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Teaching for Creativity Scales: An Instrument to Examine Teachers' Perceptions of Factors That Allow for the Teaching of Creativity

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Creativity is valuable for individuals and society; it is thus important to understand how creativity can be fostered and encouraged. Teachers have a unique opportunity to promote creativity among their students. Teaching for Creativity Scales analyze constructs that influence teachers' perceptions of teaching for creativity. Approximately 650 teachers completed the survey. In the exploratory factor analysis, the items fit a 4-factor structure, producing 4 subscales: teacher self-efficacy, environmental encouragement, societal value, and student potential. The instrument was revised and distributed to additional teachers for a confirmatory factor analysis. With a few item deletions, the proposed model was a good fit for the data (CMIN/df = 1.819, CFI = .923, TLI rho2 = .917, RMSEA = .053). With continued testing and revisions, this instrument could be useful for measuring perceptional changes due to designed interventions, comparing different populations of teachers, and describing creativity perceptions at a given school.

The beauty of creativity lies in its universality. Creativity is valuable for both individuals and society. It is essential for growth in any field. Companies require creative thinkers to develop comprehensive marketing strategies and generate new products and services (Florida & Goodnight, 2005). Higher education requires the formulation of innovative questions and research designs that address them (European University Association, 2007). Creativity is not only necessary for societal advancement and development of disciplines, but it also facilitates psychological fulfillment (Runco, 2004). Creativity may also promote motivation, positive mental states, educational achievement, and development of personality within students (Freund & Holling, 2008; Mindham, 2004; Torrance, 1976).

Given the immense benefits of creativity, it is important to understand how creativity can be fostered and encouraged. Creativity can be taught; individuals can become more creative (Davidson & Sternberg, 1984; Sternberg & Williams, 1996). For example, Niu and Sternberg's (2003) research demonstrated the potential for creative growth through their analysis of Chinese students. When students were given direct instructions to be creative or guidance on how to be more creative, the students' creativity increased. Oreck (2001) also found that children engaged in self-exploratory activities develop stronger creative abilities and appreciation.

Because creativity is important and can be fostered, educators share the responsibility of ensuring students are taught and encouraged to be creative. Although it is possible for teachers to use their influence to promote creativity (e.g., Hennessey, 2004; Piirto, 2007; Renzulli, Gentry, & Reis, 2007), they also may discourage it. Although teachers claim to value creativity, Westby and Dawson (1995) found a significant negative correlation between teachers' favorite students and the creative prototype. Additional research provides

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evidence for a more nuanced perception in which teachers find some creative characteristics desirable and others less so (Chan & Chan, 1999; Runco & Johnson, 2002). Teachers tend to view creative children as more disruptive to the classroom environment (Scott, 1999). Even beyond teachers' perceptions of individual creative students, teachers tend to prefer expected and immediately relevant answers rather than unique responses that demonstrate creativity (Beghetto, 2007, 2009; Westby & Dawson, 1995).

As there is the possibility for promotion and inhibition of creativity in the classroom, it becomes important to understand the factors that influence a teacher's commitment to students' creativity development. One potential factor may be teachers' implicit conceptions of creativity, as teachers may not subscribe to specific explicit conceptions proposed and defined by creativity researchers (Plucker, Beghetto, & Dow, 2004; Runco & Johnson, 2002; Runco, Johnson, & Baer, 1993). Teachers' implicit conceptions may go beyond the characteristics of creative students and include their beliefs on whether all students have the potential to be creative.

If there are specific attitudes and perspectives that influence teachers' ability to foster creativity in the classroom, is it possible to affect those attitudes? Several studies have quantitatively examined attitude shifts and practice adaptations in creativity training (for example, in corporate settings) but not within the field of education. Rickards (1975) attributed a lack of personal creative enhancement following training to an inability of the experimental participants to change their attitudes toward divergent thinking. He concluded that long-term creative growth requires a fundamental change of attitude, begging the question if it is possible to have a change in attitude towards creativity. Focusing on the divergent thinking component of creativity, other studies have concluded that improved attitudes toward divergent thinking accompanied increases in divergent thinking practiced and creative performance after appropriate training (Basadur & Hasdorf, 1996; Basadur, Taggar, & Pringle, 1999).

In the education field, Park, Lee, Oliver, and Cramond (2006) qualitatively examined teachers' perceptual changes of creativity fostered by professional development experiences. The authors interviewed four participants and received questionnaires from approximately 35 participants. They found that the professional development experience broadened participants' perception of student creative potential, encouraged the beliefs that creativity in their current environment was possible, and supported the idea that creativity could be enhanced in the classroom in meaningful ways. These intriguing findings are the impetus behind this study, as they have inspired the development of Teaching for Creativity Scales to provide future educational researchers and professional development specialists the ability to quantitatively observe participants' perceptional shifts.

