A Contemporary Physics Attitude Scale for Secondary School Students: Development, Validity and Reliability*

Ahmet TEKBIYIK1, Ali Rıza AKDENİZ2

1 Asst.Prof.Dr., Rize University, Faculty of Education, Rize-TURKEY
2 Prof. Dr., Rize University, Faculty of Education, Rize-TURKEY

Received: 04.11.2009 Revised: 19.05.2010 Accepted: 01.06.2010

The original language of the article is Turkish (v.7, n.4, December 2010, pp. 134-144)

Key Words: Physics; Attitude; Scale Development; Physics Curriculum; Secondary School Students.

SYNOPSIS

INTRODUCTION

Attitudes toward science is defined as a learned predisposition to evaluate in certain ways objects, people, actions, situations, or propositions involved in learning science (Eagly & Chaiken, 1993; Petty, 1995). Science educators have agreed that the development of a positive attitude toward science should be one of the most important goals of the school curriculum (Aiken & Aiken, 1969; Koballa, 1988; Laforgia, 1988). This view has effected the development of new physics curriculum established in 2007 in Turkey. In the new physics curriculum it has been emphasized that students should have positive attitudes towards physics such as appreciating, being concerned with and feeling the need for learning physics. This view can be shown both in general structure and skill acquisitions of the curriculum. In this context, it is needed some scales aimed to find out students’ attitudes required by the new physics curriculum and its contemporary learning approaches.

PURPOSE OF THE STUDY

The purpose of this study is to develop an attitude scale toward physics to evaluate attitudes required by the new physics curriculum and its modern learning approaches, and to determine the appropriateness of the scale in terms of validity and the reliability of the scale.

*This study was supported by the Research Fund of Rize University, Project Number: 2009.105.01.1.
METHODOLOGY

a- Sample

The study was conducted with 166, 9th grade students from three different types of secondary schools in Çayeli district Rize province.

b- Development Process of the Scale

In development of the scale’s items, national and international literature was reviewed. Some of the items in the scale were adapted to physics and translated into Turkish from the scale developed by Salta & Tzougraki (2004) and Menis (1999). Moreover, other items were developed by the researcher through scanning the skill acquisitions in the Physics Curriculum (MEB, 2007). All developed items were added to an item pool and 40 items thought to be the most appropriate for the research were selected. Finally a five points Likert type scale with 40 items was established.

The developed scale was presented to the field experts for content validity. It was reviewed by two physics educators, an educational sciences expert and two physics teachers. According to experts’ views, each item was revised. Then, a Turkish language expert examined the scale with regard to grammar and the meaning.

c- Analysis of the Data

The final form of the scale was applied to 166 students at 9th grade. The total item correlations, item discrimination through t-test analyses between groups’ scores with respect to top 27% and bottom 27%, factor analysis and internal consistency measures were implemented on the scale in terms of validity and reliability analysis respectively. SPSS package program was used for the analysis.

FINDINGS

Based on the item analysis, it was decided that eight items must be removed from the scale since they had correlations less than 0.20. Moreover, it was observed that two items affected internal consistency negatively because they had correlations between 0.20-0.30. For this reason these items were also removed from the scale. As a result, 10 items were removed totally and 30 items having total item correlations between 0.34-0.75 range remained in the scale. In order to find out what degree the scale distinguished with respect to individuals’ attitudes towards physics, considering scores of 27% of the top and bottom of the group were compared using t-test. The analysis showed that all items had significant differences (p<0.05) with reference to the top and the bottom of the group.

For the purpose of determining construct validity of the scale, factor analyses were carried out. Construct validity of the scale was examined using principal components factor analysis with varimax technique. Communality values were calculated as 0.532-0.812 range in the factor analyses.

After the rotation, it was found that the scale had four factors (respectively eigenvalues: 8.221, 3.767, 2.242 and 1.250). These factors have explained 48,369 percentages of total variance. The items under these four factors (subscales) were consistent with each other when looked at contents of the items. So, these could be named as importance, conception, requirement and interest. Cronbach Alpha coefficients were calculated for all subscales as 0.838, 0.795, 0.749, 0.717 respectively and for whole scale as 0.873.
In order to determine the relationships among the subscales of the scale, Pearson Product Moment Correlation analysis was implemented. The correlation results showed that there had been positive significant differences within all dimensions of the scale. Especially, a positive significant relationship at mid level was determined between subscales of conception and requirement. Therefore it was indicated that as students’ requirements to physics have increased, their conceptualization of physics might have increased too.

RESULTS

As a result, it can be concluded that Contemporary Physics Attitude Scale is a valid and reliable instrument and can be utilized by teachers and education researchers especially at secondary grades. The scale can be used as an affective data collection tool in determining students’ attitudes towards certain subjects, the variation in attitudes of students implemented various teaching methods and identifying relationships among students’ attitudes and physics-related behaviors. In addition, Confirmatory Factor Analysis can be applied on the scale to determine the functionality of the four dimensions.

REFERENCES


