlett's test of sphericity to determine the suitability of the data for factor analysis after which principal component factor analysis was used to determine structure (factors) of instrument for evaluation of affective domain in Geography (IEADG), the levels that emerged from the instrument and finally the construct validity of the instrument through Eigen – value. While research question four was answered using Cronbach alpha coefficient to establish reliability of the instrument. This Quartimax rotation is used to simplify the expressions of a particular subspace in terms of just a few major items each. Quartimax rotation tries to maximize the variance of each of the factors so that the total amount of variance accounted for is redistributed over the three extracted factors. Items that failed to have a minimum loading of 0.40 in the factors, were rejected or dropped (Hair, et al 2010). Item with negative loading and item which load in more than one factor, were also dropped. While items with factors loading of 0.40 and above were accepted and re-administer and data collected was subjected to measures of internal consistency.

Results and Discussion
This section presents results of data analysis and discussion of findings. Results are presented under this section in tables and figure according to the research questions raised and hypotheses formulated to guide the study.

Presentation of Results
Research Question1: What are the factors underlie of the developed instrument for evaluation of affective domain in Geography?

To answer Research Question 1, principal component analysis (PCA) was conducted to determine the appropriate number of factors to be extracted. The result is presented in Tables 1 & 2.

Table 1: KMO and Bartlett's Text

Kaiser-meyer-Olkin Measure of sampling Adequacy		.874
Bartlett's Text of Sphericity	Approx. Chi. Square	25446.369
	df	3403
	Sig.	.00

Table 1 as presented shows that prior to performing principal component analysis the suitability of data for factor analysis was assessed and the Kaiser Meyer-Olkin value was .87 exceeding the recommended value of .60 and Bartlett's Test of sphericity reached statistical significance at .00 supporting the factorability of the correlation matrix.

Table 2: Total Variance explained of Affective Domain Instrument in Geography

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.994	15.655	15.655	12.994	15.655	15.655	8.352	10.063	10.063
2	3.467	4.177	19.832	3.467	4.177	19.832	3.256	3.923	13.985
3	2.998	3.612	23.444	2.998	3.612	23.444	2.622	3.159	17.144
4	2.444	2.945	26.389	2.444	2.945	26.389	2.601	3.134	20.278
5	2.187	2.634	29.023	2.187	2.634	29.023	2.123	2.558	22.836
6	1.971	2.374	31.398	1.971	2.374	31.398	1.966	2.369	25.206
7	1.894	2.282	33.68	1.894	2.282	33.68	1.949	2.348	27.554
8	1.752	2.111	35.791	1.752	2.111	35.791	1.894	2.282	29.836
9	1.691	2.038	37.829	1.691	2.038	37.829	1.855	2.234	32.070
10	1.57	1.891	39.72	1.57	1.891	39.72	1.838	2.214	34.285
11	1.529	1.842	41.562	1.529	1.842	41.562	1.786	2.152	36.437
12	1.425	1.717	43.278	1.425	1.717	43.278	1.767	2.129	38.566
13	1.384	1.668	44.946	1.384	1.668	44.946	1.617	1.948	40.514
14	1.372	1.653	46.599	1.372	1.653	46.599	1.614	1.945	42.459
15	1.328	1.599	48.198	1.328	1.599	48.198	1.602	1.93	44.389
16	1.255	1.513	49.711	1.255	1.513	49.711	1.581	1.905	46.294
17	1.199	1.444	51.155	1.199	1.444	51.155	1.543	1.859	48.153
18	1.169	1.409	52.564	1.169	1.409	52.564	1.53	1.844	49.997
19	1.135	1.367	53.931	1.135	1.367	53.931	1.527	1.84	51.837
20	1.104	1.33	55.261	1.104	1.33	55.261	1.48	1.783	53.620
21	1.098	1.322	56.583	1.098	1.322	56.583	1.435	1.729	55.349
22	1.06	1.277	57.86	1.06	1.277	57.86	1.394	1.679	57.028
23	1.043	1.257	59.118	1.043	1.257	59.118	1.394	1.679	58.707
24	1.014	1.222	60.34	1.014	1.222	60.34	1.355	1.632	60.340

