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## TEACHER EDUCATION & DEVELOPMENT | REVIEW ARTICLE

# Creativity fostering teacher behaviour around the world: Annotations of studies using the CFTIndex

Kaycheng Soh<sup>1\*</sup>

**Abstract:** Teachers play a critical role in the development of student creativity. How well they play this role depends on whether they demonstrate creativity fostering behaviour when interacting with their students. There is, however, a dearth of suitable instruments for measuring this type of teacher behaviour, although there are many instruments for measuring student creativity. Based on Arthur J. Cropley's nine principles, the *Creativity Fostering Teacher Behaviour Index* (CFTIndex) was developed and trialled with a group of teachers ( $N = 117$ ) in Singapore. There are evidence showing its internal consistency reliability and concurrent validity. The need for an instrument such as the CFTIndex is witnessed by many studies based using it subsequent to its first publication. The scale has since been used by researchers in America, Canada, Chile, Hong Kong, Korea, Mexico, Nigeria, Turkey and Singapore since its first appearance in the *Journal of Creativity Behavior* in 2000. Creativity researchers have used the CFTIndex for varied purposes, including several Ph.D. theses. This article highlights information directly related to CFTIndex to provide an integrated database and to facilitate future research. Possible further research studies using the CFTIndex are suggested and discussed.

**Subjects:** Classroom Practice; Research Methods in Education; Teachers & Teacher Education

**Keywords:** creativity; fostering creativity; measurement; teacher

### ABOUT THE AUTHOR

Kaycheng Soh taught Educational Psychology, Research Methods and Educational Statistics at the National Institute of Education, Nanyang Technological University, Singapore. His recent research focuses on issues in international rankings and culminates in the publication of *Social and Educational Rankings: Problems and Prospects* (New York: Untested Ideas Research Center). He served as an evaluation consultant to many government ministries in Singapore and is currently the research consultant at the Singapore Centre for Chinese Language.

This annotation provides a bird's-eye view of studies using the CFTIndex conducted in many countries and languages, with a wide range of students, school teachers and university professors. It helps interested researchers to put their own studies in an international context. The CFTIndex can also be used by teachers and professors to evaluate their own teaching styles for self-reflection.

### PUBLIC INTEREST STATEMENT

When teachers behave in a manner that foster creativity, students are likely to respond in a creative manner and thus develop their own creativity. The availability of the CFTIndex by the present author in 2000 has spawned many relevant studies over the decade. However, there is yet a comprehensive review of these studies and the present article is an effort to fill this vacuum. This article is of interest not only to creativity researchers but perhaps more to educators in general who are concerned with developing creativity in the students.

## 1. Introduction

It is a truism that teachers play a critical role in the development of student creativity. How teachers respond to their students' ideas, views and suggestions during lessons can be expected to have an influence on the students' subsequent effort and inclination in coming up with new ideas, views and suggestions. Well-timed positive teacher responses will naturally encourage students' further efforts while, in contrast, premature and especially negative teacher responses will discourage students from further creative exploration. In short, teachers are in a strategic position to foster creativity of their students, if the teachers are able to and in a habit of demonstrating creativity fostering behaviour in the day-to-day interaction with their students. However, it is also a truism that not all teachers are equipped with such capacity-building behaviour. They may and may not be conscious of the impact of their own behaviour on that of their students where creativity is concerned. They therefore need be aware of their possible influence on student creativity and be trained to demonstrate creativity fostering behaviour in the classroom.

There are many data collection instruments for measuring student creativity but there is a dearth of instruments to measure creativity fostering behaviours of teachers. For instance, *Creativity Based Information Resources: Assessment of Creativity* (1994-) lists 162 items published in the decade from 1994 to 2004. Among these only four (2.5%) references pertain to teachers and CFTIndex is one of the four (The International Center for Studies in Creativity, n.d.). A measure of teachers' creativity fostering behaviours is therefore needed if research in this subfield of student creativity development is to be conducted with rigour and vigour. This entails the need to define and describe creative fostering teacher behaviours first and then develop an instrument based on them.

After an extensive review of the pertinent literature, Cropley (1997) in a paper *Fostering Creativity in the Classroom: General Principles* listed nine conditions necessary for teachers to foster student creativity as follows:

- (1) *Independence*: Encouraging students to learn independently;
- (2) *Integration*: Having a co-operative, socially integrative style of teaching;
- (3) *Motivation*: Motivating students to master factual knowledge, so that they have a solid base for divergent thinking;
- (4) *Judgement*: Delaying judging students' ideas until they have been thoroughly worked out and clearly formulated;
- (5) *Flexibility*: Encouraging flexible thinking;
- (6) *Evaluation*: Promoting self-evaluation in students;
- (7) *Question*: Taking students' suggestions and questions seriously;
- (8) *Opportunities*: Offering students opportunities to work with a wide variety of materials and under many different conditions; and
- (9) *Frustration*: Helping students to learn to cope with frustration and failure, so that they have the courage to try the new and unusual.

Based on these as the conceptual framework, Soh (2000) developed the *Creativity Fostering Teacher Behaviour Index* (CFTIndex) as an effort to fill the vacuum of suitable instruments for measuring teacher behaviour relevant to the above principles. The need for such an instrument was thus argued for,

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)

Almost one-and-a-half decades have passed since the publication of CFTIndex on 2000. It has been cited and used by many researchers for various purposes who investigated different aspects of creativity development: evaluating the effectiveness of creativity development projects, checking its cross-cultural validity of its translated versions and even as the main instrument for Ph.D. theses. The studies were conducted in various countries in the past few years as listed below:

- America (Edinger, 2008; Lee & Kemple, 2014)
- Canada (Hondzel, 2013).
- Chile (Manriquez & Reivera, 2005).
- Hong Kong (Forrester & Hui, 2007).
- Mexico (Belio & Urtuzuastegul, 2013).
- Nigeria (Olanisimi, Adeniyi, & Olawale, 2011; Olawale, Adeniyi, & Olubela, 2010).
- Singapore (Soh & Quek, 2007).
- Turkey (Dikici, 2013).