Other studies also have examined teachers' implicit conceptions of creativity using adjective word lists (e.g., Runco & Johnson, 2002), surveys (e.g., Kampylis, Berki, & Saariluoma, 2009), vignettes (e.g., Hong & Kang, 2010), and interviews (e.g., Bolden, Harries, & Newton, 2010), but none of the other studies in our literature search attempted to validate an instrument to assess these conceptions. Teaching for Creativity Scales was designed to fill this gap. The primary goal of this study was to design an instrument that would measure teachers' implicit beliefs that affect their ability to teach students to become more creative. Specifically, we were interested in creating an instrument that would examine the following questions: Do teachers believe that all students can learn to be more creative? Do teachers feel capable of fostering creativity in their classrooms? Do they believe that creativity is important to promote?

GENERAL METHODS

To develop the instrument, we consulted with the existing literature to ensure that our instrument provided a unique contribution and to integrate knowledge of important factors influencing creativity from a variety of fields. In the organization management field, Basadur and collegues (Basadur & Hasdorf, 1996; Basadur et al., 1999) developed a scale measuring divergent thinking attitudes. Their instrument examined three factors: valuing new ideas, belief that creativity is not for only a select few (creative individual stereotypes), and not feeling too busy for new ideas. Although the goal of the Teaching for Creativity Scales is significantly different from Basadur et al.'s scale, we integrated some of the main ideas from that instrument into our own. For example, the Basadur et al.'s Valuing New Ideas factor is similar to our Societal Value factor, but the Societal Value factor not only examines if new ideas are valuable, but also if creativity, which encompasses more than new ideas, is valuable in general for society. In addition to scale content, we consulted Basadur et al.'s work for guidance with the scaling of the instrument. In their first study, they used a 5-point Likert scale but further recommended a scale with higher resolution such as a 7-point or 9-point scale. Their recommendation was considered in the construction of the current scale selection of a 7-point scale.

Through the integration of literature and theory, we designed Teaching for Creativity Scales to measure four constructs: teacher self-efficacy, environmental encouragement, societal value, and student potential. The first

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subscale, teacher self-efficacy, examines teachers' perceived ability to foster creativity in their students. Bandura's (e.g., 1986, 1997) work on self-efficacy provided theoretical support for the inclusion of this subscale. Bandura (1997) found that individuals' beliefs about their ability affect both their motivation and actual actions. It would follow that teachers would need to think that they are capable of fostering creativity within their students in order for them to take appropriate actions to do so. Thus, this subscale focuses on whether or not teachers believe themselves capable of teaching their students to be more creative. High scores on this subscale indicate that teachers feel very efficacious in their ability to help students become more creative, whereas low scores on this subscale reflect that teachers do not personally feel capable of increasing students' creativity.

The second subscale, environmental encouragement, examines how teachers perceive their current environment and specifically refers to the local school atmosphere in which the teacher operates. Many researchers have delineated the effect of one's environment on creativity (Simonton, 2012). Specifically, Amabile's (1998) research delineated the importance of the organization environment, finding that the environment needs to provide a combination of challenge, freedom, resources, appropriate work-group features, supervisory encouragement, and organizational support for individuals to create. Further, many researchers have voiced the potential for the standards movement to stifle students' creative development (Beghetto & Plucker, 2006; Dobbins, 2009; Grainger, Barnes, & Scoffham, 2004; Hartley, 2003). Thus, this subscale measures teachers' perceptions of their environment, focusing on local environmental freedom and administrational support. A high subscale score on this factor indicates a favorable environment for creativity, and a low subscale score indicates an unsupportive environment for the growth of creativity.

The third subscale, societal value, assesses teachers' perceived value of creativity for society as a whole. Both the Expectancy Value Theory (Wigfield & Eccles, 2000) and the Achievement Orientation Model (Siegle & McCoach, 2005) are motivational theories that include value as a key component of motivation, and motivation is necessary for action. Many studies have demonstrated the effect of valuing an outcome on performance (e.g., Schiefele, Krapp, & Winteler, 1992; Rubenstein, Siegle, Reis, McCoach, & Burton, 2012; Siegle, Rubenstein, Pollard, & Romey, 2010). Therefore, it is possible that for teachers to promote creative development within their classrooms, they must first think that creativity is valuable and worth promoting. This subscale assesses teachers' perceptions on the general value of creativity for any field or endeavor. This scale does not measure whether the general society values creativity but rather if the teacher believes creativity is valuable for society. A high subscale score indicates a belief that creativity is very valuable for the good of society, and a low subscale score is indicative of the belief that creativity is not useful for society.

