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The Adaptation of Creativity Fostering Primary Teachers Index Scale into Turkish*

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Abstract

The purpose of this study was to adapt the creativity fostering teacher index scale into Turkish. For the language equivalence, firstly, the English version of the scale was translated by 30 English lecturers and then the Turkish version of the scale retranslated by the same lecturers. Later, the scale was applied to 288 teachers working in Niğde city centre and validity and reliability analyses were conducted. As a result of the exploratory factor analysis, it was revealed that the Turkish form of the scale had nine sub-scales with the 33 items. MSA value was .925. After the Varimax rotation method, factor loading values were between .392 and .779. The lowest Cronbach's Alpha coefficient was .57 for a sub-scale of the scale and all of the 33 items was .94. In the confirmatory factor analysis results, goodness of fit measures revealed the acceptable fit and the good fit for the scale. Based on the results obtained from the analysis, it was decided that the scale could measure the creativity fostering Turkish teachers' classroom behaviours.

Key Words

Creativity, Creative Teacher, Creative Teaching, Teacher Behaviours, Creativity Fostering.

Teachers have to create a free learning climate in class, motivate students for learning and urge them to think (Sungur, 1997). Related literature written on this subject points out the importance of the teacher-student relationship for fostering creativity in students (Torrance, 1968, 1995). Fostering creativity in class is seen rather as a process emphasizing differences than one attempting to form a homogeneous structure (Cropley, 1997a, p. 12). Torrance (1995, p. 13) states that teachers prefer students with high intelligence rather than those with high creativity. This approach is actually wrong and teachers must establish a creative classroom climate. As a matter of fact, Cropley (1997a, p. 12) states that some education scientists imply an authoritarian classroom management and rejects this idea suggesting a classroom climate which fosters creativity. Sungur (pp. 33-34) notes that teachers who stimulate freedom in students, accept them as individuals and encourage their students to do the best, are the ones who foster creativity. Teachers who discourage students, criticize them heavily as well as those who are unreliable and inconsistent in their behaviours prevent the fostering of creativity. However, Oral, Kaufman, and Agars (2007) find that creativity tends to increase with age, while intrinsic motivation is significantly more correlated with creativity than with extrinsic motivation.

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Students should be able to feel free and express themselves comfortably in the education climate provided by the teacher (Özden, 1997, pp. 119-120). Creative teaching requires not only meeting the complex educational needs of various types of students but also improving students' skills by processing the new information in an effective way (Reilly, Lilly, Bramwell, & Kronish, 2011). Cropley (1997b, p. 98) sets out a list consisting of nine items concerning the creativity fostering behaviours of teachers in the classroom. These behaviours on the list are converted to six-point Likert type scale by Soh (2000) and a Likert type scale with 45 items is prepared.

The purpose of this study was to analyse in Turkish teachers the language equivalence, validity and reliability of the Turkish form of the Creativity Fostering Teacher Index Scale (CFTIS), developed by Soh. In accordance with this general purpose, answers were sought to the question "what are the language equivalence, construct validity and reliability of CFTIS in Turkish teachers?"

Method

This study was a general scanning model, which is among the descriptive scanning models. The study group for the analysis of the language equivalence of the study consisted of 30 lecturers from Niğde University School of Foreign Languages. 66.7% (f=20) of the lecturers were female and 33.3% (f=10) were male. 20% of the lecturers were 25 years old or younger, 40% were between 26 and 35 years old, and 40% were 36 years old or older. 40% of the lecturers had 5 years or less length of teaching experience, 50% of them had between 6 and 15 years length of teaching experience and 10% had 16 years or more length of teaching experience.