The CFTIndex has fulfilled its predicted role in meeting the need of creativity researchers by providing them with a much needed data collection instrument. The articles are scattering here and there in the forms of journal papers, research monographs and doctoral theses, appearing in different sources. The present article is an effort to summarize and highlight information pertaining to the CFTIndex and put them in a form for ready referencing by future researchers.

The highlights are presented in chronological order of the studies. Admittedly, in the process of highlighting and extracting only information directly relevant to the CFTIndex, many of the valuable and interesting information (e.g. the extensive literature review) in the cited publications are inevitably (and reluctantly) excluded. Excluded from this annotation are other articles citing the CFTIndex but not using it as a tool for data collection. Hopeful, this is not misunderstood as doing injustice to the original documents, some of which are full-length Ph.D. theses. Moreover, new studies are likely to appear in time to come (for instance, at the time of writing, there was a request to use it for research purpose from Hong Kong) and an update is necessary in the future. More details can of course be found in the original articles and interested creativity researchers are certainly encouraged to read them in their original forms.

## 2. Annotations

In developing the Soh's (2000) CFTIndex, the nine principles for creativity fostering teacher behaviour propounded by Cropley (1997) were operationalized in terms of teacher-student transactions. For each of the nine principles, five statements of teacher behaviour in the classroom context were written to depict those teacher behaviours consistent with each principle. Each item was presented with a six-point scale, with 6 for *All the time* and 1 for *Never*. The choice of six points was to discourage the probable tendency of respondents to endorse the neutral mid-point and this, hopefully, would maximize the variance in the scores.

The 45 items formed the 9 subscales, and the CFTIndex as a whole were tested on a group of 117 teachers in Singapore. In this group, there were 26% male and 75% female, with 54% teaching in primary schools and 46% in secondary schools. Of the 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% aged between 20 and 35, and the remaining 60% aged 36 or above. In the multicultural context of Singapore, there were 56% Chinese, 21% Malay, 18% Indian, and 5% Eurasian and others.

Admittedly, the composition of this group of teachers may not be consistent with the composition of Singapore teachers as a whole. Nonetheless, the study did not begin with the intention to *generalize to the population* of Singapore teachers but to *generalize to the theory* of teacher behaviour that fosters student creativity.

**Table 1. Reliabilities, means and SDs of CFTIndex (N = 117)**

	Total variance explained	Reliability	CFTIndex (Soh, 2000)		
			Mean	SD	Correlation with Creative Person
Independence	51.77	.75	21.80	3.46	.39
Integration	63.54	.85	24.23	3.98	.45
Motivation	51.73	.74	24.21	3.25	.35
Judgement	59.99	.83	22.34	3.93	.44
Flexibility	56.60	.78	22.52	3.95	.40
Evaluation	47.19	.69	22.50	3.58	.25
Question	59.49	.82	23.69	3.42	.33
Opportunities	59.75	.83	23.69	3.50	.36
Frustration	65.00	.86	23.64	3.67	.40
CFTIndex	–	.82	208.62	27.27	.45

The CFTIndex was administered to the respondents with the results shown in Table 1. Factor analysis with Varimax rotation was run on the set of five items for each subscale *separately* with the intention that each set of items forms a subscale to measure the construct (i.e. Cropley's principle) relatively independent of the other subscales. As shown in Table 1, the total variances (of five items) of the subscales vary from 47% (Evaluation) to 65% (Frustration), with most of them explaining near 60% of the total variance that is normally found for factor analysis.

The reliabilities of the subscales in terms of Cronbach's  $\alpha$  coefficients vary from  $\alpha = .69$  (Evaluation) to  $\alpha = .86$  (Frustration) and the reliability for the scale as a whole is indicated by a median of  $\alpha = .82$ . Although five items per subscale may be on the low side in terms of scale length for which eight or more would be desirable, the reliability coefficients are sufficiently high for the subscales and the CFTIndex as a whole to be used with confidence for research purposes.

Table 1 also shows the means (and SDs) for the subscales and the CFTIndex as a whole. These were recalculated from the original article which presents the descriptive statistics separately for the females and males. For the content of actual items, see Appendix in the original article. Inter-subscale correlations vary from a moderate  $r = .49$  (between Independence and Motivation) to a high  $r = .82$  (between Flexibility and Opportunities), with a median of  $r = .67$ . These correlations indicate that while the subscales are relatively independent, they are also correlated and may form a higher order general factor.

To establish the concurrent validity of the CFTIndex, 16 adjectives were selected from Domino's (1970) 59-item *Creative Adjective Scale* through several rounds of factor analysis. The 16 adjectives formed a scale for self-evaluation by the respondent as a Creative Person. The scale has a Cronbach's  $\alpha$  coefficient of .96 indicating a very high degree of internal consistency. As shown in Table 1, the correlations between CFTIndex subscales and *Creative Person* scores varied from  $r = .25$  (Evaluation) to  $r = .45$  (Integration), with  $r = .45$  for the CFTIndex as a whole. These are substantial evidence of concurrent validity in that respondents who saw themselves as being more creative also scored higher on CFTIndex and its subscales.

Further evidence of validity was procured by the differences between Chinese and non-Chinese teachers, in view of the popular stereotype that Chinese teachers, at least in the context of Singapore, tend to be more restrictive and hence less creative than non-Chinese teachers. The inter-ethnic differences have standardized mean differences (effect size; Cohen, 1988) varying from small  $d = .26$  (Independence) to medium  $d = .45$  (Opportunities), with  $d = .43$  for the CFTIndex as a whole.

Soh (2000) acknowledged that this is a preliminary study and further work needs to be done to further evaluate the validity of the scale. He suggested several specific approaches such as checking teachers' self-ratings for CFTIndex against (a) students' ratings of teachers, (b) independent observers' ratings, (c) student creativity, (d) effect of training in creativity techniques and (e) correspondence between changes in teacher creativity and student creativity. These are possible studies which can be taken as ways of further verifying the validity of the CFTIndex or as research in its own rights.

Manriquez and Reivera's (2005) study aims to find out the pedagogical practices of faculty members of the University of Antofagasta, Chile, in connection with creativity fostering, with the conviction that creative behaviour is a highly valuable goal for modern professional training in higher education.

