A Study on Adaptation of the Attitudes toward Chemistry Lessons Scale into Turkish

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SYNOPSIS

INTRODUCTION

Science educators agree that one of the principle aims of school curricula is to develop a positive attitude toward science (Aiken & Aiken, 1969; Koballa, 1988; Laforgia, 1988). On the contrary to the general agreement among the science educators on the importance of students’ attitude toward science; suggestions on how to measure these attitudes are highly diversified.

Many researchers criticize the attitude researches in the field of science education from three aspects: i) Many studies have been conducted without a theoretical framework; ii) the multidimensionality of the attitude data is rarely tested with confirmatory factor analysis approach; iii) there are many imitating works with regard to the development of attitude scales (Breckler, 1984; Krosnick, Judd & Wittenbrink, 2005; Mayer & Richmond, 1982; Munby, 1997; Ramsden, 1998). Ramsden (1998) pointed out that many attitude scales without any theoretical framework in past studies were developed and used. This is very important because, according to the psychologists, attitude is an intrinsic condition, and therefore it cannot be directly observed; the existence of an attitude may only be inferred from the observation of the questions oriented towards that attitude. As attitude is a multidimensional construct, science education researchers should develop their own attitude scales on the basis of a theoretical model with clearly predefined dimensions (Bennett, Lubben & Hogarth, 2007). Ramsden (1998) suggested that in attitude scale
measurement studies, the dimensions of attitude should be clearly predefined and attitude scale development should be based on a suitable psychological theory. Researchers further suggest that instead of doing very similar studies, the researches in this field should be shifted towards the revision or development of existing scales.

In accordance with these suggestions, Cheung (2009) implemented the sub-section titled “Enjoyment of Science Lessons” from Fraser’s (1981) The Test of Science Related Attitudes (TOSRA) to the scale titled Attitudes towards Chemistry Lessons (ATCLS). Many scales have been developed in order to measure students’ attitude towards science. However, the most outstanding one among them is The Test of Science Related Attitudes (TOSRA) which was developed by Fraser (1977, 1978, 1981).

PURPOSE OF THE STUDY

This study aimed to adapt the Attitudes towards Chemistry Lessons Scale (ATCLS) to Turkish, which has been developed by Cheung (2009) by considering the deficiencies of the attitude scales for chemistry lessons up to the present.

METHODOLOGY

As this study includes the adaptation of a scale from a foreign language to Turkish; Şencan (2005) lists the steps to be taken in this kind of studies as follows:

- To ensure construct, concept and language equity
- To evaluate the psychometric properties of the scale.

Şencan (2005) expressed that construct equity can be identified by people who are familiar to both cultures and the subject of measurement. Therefore, the study has been conducted together with the people who are familiar to both cultures during the adaptation of the scale. Şencan (2005) indicates that the concept and language equity would be obtained through double translation method, and a successful translation should skillfully exhibit the nuances between the two cultures. Şencan (2005), for this reason, expresses that the Turkish translation of the scale should be retranslated to the foreign language and that text should be retranslated into Turkish once again for the final version. According to Şencan (2005), the psychometric properties of the adapted scale are related with outlining the dimensional structure, validity and reliability analyses of the scale through a pilot research. This study has been realized in accordance with the foregoing suggestions, and a special care has been shown to select the sample among the people who are close to the culture in which the scale is developed.

a) Sample

Four different sampling activities were undertaken in this study. In the first sample, 8 English language experts rated the translation validity. In the second, 15 Turkish language experts rated the understandability of the Turkish scale. The third involved testing the scale on 20 high school chemistry students who took both English and Turkish scales. Finally, the Turkish scale was applied to 554 high school chemistry students.

b) Data Collection Tools

The English and Turkish scales, English-Turkish harmony form and Turkish understandability form were used as data collection tools.
c) Procedure

The study was carried out through six consecutive stages. In stage 1, permission was obtained from the developer of the original scale. In stage 2, the author translated the items of the original scale into Turkish. In stage 3, English language experts rated the translation validity. In stage 4, Turkish language experts rated the items of the Turkish scale according to accurate use of Turkish language. In stage 5, the Turkish scale was translated back into English and then it was translated back into English by an English language expert. In stage 6, the English and the Turkish scales were then applied to a group of 20 volunteer students who were asked to examine the degree of harmony between two forms of the scale. Finally, validity and reliability of the translated scale was examined. The reliability of student data collected by the scale was examined on the basis of item–total correlation and Cronbach’s alpha. To test the construct validity of student data, the items of scale were subjected to confirmatory factor analysis.

FINDINGS

The results showed that there was a high level of agreement between the English and Turkish items. The Turkish scale was found to be sound in its language structure and was rated as understandable by the raters. Correlations between the English and Turkish scale scores showed that there was a high level of agreement. The findings obtained from the confirmatory factor analysis and reliability analysis showed that there was a good fit between the hypothesized model and observed data. The standardized factor loadings were reasonable and statistically significant. Fit indices generated by the EQUATIONS (EQS) program showed that the model fitted the data well (e.g., Chi-Square(48, N = 554) = 288.72 p= .000, normed fit index = .93, comparative fit index = .95, root mean square error of approximation = .07). Each of the 12 items was retained in exactly the same subscale to which it had been assigned when the English version of the scale was developed.

The analysis of the data showed that the Cronbach alpha values of the four subscales varied between .68 and .84. The item–total correlations of the 12 items ranged from .49 to .72. Hence, the adapted scale not only managed to produce reliable data, but also valid information about the multidimensionality of data. The findings related to the correlations revealed by the confirmatory factor showed that all the correlations were positive and considerable.

DISCUSSION

In the present study, the 12-item Attitude toward Chemistry Lessons Scale developed by Cheung (2009) was adapted into Turkish. The results of the translation validity of the Turkish version of the scale showed that the translated items were in strong accord with the original items. The harmony mean was found to be 9.14 out of 10. The results of the study on language and the content validity of the Turkish version of the scale indicated that the Turkish scale was highly comprehensible. The language validity mean of the experts was determined to be 8.51 out of 10. The findings obtained from the application of both Turkish and English scales on the same student group showed that the results for both the English and Turkish scales overlapped substantially. The translation and language validity results of the Turkish scale indicated that it could be used for Turkish High School groups.

All findings support the validity of translation and language, construct validity (with four dimensions) and the reliability of the Turkish version of the scale. In this way, the Turkish version of the scale acquired capability measuring of the Turkish high school students’ attitudes towards chemistry lessons. In addition, the Turkish scale gives the
Turkish teachers an opportunity to reveal student perceptions on the four dimensions in the scale and the profile of attitudes toward chemistry lessons among Turkish students. The scale also presents Turkish researchers with the possibility to undertake comparative investigations on an international level.

The sample of the study is limited to 554 students in five different high schools. Detailed data could be collected, if the Turkish scale is administered on a larger sample group. It is believed that data from different student sample would provide more evidences related to the validity and reliability of the Turkish scale.

The limitation of this research is its conduct on a sample group of 554 students from 5 different high schools. Obviously, more detailed findings can be achieved by studying on a larger sample group. As a result, it is believed that supporting this findings, which are considered as a beginning for the adaptation into Turkish of the scale that has been created together with the Attitudes towards Chemistry Lessons Scale in order to identify the attitudes of students towards chemistry lessons, with other researches that are to be conducted with different sample groups would provide further evidence on the validity and reliability of the Turkish form.
REFERENCES