Table 2 shows that 24 factors were extracted accounting for 60.340% variance. This means that 24 factors loaded with eigenvalue greater than 1.0 are responsible for 60.340% of variations in student's affective domain towards Geography. Factor one contributed the highest percentage variance of 15.655% with eigenvalue of 12.994 while factor 24 contributed the least percentage variance of 1.222% with eigenvalue of 1.014. To determine how many factors to be retained scree plot was used as presented in figure1.
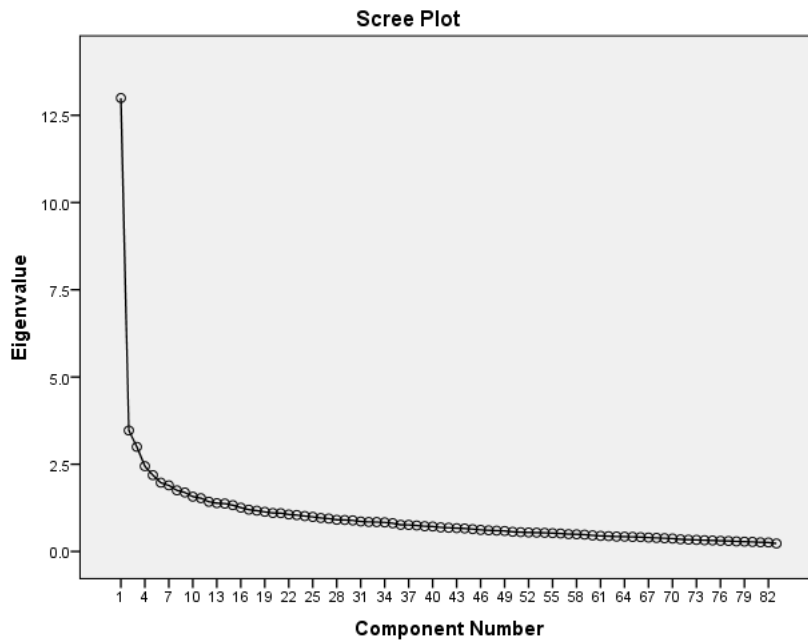
Figure 1: Scree plot for Affective domain instrument in Geography.

The result presented in figure 1 shows the scree plot for affective domain instrument in Geography. The point of interest is where the curve starts to flatten, that is the elbowing point. It can be seen that the elbowing in the scree plot occurred between 9th and 10th components, with 37.829% of the variance accounted for by the first 9 components (all with eigenvalues >1). Therefore, only 9 factors have been retained. The 37.829% of variance accounted for by the first 9 components means that the 9 extracted factor (dimensions) are not the only factors that determine affective domain the 9th factors is chosen based on Iorbee (2020) recommendation. Therefore, since the items were uncorrelated, Quartimax rotation method was employed for factor rotation in order to determine items that will load either $\geq$ to 0.40.

Research Question 2: How many major levels (dimensions) of affective domain that will emerge from the factor analysis of the items of instrument for evaluation of affective domain in Geography (IEADG).

To assess the major dimensions (factors) of affective domain emerging from the factor analysis of instrument for evaluation of affective domain in Geography, the data were subjected to principal component Analysis (PCA)the result is presented in Table 3.

Table 3: Rotation component matrix

S/N	1	2	3	4	5	6	7	8	9
49	0.751								
50	0.711								
46	0.67								
45	0.659								
47	0.576								
48	0.576								
44	0.566								
51	0.558								
40	0.525								
52	0.512								
41	0.481								
62	0.464								
39	0.441								
61	0.432								
60	0.422								
43	0.415								
59	0.415								
32	**0.365**								
15		0.687							
16		0.687							
18		0.651							
17		0.597							

Item								
33	**0.396**							
19	**0.351**							
80		0.679						
82		0.599						
83		0.518						
81		0.497						
78		0.447						
76		**0.377**						
77			0.698					
74			0.643					
73			0.549					
68			0.537					
72			0.465					
79			0.425					
34				0.682				
35				0.516				
26				0.444				
37				**0.386**				
11					0.594			
10					0.516			
6					0.509			
2					0.40			
27					**0.314**			
56						0.669		
66						0.529		
70						0.451		
38							0.671	
31							**0.339**	
23							**0.325**	
30								0.673
29								0.623