The study involved 233 Assistant Professors and Associate Professors of the University. With 164 respondents completed the CFTIndex with a response rate was 70%. Of the respondents, 14% aged 31–40 years, 27% aged 41–50 years and 59% aged 51 or more years. In terms of teaching experience, 20% had less than 10 years, 39% had between 11 and 20 years, and 41% had 21 or more years. There were 70% males and 30% females. Where academic qualification is concerned, 36% held a Bachelor's degree, 46% a Master's degree and 18% a Ph.D. degree. Thus, generally, this sample consisted mainly of senior, highly qualified and experienced faculty members.

The CFTIndex was translated into Spanish and renamed as *Learning Style Self-Assessment Scale*, but the structure of the nine subscales and eight of the nine subscale names were retained, with Question renamed as Consultation. Also, the original six-point scale was used. Methodologically, the study followed very closely the original study when the CFTIndex was first developed, although reliabilities are not reported.

Inter-subscale correlations vary from  $r = .28$  (between Independence and Flexibility) to  $r = .62$  (between Independence and Integration), with a median of  $r = .47$ . However, 12 of the possible 36 correlations are at or greater than  $r = .50$  and 16 are between  $r = .40$  and  $r = .50$ . This shows the subscales to have moderately correlated with one another. With the given sample size, all correlations are statistically significant ( $p < .05$ ).

When all the items were submitted as one lot for a factor analysis, a general factor was obtained with factor loadings varying from  $\lambda = .788$  (Independence) to  $\lambda = .616$  (Flexibility). However, the authors also followed the original approach by factor-analysing the sets of five items of each subscale. This time, the total variances explained for the subscales are shown in Table 2 together with the

**Table 2. Means, SDs and reliabilities for CFTIndex (N = 31)**

	Total variance	CFTIndex (Manríquez, Carrasco, Navarro, Rivera, & Pizarro, 2005)	
		Mean	SD
Independence	62.1	25.75	3.04
Integration	57.4	25.27	3.83
Motivation	48.2	26.06	2.83
Judgement	51.6	23.55	3.64
Flexibility	37.9	25.70	2.96
Evaluation	61.7	23.41	4.38
Consultation (Question)	43.1	27.56	2.70
Opportunities	54.9	26.46	2.69
Frustration	56.4	25.44	4.08
CFTIndex	52.6	229.26	21.87

means and SDs for the CFTIndex and its nine subscales. Moreover, mean comparisons for each of the three demographic variables (i.e. age, academic qualification and teaching experience) showed no significant differences.

The authors concluded that although the study does not contribute greatly to making theoretical progress, their results do show that creativity behaviour does exist in their university. They further argued that there was a “relevant desirability that acquires a substantive priority, taking into account how important it is for developing professional competencies, the transfer value it has for meaningful learning, and the pertinence it gives to a sensible curriculum” (p. 28).

Comparisons with the original CFTIndex (Soh, 2000) shows that for all subscales the Chile groups had greater means, especially for Independence, Flexibility, Consultation (Question) and Opportunities where the Cohen’s  $d$ ’s indicate large effects. These differences could well reflect the differences in culture, professional status, and age of the Singapore and Chile groups. Since the two studies used the same methodology, these differences are unlikely a methodological effect.

The purpose of Soh and Quek’s (2007) study was to explore further the validity of the CFTIndex using fresh data from another group of Singaporean teachers. Involved in the study were 31 secondary school teachers 97% of whom were university degree holders teaching language. Most of these teachers attended a workshop on creativity techniques (e.g. SCAMPER) a year prior to this study conducted by the first author.

Table 3 below shows the means, SD’s and Cronbach’s  $\alpha$  coefficients for the CFTIndex as a whole and its nine subscales. The reliabilities are generally high, varying from  $\alpha = .62$  (Motivation) to  $\alpha = .85$ , with a median of  $\alpha = .77$ . However, the reliability for the whole scale of 45 items is  $\alpha = .95$ , which is very high for research instrument.

Following the same approach of the original study (Soh, 2000) by factor-analysing the subscales separately, it was observed that Independence, Integration, Flexibility, Evaluation and Frustration retained the original structures, with total variances explained varying from 53% (Evaluation) and 75% (Judgement). The other four subscales each split into two orthogonal factors. Such deviation from the original study was attributed to the smaller sample size and homogeneity of the group in view of their training in creativity techniques prior to the study.

When subscale scores were factor-analysed, comparisons with factor loadings of the original study show high similarity of the two sets of loadings, with a correlation of  $r = .82$ . The original factor loadings vary from  $\lambda = .70$  (Motivation) to  $\lambda = .91$  (Opportunity), the new set of factor loading vary from  $\lambda = .43$  (Motivation) to  $\lambda = .89$  (Flexibility).

**Table 3. Means, SDs and reliabilities for CFTIndex (N = 31)**

	Reliability	CFTIndex (Soh & Quek, 2007)	
		Mean	SD
Independence	.81	22.87	3.45
Integration	.80	23.77	2.88
Motivation	.62	23.81	2.93
Judgement	.76	22.52	3.61
Flexibility	.83	24.42	3.01
Evaluation	.77	21.58	3.53
Question	.70	25.16	2.53
Opportunities	.71	24.52	2.74
Frustration	.85	25.10	3.33
Overall	.95	213.75	21.6

The structure of the CFTIndex appears to be relatively stable in spite of the differences between the original group and the one of this replication. There is also the possible training effect influencing the structure somehow. However, the authors concluded that “the CFTIndex has the potential to provide practical information to a classroom teachers keen on developing students’ creativity” (p. 68).

Comparisons with the original version, the subscale and whole scale means show little difference, perhaps with the exception of Independence, Flexibility, Question and Frustration for which the replication groups scored slightly higher. Cronbach’s  $\alpha$  coefficients are slightly greater for the replication groups for Motivation, Question, Opportunities and CFTIndex as a whole. These differences in the means and reliabilities might be attributable to the fact that the replication groups were more homogeneous, mostly university graduates teaching language in the main. In other words, the findings of the original study have been replicated by and large.

Forrester and Hui’s (2007) study was premised by the hypothesis that “if teachers saw value in creativity as integral to their effective teaching, observed teachers’ classroom behavioural choices would reflect a significant array of creativity-enhancing techniques”.

