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Design and Validation of Geography Attitudinal Scale

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Abstract

The aim of this study is to design, develop, validate and conduct reliability test of a questionnaire evaluating attitudes of students towards Geography. The questionnaire was analyzed using SPSS software version 21.0. The coefficient of crombach's Alfa obtained from the instrument was 0.82. The instrument was also validated using exploratory factor analysis. It was observed that the underlying factors had total variance of 50.418% in the attitude of the students. Conclusively, the attitude Questionnaire towards Geography was found to be an appropriate instrument for a good study and measurement of student's attitude towards Geography.

Keywords: Design, Attitudinal, Information, Geography, Natural Environment, Validity, Reliability.

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INTRODUCTION

The effectiveness of an attitudinal test depends mostly upon the item's effectiveness to measure what it purports to measure. However, some attitudinal instrument developed to test students' attitudes is not adequate for eliciting Geography attitudinal information. Some of today's attitudinal scales still lack necessary parameters required to derive information relating to Geography attitudes. Some researchers and educators in the field of Geography may not take into

cognizance the relevance of validation to the use of attitudinal tests and this could result in misleading conclusion.

LITERATURE REVIEW

Validity

An assessment instrument should be valid and reliable in terms of the inferences and scores it produces. Validity refers to the extent to which the evidence supports that the interpretations are correct and the manner in which interpretations are used are appropriate (AERA, AP & NCME, 1999). Ideally, there are three major types of validity related to assessment or instrument validation: construct, content, and criterion related validities (Crocker & Algina, 1986).

Construct Validity

Construct validity is the extent to which an instrument or an assessment assesses the theoretical construct it purports to measure. Responses from instrument participants can be interpreted as reflecting the theoretical construct. The Rasch model is a model based on Item Responses Theory. It is one of the most popular approaches for estimating construct validity (Comer, Conaghan, & Tennant, 2011). The Rasch model contains two determinants of an item response; the respondent's trait level and the item's difficulty level. A student with high level of attitudes towards geography will be more likely to endorse or agree with an item that measures positive attitude than a student with low level of attitude towards the same subject. An item with higher difficulty level will be less likely to be endorsed or agreed to by respondents with lower level of the trait being measured. The Rasch model estimates responses based on item difficulty level and respondent trait level. When the actual responses are close to the estimated responses, the instrument has high construct validity (fitting with the model).

Content Validity

Content validity refers to the extent to which a test or an assessment instrument measures what it is supposed to measure with sufficient coverage (Brown, 1996). Therefore, there are two short comings that influence content validity. First, if the instrument contains construct-irrelevant items (Furr & Bacharach, 2007), including questions that are badly worded which can cause misinterpretation. Second, if the instrument fails to include the full range of contents that is relevant to the construct (Furr & Bacharach, 2007). In practice, content validity is always evaluated by subject experts within the construct field. Lynn (1986); Rubio, Berg-Weger, Tebb, Lee, and Rauch (2003) proposed a systematic procedure to conduct content validity test, including number of experts in the panel, survey design and development, survey investigation, and data analysis.

Criterion Validity

Criterion validity is regarded as the degree to which an assessment correlates with a current or future event (Furr & Bacharach, 2007). Therefore, criterion validity may further be sub-divided into predictive validity and concurrent validity. Predictive validity refers to the degree to which

measurement scores are correlated with relevant variables that are measured at a future point in time. On the other hand, Concurrent validity is regarded as the degree to which the results obtained by the target survey instrument correlate with the results obtained for the same population by another "validated" instrument at the same time. Because it is difficult to get and evaluate the same set of participants at a future time, concurrent validity is more practicable than predictive validity in the criterion validity test. Among the above validity types, construct validity is more important and broader than the other two validity tests from a more contemporary perspective of assessment and evaluation (Furr & Bacharach, 2007; Messick, 1995). In other words, content and criterion validities should be considered within the context of construct validity. In this study, the target instrument is validated by construct and content validity.