The final construct is student potential, which addresses teachers' perceptions of the potential for students to become more creative. Plucker and Beghetto (2003) and Plucker et al. (2004) described biggest obstacle for the enhancement of creativity as the belief that individuals are either born creative or they are not. Building upon this concept, Makel (2009) proposed that this implicit mindset about creativity could be compared with Dweck's (1986) work, suggesting that just as one's beliefs about intelligence influences one's motivation and actions so can one's beliefs about creativity. Therefore, if teachers believe that students do not have the ability to grow in personal creativity, then, it would follow that these teachers would not make creativity development a priority in the classroom. This subscale was designed to address this potential belief. A high subscale score indicates a teacher's belief that all students can become more creative, and a low subscale score suggests that the teacher believes that not all students can learn to be more creative.

From these four constructs, we generated 50 items, and all items were placed on a 7-point Likert scale with 7 representing *strongly agree* and 1 representing *strongly disagree*. Eight independent reviewers who were either experts in education and/or creativity or practicing teachers initially validated the instrument's content. Three additional reviewers offered helpful comments regarding the instrument but did not complete the review form. The eight reviewers examined each item and predicted under which factor it belonged, how certain they were of their choice, and the relevance of the item. Three items were deleted in the process, and 18 items were reworded for clarity. Following this initial content validation, we assessed the instrument factor structure through an exploratory factor analysis and then further analyzed the instrument using a separate sample for a confirmatory factor analysis.

STUDY 1: EXPLORATORY FACTOR ANALYSIS

Participants

Study 1 participants were recruited across the United States. We targeted four specific states, and the rest of the participants were recruited from across the country using a graduate degree program electronic list serve. A total of 308 teachers participated in this study, and

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TABLE 1
Items for the Exploratory Factor Analysis

1. I am capable of helping students to become more flexible in their thinking.
2. All students can develop original ideas.
3. Thinking about topics in unique ways is important.
4. Creativity is an ability that only a few students possess.
5. I am capable of enhancing my students' abilities to take meaningful academic risks.
6. I am capable of fostering creative problem solving in my classroom.
7. When individuals approach problems in unique ways, they add to humanity's knowledge of the world.
8. I feel free to teach students to think more creatively.
9. I have time to teach students to think more creatively.
10. Inventive thoughts are necessary for growth in any field of study.
11. Teaching creative thinking is one of my strengths.
12. I am capable of creating a safe atmosphere that fosters risk taking.
13. I am capable of increasing my students' abilities to create unique solutions.
14. Students can learn how to ask meaningful questions.
15. Students are either creative or they are not.
16. Without new and creative ideas, America could be left behind.
17. Teaching creative thinking would be frowned upon in my school.
18. My school's priorities do not include teaching students to think creatively.
19. Creativity can save lives.
20. I am capable of developing a classroom atmosphere that welcomes imagination.
21. Students can improve in their ability to think outside the box.
22. All students can grow in their creative problem solving skills.
23. If there were more creative people, more problems would be solved.
24. New ideas must be generated to enact positive change.
25. My administration encourages me to foster innovative thinking in my students.
26. All students can contribute innovative thoughts to a discussion.
27. There are only a few creative students.
28. I am capable of promoting flexible thinking.
29. Factors outside my control make it difficult to foster creative student thinking.
30. My current school environment does not encourage teachers to produce independent thinkers.
31. All students can learn to produce something innovative.
32. I am capable of helping my students to see the world from new perspectives.
33. Students can learn how to design experiments to test original ideas.
34. I am capable of teaching my students to find connections in seemingly unconnected ideas.
35. We really need creative people.
36. Innovative ideas can move society forward.
37. It is possible to give students the freedom to explore topics within my school environment.
38. Many students can become more curious.
39. Only a few exceptional people are inventive.
40. I am capable of increasing the quantity of original thoughts my students have.
41. One good idea is worth the time it takes to generate a hundred bad ones.
42. I am capable of helping students to elaborate on their own unique ideas.
43. Old problems can be solved with new ideas.
44. I am unsure of how to foster creativity in my classroom.
45. My current school environment places little value on the development of student creativity.
46. Teaching creative problem solving is not one of my strengths.
47. It is a priority in my school to increase students' inventiveness.