The study involved 27 primary school teachers (11 males and 16 females) 17 of whom had eight or less years of teaching and 10 had more. Of the teachers, five held a university degree and the rest certificates. They taught Chinese, mathematics and General Studies. The CFTIndex was used as the main data collection instrument, in addition to Gough’s Creativity Personality Scale which has 30 adjectives; a shorter version based on Domino (1970) was used in Soh (2000) and a Chinese Creativity Test. The teachers were observed for their classroom teaching.

Some interesting correlations were observed between teachers’ creativity fostering behaviour and students’ verbal and figural creativity measures. Table 4 was reconstructed by using the data from the article. The correlations lend support to the concurrent validity of the CFTIndex.

The article also reports inter-subscale correlations for the CFTIndex. Of the 36 possible correlations paring two scales, five are  $r > .80$ , 14 are  $.79 > r > .70$ , four are  $.69 > r > .60$  and five are  $.59 > r > .40$ . Of these, the lowest is  $r = .43$  (Integration and Opportunity), the highest is  $r = .89$  (Independence and Judgement), with a median of the correlations is  $r = .74$ . These inter-subscale correlations are comparable in range with those found in Soh’s (2000) original study, although the Hong Kong study has a lower median (as compared with  $r = .82$ ).

Moreover, significance differences were found for creative fostering behaviours among subject groups of teachers. Specifically, Chinese Language teachers scored higher than did Mathematics and General Studies teachers for Independence, Integration, Flexibility and Evaluation. However,

**Table 4. Correlations between teacher behaviour and student creativity**

	Student creativity		Creative personality
	Verbal	Figural	
Independence			.40
Integration			–
Motivation	.39	.39	.43
Judgement			.48
Flexibility			.51
Evaluation		.46	–
Question			.52
Opportunities			.38
Frustration			.34

Note: All correlation coefficients are statistically significant ( $p < .05$ ).

gender, teaching experience and qualification did not influence the teachers' scores for the CFTIndex subscales. Furthermore, multiple regression shows Motivation and Evaluation to predict significantly students verbal creativity.

In their conclusion, the authors noted that there is a need to use instruments for data collection grounded in the classroom context so as to inform in-depth study. They also pointed out that their research question remains unanswered but the study point to possible pathway to its eventual answering.

Although the study does not report as a routine the reliabilities of the CFTIndex and its subscales, it provides interesting new information in the correlations between subscale scores and student creativity; these lead evidence to the validity of the CFTIndex in a different way. It is of note that the correlations with *Creative Person* scores are comparable between the two studies, although that for Integration, Evaluation and CFTIndex are regrettably unavailable from the Hong Kong study.

Within the context of *No Child Left Behind*, Edinger's (2008) study investigated creativity fostering teacher behaviours in a high-stakes standardized testing environment. Twenty 9th and 10th grade teachers from a high school in a large, mid-Atlantic suburban school district were involved in the study. The teachers taught mainly English and Social Studies, with one quarter taught Science or Mathematics. Of these teachers, 45% had five or less years of teaching experience, 25% had 6–10 years and 30% had 16 or more years. At the same time, 35% of the teachers held a Bachelor's degree and 65% a Master's degree.

For data collection, self-report was gathered by using the original CFTIndex; six-point scale was used. However, noting the limitation of such data, a scale relevant to the CFTIndex was used to gather observational data. Classroom observation and face-to-face interviews were conducted with teachers who scored above the 50th percentile of CFTIndex. Table 5 below shows the means and SDs for the subscales and CFTIndex as a whole. As the author reported the mean (and SD) for the average of five items of each subscale, these were rescaled for the original five items. Correlations among the subscales were found to vary from  $r = .67$  (Evaluation and Opportunities) to  $r = .94$  (Opportunities and Frustration). Reliabilities are not reported.

The author was of the view that behavioural strategies appear to be utilized with a high degree of effectiveness. Participants' ability to foster creativity in the classroom was improved by supportive administration and instructional peers but was constrained by a lack of time and the constricting standardized testing environment. Thus, teachers' creativity fostering behaviours and abilities were influenced by both personal and environmental factors.

**Table 5. Means and SDs for CFTIndex (N = 20)**

	CFTIndex (Edinger, 2008)		Rescaled	
	Mean	SD	Mean	SD
Independence	5.08	.60	25.40	3.00
Integration	5.06	.55	25.30	2.75
Motivation	4.97	.68	24.85	3.40
Judgement	4.93	.61	24.65	3.05
Flexibility	4.87	.61	24.35	3.05
Evaluation	4.75	.66	23.75	3.30
Question	4.55	.61	22.75	3.05
Opportunities	4.36	.70	21.80	3.50
Frustration	4.08	.73	20.40	3.65
Overall	4.71	.64	211.95	28.8

Note: The rescaled means and SD's are for five items per subscale using six-point scale as in the original CFTIndex.

The author conclude by suggesting that “Administration can positively influence the teachers’ ability to be creative in the classroom by being open to ideas, by making teachers aware of professional opportunities, and planning meaningful staff development” (p. xi). He further suggested that the CFTIndex could be used for in-depth qualitative research and to explore the relationship between creativity abilities and experience of administration.

A difficulty in the direct use of the information of this study lies with the use of five-point instead of the original six-point scale and the reporting of average score for each subscale instead of the total of item score. The author might have some good reasons to change the format and reporting, but doing so prevent direct comparisons to be made across studies. However, this difficulty is easily overcome by rescaling the scores. Of course, it remains to be seen how the changes affect the interpretation of the results.

Comparisons between the two studies show that the Atlantic group score higher than the original Singapore group on Independent and Judgement but lower on Opportunities and Frustration; the Cohen’s  $d$ ’s indicate medium or large effect. These could be due to cultural difference and, possibly, age of the teachers (the Atlantic group being younger).

In a context of productivity and capacity building, Olawale, Adeniyi, and Olubela’s (2010) study aims to ascertain the creativity fostering behaviour of university lecturers. The study involves forty university lecturers from four universities in Oyo and Ogun States selected randomly, with five males and five females from two faculties of each institution. The age range was between 32 and 64 years with a mean of 44.3 (SD = 2.36). Used for data collection was the CFTIndex which has 45 items forming 9 subscales. Instead of the original six-point scale, a five-point scale was used. Reason for this change is not explicated. However, to facilitate comparisons with the original scale, the means and SD’s were rescaled for six-point scale.