The study group for the analysis of the construct validity and reliability of the study consisted of 288 teachers from 13 primary schools in Niğde city centre. Teachers' field of study was not taken into account in the process of selection. 51.4% (f=148) of the teachers were female, and 48.6% (140) were male. The majority of the teachers (40.3%) were between 20 and 30 years old. Again, 36.1% of the teachers had between 1 and 5 years length of teaching experience. 29.9% of the teachers worked as novice teachers. It was observed that the majority of the teachers (43.4%) were elementary teachers. The teachers classified as "other" were mainly teachers of history, geography, physics and chemistry etc. These other teachers constituted 10.8% of the total. Rate of the math teachers was 8.3%. The music teachers had the lowest rate with 1.4%.

In the related literature, there are different views on the necessary sample size to conduct factor analysis. Hair, Black, Babin, and Anderson (2010, p. 102) state that factor analysis cannot be conducted with a sample less than 50 and that the sample size should be more than 100. Osborne and Costello (2004) note the recommended subject to item ratio for factor analysis as 5/1 and 10/1. According to Tavşancıl (2010, p. 51), sample size should be minimum five times as big as the number of items. Hoyle (1995) emphasises that the minimum sample size should be 250 in order to conduct a confirmatory factor analysis. In this study, the number of subjects is 288 and thus the ratio is 288/45 (items) =6.4. In other words there are 6.4 subjects per item. In this case, it can be said that the sample size is adequate for factor analysis.

Creativity Fostering Teacher Index

Original Scale: Soh (2000) prepared a six-point Likert type scale with 45 items in order to determine the creativity fostering behaviours of teachers. The scale has nine sub-scales. The factor loadings of the items vary between .52 and .85. The lowest correlation is between question and motivation (.48) while the highest correlation is between opportunity and flexibility (.82). The Cronbach's alpha coefficient of the entire scale is .96.

Turkish Scale: This study with the purpose of adapting the Soh's (2000) scale into Turkish was called "Yaratıcılığı Destekleyen Öğretmen İndeksi Ölçeği–YDÖİÖ" (Creativity Fostering Teacher Index Scale). For the adaptation, correspondence with the author was carried out on 31 May 2010 and his permission was granted. Initially the scale was translated from English into Turkish by the field expert. At the same time, it was translated from English into Turkish by another linguist, as well. The importance of translating a scale into the original language has also been emphasized in the literature (Brislin, 1970; Kim & Lim, 1999). The Turkish form of the scale translated by the linguist was translated back into English. Similarly, the Turkish translation rendered by the field expert was translated back into English by the linguist. Afterward, the linguist and the field expert came together and compared the Turkish and English forms rendered. The general meaning of the sentences, their complexity level, sentence forms, semantic resemblance of words and grammatical structures of sentences

were analyzed (Kim & Lim). Afterwards, a group of five people was formed, which translated each item by discussing their Turkish and English forms. Next, the language equivalence study was conducted to ensure consistency between the Turkish form of the scale and the English form (Hambleton & Bollwark, 1991).

The scale was applied to 30 lecturers from Niğde University School of Foreign Languages in order to ensure the language equivalence of the scale. A face-to-face conversation was held with some of the lecturers. At the end of this meeting, it was decided that the scale should be applied to the study group using a five-point rating. As the last regulation, rating was arranged as follows: 5: always, 4: often, 3: sometimes, 2: rarely, 1: never. The possible maximum score was determined as 225, with the lowest as 45. There was no item in the scale that was reverse rated.

Application of the Scale to the Study Group: The scale was applied to the study group by the researcher in accord with the principles of volunteering. Permission was obtained from Niğde Provincial Directorate of National Education on 25 March 2011. Implementation took place in April and May 2011. The time period for the teachers to fill out the scale varied between 25 and 35 minutes.

Data Analysis

Data collected at a result of the application of CFTIS in the study group was analyzed by using SPSS 15 software. Pearson correlation coefficient was calculated to determine the consistency between the Turkish and English form application of the scale. Exploratory factor analysis (EFA) was conducted in order to have an idea about the construct validity of the Turkish scale. Confirmatory factor analysis (CFA) was conducted using AMOS 7 software to confirm the results of the exploratory factor analysis. Cronbach's Alpha coefficient was calculated for the internal consistency of CFTIS, and a revised item-total correlation to determine the adequacy of the scale items to differentiate.