Extraction method: Principal Component Analysis

Rotation Method: Quartimax with Kaiser Normalization a Rotation converged in 53 iteration

Table 3 shows the major factors that emerged with their factors loadings. From the results of the factor analysis based on the criteria that a factor loading less than 0.400 and items being loaded on more than one interpretable components are to be eliminated or discarded, 9 major factors emerged with 45 isolated items and rotation converged in 53 iteration. The extracts of various factors and items substantially loaded on them show that the 9 factors emerged with the following factors and items as follow: factor 1(49,50,46,45, 47,48,44,51,40,52,41,62,39,61,60,43,59) factor 2(15,16,18,17) factor 3(80,82,83,81,78) , factor 4(77,74,73,68,72,79), factor 5(34,35,26,), factor 6(11,10,6,2), factor 7(56,66,70), factor 8(38) and factor 9(30,29). Number of itemsare 17, 4, 5, 6, 3, 4, 3, 1 and 2 for factor 1, 2, 3, 4, 5, 6, 7, 8, and 9 respectively. The items that loaded on a factors were carefully studied and labeled appropriately based on the underlying tune of the items. The result is presented in Table 4.

Table 4: **9 dimensions (factors) of instrument for evaluation of Affective Domain in Geography**

S/N	Factors	No of Items	Items
1	Receiving level of affective domain	17	49, 50, 46, 45, 47, 48, 44, 51, 40, 52, 41, 62. 39, 61, 60, 43, 59.
2	Honesty level of affective domain	4	15, 16, 18, 17
3	Organization level of affective domain	5	80, 82, 83, 81, 78
4	Self control level of affective domain	6	77, 74, 73, 68, 72, 79
5	Characterization level of affective domain	3	34, 35, 26
6	Responding level of affective domain	4	11, 10, 6, 2
7	Perseverance level of affective domain	3	56, 66, 70

8	Valuing level of affective domain	1	38
9	Initiativeness level of affective domain	2	30, 29
	Total	**45**	

Factor 1 has 17 items (49, 50, 46, 45, 47, 48, 44, 51, 40, 52, 41, 62, 39, 61, 60, 43 and 59) that loaded on it which are related to student's willingness to attend to particular phenomena or stimuli in Geography. Thus, this factor was named "receiving level of affective domain in Geography. Factor 2 contains 4 items (15, 16, 18 and 17) which showed students facets of moral character that connotes positive and virtuous attributes such as integrity, truthfulness, straight forwardness and honesty. Thus, the factor was labeled honesty level of affective domain. Factor 3 also loaded 5 items (80, 82, 83, 81 and 78). A critical look at the items shows that the items have to do with bringing together values, resolving conflicts between them and beginning the building of an internally consistent value system. Therefore, it was named organization level of affective domain. 6 items (17, 74, 73, 68, 72 and 79) loaded on factor 4. A cursory look at the items showed the ability of one to manage his/her actions, feelings, believes, emotions and behave calmly and sensible towards an event or phenomena therefore, it was named self control level of affective domain. Factor 5 has 3 items (34, 35 and 26) the 3 items that loaded on factor 5 showed the students individual value system that controlled their behavior for a sufficiently long time for them to develop a characteristic life style. Thus the factor was termed characterization level of affective domain.

Factor 6 also has 4 items (11, 10, 6 and 2). The 4 items that loaded on factor 6 reported active participation on the part of the students. At this level students not only attends to phenomenon but also reacts to it in some way. Thus, the factor was named responding. 3 items (56, 66, and 70) loaded on factor 7. The items were related to persistence in doing something despite difficulty, delay, obstacles or discouragement. Therefore, the factor was labeled perseverance. Factor 8 is a unique factor with only one item which is related to the worth or value a student attaches to a particular object phenomenon or behavior which ranges in degree from the simpler acceptance of a value to a more complex level of commitment. This factor is therefore named valuing level of affective domain. Furthermore only 2 items made up the 9th factor which relates to the ability to develop fresh approach to solve, problems or a new way of dealing with a problem. Thus, the factor was labeled initiativeness.