Table 6 below shows the means and SD’s for the 40 lecturers worked out from Tables 1–4 of Olawale et al. (2010) paper. First, it is of note that the Cronbach’s  $\alpha$  coefficients are high, varying from  $\alpha = .74$  (Motivation) to  $\alpha = .86$  and for the CFTIndex as a whole  $\alpha = .74$ . These show that the CFTIndex as a whole is very highly reliable or internally consistent and its nine subscales also have reasonably high reliabilities. In short, the scores yielded by the scale and subscales can be trusted in terms of reliability.

**Table 6. Means, SDs and reliabilities for CFTIndex (N = 40)**

	Reliability	CFTIndex (Olawale et al., 2010)		Rescaled	
		Mean	SD	Mean	SD
Independence	.76	18.3	3.30	21.96	3.96
Integration	.85	21.5	2.17	25.80	2.60
Motivation	.74	20.7	2.76	24.84	3.31
Judgement	.83	18.9	2.87	22.68	3.44
Flexibility	.78	20.5	2.13	24.60	2.56
Evaluation	.69	18.9	3.35	22.68	4.02
Question	.82	21.4	2.67	25.68	3.20
Opportunities	.83	21.2	2.50	25.44	3.00
Frustration	.86	21.8	2.66	26.16	3.19
Overall	.96	182.70	24.39	219.24	29.25

Note: The rescaled means and SD’s are for five items per subscale using six-point scale as in the original CFTIndex.

The authors concluded that “the university lecturers in Ogun and Oyo States exhibited a good amount of productivity and capacity building based on their creativity fostering behaviours” (p. 259). They were convinced that “the university lecturers were resourceful and creative enough thereby contributing meaningfully to the system” (p. 259) and further stressed that “if undergraduates and graduate students are not trained in creativity thinking or behaviour by the lecturers, they would remain passive, potentially vibrant and inactive as before they were admitted to the university” (p. 231). Finally, they called for attention of policy-makers and decision-makers to organize periodic training for university lecturers in creativity fostering behaviour.

In a context of productivity and capacity building, Olanisimi, Adeniyi, and Olawale’s (2011) study aims to ascertain the creativity fostering behaviour of primary school teachers. The study involves 36 special primary school teachers from the Oyo state. The average age of the teachers was 36.8 (SD = 3.7). Data were collected by using the CFTIndex. Five-point scale was used instead of the original six-point scale with 1 indicating *Never* and 5 *Always*. However, the need to change the scale-point was not explained. Table 7 below shows the results, worked from Table 4 of the paper for the three schools.

It was concluded that “Results from the study showed that there was variation across subject, subscales and schools in the capacity building and productivity of teachers” (p. 25). The authors suggest that the special teachers should be creative, resourceful and innovative to adequately meet the needs of the students who have special needs or disabilities, because the absence of such creative teachers could make children with special needs waste away, half-baked and remain dependent for survival. For this reason, the authors further argue, teachers and professionals handling children with special needs should possess adequate amount of creativity fostering behaviours, depicting their productivity and capacity building.

In Hondzel’s (2013) Ph.D. thesis, Hondzel intended to find out the creativity fostering behaviours of primary school teachers. The study involved 22 Grade 5 to 7 teachers from across Southern Ontario. The schools were located in city, town, village and remote rural community. There were 4 male and 18 female teachers in the sample. The average years of teaching experience is 12.5 (SD = 8.7), with 2 teachers aged below 29, 13 aged 29–41, and 7 aged 42–55.

In the first stage of the study, teachers completed online the CFTIndex and, in the second stage, they were observed in the classroom as well as interviewed. The original six-point scales were used but reported as the averages of five items for each subscale. To facilitate comparisons, the means

**Table 7. Means and SDs for CFTIndex (N = 36)**

	CFTIndex (Olanisimi et al., 2011)		Rescaled	
	Mean	SD	Mean	SD
Independence	19.14	2.33	22.95	2.80
Integration	20.83	2.68	25.00	3.20
Motivation	20.64	2.14	24.75	2.55
Judgement	19.39	2.39	23.25	2.85
Flexibility	20.14	3.41	24.15	4.10
Evaluation	18.36	3.36	22.05	4.05
Question	20.03	2.51	24.05	3.00
Opportunities	20.97	2.88	25.15	3.45
Frustration	20.16	2.71	24.20	3.25
Overall	179.64	24.39	215.55	29.25

Note: The rescaled means and SD’s are for five items per subscale using six-point scale as in the original CFTIndex.

and SD's were rescaled for five items per subscale. As shown in Table 8, the Cronbach's  $\alpha$  coefficients for the nine subscales are generally high and the median of the  $\alpha$  coefficients is  $\alpha = .83$  which is greater than the conventionally expected  $\alpha = .7$  for research instrument, though somewhat lower for the expected  $\alpha = .9$  for making decisions on individuals.

Independent t-test shows no differences between male and female teachers as well as between teachers teaching in urban and rural locations. There is a moderate correlation between years of teaching experience with overall CFTI ( $r = .51$ ), Motivation ( $r = .59$ ), Opportunities ( $r = .44$ ) and Flexibility ( $r = .51$ ).

The author concludes that "the strategies teachers use to foster creativity in students should then emphasise the well-rounded and imaginative development of children while tolerating behaviours associated with creative production... These strategies tended to fall into one or more of four categories: differentiated instruction, emotional variables, collaboration, and experiential learning" (p. 123).

The purpose of Dikici's (2013) study was to evaluate the language equivalence, validity and reliability of the CFTIndex when used with Turkish teachers. The translation of the original English version into the Turkish version involved 30 lecturers from the Nigde University School of Foreign Languages. There were 20 female and 10 male respondents. There were 6 respondents aged 25 or younger, 12 aged 26–35, and another 12 aged 36 or older. Twelve of the lecturers had five or less years of teaching experience, 15 had between 6 and 15 years of teaching experience, and 3 had more than 16 years.