Findings

Initially, the original English version of the scale was translated by 30 lecturers from Niğde University School of Foreign Languages to determine the language equivalence of CFTIS. The same group was given the Turkish version of the scale a week later to retranslate it. This time six-point rating was used for both scales. Upon the analysis of Pearson correlation coefficients concerning the scale's 45 items, it was observed that the lowest correlation belonged to the 2nd item with .32, while the highest correlation belonged to the 38th item with .89. P values of the 2nd, 5th, 8th, 18th, 24th, 29th and 33rd items were significant at .05 levels. Other items were significant at .01 levels. High level of correlation was observed between the scores obtained from the English and Turkish sub-scales.

Conduct of Exploratory Factor Analysis

The scale was turned into five-point scoring and applied to the teachers after the analysis of language equivalence. Exploratory factor analysis (EFA) was conducted on the data collected. Factor analysis is a method to determine the number of independent variables (factors) and the coordinates (factor loadings) of the dependent variables (Turgut & Baykul, 1992, p. 73). As a result of this analysis nine factors were determined whose eigenvalues were 1 or more. The amount of variance explained by the first factor was 14.066% and the total amount of variance explained by all of the nine factors was 59.120%. During the application, value of the Bartlett's test of sphericity was calculated as 6230.061 and the p value as .000. The hypothesis of "the correlation matrix is an identity matrix" - according to the Bartlett's test - was tested (Taşpınar, 1997, p. 91). In addition to the Bartlett's test, MSA test (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) also provides insight into the appropriateness of the factor analysis. Low MSA values indicate that the sample is not adequate. A MSA value of .60 is regarded as average, .70 as good, .80 as very good, and .90 as perfect (Eroğlu, 2008, p. 322; Tavşancıl, 2010, p. 50). In this analysis MSA was calculated as .925.

The difference between the highest factor loading value of an item and the next highest factor loading value must be minimum .10 (Büyüköztürk, 2002, p. 119; Tavşancıl, 2010, p. 50). It is generally required that the factor loading value of an item should be .45 or more. If the sample size is 350 or above, items with a factor loading value of .30 are significant and can be kept in the scale; if the sample size is 250 or above, then items with a factor value of .35 are significant and can be kept in the scale (Hair et al., 2010, p. 117). In the light of this knowledge, factor rotation technique was applied. The Varimax method, an orthogonal rotation method, was chosen for this purpose, as it is more appropriate for social sciences (Tavşancıl, p. 50).

As a result of this analysis, 4th, 6th, 10th, 19th, 24th, 25th, 28th, 30th, 38th, 39th, 41st, and 44th items were excluded from the scale, either because their factor loadings were not above .35 or because they were under irrelevant factors. It was revealed that the CFTIS had nine factors. Accordingly, factors and their related items shown in parentheses were as follows: Factor 1 (1 and 37), Factor 2=(2, 11, 20 and 29), Factor 3=(3, 12 and 21), Factor 4=(13, 22, 31 and 40), Factor 5=(5, 14, 23 and 32), Factor 6=(15, 33 and 42), Factor 7=(7, 16, 34 and 43), Factor 8=(8, 17, 26 and 35) and Factor 9=(9, 18, 27, 36 and 45).

The factor loading values of the items in the first factor were .392 and .609. The factor loading values of the items in the second factor were between .431 and .705. The factor loading values of the items in the third factor were between .476 and .551. The factor loading values of the items in the fourth factor were between .362 and .656. The factor loading values of the items in the fifth factor were between .405 and .482. The factor loading values of the items in the sixth factor were between .476 and .779. The factor loading values of the items in the seventh factor were .606 and .775. The factor loading values of the items in the eighth factor were between .604 and .725. The factor loading values of the items in the ninth factor were between .442 and .683. These results were similar to the construct validity results of the original scale developed by Soh (2000). As the factors of the original scale were named taking the item contents into consideration, the same names were used in this study.