Finally, the Table 3 shows that the 45, items (2, 6, 10, 11, 15, 16, 17, 18, 26, 29, 30, 34, 35, 38, 39, 40, 41, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 56, 59, 60, 61, 62, 66, 68, 70, 72, 73, 74, 77, 78, 79, 80, 81, 82 and 83) have minimum loadings of $\geq$ 0.400. This indicates that out of the 83 items generated to make up the initial instrument only, 45 items emerged.

Research Question 3: What is the construct validity of the developed instrument for evaluation of affective domain in Geography (IEADG)?

To answer research question 3, exploratory factor Analysis was conducted based on the number of 9 extracted factors. The analysis was conducted using statistical package for social sciences (SPSS). The results are presented in Table 5.

Table 5: Eigen – values showing construct validity of the 9 emerging factors of refine instrument.

Factors	Eigen Value	% of variance	Cumulative % variance
1	12.994	15.655	15.655
2	3.467	4.177	19.832
3	2.998	3.612	23.444
4	2.444	2.945	26.389
5	2.187	2.634	29.023
6	1.971	2.374	31.398
7	1.894	2.282	33.68
8	1.752	2.111	35.791
9	1.691	2.038	37.829

Result in Table 5 show how the construct validity of the instrument was ascertained from the pattern and size of the factor loading obtained from the factor analysis. The result shows that the 9 factors have eigenvalues (a measure of explained variance) greater than 1.0, which is a common criteria for a factor to be useful (Iorbee, 2020). This implies that the 9 extracted factors are construct valid.

The results also show that items which belong to the same factor have high loading on a common factor and low loading on the other factor as the percentage variance decreases.

Research Question 4: How reliable is the developed instrument for evaluation of affective domain in Geography (IEADG)?

To answer this research question, the reliability coefficient of the development instrument for evaluation of Affective Domain in Geography was determined using Cronbach Alpha coefficient. The reliability estimates of IEADG are presented in Table 6.

Table 6: Reliability Estimates of the refined instrument for Evaluation of Affective Domain in Geography (IEADG) according to cluster

Factors	Domain	Cronbach Alpha coefficient
1	Receiving level of affective domain	0.772
2	Honesty level of affective domain	0.646
3	Organization level of affective domain	0.740
4	Self control level of affective domain	0.701
5	Characterization level of affective domain	0.677
6	Responding level of affective domain	0.502
7	Perserverance level of affective domain	0.697
8	Valuing level of affective domain	-
9	Initiativeness level of affective domain	0.530

Table 7: Total Reliability Estimates of the refined instrument for Evaluation Affective Domain in Geography (IEADG)

Cronbach Alpha	Cronbach's Alpha based on Standardized items	No. of items
0.896	0.896	45

The results of the items analysis in Tables 6 and 7 have shown high level of internal consistency however the value of reliability coefficient reduces according to number of items in each cluster that is most cluster with few number of items, also have a low reliability coefficient.

The results show that factor 1, 2, 3, 4, 5, 6, 7, and 9 have cronbach's Alpha estimates of 0.772, 0.646, 0.740, 0.701, 0.677, 0.502, 0.697 and 0.530 respectively. However, the total or overall reliability coefficient of the entire refined instrument in Table 7 shows 0.896 which is above minimum reliability estimate for a non-cognitive instrument. This revealed that all the identified factors are highly reliable as the total reliability is more than the 0.70 bench mark for non-cognitive instrument (Iorbee, 2020).

Summary of Major Findings

The major findings of this study were the following:

1. Nine major factors (dimension) of instrument for evaluation of affective domain in Geography namely: receiving, honesty, organization, self control, characterization, responding, perserverance, valuing and initiativeness levels of affective domain were extracted using scree plot.
2. Based on the factor extraction 45 isolated items with a minimum factor loading of 0.40 were selected while 38 underlie items were discarded and the rotation converged at 53 iterations.
3. The refined instrument for evaluation of affective domain in Geography was valid as this is evidence from the eigenvalues of the nine dimensions that emerged as shown in Table 5.
4. The refined instrument for evaluation of affective domain in Geography (IEADG) was highly reliable as it, is evidenced from the reliability coefficient of the instrument.