TABLE 2
Pattern Coefficients for Teaching for Creativity Scale from the Exploratory Factor Analysis

Item Number	*Factor 1: Teacher Self-Efficacy*	*Factor 2: Environmental Encouragement*	*Factor 3: Societal Value*	*Factor 4: Student Potential*
1	.787			
28	.785			
13	.761			
11	.747			
42	.713			
44R	.713	.148	−.175	
46R	.698		−.146	
6	.698			−.111
40	.694	−.103	.135	
5	.660			−.146
12	.652			
34	.647			−.148
20	.591		.128	
32	.548		.186	−.186
8	.402	.325	.126	
38	.338		.292	−.192
30R	−.204	.841		
45R		.831		
18R		.780		
25		.723	.141	
17R		.680		
47		.598		
37	.234	.499		
29R		.404		−.166
9	.357	.372		
36			.829	
35	.118		.772	
16	−.182		.737	
24			.686	
23			.653	
19			.649	
43			.643	
7	.132		.596	
10			.566	−.158
41			.374	−.134
21	.244		.360	−.231
3	.256		.342	−.122
15R				−.689
27R				−.687
26		.133		−.678
31				−.652
4R				−.630
39R			−.113	−.585
2	.125			−.563
22			.276	−.527
33	.298		.116	−.407
14	.243		.239	−.277

Note. Teachers ($n = 263$). Loadings below .100 were suppressed.

the majority of the participants were women (81%). A slight majority had been teaching for at least 10 years (55%) and held at least a master's degree (68%). An overwhelming majority (90%) indicated they liked or loved their jobs.

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TABLE 3
Structure Coefficients for Teaching for Creativity Scale from the Exploratory Factor Analysis

Item Number	*Factor 1: Teacher Self-efficacy*	*Factor 2: Environmental Encouragement*	*Factor 3: Societal Value*	*Factor 4: Student Potential*
28	.825	.185	.388	−.414
13	.810	.215	.398	−.383
42	.769	.119	.408	−.420
11	.764	.232	.367	−.275
6	.755	.231	.326	−.415
40	.747		.453	−.385
1	.744	.113	.313	−.268
5	.729	.121	.378	−.441
34	.727		.427	−.450
32	.690		.492	−.484
20	.685	.201	.395	−.367
44R	.663	.326	.106	−.236
12	.656	.215	.281	−.240
46R	.652	.200	.157	−.273
38	.538		.508	−.444
8	.513	.406	.256	−.213
9	.468	.456	.168	−.227
45R	.227	.845		
30R		.797	−.133	
18R	.113	.774	−.149	
25	.261	.720	.101	−.142
17R	.135	.672		
47	.184	.619		
37	.367	.542	.133	−.139
29R	.115	.426		−.172
35	.426		.792	−.277
36	.302		.784	−.213
24	.315		.697	−.253
7	422		.677	−.355
43	.321		.673	−.337
23	.302	−.132	.667	−.197
16	.150		.665	−.223
19	.267	−.121	.648	−.192
10	.329		.640	−.378
21	.484		.553	−.465
3	.448		.498	−.358
41	.234		.435	−.282
26	.294	.188	.304	−.697
27R	.320	.118	.239	−.693
15R	.271		.303	−.691
31	.282	.106	.298	−.667
4R	.317		.209	−.637
22	.295		.449	−.609
2	.344	.107	.200	−.595
33	.512		.397	−.574
39R	.258		.132	−.566
14	.457		.447	−.468

Note. Teachers ($n = 263$). Loadings below .100 were suppressed.

Materials and Procedure

For Study 1, we used two different sampling methods to distribute the 47-item Teaching for Creativity Scales (see Table 1: an online survey and a mailed survey. The online survey was available through Survey Monkey, and the Web site was sent to graduates of an online graduate program in educational psychology. Participants were asked to complete the survey and to pass along the survey to at least one colleague to help ensure sample variability. The paper survey was mailed to nine district liaisons in four states. The liaisons gave the survey to all teachers in their buildings, collected them, and mailed the surveys back to the authors. A total of 154 teachers completed the survey online, and 154 teachers completed the paper survey.

Results

An exploratory factor analysis of the 47 statements with an oblique rotation produced a four-factor solution that explained 48% of the variance. The decision to retain four factors was based on the principal components analysis (PCA). The PCA means and 95th percentile both suggested a four-factor extraction. This parallel analysis was performed with the instrument data as recommended by Henson and Roberts (2006) and Fabrigar, Wegener, MacCallum, and Strahan (1999).

