

WCES-2010

The reliability and validity study of the attitude scale for biology course

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Received October 19, 2009; revised December 28, 2009; accepted January 11, 2010

Abstract

This study aimed at developing an attitude scale for biology course. Study samples were composed of 169 students to have attended Science High School in Kırklareli Province, Turkey, in 2008-2009 education year. In the scope of the present study, the scale developed by Demirci (2003) for the science course was adopted to biology course. The scale (which was a one-dimension in its original format) was subjected to factor analysis, which showed that adopted scale was also a one-factor scale with factor loads varying in .40-.75 range. Cronbach alpha reliability coefficient of this 32-item attitude scale for biology course was calculated to be .96.

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Keywords: Attitude; Attitude scale; biology course; attitude toward biology; reliability and validity.

1. Introduction

Traditionally biology is defined as a discipline that studies living beings. Practices of the biology have become inevitable parts of the everyday experiences. Advances in biology form the basis for many medical advances that are required by people in order to have a quality life period. Biology includes such topics as improving the health of people, searching for alternatif nutrition sources. Biology is significant not only for its quest for improving the people's live but also for its attempt to maket he universe of living being including people more meaningful. People can be informed about these topics only through biology education (Köseoğlu, 2004).

Biology is a dicipline that is a necessary part of everybody's education and that develops rapitly. Biology is the closest dicipline to the individuals that provides them with the opportunity to know themselves and to l ive in accordance with this knowledge (Sucuoğlu, 2003). Students can understands that their own development as well as the development of their family, nutrition, health-related issues, environmental points and many other important and interesting developments. Therefore, biology is an integrated part of education (Ohlsson and Ergezen, 1997). On the other hand, biology is a very special area among the other science fields due to its characteristic of being both scientific and social.

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Attitude refers to the mental tendency of individual in regard to people, objects, events and topics (Aiken, 1985). Attitudes are acquired through learning and determine the behavior. They may be positive and negative. Therefore, the students' attitude towards biology determines their positive or negative feelings about biology. Such emotions have very critical role in the teaching process. Research indicates that the number of the attitude scales in regard to biology is less. Therefore, the aim of the current study is to develop an attitude scale with higher reliability and validity levels.

2. Method

2.1. Sample

The sample of the study includes a total of 169 high schoolers attending to Kırklareli Science High School during the School year of 2008-2009.

2.2. Data collection tool

The attitude scale towards the science course developed by Demirci (2003) was adapted for the biology course and used to collect the data of the study. The scale developed by Demirci (2003) has the Cronbach alpha reliability coefficient of .95 and has thirty-two items. The term "the science course" in the item was used as "the biology course" Then, these items were reviewed by testing specialists and biology educators and necessary modifications were done on the items.

2.3. Data analysis

In order to identify the functionality and usefulness of the scale adopted factor analysis was employed.

3. Findings

As stated earlier, factor analysis was used to realize the construct validity and to achieve the functionality through identifying the factor loads of the items of the scale (Büyüköztürk, 2006). Before the factor analysis, the suitability of data for factor analysis was tested through the use of the Kaiser-Meyer-Olkin (Kaiser-Meyer-Olkin) and Bartlett tests. The KMO value and the Bartlett test value were found to be 0.938 and $X^2 = 3544,082$ ($P \leq 05$), respectively. It is commonly argued that the minimum KMO value for being eligible for the factor analysis is 0.60 (Pullant, 2001). In this study, this value is found to be 0.94 that is higher than that recommended. Thus, the data were eligible for the factor analysis.

Table 1 shows the total item correlations and factor loads of the scale. Without rotating, the basic constituents factor analysis suggests that items are grouped under a single factor, and therefore, the scale adapted is unidimensional (Table 1 and Figure 1). The analysis of the total item correlations indicates that the total item correlation of the all items is greater than 0.3. Table 1 displays that the factor load of the items ranges between 0.48 and 0.840. Total variance accounted for by the items within the single factor is found to be 46 %. The commonly agreed level in this regard is 41 % (Kline, 1994). Since the value of total variance accounted for is greater than the minimum threshold, it is safe to argue that the scale is consisted of a single factor.

Table 1. Total item correlation, factor loadings of the items and common factor variance

İtem No	Total item Correlation	Factor load
B9	,8217	,840
B29	,7904	,815
B20	,7490	,768
B28	,7298	,758
B30	,7320	,756
B17	,7231	,745
B5	,7157	,745
B7	,7119	,738
B15	,7058	,734
B25	,7033	,731
B11	,7014	,725
B31	,6957	,725
B4	,7034	,724
B14	,6871	,709
B13	,6710	,697
B6	,6605	,686
B3	,6570	,685
B18	,6524	,676
B32	,6418	,670
B12	,6393	,664
B27	,6228	,650
B24	,6093	,636
B1	,6022	,631
B23	,5829	,610
B22	,5774	,607
B21	,5626	,592
B26	,5580	,590
B16	,5546	,578
B19	,5012	,530
B8	,4911	,520
B2	,4848	,510
B10	,4539	,479

Total variance accounted for: % 46

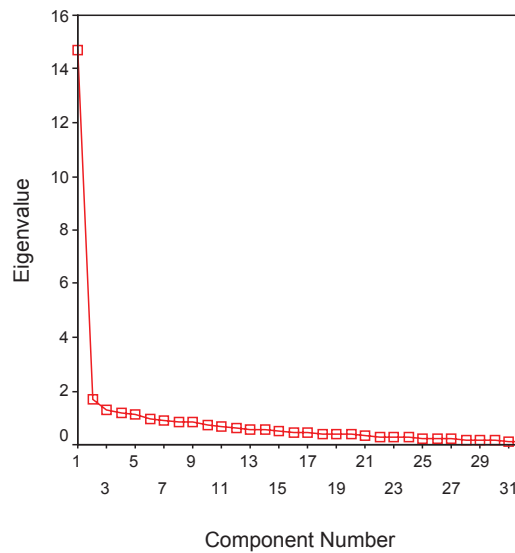


Figure 1 Scree Plot

The Cronbach alpha internal consistency coefficient of the scale is found to be 0.96. Descriptive statistical values of the scale are given in Table 2.

Table 2. Descriptive statics about the scale

	Attitude scale for biology course
N	169
Mean	103,47
Medyan	104,00
Mod	101,00
Std. Deviation	24,73
Minimum	32,00
Maximum	158,00

4. Discussion

The scale developed by Demirci (2003) is found to be a single-factor scale and to have the factor loadings ranging between 0.48 and 0.840 as a result of the factor analysis. The scale is consisted of thirty-two items and its Cronbach alpha reliability coefficient is found to be 0.96.

As stated earlier, there are no common scales in regard to the biology attitude. The findings of the analyses carried out indicate that “Attitude Scale towards the Biology Scale” can be employed to uncover the students’ attitudes towards the biology course. It is expected that the scale may be administered to the students taking biology courses and that the results obtained from its use may be employed to the design activities to improve the student attitudes towards the biology course. It is a scale that can be administered also to high schoolers and those at the higher education level.

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