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Message from the Editor-in-Chief

Dear Colleagues,

We are very pleased to publish Special Issue 2 for INTE 2015 conference. This issue covers the papers presented at 6th International New Horizons in Education Conference which was held in Barcelona, Spain. These papers are about different research scopes and approaches of new developments and innovation in educational.

Call for Papers

TOJET invites you article contributions. Submitted articles should be about all aspects of educational technology. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET. Manuscripts must be submitted in English.

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Evaluating The Psychometric Properties Of Turkish Version Of The Science Motivation Questionnaire

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ABSTRACT

The aim of this research is to examine the validity and reliability of the Turkish Version of the Science Motivation Questionnaire (SMQ; Glynn, Taasoobshirazi and Brickman, 2008). Participants were 302 university students. The results of confirmatory factor analysis demonstrated that the 30 items loaded on five factors and the five-dimensional model was well fit ($\chi^2=1353.45, df=390, RMSEA=.0091, NFI=.95, NNFI=.96, CFI=.96, IFI=.96, RFI=.94$, and $SRMR=.034$). The internal consistency coefficients were .94 for intrinsic motivation and personal relevance subscale, .75 for self-efficacy and assessment anxiety subscale, .92 for self-determination subscale, .84 for career motivation subscale, .87 for grade motivation subscale and .95 for the overall scale. The corrected item-total correlations of SMQ ranged from .21 to .77. Overall findings demonstrated that this scale is a valid and reliable instrument for measurement of individuals' science motivation.

Keywords: Science, motivation, validity, reliability, confirmatory factor analysis

INTRODUCTION

Science education aims to provide students to stir sense of wonder about the scientific and technological developments, comprehend natural world, develop their information, experience and interests about jobs based on science, utilize scientific procedure and principles effectively and properly while making decisions, decide explicitly and definitively upon scientific subjects (MEB, 2005; YOK/World Bank, 1997). Motivation -one of the emotional components- is a process of acting in particular manners so as to meet their needs (Lefrançois, 1995; Sabuncuoğlu and Tüz, 1998). Students' interests and grades of subjects, sense of task, attitude and condition in the process of acquiring scientific knowledge, purposes are the components effecting the motivation of students (Tuan, Chin & Sheh, 2005). The most essential element influencing learning deeply is motivation (Ryan & Deci, 2000). Researches in the scope of motivation and learning demonstrated that personal goal inclination, meaning of a task, sense of self-efficacy, test anxiety, learning environment and purposes have an effect upon learning motivation (Barlia and Beth, 1999; Brophy, 1998; Garcia 1995; Pintrich and Schunk, 1996; Tuan and Chin ve Shieh, 2005). Motivation effects highly both learning and achievement. Students with high motivation make more effort on the tasks and activities in the classroom than any others (Wolters and Rosenthal, 2000). In addition, motivation has an influence on the frequency of the students' learning process and duration of an activity (Schunk, 1991; Barlia, 1999). According to Schiefele and Rheinberg (1997), motivation has an impact on three dimension of learning. These are sustainability of learning activities, form of performed learning activities and functional role of the student during learning process (Vollmeyer & Rheinberg, 2000). Science motivation of students is a multi dimensional notion which is influenced by individual properties of students and teachers, methods and techniques used in teaching process and the environment of learning activity. According to Lee ve Brophy (1996), providing students' motivation for a better understanding of science, and applying active methods and strategies to manage this motivation are the two properties to be based on while explaining students' science motivation (Barlia, 1999). In terms of constructivist teaching theory, students are the individuals who carry out permanent and meaningful learning process by combining the new knowledge with the existing knowledge (Palmer, 2005). When students understand concept and activities of science as important for themselves, the newly learned subjects are being more persistent. While learning a new term, students comment better on this term from the point of their prior knowledge, aim, interest and beliefs (Palmer, 2005). In this study, the adaptation of the Science Motivation Questionnaire to Turkish and the investigation of its psychometric properties are aimed.

METHOD

2.1 Participants

The sample of this study consisted of 302 university students from Sakarya University, Turkey. Of the participants 202 were female, 100 were male. Their ages ranged between 18-36 ($M=20.25$, $Sd=2.07$).