The Turkish version of the CFTIndex was then completed by 288 teachers from 13 primary schools in the Nigde city centre. Instead of the original six-point scale, a five-point scale was used and there is no explanation for this change. Of these teachers, 148 (51.4%) were females and 140 (48.6%) were males. The majority of the teachers were between 20 and 30 years old, and 104 (36.1%) of the teachers have between one and five years of teaching experience, with another 86 (29.9%) worked as novice teachers. Moreover, 125 (55%) of the teachers taught mainly elementary classes. Back-translation was conducted to check translation equivalence and it was decided to use a five-point scale instead of the original six-point scale after a discussion. Reason for changing the scale length is not given.

The 30 lecturers completed the original English version first and then the Turkish version one week later. In both cases, the original six-point scale was used. Scores for the two versions were calculated and the correlations varied from a low  $r = .32$  (item 2) to a very high  $r = .89$  (item 38). Seven of the forty-five correlations are significant at the .05 level and the remaining 38 items have correlations significant at the .01 level.

**Table 8. Means and SDs for CFTIndex (N = 22)**

	Cronbach's $\alpha$	CFTIndex (Hondzel, 2013)	Rescaled		
		Mean	SD	Mean	SD
Independence	.76	4.28	.72	21.40	3.60
Integration	.85	5.45	.38	27.25	1.90
Motivation	.74	4.78	.58	23.90	2.90
Judgement	.83	4.45	.57	22.25	2.85
Flexibility	.78	4.78	.56	23.90	2.80
Evaluation	.69	4.82	.61	24.10	3.05
Question	.82	4.78	.60	23.90	3.00
Opportunities	.83	5.18	.48	25.90	2.40
Frustration	.86	4.93	.67	24.65	3.35
Overall	.83	4.82	.40	216.90	18.00

Note: The rescaled means and SD's are for five items per subscale as in the original CFTIndex.

Factor analysis of the primary school teachers' responses yielded nine factors explaining 59.12% of the total variance. Varimax rotation was employed to obtain orthogonal factors. The Kaiser-Meyer-Olkin MSA of .925 indicates a perfect sampling adequacy. There is however a difference in the approach of data analysis when compared with the original study: in this study, all 45 items were factor-analysed together at one run, whereas the nine subscales were factor-analysed separately in the original development of the CFTIndex. Table 9 below was reconstructed from the text which reports that "These results were similar to the construct validity results of the original scale developed by Soh (2000)" (p. 321). For this reason, the author retained the original names of the subscales.

In Table 9, however, 12 items which did not satisfy the criterion for item retention were excluded. For the retained 33 items as a whole, the Cronbach's  $\alpha$  coefficient is  $\alpha = .94$ . For the subscales, the lowest is  $\alpha = .57$  for subscale 6 (Evaluation) and the highest if  $\alpha = .77$  for subscale 3x (Motivation). For these, the author asserts that "It is nearly impossible in the areas of education and psychology to develop a scale with a reliability coefficient of + 1. For this reason, it can be said that Cronbach's Alpha coefficients obtained from the scale and subscales is sufficient" (p. 321). Moreover, item-total correlations of the subscales were estimated and these vary from  $r = .29$  to  $r = .66$ . Correlations among the nine subscales were also estimated and the lowest is  $r = .26$  between Independence (subscale 1) and Question (subscale 7) and the highest is  $r = .74$  between Integration (subscale 2) and Flexibility (subscale 5).

Following the exploratory factor analysis which yielded the above results, a confirmatory factor analysis was run to verify the obtained structure. This was confirmed by the goodness-of-fit statistics such as  $\chi^2/df = 1.409$  and root mean square error of approximation RMSEA = .038, both falling within the desired limits. The author then concluded that "These values, which take account of sample size and complexity of model, demonstrate good fit" (p. 321).

With the results above, the author concluded that "The behaviours and practices of teachers in class are important to foster student creativity... . As a result of the language equivalence analysis, high correlation was observed between the Turkish and English forms of the CFTIS, developed by Soh (2000) ... . It can be recommended to the researchers who will used the scale to make their interpretation according to 33 items and nine subscales" (p. 321).

The purpose of Belio and Urtuzuastegul's (2013) study was to determine the opinion of the faculty members regarding their creativity fostering behaviour. This study involved 34 faculty members and 202 students. Data were collected by using the 45-item six-point scales of the CFTIndex, translated from English into Spanish, with some modification of the items to suit the students. The original six-point scale was used.

**Table 9. Factor analysis results**

Factor	Item	Loading
Independence	1, 37	.392, .609
Integration	2, 11, 20	.431 - .705
Motivation	3, 12, 21	.476 - .551
Judgement	13, 22, 31, 40	.362 - .656
Flexibility	5, 14, 23, 32	.405 - .482
Evaluation	15, 33, 42	.476 - .779
Question	7, 16, 34, 43	.606 - .775
Opportunities	8, 17, 26, 35	.604 - .725
Frustration	9, 18, 27, 36, 45	.442 - .683

Note: For item content, see [Appendix](#).

**Table 10. Means and SDs for CFTIndex**

	CFTIndex (Belio & Urtuzuastegui, 2013)		Rescaled		
	Faculty	Students	Faculty	Students	Difference
Independence	5.1	4.3	25.5	21.5	4.0
Integration	5.3	4.2	26.5	21.0	5.5
Motivation	5.0	4.2	25.0	21.0	4.0
Judgement	4.7	4.1	23.5	20.5	3.0
Flexibility	4.8	4.0	24.0	20.0	4.0
Evaluation	4.8	4.0	24.0	20.0	4.0
Consultation	5.5	4.2	27.5	21.0	6.5
Opportunities	5.2	4.3	26.0	21.5	4.5
Frustration	5.4	4.0	27.0	20.0	7.0
Overall	5.1	4.1	228.60	186.3	42.3

Note: The rescaled means and SD's are for five items per subscale using six-point scale as in the original CFTIndex.

Demographic data includes gender, age, academic qualification and teaching experience. These, however, were found to be unrelated to the CFTIndex scores. Table 10 shows the scores of the faculty members and students for the CFTIndex and its nine subscales. In the original article, average scores for the five items of each subscale were reported. These were rescaled for five items. However, SD's and reliabilities are not available from the article, except that for the CFTIndex as a whole has an  $\alpha = .98$  which is much greater than the  $\alpha = .70$  expected of research instrument.