On the pattern matrix (see Table 2), items without a primary factor loading above .5 or a secondary loading above .2 were flagged for deletion. Nine items were deleted based on these criteria. Within the structure matrix (see Table 3), items should not load on multiple factors to the same degree. None of the items that were not already flagged from the pattern matrix had primary and secondary loadings within one tenth of each other, so no additional items were deleted that were not already deleted from the pattern matrix analysis. Table 4 shows the items that were deleted because of the pattern matrix results.

The subscales' interitem correlations are available upon request, but no individual items were correlated above .75 or below .2. After consulting the pattern and structure matrices as well as the inter-item correlations to eliminate items, we used the subscale reliabilities

TABLE 4
Deletions Based on the Exploratory Factor Analysis's Pattern Matrix Results

Item Number	*Primary Factor Loadings*	*Secondary Factor Loadings*
3	F3: .342	F1: .256, F3: .342
8	F1: .402	F2: .325
9	F2: .372	F1: .357
14	F4: −.277	F1: .243, F3: .239
21	F3: .360	F1: .244, F4: −.231
33	F4: −.407	F1: .298
38	F1: .338	F3: .292
41	F3: .374	—
37	F2: .451	F1: .210

TABLE 5
Psychometrics of Final Subscales for the Exploratory Factor Analysis

Subscales (Actual Item Numbers)	*Total Items*	*Mean*	*Standard Deviation*	*Cronbach's Alpha*	*Average Interitem Correlation*	*Standard Deviation Interitem Correlation*
Subscale 1: Teacher self-efficacy (1, 5, 6, 11, 12, 13, 20, 28, 32, 34, 40, 42, 44R)	13	5.8557	.6917	.930	.537	.077
Subscale 2: Environmental encouragement (25, 47, 17R, 18R, 30R, 45R)	6	4.8236	1.2529	.886	.564	.089
Subscale 3: Societal value (7, 10, 16, 19, 23, 24, 35, 36, 43)	9	6.2212	.6757	.882	.477	.077
Subscale 4: Student potential (2, 22, 26, 31, 4R, 15R, 27R)	7	5.8979	.7987	.833	.422	.105

TABLE 6
Correlations Among Subscales for the Exploratory Factor Analysis

Subscale	*1*	*2*	*3*	*4*
1. Teacher self-efficacy	—	.216**	.483**	.460**
2. Environmental encouragement		—	−.072	.154**
3. Societal value			—	.373**
4. Student potential				—

Note. Subscales 1–3 teachers ($n = 306$), subscale 4 teachers ($n = 308$).
**Significant at the .01 level.

to determine if any further items should be deleted. Three items were deleted to increase scale reliability. All three of the items were reverse coded items. With these deletions, the reliability of the subscales ranged from .833–.930, so each subscale exceeded the minimum recommended reliability of .70 (Gable & Wolf, 1993). Table 5 presents the final items, reliabilities, means, standard deviations, and inter-item correlation averages and standard deviations for each subscale. All subscale's inter-item correlations were appropriate, and only subscale 4 had a slightly higher inter-item correlation standard deviation than would be desired (.105 compared to .100). Table 6 presents the correlations across the subscales, and teacher self-efficacy is significantly correlated with all three other subscales, but most highly correlated with student potential and societal value. Overall, the least correlated subscale is Environmental Encouragement.

STUDY 2: CONFIRMATORY FACTOR ANALYSIS

Participants

Study 2 participants also came from across the United States. We targeted two specific states for this sample, and the rest of the participants were recruited from across the country using a conference electronic list serve. A total of 366 teachers participated in this study, and the majority of them were women (90%). Additionally, a majority of the teachers had been teaching for at least 10 years (66%) and held at least a masters degree (72%). Most of these teachers (88%) indicated they liked or loved their job.

Materials and Procedure

Following revision based on the exploratory factor analysis, the modified 43-item instrument (see Table 7) was sent to an e-mail contact list of teachers who had attended a gifted and talented summer conference for the confirmatory factor analysis. Half of the participants were obtained through this method. Two large districts in different states volunteered to send e-mail requests to all of their teachers, and this study was also advertised on some social media sites requesting additional teacher participants.

