

## Indexing Creativity Fostering Teacher Behaviour: Replication and Modification

Ayhan Dikici<sup>[a],\*</sup>; Kaycheng Soh<sup>[b]</sup>

<sup>[a]</sup>Ph.D., Associate Professor, Curriculum & Instruction, Nigde University, Nigde, Turkey.

<sup>[b]</sup>Ph.D., Research Consultant, Department of Psychological Studies of the National Institute of Education, Nanyang Technological University, Singapore.

\*Corresponding author.

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### Abstract

Many measurement tools on creativity are available in the literature. One of these scales is Creativity Fostering Teacher Behaviour Index (CFTIndex) developed for Singaporean teacher originally. It was then translated into Turkish and trialled on teachers in Niğde province with acceptable reliability and factorial validity. The main purpose of this study is to compare the original English and the translated Turkish versions and to explore more flexible use of CFTIndex to facilitate data collection for future research. Factor loadings of English and Turkish versions are found to be highly similar. The original version that consists of 45-item was shortened to 27-item and also grouped into five sets. Correlations with the full-length version show acceptable validity and reliability. All new versions were verified by confirmatory factor analysis. It is concluded that CFTIndex has flexible features and its shorter forms can be used with confidence. It is especially useful when a study entails collecting data for many variables.

**Key words:** Creativity; Creativity fostering; Teacher behaviours; Creative teaching; Student creativity

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### INTRODUCTION

Creativity has gained increasing importance and teachers are therefore expected to foster student creativity as one educational goal. There is a consensus in the literature that creativity can be improved (Amabile, 1996; Baer & Kaufman, 2006; Cropley, 1992; Kaufman & Beghetto, 2009; Torrance, 1968; 1995). Fostering creativity is about teacher behaviours, which includes maintaining an open attitude towards creative ideas or behaviours, showing a humanistic student control, being flexible in thinking and behaving, and valuing independent thinking (Amabile, 1996; Cropley, 1997; Hennessey, 1995; Lubart, 1994; Sternberg & Lubart, 1995). Teachers' teaching in class may encourage children and teenagers for creativity or cause it to atrophy. Research emphasizes that the relationship between teacher and student is important for students to develop their creativity (Amabile, Hennessey, & Grossman, 1986; Cropley et al., 2009; Erdogdu, 2006; Kim & Schallert, 2011; Torrance, 1968, 1995). Sungur (1997) noted that teachers who allow students freedom, accept them as individuals, and encourage them to do the best are the ones who foster creativity. In contrast, teachers who discourage students, criticize them heavily as well as those who are unreliable and inconsistent in their behaviours curtail student creativity. Moreover, if a teacher presents knowledge to students in a new or different way, s/he could be regarded as teaching creatively and fostering student creativity.

However, measurement of creativity is a problem for researchers and educators/teachers. Many instruments for measuring student creativity are available but there is a lack of instruments to measure teachers' creativity fostering behaviours. No less than 162 items published between 1994 and 2004 were listed in *Creativity Based Information Resources: Assessment of Creativity* (The International Center for Studies in Creativity). Of these,

only four (2.5%) pertain to teacher behaviour, including the Creativity Fostering Teacher Behaviour Index (CFTIndex) (Soh, 2000). A measure of teachers' creativity fostering behaviour is therefore needed if research on the development of student creativity is to be conducted with rigour and vigour. To develop such an instrument, it is necessary to first describe teacher behaviours that foster student creativity.

In a paper *Fostering Creativity in the Classroom: General Principles*, based on an extensive literature review, Cropley (1997) lists the following nine teacher behaviours that foster student creativity:

- a) *Independence*: Encouraging independent learning of students
- b) *Integration*: Facilitating co-operative and socially integrative teaching
- c) *Motivation*: Emphasizing mastery of knowledge to enable divergent thinking
- d) *Judgment*: Postponing judgment on students' ideas and encouraging them to more clearly formulate the ideas
- e) *Flexibility*: Promoting flexible thinking
- f) *Evaluation*: Encouraging students' self-evaluation
- g) *Question*: Considering seriously students' suggestions
- h) *Opportunities*: Creating opportunities for students to work under varied conditions with a variety of materials
- i) *Frustration*: Providing a safety net to help students cope with frustration or failure

Soh (2000) operationalized these nine principles to develop the *Creativity Fostering Teacher Behaviour Index* (CFTIndex) with the following justification:

"...Where creativity fostering behaviour of teachers is concerned, the lack of suitable measuring instruments will limit the relevant discourse to the philosophical and conceptual levels (which are, of course, important in their own right as a subdomain of creativity research). But, there is also the need to empirically test out the theory, an activity that calls for adequate measurement... (Soh, 2000, p.119).