An interesting aspect of this study is the comparisons of faculty's scores with students' scores. As shown in Table 10, there are generally differences between the faculty's and students' scores, in favour of the former group. Such differences show either over-reporting by the faculty on their own creativity fostering behaviour or under-reporting by the students on their teachers, or both. The three largest differences are for Frustration, Consultation (originally, Question) and Integration. In a sense, these are the aspects worthy of more attention if student creativity is to be fostered.

The authors also classified the faculty members into five groups in terms of teaching experience. Table 11 shows the overall CFTIndex scores for the groups. It is interesting to note that the greater faculty-student discrepancies are found for the faculty members with less than six years of teaching experience and also for those with more than 20 years, while the three groups in-between have much smaller discrepancies. In other words, the least and the most experienced faculty members tended to over-reporting their creativity fostering behaviour or, alternatively, their students under-reported.

The authors concluded effective teaching depends on many factors, some of which are unalterable such as age and gender while others can be acquired through experience. The students, on average, feel that their teachers are moderately creative in their teaching while the teachers themselves believe that they are highly creative.

The purpose of Lee and Kemple's (2014) study (a PhD thesis) was to examine the pre-service teachers' personality traits, engagement in creative activities and beliefs about the teaching practices that have been shown to support children's creativity. The study involved a total of 302 early

**Table 11. CFTIndex scores for groups of teaching experience**

	Under 6 years	6–10 years	11–15 years	16–20 years	Above 20 years
Faculty	26.4	25.6	25.4	24.3	25.9
Students	16.4	23.1	23.8	21.8	17.7
Difference	10.0	2.5	1.7	2.4	8.2

childhood and elementary pre-service teachers from a university in the southern part of the USA. Personality traits were measured with a 10-item inventory for the Big Five Factors (i.e. Openness, Conscientiousness, Agreeableness, Extraversion and Emotional Stability). Engagement in creative activities was measured with a 28-item Creative Behaviors Inventory which had four components for visual art, literary arts, drama and receiving arts awards. Support for children's creativity was measured by using the CFTIndex. However, through a confirmatory factors analysis, the CFTIndex was modified to have only three items each for the nine subscales instead of the original five items.

A mediation model was hypothesized with engagement as the mediator between personality and creativity fostering behaviour. Multiple regression analysis results supported the hypothesized model.

The findings indicate that pre-service teachers with higher scores on Openness had more engagement in creativity-related experiences. Those with higher scores on Openness and who creativity-related experiences were more likely to espouse creativity fostering teaching styles. Moreover, pre-service teachers' own creativity-related experiences fully/partially mediated the relationship between Openness and CFTIndex scores.

This study introduces personality traits as a set of predictors of creativity fostering behaviour, with engagement in creative activities as the moderator. This is a welcome feature that brings about a better understanding of teacher behaviour and this is does not found in the other studies using the CFTIndex. However, the reduction of items down to three for each subscale needs be cautious; a (sub-)scale normally needs 8–12 to be stable and the five items per subscale in the original CFTIndex is already on the low side. The Cronbach's  $\alpha$  coefficients for the modified three-item subscales vary from  $\alpha = .71$  (Flexibility) to  $\alpha = .80$  (Independence) although it is  $\alpha = .91$ . These are somewhat lower than the average reliabilities (Table 12 below).

### 3. Integration and prospect

Although not all studies annotated here present reliabilities of the data, it is interesting to have the available reliabilities integrated for an overview of the CFTIndex and its subscale to evaluate how much trust they deserve. Table 12 shows the sample-size weighted average of the Cronbach's  $\alpha$  coefficients available in some of the cited studies. As shown therein, the five subscales which have reliabilities  $\alpha > .80$  are Frustration, Integration, Judgement Opportunities and Question. Those with lower reliabilities ( $\alpha < .80$ ) are Flexibility, Independence, Motivation and Evaluation. The CFTIndex as a whole has reliability of  $\alpha = .85$ . Thus, generally, the CFTIndex and its subscales yielded reliable scores and can be confidently used for further research.

**Table 12. Reliabilities for CFTIndex (N = 210)**

	Average $\alpha$	Rank
Independence	.75	7
Integration	.85	2
Motivation	.74	8
Judgement	.83	3.5
Flexibility	.78	6
Evaluation	.69	9
Question	.82	5
Opportunities	.83	3.5
Frustration	.86	1
Overall	.85	–

The information from the various studies was combined for a broader view of the nine subscales and the CFTIndex as a whole. For those studies which have reported *both* the means and SDs, sample-size weighted means and SD's were calculated. As shown in Table 13, Integration, Motivation and Opportunities have the highest means. They indicate that teachers of the studies displayed these three creativity fostering behaviours more visibly. In the middle range are Question, Frustration and Flexibility. The lowest means go to Judgement, Evaluation and Independence. This suggests that teachers found it more difficult to withhold their judgement on students' ideas and suggestions, to refrain from premature evaluation these, and to encourage students' independent learning. Thus, if training is to be offered to foster teachers' creativity fostering behaviours, these three will need more attention and effort.

The SD's are also interesting. The three widest spread of scores go to Evaluation, Judgement and Flexibility, indicating that teachers had less agreement for these. On the other hand, the three narrowest spread of scores go to Opportunities, Question and Motivation, suggesting that teachers were more agreeing in these. In-between are Frustration, Independence and Integration.

Integrating the two sets of rankings for the means and SD's, it is obvious that Evaluation and Judgement both have low means and high SD's. This implies that if training are to be given, trainers are likely to find it more difficult to raise the level and, at the same time, to attain greater consensus.

Having had the studies thus annotated and their information integrated, a logical question is, *Where do we go from here?*

Whether creativity is born or bred is a nature–nurture question beyond the scope of this article. Nevertheless, the current mood and belief is that creativity can be fostering, as evidenced by many writings posted on the Internet and more formal publications (e.g. Cropley & Cropley, 2013). In this context, CFTIndex seems to have proven that it is a data collection tool much needed by creativity researchers, especially those who are concerned with the development of student creativity. An extension to this is the development of child creativity by parents and hence the CFTIndex can be adapted to measure creativity fostering parental behaviour. Moreover, since the school and the family are partners in developing the child, researchers could well include both teachers and parents in their studies of child creativity. Besides, parenting educators could benefit by including creativity fostering parental behaviour as part of their programmes by following the nine principles propounded by Cropley (1997) and modify the CFTIndex as both research tool and instructional material.