Discussion of Findings

The discussion of the findings of this study was based on the six research questions were raised and two hypotheses formulated. The finding revealed that 24 factors that accounted for 60.340% of the total variance in students' instrument for Evaluation of affective domain in Geography were extracted. However, 9 factors (dimension) that were found to best approximate and major ones that loaded were 37.839% of total variance.

The result is in agreement with, Hassad (2007), Roger (2016) Wyatt (2016); Jared (2016), Esomonu and Okeaba (2016) Maisarah et al (2018) Iorbe (2020), and Ebrahim and Salim (2012) who in their different studies revealed different level of factors in their studies but the present study had 9 factors against the previous studies who the highest factor was 5. In addition the study is not in consonance with the findings of Malhotra et al (1988), Saptono & Najah (2018), Kyriazos & Statikas (2018) and Vincent (2020) whom their study did not revealed the number of factor

underlie their instrument. The present study may probably be due to the fact that nowadays there are lots of experiences being learnt through internet due to technological development.

The result from research question two as presented in Table 3 shows that 9 major factors emerged with 45 items. These are: receiving, honesty, organization, self-control, characterization, responding, perseverance, valuing and initiativeness levels of affective domain. This implies that out of 83 items on the original drafted instrument only nine factors with 45 items are most valid items based on 0.40 as benchmark of acceptable factor loading for evaluation of affective domain in Geography while the remaining 38 items are underlie factors. The finding of this present study is in line with Bloom's theory propounded by Bloom and Krathwohl (1964) that recommended 5 levels of affective domain. However, this study identify 9 levels of affective domain from the instrument developed as an improvement on (Bloom and Krathwohl 1964) recommendation. The present stud is also in line with Vincent (2020) and Iorbee (2020) who used Hair, Black and Babin (2010) recommendation of 0.30 - 0.70 as a minimum benchmark of factor loading for item selection, and out of their generated items of 72 and 60 the refined instrument had 34 and 42 items selected respectively while the present study is in disagreement with Ezeudu et al (2013) & Saptono and Najah (2019) who only stated the item selection benchmark without the number of item selected and also not in consonance with Malhotra et al (1988), Saptono & Najah (2018), Kyriazos & Statikas (2018) and Vincent (2020) whose studies didn't indicate the number of factor in their instrument. This result may be due to the exposure of students nowadays which brings out more of their hidden values.

Finding from research question three as presented in Table 5 shows that the 9 extracted factors have eigenvalue greater than 1.0, which is a common criteria for a factor to be useful (Iorbee, 2020). This implies that the final instrument for Evaluation of Affective Domain in Geography (IEADG) and its factors are based on construct validity and could be used to evaluate students' affective domain in Geography. The finding is in agreement with Iorbee (2020), Hassad (2007) and Vincent (2020) who stated that the instrument is valid when the eigenvalue is equal to or greater than 1.0 as it is indicated that the instrument in the present study is constructively valid as the 9 extracted factors all have eigenvalues greater than 1.0 from the result of factor analysis.

The result as presented in table 6 shows that the final instrument for evaluation of affective domain in Geography with 9 factors is highly reliable with a reliability value of 0.896 coefficient. This result is in line with the study of Ugodulunwa and Adeyemo (2016), Ebrahim and Salim (2012) Wyatt (2016), Esomonu and Okeaba (2016) and Vincent (2020) whose reliability coefficient are 0.90, 0.84, 0.92 and 0.82 respectively. This present findings may be probably due to the objectivity of the students towards the instrument.

Conclusion
It was concluded that the instrument which yielded more than originally known 5 levels of affective domain by Bloom (1956) is reliable, valid and can be used for its purpose in Nigerian Secondary Schools.

Recommendations
Based on the findings of the study, the following recommendations enumerated:
1.   The refined instrument for evaluation of affective domain in Geography (IEADG) should be used in North Central Nigeria and it should be used as a guide to develop the same type of instrument in other subjects.
2.   The instrument should be used by teachers to assess students' affective domain so as to encourage development of affective domain towards learning in all subjects specifically Geography.
3.   Since the refined instrument for evaluation of affective domain in Geography students is valid and reliable, it should serve as a template for developing and validating other affective domain evaluation instrument in other subjects especially in the area of sampling adequacy, factor extraction, rotation convergence, factor rotation and item selection.

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