2.2. Procedure

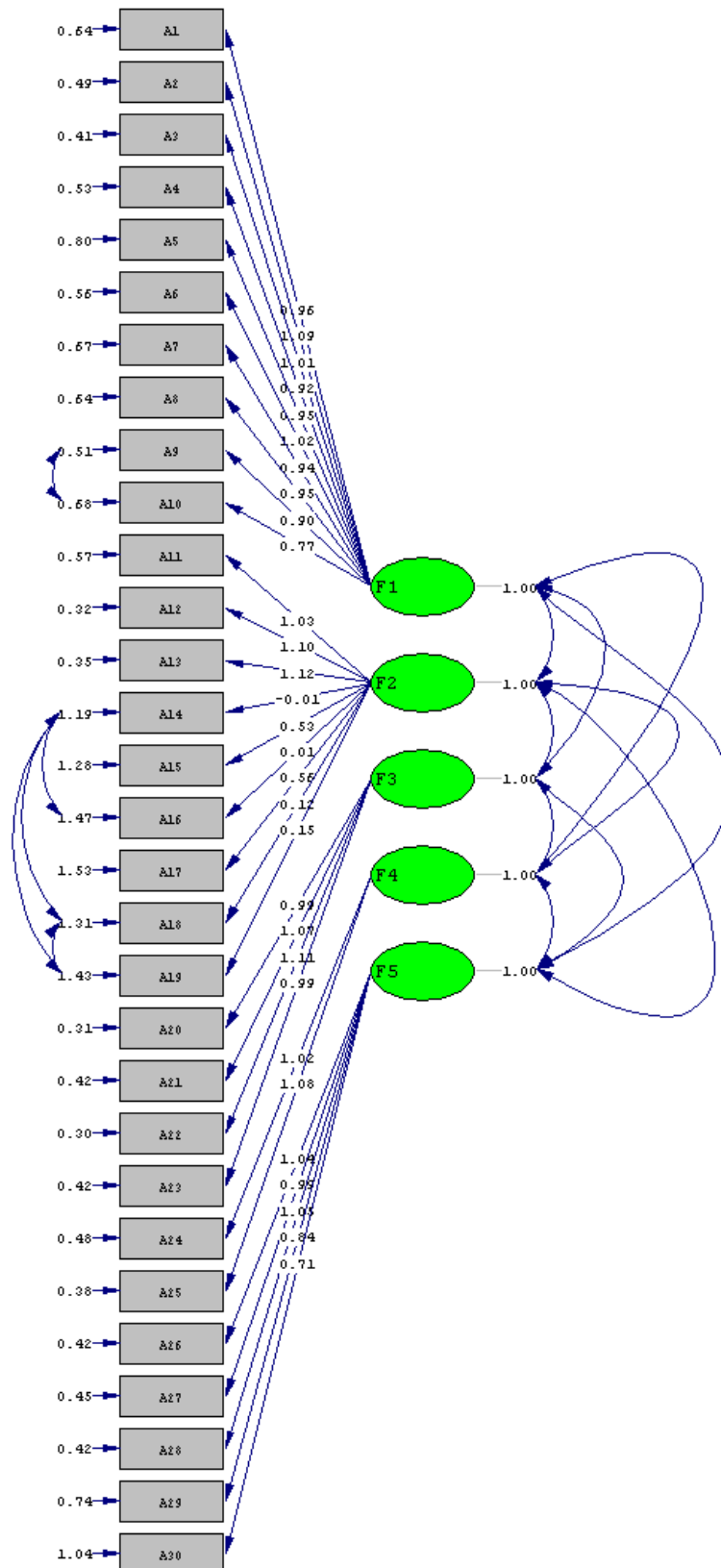
Following steps were taken for the adaptation of the scale. First of all, a permission was received to adapt the scale by the use of electronic mail. Firstly, English form of the scale was translated into Turkish by 4 English speaking instructors then the Turkish forms were translated into English again and language consistency and grammatical revision of the two forms were checked, and a trial form of Turkish scale was obtained. Secondly, the Turkish form of the scale was negotiated by 3 instructors who work in the departments of educational sciences and assessment, evaluation and the scale were prepared for the application with the final revision. In order to examine construct validity of the scale, confirmatory factor analyses (CFA) was applied. Reliability of the scale was examined with Cronbach's alpha internal consistency method and item analyses were investigated with corrected item total correlation. SPSS 22.0 and LISREL 8.54 (Joreskog ve Sorbom, 1996) were used for item and reliability and validity analyses respectively.