As gathered from the experience of this annotation, for research purposes, there is an obvious need to have a standard procedure to enable comparisons among studies.

**Table 13. Integration of means and SDs for CFTIndex**

Subscale	CFTIndex		Ranking	
	Mean	SD	Mean	SD
Independence	22.34	3.44	9	5
Integration	24.85	3.35	1	6
Motivation	24.35	3.12	2	9
Judgement	22.70	3.54	7	2
Flexibility	23.53	3.54	6	3
Evaluation	22.59	3.65	8	1
Question	24.16	3.18	4	8
Opportunities	24.29	3.26	3	7
Frustration	24.10	3.48	5	4
Overall	212.67	26.82	–	–

Firstly, keep close to the original six-point scale with five items for each subscale and report the total score accordingly. Researchers may have different research environments which require them to modify; for instance, they may use a five-point scale or report average item score as subscale score as has been done in some studies annotated above. This makes their studies not directly comparable with others'. If it is imperative to modify, also reported rescaled scores as have been demonstrated above. A study standing alone, however well done, has little usefulness; ensuring or facilitating comparisons with other like studies enhances its value in a wider context. Moreover, on a technical note, using six instead of five points for the scale is to minimize the respondent's tendency of choosing the neutral category and, at the same time, to maximize variance which is important for correlation analysis and related statistical technique, e.g. factor analysis.

Secondly, make it a good habit to report the SD when reporting the mean. This serves two useful purposes. The mean shows the averaged performance level of a group but does not show the spread of its scores which has implication for its precision and hence trustworthiness. Next, for comparison by either the statistical significance test or the effect size, or both, the SD is needed for calculation. As alluded to above, comparison with other studies enhance the value of an otherwise isolated study. This requires the SD.

Thirdly, also make it a good habit to report reliabilities of the CFTIndex and its nine subscales. This information enables other researchers to decide how much they can trust what has been reported in a study. Since CFTIndex is a social measure and social measures tend to be more fallible, reporting reliabilities also serve the purpose of cautioning other researchers not to over-trust a set of research outcomes but to take due caution against over-interpretation which may lead to misinformation and wrong decision.

In conclusion, the CFTIndex has made its contribution to one aspect, and an important one at that, of creativity research. In view of the recent Ph.D. dissertations and other studies which used it for data collection, and in view of the prevalent mood about creativity fostering, more studies like those annotated here can be expected. Thus, this annotation may serve a pivotal function in summing up what has taken place hitherto and bridge over to new researcher. Hopeful, this annotation helps in bringing to future researchers' awareness of what has been done by their predecessors and what they themselves can add to the field, with more informed methodology.

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## Appendix

Items of the Creativity Fostering Teacher Behaviour Index (CFTIndex)

Subscale	Item	Item content
1. Independence	1	I encourage students to show me what they have learned on their own
	10	I teacher my students the basics and leave them to find out more for themselves
	19	I leave questions for my students to find out for themselves
	28	I teach students the basics and leave room for individual learning
	37	I leave open-ended questions for my students to find the answers for themselves
2. Integration	2	In my class, students have opportunities to share ideas and views
	11	Students in my class have opportunities to do group work regularly
	20	Students in my class are encouraged to contribute to the lesson with their ideas and suggestions
	29	I encourage students to ask questions and make suggestions in my class
	38	Students in my class are expected to work in group cooperatively
3. Motivation	3	Learning the basic knowledge/skills well is emphasized in my class
	12	I emphasize the importance of mastering the essential knowledge and skills
	21	My students know that I expect them to learn the basic knowledge and skills well
	30	Moving from one topic to the next quickly is <b>not</b> my main concern in class
	39	Covering the syllabus is <b>not</b> more important to me than making sure the students learn the basics well
4. Judgement	4	When my students have some ideas, I get them to explore further before I take a stand
	13	When my students suggest something, I follow it up with questions to make them think further
	22	I do not give my view immediately on students' ideas, whether I agree or disagree with them
	31	I comments on student's ideas only after they have been more thoroughly explored
	40	I encourage students to do things differently although doing this takes up more time

(Continued)

Appendix (Continued)

Subscale	Item	Item content
5. Flexibility	5	In my class, I probe students' idea to encourage thinking
	14	I encourage my students to ask questions freely even if they appear irrelevant
	23	I encourage my students to think in different directions even if some of the ideas may not work
	32	I like my students to take time to think in different ways
	41	I allow my students to deviate from what they are told to do
6. Evaluation	6	I expect my students to check their own work instead of waiting for me to correct them
	15	I provide opportunities for my students to share their strong and weak points with the class
	24	My students know that I expect them to check their own work before I do
	33	In my class, students have opportunities to judge for themselves whether they are right or wrong
	42	I allow my students to show one another their own work before submission
7. Question	7	I follow up on my students' suggestions so that they know I take them seriously
	16	When My students have questions to ask, I listen to them carefully
	25	My students know I do not dismiss their suggestions lightly
	34	I listen to my students' suggestions even if they are not practical or useful
	43	I listen patiently when my students ask questions that may sound silly
8. Opportunities	8	I encourage my students to try out what they have learned from me in different situations
	17	When my students put what they have learned into different uses, I appreciate them
	26	My students are encouraged to do different things with what they have learned in class
	35	I don't mind my students trying out their own ideas and deviating from what I have shown them
	44	Students are allowed to go beyond what I teach them within my subject
9. Frustration	9	My students who are frustrated can come to me for emotional support
	18	I help students who experience failure to cope with it so that they regain their confidence
	27	I help my students to draw lessons from their failure
	36	I encourage students who have frustration to take it as part of the learning process
	45	I encourage students who experience failure to find other possible solutions

Note: The items were presented with "All the time 6 \_ 5 \_ 4 \_ 3 \_ 2 \_ 1 Never".



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