Today, one and a half decades have passed since the first appearance of CFTIndex and the scale has been used by many researchers to investigate different aspects of creativity development in educational contexts, including evaluation of programme effectiveness, checking its cross-cultural validity, and as the main instrument for PhD theses (Soh, 2015). These studies were conducted by researchers in various regions of the world, including America (Edinger, 2008), Canada (Hondzel, 2013), Chile (Manriquez & Reivera, 2005), Hong Kong (Forrester & Hui, 2007), Korea (Lee, 2013), Mexico (Belio & Urtuzuástegui 2013), Nigeria (Olawale, Adeniyi, & Olubela, 2010; Olanisimi, Adeniyi, & Olawale, 2011),

Singapore (Soh & Quek, 2007), and Turkey (Dikici, 2013; 2014). Forrester and Hui's (2007) study was premised by the hypothesis that if teachers saw value in creativity as integral to their effective teaching, teachers' classroom behaviour would reflect a significant array of creativity-enhancing techniques. Their study procures some significant correlations between teachers' creativity fostering behaviours, as measured by CFTIndex, and students' verbal and figural creativity measures. The correlations lend support to the concurrent validity of the CFTIndex. Soh's recent paper (2015) revealed that there were cross-cultural evidence showing its internal consistency reliability and concurrent validity. The need for an instrument such as the CFTIndex is witnessed by those studies using it subsequent to its first publication.

With the above background, the present study set out to find answers to the following research questions:

- a) Whether the original findings of the CFTIndex are replicated in the Turkish cultural context?
- b) Can the CFTIndex be shortened and modified with acceptable validity and reliability?

The first research question is theoretically oriented. The CFTIndex has been used by researchers in various countries which have different cultures and languages. A natural question is the trustworthiness of the scale in term of validity and reliability across cultural-linguistic milieus. The problem of international interchangeability of achievement tests has been of great concern to the international measurement community (International Test Commission, 2010) and the same concern should apply to non-achievement measurements such as the CFTIndex when the instrument is used across countries. This does not concern only with those studies which have already used it but also those that can be expected to come in the future in view of the current interest in fostering child or student creativity (Deniz, 2007; Hambleton & Kanjee 1995; Hambleton & Patsula, 1998; van de Vijver, & Hambleton, 1996).

The second research question is on practicability. Studies of various aspects of creativity always involved several types of variables, covering cognitive, affective, and behavioural domains. Thus, they always required collecting data using various instruments each of which is a multi-item test or scale. In this circumstance, the respondents (mostly teachers and students) are requested to response to a plethora of items which can run into a hundred or more. This data collection poses the problems of time constraint and respondent fatigue and, thereby, influences the quality of the collected data. For the CFTIndex, it may be shortened and modified and yet yield trustworthy data; this makes data collection less a problem and enables researchers to have useable data without sacrificing validity and reliability too much.

## 1. METHOD

### 1.1 Measure

When developing the CFTIndex, Soh (2000) operationalized Cropley's (1997) nine principles for creativity fostering into concrete and specific teacher behaviours in the classroom context. They depict the various kinds of behaviours teachers need to demonstrate in their daily interaction with the students during lessons. Five items were written for each of the nine principles thus forming nine subscales of the CFTIndex. Each item takes the form of a six-point scale (from strongly agree to strongly disagree) to avoid the tendency to endorse the neutral middle-point and to maximize the item variance.

### 1.2 Participants

There are three groups of respondents whose data are analysed here. Firstly, in Singapore, Soh (2000) administered the 45-item CFTIndex to a sample of 117 teachers. There was a female preponderance with 25% male and 75% female. In terms of teaching level, 54% of the respondents taught in primary schools and 46% in secondary schools. Of these teachers, 62% had a university degree and a majority (62%) of them taught language while the rest taught science, mathematics, and humanities. In terms of age, 40% of teachers aged 20-35 years and the remaining 60% aged 36 or above. In the multi-cultural Singapore, there were 56% Chinese, 21% Malay, 18% Indian, and 5% Eurasian and others.

The second is a group of teachers in Turkey. Dikici (2013) administered the Turkish version of the CFTIndex to a sample of 288 teachers. The translation involved 30 lecturers from the School of Foreign Languages at Dikici's university. Back-translated was done to verify translation equivalence. The lecturers completed the English and Turkish versions. Turkish version is available in Appendix 1. Correlations between the English and Turkish items varied from a low  $r=.32$  (item 2) to a very high  $r=.89$  (item 38). Seven of the 45 correlations are significant at

.05 level and the remaining 38 items have correlations significant at .01 level. The Turkish version was then completed by 288 teachers from 13 primary schools in the Dikici's city centre. Of these, 51% were female and 49% were male; thus, there was a good balance in terms of gender. The majority of the teachers were between 20-30 years of age, and 36.1 % of the teachers had between one to five years of teaching experience, with another 35.5 % had between six to twenty years of teaching experience, and 18.4 of the teachers had twenty one or high years teaching experience as experienced teachers. Moreover, 55% of them taught mainly elementary classes.