Reliability Analysis of CFTIS

Adapted item total correlations were analysed in order to determine the extent at which items in the sub-scales of CFTIS were adequate to differentiate individuals with regard to the features they measure. Significant correlation between the total score of the items in the measuring instrument or that of the sub-scales and the total score of the scale was accepted as an indicator of internal consistency (Tavşancıl, 2010, p. 54). Internal consistency reliability of the scale (Baykul, 2000, p. 149) in order to determine the commonality level of the items and Cronbach's Alpha coefficient in order to determine the variability of the items to be measured were calculated. In cases where a single application and form is required, it is more advantageous to determine the reliability using the Alpha reliability coefficient than to use test-retest method (Tan, 2008, p. 116).

As part of the reliability analysis, Cronbach's Alpha coefficient of the remaining 33 items was computed as .94. The lowest Cronbach's Alpha coefficient belonged to factor 6 (.57) and the highest to factor 3 (.77). Internal consistency level of a scale increased as the reliability coefficient approached 1 and decreased as the reliability coefficient approaches zero. It is nearly impossible in the areas of education and psychology to develop a scale with a reliability coefficient of +1 (Tekin, 1979, p. 58). For this reason, it can be said that Cronbach's Alpha coefficient obtained from the scale and sub-scales is sufficient. It was determined that the item total correlation coefficients of the sub-scales varied between .28 and .66. The item total correlation coefficients obtained from the scores of each scale items varied between .30 (item 35) and .69 (item 18). All values were statistically found significant at the .01 level. The correlation coefficients among the nine sub-scales making up the scale were computed and found significant at the .01 level. The lowest correlation coefficient among the sub-scales was between question and independence (.26). The highest correlation was, on the other hand, between flexibility and integration (.74).

Conduct of Confirmatory Factor Analysis

Confirmatory factor analysis (CFA), which is used to confirm the factors or sub-scales determined in EFA and to test the reliability of scoring and the validity of the scale, calculates some values demonstrating the statistical significance of a suggested model. In contrast to EFA, CFA is appropriately used when the researcher has some knowledge of underlying latent variable structure (Byrne, 2010, p. 6). CFA was conducted with AMOS 7 software using the maximum likelihood method.

The value which tests the statistical appropriateness of the suggested model in CFA and of the analysis data is x^2 (CMIN) value (Bacon, 1997, p. 11; Schumacker & Lomax, 2004, p. 82). However, it was deemed more suitable to use x^2/df value, adjusted with degree of freedom (df), because x^2 is sensitive to sample size, resulting in high x^2 values in multi-element samples (Bagozzi, 1981, p. 380; Hair et al., 2010, p. 666). According to Bentler (1990) x^2 causes problems in the case of samples with more than 250 subjects. He suggests that different goodness of fit indices should be used in such cases. The x^2 value for the CFTIS was calculated as 1144.896 and p value as .000 in the suggested model, because the sample size used in the study was 288. As these values are high, the x^2/df value

adjusted with df was used. The x^2/df value, which is deemed suitable at 0-3 range (Schermelleh-Engel & Moosbrugger, 2003), was calculated as 2.494 for the suggested model. After the completion of the suggested modifications (Byrne, 2010, p. 86; Meydan & Şeşen, 2011, p. 38; Schumacker & Lomax, 2004, p. 70), the following results were obtained within the limits of good fit: x^2=580.640, p=.000 and x^2/df=1.409. Root means square error of approximation – RMSEA (Bayram, 2010, p. 78; Byrne, p. 80) was calculated as .038 for the suggested model.