Reliability

Reliability means the consistency of the assessment outcomes generated at different times or the consistency of an assessment instrument to measure what it purports to measure. The most popular approach for testing instrument's reliability is internal consistency reliability (Hogan, Benjamin, & Brezinski, 2000) and most common internal consistency measure is Cronbach's alpha test. The Rasch model provides two reliability measures: Rasch item reliability and Rasch person reliability (Bond & Fox, 2013). A reliable instrument should obtain similar outcomes if the instrument is conducted toward a comparable group of participants with similar traits known as Rasch item reliability (Bond & Fox, 2013). A reliable respondent should give the same or similar responses toward another instrument with the same construct and difficulty level of questions known as Rasch person reliability (Wright & Masters, 1982). This study adopts Cronbach's alpha reliability.

METHODS

Data Collection

All data were collected from the participants in an intact class of SS3 Geography students. The participants were made of SS3 Geography students preparing for their senior school examinations. This was done with the expectation that these initial participants would become a core group of students that is likely to show more maturity and exhibits certain attitudes because they have studied Geography for at least three years and their external examinations is approaching. A Geography attitudinal instrument was used to collect participants' responses. In total, 546 students participated in the survey.

Analysis

Crombach Alfa was applied for reliability tests. An expert panel review was carried out for the content validity. All statistical tests were conducted by using SPSS version 21.0. The exploratory factor analysis was carried out using SPSS version 21.0.

RESULTS

Data collected from a total of 546 respondents were used for the analysis. All reliability and validity tests focused on 21 attitudinal questions only.

Exploratory Factor Analysis of Geography Attitudinal Scale

Principal component analysis method was used. The Kaiser-Meyer-Olkin (KMO) and Barlett`s Test of Sphericity were investigated. According to results, KMO value was .873; and also, Barlett`s Test of Sphericity test was 2728.721 ($p<.05$) and the Determinant is 0.028. These results indicated that the sample size was sufficient and adequate for factor analysis. Thus, factor analysis was carried out.

Factor analysis results showed that the scale consists of four (4) dimensions which are named as "Geography as a school subject, "Geography and Natural Environment", "Attitude of students to the importance of Geography", and "Attitude of students to the relevance of Geography" has 50.418% of the total variance explained.

Geography as a school subject dimension has 23.775% variance and 5.231 eigenvalue; Geography and Natural Environment dimension has 11.137% variance and 2.450 eigenvalue; Attitude of students to the importance of Geography dimension has 5.433% variance and 1.195 eigenvalue; and Attitude of students to the relevance of Geography dimension has 4.669% and 1.027 eigenvalue.

Table 1: Results of Exploratory Factor Analysis

Items	Factor Loading/dimensions			
	1	2	3	4
GAS16	.687			
GAS17	.581	.372		
GAS11	.580			
GAS8	.575			
GAS12	.573	.322		
GAS10	.539			-.365
GAS21	.536			
GAS7	.487	.353		
GAS1		.734		
GAS3		.597		
GAS5		.576		-.368
GAS4		.568		
GAS19	.413	.528		
GAS14	.341	.439		
GAS13	.397	.429		
GAS22			.715	
GAS18			.672	
GAS15			.635	
GAS20	.330		.577	
GAS6			.534	.428
GAS9		.317	.385	
GAS2				.724

NB: 1 = Geography as a school subject, 2 = Geography and Natural Environment, 3 = Attitude of students to the importance of Geography while 4 = Attitude of students to the relevance of Geography.

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Reliability Tests

The Cronbach's Alpha reliability tests were applied to test the reliability of the 21 attitudinal items. The 21 survey items have high internal reliability (Cronbach's Alpha = 0. 82). In addition, the Cronbach coefficient does not obtain significant improvement by removing any of individual items, which means it is not necessary to remove any items in order to improve the instrument's reliability.

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