Again the third group is 202 teachers in Turkey (Dikici, 2014). Confirmatory factor analysis (CFA) was conducted on the data collected from this group. Of these, 55% were female and 45% were male. Their ages ranged from 21 to 51 years with the majority of them between 30-50 years of age. Only 9% had between one to five years of teaching experience with 65% of them had between six to twenty years of teaching and another 26% have worked for more than 21 years. Similar to the second group, 54% of them taught mainly elementary classes.

## 2. RESULTS

### 2.1 Factor Structures

Data collected at a result of the application of CFTIndex in the study groups were analyzed by using SPSS 15 software. The data of the second group for 45 items of the CFTIndex were submitted for a series of factor analysis, specifically Principal Axis Factoring with oblique rotation. Following the method was not used in the development of the original CFTIndex (Soh, 2000), factor analysis was run for the nine subscales *one at a time* for its five items. The results are shown in Table 1 which also shows the relevant information from the original study to facilitate comparisons to be made between the English and Turkish versions.

**Table 1**  
**Factor Structures: Comparison of Turkish and English Versions**

Subscale	Item	Item content	Turkish	English
1 Independence 41.8% (51.8%)	1	I encourage students to show me what they have learned on their own.	.68	.52
	10	I teacher my students the basics and leave them to find out more for themselves.	.61	.76
	19	I leave questions for my students to find out for themselves.	.59	.78
	28	I teach students the basics and leave room for individual learning.	.70	.75
2 Integration 48.5% (63.5%)	37	I leave open-ended questions for my students to find the answers for themselves.	.64	.78
	2	In my class, students have opportunities to share ideas and views.	.72	.81
	11	Students in my class have opportunities to do group work regularly.	.65	.84
	20	Students in my class are encouraged to contribute to the lesson with their ideas and suggestions.	.75	.78
	29	I encourage students to ask questions and make suggestions in my class.	.69	.77
	38	Students in my class are expected to work in group co-operatively.	.67	.78

To be continued

Continued

Subscale	Item	Item content	Turkish	English
<b>3</b> Motivation 41.4%[3, 12, 1] 24.3%[30, 39] <i>r</i> =-.19 (51.7%)	3	Learning the basic knowledge/skills well is emphasized in my class.	.83	.76
	12	I emphasize the importance of mastering the essential knowledge and skills.	.86	.81
	21	My students know that I expect them to learn the basic knowledge and skills well.	.79	.77
	30	Moving from one topic to the next quickly is <i>not</i> my main concern in class.	.81	.57
	39	Covering the syllabus is <i>not</i> more important to me than making sure the students learn the basics well.	.73	.66
<b>4</b> Judgment 42.9% (60.0%)	4	When my students have some ideas, I get them to explore further before I take a stand.	.62	.74
	13	When my students suggest something, I follow it up with questions to make them think further.	.64	.78
	22	I do not give my view immediately on students' ideas, whether I agree or disagree with them.	.64	.79
	31	I comments on student's ideas only after they have been more thoroughly explored.	.65	.82
	40	I encourage students to do things differently although doing this takes up more time,	.72	.72
<b>5</b> Flexibility 46.0% (56.6%)	5	In my class, I probe students' idea to encourage thinking.	.66	.83
	14	I encourage my students to ask questions freely even if they appear irrelevant.	.73	.81
	23	I encourage my students to think in different directions even if some of the ideas may not work.	.72	.75
	32	I like my students to take time to think in different ways.	.69	.81
	41	I allow my students to deviate from what they are told to do.	.57	.53
<b>6</b> Evaluation 44.5% (47.2%)	6	I expect my students to check their own work instead of waiting for me to correct them.	.70	.77
	15	I provide opportunities for my students to share their strong and weak points with the class.	.69	.69
	24	My students know that I expect them to check their own work before I do.	.68	.78
	33	In my class, students have opportunities to judge for themselves whether they are right or wrong.	.64	.74
	42	I allow my students to show one another their own work before submission.	.62	.37
<b>7</b> Question 49.4% (59.5%)	7	I follow up on my students' suggestions so that they know I take them seriously.	.78	.72
	16	When my students have questions to ask, I listen to them carefully.	.64	.85
	25	My students know I do not dismiss their suggestions lightly.	.64	.73
	34	I listen to my students' suggestions even if they are not practical or useful.	.71	.89
	43	I listen patiently when my students ask questions that may sound silly.	.73	.64
<b>8</b> Opportunities 48.4% (59.8%)	8	I encourage my students to try out what they have learned from me in different situations.	.76	.77
	17	When my students put what they have learned into different uses, I appreciate them.	.75	.73
	26	My students are encouraged to do different things with what they have learned in class.	.76	.85
	35	I don't mind my students trying out their own ideas and deviating from what I have shown them.	.46	.79
	44	Students are allowed to go beyond what I teach them within my subject.	.71	.73
<b>9</b> Frustration 51.3% (65.0%)	9	My students who are frustrated can come to me for emotional support.	.56	.67
	18	I help students who experience failure to cope with it so that they regain their confidence.	.82	.83
	27	I help my students to draw lessons from their failure.	.67	.84
	36	I encourage students who have frustration to take it as part of the learning process.	.71	.82
	45	I encourage students who experience failure to find other possible solutions.	.79	.86

Note. (1) The items were presented with "All the time 6 5 4 3 2 1 Never". (2) Percentages in parentheses are the total variances explained for the subscales reported for the English version.