Results

The factorial validity of the Teaching for Creativity Scales was tested using confirmatory factor analysis (CFA) procedures. Amos 17.0 was used to complete all analyses. To test the instrument's model fit, the following criteria were considered: (a) the χ^2 likelihood ratio statistic (CMIN/df), (b) the comparative fit index (CFI), (c) Tucker-Lewis rho2 index (TLI; Tucker & Lewis, 1973), and (d the root mean square error of approximation (RMSEA). For the χ^2 likelihood ratio statistic, values below 2 represent a better fitting model, and values greater than 5 are unacceptable. For the CFI and TLI values, Bentler (1992) proposed that values greater than .9 are indicative of an acceptable fit. The RMSEA value was critiqued using Byrne and

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TABLE 7
Revised Items for the Confirmatory Factor Analysis

1. I am capable of helping students to become more flexible in their thinking.
2. My school district provides professional development that stresses the fostering of creative thinking in the classroom.
3. The societal benefits of creativity are worth risking my job to make sure my students are creative thinkers.
4. All students can develop original ideas.
5. I am capable of enhancing my students' abilities to take meaningful academic risks.
6. Teaching creative thinking would be frowned upon in my school.
7. I am capable of fostering creative problem solving in my classroom.
8. If there were more creative people, the world would be a much better place.
9. My school's priorities do not include teaching students to think creatively.
10. When individuals approach problems in unique ways, they add to humanity's knowledge of the world.
11. Teaching creative thinking is one of my strengths.
12. I am capable of increasing my students' abilities to create unique solutions.
13. Inventive thoughts are necessary for growth in any field of study.
14. Creativity is an ability that only a few students possess.
15. I am capable of developing a classroom atmosphere that welcomes imagination.
16. My administration encourages me to foster innovative thinking in my students.
17. I believe thinking creatively is the most important skill for students to learn.
18. Students are either creative or they are not.
19. I am capable of promoting flexible thinking.
20. My current school environment does not encourage teachers to produce independent thinkers.
21. Without new and creative ideas, America will be left behind.
22. I am capable of helping my students to see the world from new perspectives.
23. Creativity can save lives.
24. All students can grow in their creative problem solving skills.
25. I am capable of teaching my students to find connections in seemingly unconnected ideas.
26. I have helped many students to become more creative.
27. My current school environment places little value on the development of student creativity.
28. If there were more creative people, more problems would be solved.
29. I am capable of increasing the quantity of original thoughts my students have.
30. New ideas must be generated to enact positive change.
31. All students can contribute innovative thoughts to a discussion.
32. I am capable of helping students to elaborate on their own unique ideas.
33. It is a priority in my school to increase students' inventiveness.
34. We really need creative people.
35. There are only a few creative students.
36. I am unsure of how to foster creativity in my classroom.
37. Innovative ideas can move society forward.
38. All students can learn to produce something innovative.
39. At the end of the year, I am confident that all of my students are more creative thinkers.
40. Old problems can be solved with new ideas.
41. All students can learn to be as creative as Einstein or Picasso.
42. Teaching creative problem solving is not one of my strengths.
43. All students have the potential to change the world with their creative ideas.

TABLE 8
Pattern Coefficients for Teaching for Creativity Scale from the Confirmatory Factor Analysis

Item Number	*Factor 1: Teacher Self-efficacy*	*Factor 2: Environmental Encouragement*	*Factor 3: Societal Value*	*Factor 4: Student Potential*
19	.85			
12	.82			
7	.76			
26	.79			
15	.73			
11	.74			
1	.66			
25	.73			
42R	.52			
32	.77			
22	.76			
29	.78			
5	.66			
27R		.89		
16		.78		
9R		.84		
20R		.86		
33		.68		
2		.65		
6R		.61		
28			.80	
37			.84	
34			.82	
21			.67	
30			.58	
10			.73	
40			.73	
13			.71	
23			.66	
17			.49	
31				.82
38				.77
4				.66
43				.63
14R				.41
24				.76

Note. Teachers ($n = 287$).

Campbell's (1999) criteria (below .05 represents a good fit, and values up to .08 represents a reasonable fit).

The original model included all 43 items (see Table 7), but the model fit was less than adequate (CMIN/df = 2.252, CFI = .856, TLI rho2 = .848, RMSEA = .066), so items with the largest modification indexes were systematically analyzed to determine their effect on the model fit. To determine which item should be deleted, we first noted if either item had large modification indexes with other items. If the items were relatively equal, we then determined if the items conceptually similar and kept the item with the lowest mean and larger standard deviation. When the means were relatively similar, we consulted the effect the item has on the subscale reliability and kept the item that most positively

TABLE 9
Mean, Standard Deviations, and Reliabilities of Subscales for the Confirmatory Factor Analysis

Subscales	*Items*	*Mean*	*Standard Deviation*	*Cronbach's Alpha*
Subscale 1: Teacher self-efficacy	13 items (1, 5, 7, 11, 12, 15, 19, 22, 25, 26, 29, 32, 42 R)	5.9471	.68211	.929
Subscale 2: Environmental encouragement	7 items (2, 6 R, 9, 16, 20 R, 27 R, 33)	4.5917	.94377	.906
Subscale 3: Societal value	10 items (10, 13, 17, 21, 23, 28, 30, 34, 37, 40)	6.0673	.71124	.897
Subscale 4: Student potential	6 items (4, 14 R, 24, 31, 38, 43)	5.9895	.76503	.805

TABLE 10
Component Correlation Matrix for the Confirmatory Factor Analysis

Subscale	*1*	*2*	*3*	*4*
1. Teacher self-efficacy	—	.05	.41	.32
2. Environmental encouragement		—	−.17	.13
3. Societal value			—	.42
4. Student potential				—

Note. Teachers ($n = 287$).