Schumacker and Lomax (2004, p. 83) state that only one statistical significance test is not enough in order to define a model as accurate and that the model must be assessed according to many criteria for CFA and structural equation modelling. For this reason, other indices of goodness-of-fit [Root mean square residual (RMR), Normed fit Index (NFI), Nonnormed Fit Index (NNFI) also known as the Tucker-Lewis Index (TLI), Comparative fit Index (CFI), Goodness-of-fit Index (GFI), and Adjusted Goodness-of-fit Index (AGFI), good fit, acceptable fit limits] were also analysed (Bayram, 2010, pp. 75-76; Byrne, 2010, p. 77; Hair et al., 2010, pp. 668-672; Hu & Bentler, 1995; Schermelleh-Engel & Moosbrugger, 2003; Schumacker & Lomax, 2004, p. 83). It was determined that RMSEA and RMR were within the limits of good fit, while NNFI, CFI, GFI and AGFI were within the limits of acceptable fit. NFI, however, is outside the limits of acceptable fit. In addition, Incremental Fit Index (IFI) was calculated as .960 and Tucker-Lewis Index (TLI) as .950. These values, which take account of sample size and complexity of model, demonstrate good fit (Hair et al., 2010, p .668; Şimşek, 2007, p. 48).

After the study model was determined to be suitable for the observed data, t-statistical values and reliability values were calculated to test whether the parameters estimated by the CFA as well as the standardised regression weights, standard errors and standardised regression weights were different from zero. Construct reliability (CR) value of .70 or more indicates good reliability, while a value between .60 and .70 indicates acceptable reliability (Hair et al., 2010, p. 710). According to Şimşek (2007, p.1 8) the reliability coefficient must be at least .50. Reliability values of the suggested model were calculated above .90 for all sub-scales. It was observed that the standardised regression weights that were calculated were statistically significant at the .05 level and could be used to interpret the structure and sub-scales.

Discussion and Implications

The behaviours and practices of teachers in class are important to foster student creativity. To this end, language equivalence analysis was conducted as the initial step of adapting the creativity fostering teacher index scale into Turkish. As a result of the language validity analysis, high correlation was observed between the Turkish and English forms of the CFTIS, developed by Soh (2000). According to the results of the EFA 12 items of CFTIS were eliminated from the scale because they did not have the expected factor loadings or because they stood under irrelevant factors. The remaining 33 items constituted nine sub-scales. These nine scales were similar to those developed by Soh. Furthermore, the sub-scales and factor loadings obtained from the Turkish scale were observed to be similar to those of the original scale. Therefore, the sub-scale titles of the original scale were used for the sub-scales titles obtained from the Turkish form. As a result of the EFA and CFA analyses, 33 items and 9 sub-scales were concluded to be suitable for the Turkish sample.

The Teaching Style Inventory, developed by Grasha (1996) and adapted to Turkish by Bilgin, Uzuntiryaki, and Geban (2002), is also available in the literature of the field. However, the inventory developed by Grasha does not aim at measuring the creativity fostering teacher behaviours. In a further research may investigate relationship between the Teaching Style Inventory and CFTIS. Based on the creativity fostering teacher index of Cropley (1997b), Olawale, Adeniyi, and Olubela (2010) prepared a five-point likert-type scale with 45 items and nine sub-scales. Their scale was very similar to that of Soh (2000). Yet, this scale has score ranges to interpret the results. 1-10 range signifies not being creative, 11-15 range depicts being marginally creative, 16-20 range indicates being moderately creative and 21-25 range means being very creative. The overall Cronbach's Alpha reliability coefficient stood at .96. In the case of sub-scales, the lowest Alpha coefficient belongs to evaluation (.69) and the highest to frustration (.86). The reliability coefficients obtained by Olawale et al. are similar to those obtained in this study.

In conclusion, it can be recommended to the researchers who will use the scale to make their interpretation according to 33 items and 9 sub-scales. Appendix 1 contains the entire Turkish translated form of the scale with its 33 rearranged items and nine sub-scales. High points obtained from each item of the scale signify creativity fostering teach-

ing style of the teacher. The scale does not include any reverse scored item. This study was applied to teachers working in Niğde city centre. However, it should be considered that the scale can produce different results in different samples.

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