As can be seen from Table 1, the lowest percentage of total variance explained is the first factor for Motivation (41.4%) and the greatest is for Frustration (51.3%). However, in the original study, Motivation explained 51.7% of total variance and Frustration 65.0%. In fact, the total variances explained for the Turkish data are generally lower than those for the original study. Although there is no hard and fast rule regarding the minimal percentage of total variance explained, most of those for the Turkish data fall within the range of 40% to 50% and are somewhat lower than most other factor analysis results.

## 2.2 Factor Loadings

In terms of factor loadings, those for the Turkish data vary from  $\lambda=.46$  to  $\lambda=.86$ , with a mean of  $\lambda=.69$  ( $SD=.08$ ) compares with those for the original study which has factor loadings from  $\lambda=.37$  to  $\lambda=.89$ , with a mean of  $\lambda=.75$  ( $SD=.10$ ). Thus, it is concluded that factor loadings are generally lower for the Turkish data and also have a narrow spread. Therefore, it can be argued that these differences are small enough to render the Turkish results trustworthy.

There is one exception, though. This has to do with Motivation which has two factors together explaining 66% of total variance, as compared with Motivation as one factor in the original study explaining 52%. Factor

analysis was re-run this time with Promax rotation to check where the two factors are correlated. However, the inter-factor  $r=-.19$  indicates that they are slightly antagonistic to each other. The first factor is loaded by the first three items which have to do with mastery of basic knowledge, whereas the second is loaded by the fourth and fifth items which have to do with covering syllabus. Whether this is accidental awaits further study. The Singapore sample is of certified teachers whereas the majority of Turkish sample is of trainee-teachers. Their different professional experience might have contributed to this finding.

## 2.3 Inter-Subscale Correlations

With the nine subscale thus formed; it is interesting to see how these correlate with one another and to compare the inter-subscale correlations with those of the original study. As shown in Table 2, for the Turkish data, the lowest is  $r=.52$  (between Motivation and Question and Motivation and Opportunity), the highest is  $r=.74$  (between Flexibility and Evaluation), with a median of  $r=.67$ . By comparison, for the original data, the lowest correlation is  $r=.46$  (between Judgment and Frustration), the highest is  $r=.82$  (between Flexibility and Opportunities), with a median of  $r=.67$ . Thus, in terms of inter-subscale correlations, the two versions are comparable, on average.

**Table 2**  
**Inter-Subscale Correlations**

	Alpha	1	2	3	4	5	6	7	8	9
Alpha	-	.64	.72	.57	.66	.69	.69	.73	.71	.75
1 Independence	.76	-	.70	.59	.69	.68	.69	.58	.63	.70
2 Integration	.85	.62	-	.62	.71	.73	.70	.67	.71	.69
3 Motivation	.74	.49	.56	-	.60	.56	.57	.52	.52	.55
4 Judgment	.83	.70	.71	.59	-	.72	.69	.64	.61	.64
5 Flexibility	.78	.58	.71	.55	.78	-	.74	.67	.66	.66
6 Evaluation	.69	.60	.68	.55	.69	.72	-	.57	.59	.64
7 Question	.82	.52	.67	.48	.76	.80	.67	-	.72	.71
8 Opportunities	.83	.65	.71	.59	.69	.82	.70	.80	-	.72
9 Frustration	.86	.65	.65	.57	.46	.66	.65	.70	.75	-

Note. Figures above the principal diagonal are for the Turkish version and those below English version.

## 2.4 Mean Comparisons

How did the Turkish and Singapore teachers' score differ on the CFTIndex and its nine subscales are shown in Table 3. Comparisons show that on all measures, the Singaporean teachers scored higher than did the Turkish teachers. More specifically, large standardized mean difference (SMD)'s were obtained for

Integration, Motivation, Judgment, Evaluation, Question, Opportunities, and Frustration, while the SMD for Independence is small and that for Flexibility is a medium one. The difference in Overall has a large SMD, too. Thus, Turkish teachers generally showed less creativity fostering behaviour than did their Singaporean counterparts, although less so where encouraging independent learning and flexible thinking are concerned.