RESULTS

3.1. Construct Validity

When investigators have clear or competing hypotheses about a scale – the number of factors or dimensions underlying its items, the relation between specific items and specific factors, and the association between factors, confirmatory Factor Analysis (CFA) is functional. In other words, CFA provides researchers to assess the degree to which their measurement hypotheses are consistent with actual data developed by respondents using the scale (Furr & Bacharach 2008). The results of confirmatory factor analysis demonstrated that the five-dimensional model was well fit.

($\chi^2=1353.45, df=390, RMSEA=.0091, NFI=.95, NNFI=.96, CFI=.96, IFI=.96, RFI=.94$, and $SRMR=.034$). Factor loadings and path diagram of Turkish version of SMQ are presented in Figure 1.1



Chi-Square=1353.45, df=390, P-value=0.00000, RMSEA=0.091

Figure 1.1 Factor Loadings and Path Diagram for the SMQ (F1= intrinsic motivation and personal relevance , F2= self-efficacy and assessment anxiety ,F3= self-determination, F4= career motivation ,F5= grade motivation)

3.2. Reliability

The Cronbach's Alpha internal consistency reliability coefficients of the scale were found as .94 for intrinsic motivation and personal relevance subscale, .75 for self-efficacy and assessment anxiety subscale, .92 for self-determination subscale, .84 for career motivation subscale, .87 for grade motivation subscale and .95 for the overall scale. The corrected item-total correlations of SMQ ranged from .21 to .77.

DISCUSSION

The adaptation of the SMQ into Turkish and the investigation of its psychometric properties were aimed with this research. The fact that the factor structure was harmonized with the factor structure of the original scale, was indicated by CFA. Hence, it can be said that the structural model of the SMQ which comprises of five factors was well fit to the Turkish culture (Bentler & Bonett, 1980; Hu & Bentler, 1999; Schermelleh-Engel & Moosbrugger, 2003). The internal consistency reliability coefficients of the scale were high (Büyüköztürk, 2010; Kline, 2000). Taking into consideration that item total correlations having a value of .30 (Büyüköztürk, 2010). The results of confirmatory factor analysis demonstrated that the 30 items loaded on five factors and the five-dimensional model was well fit

($\chi^2=1353.45$, $df=390$, $RMSEA=.0091$, $NFI=.95$, $NNFI=.96$, $CFI=.96$, $IFI=.96$, $RFI=.94$, and

$SRMR=.034$). Motivation is one of the primary components to construct knowledge in mind. After reviewing the research, unsuccessful students can be said to have low motivation. Motivation of learning science has a positive influence on academic success as well. Following the searches, a linear relationship was found between students' science learning and their motivation. Motivation variable can not be observed directly. It is the most crucial component which should be in purposive activities to receive a successful result in education activities. Students should be provided to be active in the learning process to raise their motivation. The students should be allowed to go through trial-and-error and learning by experience. This study can be developed to examine the relationships with different variables as well. For instance, it can be investigated how gender, education of parents, grades, learning strategies can effect motivation of learning science. Validity of science motivation scale can be increased by applying the scale to students of primary and high schools except from undergraduate students. The current research has some limitations. Sample size of the present study is an important limitation. Stated in other words, following studies should examine the same research questions with a wider sample size. A wider sample size may explain some correlations and so increase the validity of the results. If these results could be generalized to a larger population, applying this research in different rural areas of Turkey may represent. Another limitation of the present survey is that the sample consists of university students which limited the generalizability of the results. Therefore, it could be essential to survey the relationship of these variables in other sample groups. The fact that this scale had high validity and reliability scores were indicated by overall findings.

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