TABLE 11
Correlations among Subscales for the Confirmatory Factor Aanalysis

Subscale	*1*	*2*	*3*	*4*
1. Teacher self-efficacy	—	.086	.599**	.485**
2. Environmental encouragement		—	−.018	.155**
3. Societal value			—	.486**
4. Student potential				—

Note. Teachers ($n = 359$).
**Significant at the .01 level.

affected the subscale's reliability. Overall, we deleted 6 items based on modification indexes (items 35, 18, 41, 8, 39, and 36). With each item deletion, the model fit improved. With the remaining items, the model fit was adequate (CMIN/df = 1.815, CFI = .919, TLI rho2 = .913, RMSEA = .053). The resulting pattern coefficients for this instrument is found in Table 8.

Based on the CFA, we created subscales and then analyzed the subscales' reliabilities. For the societal value subscale, if item 3 ("The societal benefits of creativity are worth risking my job to make sure my students are creative thinkers.") were deleted, the reliability would increase from .871 to .897. Item 3 was subsequently deleted. With that deletion the model fit remained adequate (CMIN/df = 1.819, CFI = .923, TLI rho2 = .917, RMSEA = .053). Table 9 contains the final subscales' item compositions and reliabilities as well as the subscales' means and standard deviations, and Table 10 reports the component correlations before deleting any items from the instrument.

Table 11 presents the correlations across the subscales. Teacher self-efficacy is significantly correlated with both societal value and student potential, but most highly correlated with societal value. Societal value and student potential are also significantly and highly correlated. Overall, the least correlated subscale with the other subscales is environmental encouragement.

In Study 2, the teachers also were asked to answer two questions about how creative they were in general and how creative they thought they were as a teacher on a 10-point scale, ranging from not at all creative to exceptionally creative. The two questions were highly correlated ($r = .690$). The majority of teachers (81%) rated their personal and professional creativity within 1 point of each other. Teachers' personal and professional creativity ratings most closely correlated with Subscale 1's (Teacher Self-Efficacy) means ($r = .448$ in general and $r = .535$ as a teacher). Subscale 3 (Societal Value) and Subscale 4 (Student Potential) are correlated to a lower extent with the teachers' creativity rating, and Subscale 2 (Environmental Encouragement) was not significantly correlated. Table 12 contains the actual correlations.

TABLE 12
Correlations Among Subscales and Teacher Rating Questions from the Confirmatory Factor Analysis Sample

	Teacher Self-Efficacy	*Environmental Encouragement*	*Societal Value*	*Student Potential*	*In General, How Creative do you Consider Yourself?*	*As a Teacher, How Creative do you Consider Yourself?*
In general, how creative do you consider yourself?	.448**	.036	.298**	.255**	—	.690**
As a teacher, how creative do you consider yourself?	.535**	.086	.282**	.325**	.690**	—

Note. Teachers ($n = 333$).
**Significant at the .01 level.

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DISCUSSION

The primary purpose of this study was to design a psychometrically sound instrument to examine teachers' implicit conceptions of creativity, and to that end, the initial validation of the Teaching for Creativity Scales was successful. The items fit a four-factor extraction, producing four subscales with items that load squarely on the intended factor and only on the intended factor illustrating the unidimensionality of the items. Each subscale has solid reliabilities and good inter-item correlations without being too highly correlated, and the confirmatory factor analysis yielded a good model fit.

Beyond the design and validation of the instrument, these initial samples also provide insight into teachers' implicit conceptions of creativity. The societal value subscale means (6.22 and 6.07) and standard deviations (.68 and .71) indicate that teachers believe creativity is extremely valuable for society. This subscale experienced a ceiling effect that prevented the data from being distributed normally, which demonstrates a potential limitation with this subscale. There are several possible explanations for this. It is possible, however, that there is not much variation in teachers' perceptions of the value of creativity. Several studies would confirm that teachers value creativity (e.g., Westby & Dawson, 1995); although we thought there would be more variation as was seen in the Kampylis et al., (2009) sample. Another potential explanation and/or limitation is the convenient sample used in this study. The teachers who decided to donate their time to this research project may be a self-selecting group who truly value creativity; teachers who are apathetic or uninterested may not volunteer to complete the survey. An additional possibility is that the teacher responded in a socially expected manner.