**Table 3**  
**Comparisons Between Turkish and Singapore Samples**

Sub-scale	Turkish sample Dikici (2013)		Singaporean sample Soh (2000)		Difference	<i>t</i>	SMD
	Mean	SD	Mean	SD			
Independence	20.77	2.51	21.80	3.46	-1.03	-3.68*	-0.37
Integration	21.13	2.75	24.23	3.98	-3.10	-9.89*	-0.98
Motivation	20.19	2.81	24.21	3.25	-4.02	-13.74*	-1.37
Judgment	19.80	2.71	22.34	3.93	-2.54	-8.21*	-0.82
Flexibility	20.72	2.60	22.52	3.95	-1.80	-5.93*	-0.59
Evaluation	19.99	2.86	22.50	3.58	-2.51	-8.19*	-0.81
Question	21.05	2.79	23.69	3.42	-2.64	-8.90*	-0.88
Opportunities	21.15	2.65	23.69	3.50	-2.54	-8.75*	-0.87
Frustration	21.18	2.82	23.64	3.67	-2.46	-8.01*	-0.80
Overall	185.98	20.29	208.62	27.27	-22.64	-10.11*	-1.00

Note. \**p* < .05. Turkish means and SDs were re-scaled for six-point scales.

### 2.5 Variation 1: Three-item Subscale

A variant of the CFTIndex is to shorten its length from 45 items to only 27 for the Turkish data. This was done by using the first three items in each subscale. As shown in Table 4, the correlations between the original five-item of the Turkish version and the shortened three-item subscales are all high, varying from *r*=.83 (Independence) to *r*=.93 (Integration). Moreover, two Overall scores correlate highly with *r*=.96. These together indicate that the shorter version functions very closely to the longer version. When the two sets of subscale scores were submitted for factor analysis separately, they returned with highly similar structures as the factor loadings are close enough, with some slight variations. It can therefore be concluded that the two versions are sufficiently ‘parallel’ and can be used interchangeably, although the longer version explained a bit more of the total variance.

**Table 4**  
**Correlations Between Five-Item and Three-Item Versions**

Sub-scale	Correlation	Factor loadings	
		Five-item version	Three-item version
Independence	.83	.84	.74
Integration	.93	.88	.85
Motivation	.77	.73	.75
Judgment	.90	.84	.80
Flexibility	.90	.86	.83
Evaluation	.91	.83	.77
Question	.88	.81	.83
Opportunities	.88	.82	.82
Frustration	.92	.84	.78
Total variance explained	-	68.9%	63.5%
Overall	.96	-	-

Note. All correlation coefficients are significant level at .001.

### 2.6 Variation 2: Nine-Item Scale

Another variant is to form a nine-item scale by combining

one item from each subscale as an abridged version of the CFTIndex. Thus, the original 45 items formed five sets each covering all nine “principles”, albeit only one item for each. In Table 5, Total is for all 45 items, Set 1 is made up of the first items of all nine subscales, set 2 the second items of all nine subscales, and so on.

Table 5 shows the correlations of the original CFTIndex (45 items), CFT27 (27 items making up the nine three-item subscales), and the five Sets (i.e., each Set with one item from the nine subscales). Firstly, five Sets all correlate highly with Total with coefficients greater than *r*=.80, with a median of *r*=.86. Their correlations with the 27-items forming the nine three-item subscales are also quite high, varying from *r*=.68 to *r*=.92, with a median of *r*=.89. Among the five Sets, the correlations vary from *r*=.60 (between Sets 2 and 5) to *r*=.80 (between Sets 1 and 2), with a median of *r*=.68.

These patterns of correlations among the various versions suggest that Set 1 and Set 2 (more than the other Sets) can be used as a general indicator of creativity fostering behaviour index, if details of such behaviours are not needed.

**Table 5**  
**Correlations of Item-Sets With Total**

	CFTIndex	CFT27	Set 1	Set 2	Set 3	Set 4	Set 5
Total (45 items)	1.00	.96	.86	.87	.88	.85	.84
CFT27		1.00	.92	.92	.89	.71	.68
Set 1			1.00	.80	.72	.59	.58
Set 2				1.00	.71	.64	.60
Set 3					1.00	.70	.66
Set 4						1.00	.71
Set 5							1.00
Alpha	.95	.93	.74	.82	.76	.81	.84

Note. All correlation coefficients are significant level at .001.

## 2.7 Confirmatory Factor Analysis for all Versions

Confirmatory factor analysis (CFA), which is used to confirm the factors or sub-scales determined in Exploratory factor analysis (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. Confirmatory factor analysis (CFA) was conducted using AMOS 18 software. Maximum likelihood method was used in CFA. The evaluation of the model's adequacy was based on the Minimum value of the discrepancy function (CMIN/ $x^2$ ), Root Mean Square Residual (RMR), Root Means Square Error of Approximation (RMSEA), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Goodness-of-Fit Index (GFI), and Adjusted Goodness-of-Fit Index (AGFI), in addition to its lower and upper confidence interval boundaries (Byrne, 2010; Hair, Black, Babin, & Anderson 2010; Hu & Bentler, 1995; Schermelleh-Engel, Moosbrugger, & Müller, 2003; Schumacker & Lomax, 2004). In previous study (Dikici, 2013), it was determined that ( $x^2_{(412)}=580.640$ ,  $p<.05$ ;  $x^2/df=1.409$ ) RMSEA (.03) and RMR (.02) were within the limits of good fit, CFI (.95), GFI (.90), NFI (.87), NNFI (.95), and AGFI (.85) were within the limits of acceptable fit. In addition, Incremental Fit Index (IFI) was calculated as .96 and Tucker-Lewis Index (TLI) as .95. These values, which take account of sample size and complexity of the model, demonstrate good fit. Standardized parameter estimations ranged from .26 to .84 indicate that the items in the CFT33 were significantly predicted by their latent variables (all  $ps<.001$ ) (Dikici, 2013).

**CFT45:** For the five-item version in the present study, the first-order factor model (i.e., independent, integration, motivation, judgment, flexibility, evaluation, question, opportunities, and frustration) was tested through CFA in order to validate the factor structure of the CFT45 in the third sample (Dikici, 2014). The results of the CFA demonstrated that the first-order factor model ( $x^2_{(765)}=822.800$ ,  $p>.05$ ;  $x^2/df=1.076$ ; RMR=.03; RMSEA=.02; NFI=.86; CFI=.99; GFI=.85; AGFI=.80) has acceptable fit. Standardized parameter estimations ranged from .30 to .79, indicating that the items in the CFT45 were significantly predicted by their latent variables (all  $ps<.001$ ).

**CFT27:** The three-item version, the first-order factor model was tested through CFA in order to validate the factor structure of the CFT27 in the third sample. The results of the CFA demonstrated that the first-order factor model ( $x^2_{(239)}=262.731$ ,  $p>.05$ ;  $x^2/df=1.099$ ; RMR=.02; RMSEA=.02; NFI=.91; CFI=.99; GFI=.91; AGFI=.86) fits the data significantly. Standardized parameter estimations ranged from .42 to .79, indicating that the items in the CFT27 were significantly predicted by their latent variables (all  $ps<.001$ ).

**CFTset1:** For the one-item version CFTset1, CFA demonstrated that the first-order factor model ( $x^2_{(17)}=26.746$ ,  $p>.05$ ;  $x^2/df=1.573$ ; RMR=.02;

RMSEA=.05; NFI=.96; CFI=.98; GFI=.97; AGFI=.93) good fit the data significantly. Standardized parameter estimations ranged from .45 to .76, indicating that the items in the CFTset1 were significantly predicted by their latent variables (all  $ps<.001$ ).

**CFTset2:** CFTset2, CFA demonstrated that the first-order factor model ( $x^2_{(16)}=16.015$ ,  $p>.05$ ;  $x^2/df=1.001$ ; RMR=.01; RMSEA=.00; NFI=.98; CFI=.99; GFI=.98; AGFI=.95) fits the data significantly. Standardized parameter estimations ranged from .46 to .80, indicating that the items in the CFTset2 were significantly predicted by their latent variables (all  $ps<.001$ ).

**CFTset3:** CFTset3, CFA demonstrated that the first-order factor model ( $x^2_{(14)}=12.141$ ,  $p>.05$ ;  $x^2/df=.867$ ; RMR=.01; RMSEA=.00; NFI=.98; CFI=.99; GFI=.98; AGFI=.96) has good fit with the data significantly. Standardized parameter estimations ranged from .56 to .77, indicating that the items in the CFTset3 were significantly predicted by their latent variables (all  $ps<.001$ ).

**CFTset4:** CFTset4, CFA demonstrated that the first-order factor model ( $x^2_{(17)}=13.527$ ,  $p>.05$ ;  $x^2/df=.796$ ; RMR=.02; RMSEA=.00; NFI=.97; CFI=.99; GFI=.98; AGFI=.96) fits the data significantly. Standardized parameter estimations ranged from .26 to .78, indicating that the items in the CFTset4 were significantly predicted by their latent variables (all  $ps<.001$ ).

**CFTset5:** CFTset5, CFA demonstrated that the first-order factor model ( $x^2_{(15)}=9.372$ ,  $p>.05$ ;  $x^2/df=.625$ ; RMR=.02; RMSEA=.00; NFI=.99; CFI=.99; GFI=.99; AGFI=.97) has good fit with the data significantly. Standardized parameter estimations ranged from .40 to .76, indicating that the items in the CFTset5 were significantly predicted by their latent variables (all  $ps<.001$ ).