To a lesser extent, the student potential and teacher self-efficacy subscales also had extremely high means, indicating that teachers felt that most students could grow in their creativity and that they, as teachers, were capable in developing student creativity. This demonstrated that these teachers did not believe that students were either creative or not, which previous research suggested was the biggest hindrance to creativity development (Plucker & Beghetto, 2003; Plucker et al., 2004). It also provides evidence for further cultural differences in perceptions of student creativity, as only half of Greek sample of teachers believed that all students could learn to be creative (Kampylis et al., 2009).

We found a high correlation between teachers' perceptions of their own creativity and the teacher self-efficacy subscale. Further, all three subscales (societal value, student potential, and teacher self-efficacy) were significantly correlated, indicating that teachers who believed creativity is valuable, also thought they could foster it within their students and that their students were capable of becoming more creative. These findings are supported in the literature. Boldin, Harries, and Newton (2010) proposed that teachers need to be creative themselves before they can teach students to be more creative, and in one empirical study, teachers who thought of themselves as highly creative also viewed their students as more creative (Eason, Giannangelo, & Franceschini, 2009).

Although those three subscales were highly correlated, the fourth subscale, environmental encouragement was not. Rather, it was minimally, or not at all, correlated with the other subscales in both samples. The means on this subscale were lower with higher standard deviations. This finding supports the concerns voiced by many in our field regarding the detrimental nature of the standards movement on creativity development (Beghetto & Plucker, 2006; Dobbins, 2009; Grainger et al., 2004; Hartley, 2003). It also provides evidence for Makel's (2009) creativity gap: the gap between teachers/adults' valuing creativity yet not being able to place an educational emphasis on developing student creativity. It is possible that the standards movement alone is not responsible for the lack of environmental support of creativity development, but rather it is the application and implementation of the standards within individual districts that deters teachers from focusing on creativity. This pressure seems to increase as students develop (Craft, Cremin, Burnard, & Chappell, 2007). Qualitative findings also have suggested that teachers experience great anxiety to meet curriculum objectives provided by the district, preventing teachers from including creativity in the classroom (Dobbins, 2009). Therefore, although teachers feel capable of developing student creativity, they may not feel capable within their current environment. This difference is worth further investigation.

Beyond inhibiting student creative development, this creativity gap may also create cognitive dissonance within these teachers who feel that creativity is valuable, that they are creative, and that they can foster it within all students. This could lead to teacher frustration if this dissonance is not considered in future policy design and implementation. Being able to teach creatively and develop student creativity could be motivating factors for some teachers, and their occupation could provide them their creative outlet (Csikszentmihalyi, 1991; Freund & Holling, 2008). This instrument may provide useful information to administrators as they gauge the environmental perceptions of their teachers. Furthermore, administrators may use this instrument to guide decisions in choosing appropriate in-service opportunities.

In addition to the practical consideration of increasing environmental encouragement for creativity, this research also provides fodder for additional studies.

One potential area that could be expanded upon is the scope of the instrument. It is possible that the instrument does not address all factors that influence teachers' abilities to develop student creativity. For example, teachers may believe, in general, creativity is valuable for society, but they may not believe that it is valuable enough to devote limited classroom time to its development. An additional subscale examining relative curricular value may be helpful in understanding why some teachers develop student creativity but others do not.

Beyond the scope of the instrument, future studies should continue to investigate its validity. It would be beneficial to design a test/retest study to examine the reliability of the scales over time. This instrument should also be validated with different population groups, and if it were validated with other cultural groups, it could potentially be used to assess cultural differences with respect to teachers' perceptions of creativity. This would be particularly interesting given several studies' findings suggesting that culture influences implicit theories of creativity (e.g., Chan & Chan, 1999; Runco & Johnson, 2002). Future studies could use this instrument to further explore the differences within various cultures.

One other valuable line of research could examine the relationships between teachers' beliefs about creativity and classroom outcomes. It would be important to investigate which factor or combination of factors best predicts teachers' abilities to foster creativity in the classroom. This instrument also could be used to evaluate the efficacy of certain professional development or intervention opportunities on influencing teachers' perceptions of creativity. Overall, there are a plethora of studies that could employ this instrument to make significant contributions to the field. Teaching for Creativity Scales has the potential to fill a specific void in creativity research by providing a tool to gauge teachers' perceptions of creativity.

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