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## DISCUSSION

The present study set out with two research questions. First, more theoretically oriented, is to find out whether the original findings of the CFTIndex are replicated in a different cultural context from the original one. Secondly, more practically oriented, is to find out whether the CFTIndex can be modified (shortened) and yet attained acceptable validity and reliability.

The answer to the first question is affirmative. Comparisons between the two sets of data show that what was found for the English version are largely replicated in the Turkish version, with some variations not unexpected, though. The only obvious difference is the factor structure of Motivation. For this, five items form one factor in the English version but two oblique (and antagonistic) factors in the Turkish version. Careful scrutiny of item content suggests that a two-factor solution makes better sense as the first three items pertain more to mastery of basic knowledge while the last two items deal with syllabus coverage. If the two-factor solution is found in further studies using data from other cultures, then CFTIndex will

need to be expanded to ten subscales to accommodate the new findings of Turkish data. Other than this, CFTIndex appears to be very stable across cultures.

The answer to the second question is also positive. The first modification is a shorter version of the nine subscales with three instead of the original five items each. This reduces the whole CFTIndex down to 27 from the original 45 items. The shorter subscales correlate very highly ( $r=.96$ ) with the original version and thus can be trusted to yield very much the same information for the CFTIndex.

The second modification is the nine-item scale covering the same nine principles. Here, again, the shorted scales (Sets) correlate reasonably well with the full-length CFTIndex and also the shorter 27-item scale, especially Set 2 which has high correlations with the original 45-item CFTIndex ( $r=.87$ ) and the shorter CFT27 ( $r=.92$ ) and a reasonably high Cronbach's alpha ( $\alpha=.82$ ). For research project which involve many variables with creativity fostering teacher behaviour as one, the shortened nine-item scales (especially Set 2) will yield very much the same information and yet more economic in terms of testing time for the respondents who have to respond to many test items for the many variables of the studies. Needless to say, using the nine-item scale deprives the researchers of the opportunity to investigate each of the nine principles more convincingly as there will be only one item for each.

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## CONCLUSION

All considered, the original CFTIndex has shown acceptable construct validity and internal consistency reliability when used in a culture different from that where it was first designed. It has also shown flexibility that will allow future researchers to have different combinations of items to form shorter scales and subs-scales to suit the need for future studies of creative fostering teacher behaviour. The more economical approach (in terms of testing time and respondent fatigue) to data collection enabled by the modified, shortened versions is important especially for studies involving many variables beyond teachers' creativity fostering behaviours. Besides this fact, a recent study analysed a new Turkish data set of CFTIndex by using a single factor structure combining the 9 subscales shows evidence of the flexibility and usefulness of the instrument (Dikici, 2014). In conclusion, it can be recommended to creativity researchers who wish to use the scale to make their interpretation according to 27 items and 9 sub-scales. High points are obtained from each item of the scale signify creativity fostering teaching style of the teacher. The scale does not include any reverse scored item.

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## CAVEAT AND FURTHER RESEARCH

The construct and factorial validities of the CFTIndex have been evidenced in those studies of the past one and a half decades as annotated by Soh (2015) and are further

corroborated by the present study. Nonetheless, as the usefulness of an educational or a psychological measure lies with its ability to predict (or, at least, correlate with) measures beyond itself, it must be admitted that the CFTIndex and its variants need to be validated with measures other than its own scores.

In this regard, in the development of the original scales (Soh, 2000), scores were validated against creative personality scores (using Gough's adjectives) with positive results. Forrester and Hui (2007) adopted the same approach with supporting evidence. They also produced correlations between CFTIndex scores and students' verbal and figural creative measures, thus further indicate the validity of CFTIndex, partially though it may be. However, as not much has been done along this line of research, future studies of CFTIndex and its variants could well go in this direction.

Perhaps, as an intermediate step, CFTIndex could be modified as a student version by re-wording, for instance, replacing such words as I and my students with our teacher and we students, respectively. Correlations between teachers' self-ratings and their student' ratings can then be correlated and compared as another kind of evidence of the scale's validity. Other approaches to the validity of CFTIndex are limited only by creativity researchers' creativity.

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## APPENDIX

### Maddeler

- 1 Kendi kendilerine öğrendikleri şeyi bana göstermeleri için öğrencileri cesaretlendiririm.
- 2 Sınıftaki öğrenciler fikir ve düşüncelerini paylaşma fırsatına sahiptir.
- 3 Temel bilgi ve becerilerin iyi bir şekilde öğrenilmesi sınıfta vurgulanır.
- 4 Öğrencilerimin bazı fikirleri olduğunda fikrimi ortaya koymadan önce onlara daha fazla araştırma yaptırım.
- 5 Sınıfta düşünmeyi cesaretlendirmek için öğrencilerimin fikirlerini irdelerim.
- 6 Öğrencilerimin çalışmalarını düzeltmek için beni beklemek yerine onların kendi çalışmalarını kontrol etmelerini beklerim.
- 7 Öğrencilerimi ciddiye aldığımı bilmeleri için onların önerilerini dikkate alırım.
- 8 Benden öğrendiklerini farklı durumlarda denemeleri için öğrencilerimi cesaretlendiririm.
- 9 Hüsrana uğrayan öğrencilerim duygusal destek almak için bana gelebilir.
- 10 Öğrencilerime temel bilgileri öğretirim ve daha fazlasını keşfetmeleri için onları serbest bırakırım.
- 11 Sınıftaki öğrenciler düzenli bir şekilde grup çalışması yapma fırsatına sahiptirler.
- 12 Temel bilgi ve becerilerin iyice öğrenilmesinin önemini vurgularım.
- 13 Öğrencilerim bir şey öne sürdüklerinde onları daha fazlasını düşündürmek için sorularla düşüncelerini irdelerim.
- 14 Öğrencilerimi ilgisiz görünse bile özgürce soru sormak için cesaretlendiririm.
- 15 Öğrencilerimin güçlü ve zayıf yönlerini sınıfta paylaşmaları için onlara fırsatlar sağlarım.
- 16 Öğrencilerimin soruları olduğunda onları dikkatlice dinlerim.
- 17 Öğrencilerimin öğrendiklerini farklı şekilde kullandıklarında onları takdir ederim.
- 18 Yeniden kendilerine güvenlerini kazanmaları amacıyla başarısız oldukları şeyin üstesinden gelmeleri için başarısız olan öğrencilerime yardım ederim.
- 19 Öğrencilerime kendi kendilerine öğrenmeleri için sorular veririm.
- 20 Sınıftaki öğrenciler fikir ve önerileri ile derse katkı sağlamak için cesaretlendirilir.
- 21 Öğrencilerim temel bilgi ve becerileri iyi öğrenmelerini beklediğimi bilir.
- 22 Onlarla aynı görüşte olsam da olmasam da öğrencilerin fikirleri hakkında derhal düşüncemi söylemem.
- 23 Fikirlerin bazıları işlevsiz olsa bile farklı yönlerden düşünmeleri için öğrencilerimi cesaretlendiririm.
- 24 Öğrencilerim kendi çalışmalarını ben kontrol etmeden önce kendilerinin kontrol etmelerini beklediğimi bilir.
- 25 Öğrencilerim önerilerini kolayca reddetmeyeceğimi bilir.
- 26 Öğrencilerim sınıfta öğrendikleri şeyle farklı şeyler yapmak için cesaretlendirilir.
- 27 Öğrencilerimin hatalarından ders çıkarmalarına yardımcı olurum.
- 28 Öğrencilerime temel bilgileri öğretir ve bireysel öğrenme için fırsat tanırım.
- 29 Sınıfta öğrencileri soru sormaları ve öneri yapmaları için cesaretlendiririm.
- 30 Sınıfta bir konudan bir konuya hızlı bir şekilde geçmek beni endişelendirmez.
- 31 Öğrenciler fikirlerini bütünüyle araştırdıklarında ancak öğrencilerin fikirleri üzerinde yorum yaparım.
- 32 Farklı şekillerde düşünmek için zaman isteyen öğrencilerimi severim.
- 33 Doğru ya da yanlış olup olmadıklarını görmeleri için sınıfta öğrencilerin kendi kendilerini yargılamaları için onlara fırsat veririm.
- 34 Öğrencilerimin pratik ya da faydalı olmayan önerilerini bile dinlerim.
- 35 Benim gösterdiğim şeyden sapan ve kendi fikirlerini deneyen öğrencilerime itirazım yoktur.
- 36 Öğrenme sürecinin bir parçası olarak hüsrana uğrayan öğrencilerimi cesaretlendiririm.
- 37 Kendi kendilerine cevaplarını bulmaları için öğrencilerime açık uçlu sorular bırakırım.
- 38 Sınıftaki öğrencilerden işbirlikli bir şekilde grup içinde çalışmaları beklenir.
- 39 Programı tamamlamak benim için öğrencilerin temel bilgileri iyi öğrendiklerinden emin olmaktan daha önemli değildir.
- 40 Çok fazla zaman almasına rağmen öğrencilerimi farklı şeyler yapmaları için cesaretlendiririm.
- 41 Öğrencilere onlara yapmaları söylenen şeyin dışına çıkmalarına müsaade ederim.
- 42 Öğrencilerime çalışmalarını sunmadan önce birbirlerine göstermelerine müsaade ederim.
- 43 Öğrencilerim aptalca gibi görünebilen sorular sorduklarında onları sabırla dinlerim.
- 44 Öğrencilerime benim konu içinde öğrettiğim şeyin daha ötesine gitmelerine müsaade ederim.
- 45 Başarısızlık deneyimi yaşayan öğrencilerimi diğer muhtemel çözüm yollarını bulmaları için cesaretlendiririm.