



RESEARCH PAPER

Development of Scale to Measure Teachers' Creativity

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PAPER INFO	ABSTRACT
<p>Received: June 05, 2021</p> <p>Accepted: September 05, 2021</p> <p>Online: September 08, 2021</p> <p>Keywords: Creativity, Development of Scale, Teacher's Creativity,</p> <p>*Corresponding Author: g_noureen@yaho o.com</p>	<p>This article is based the effect of Leader member exchange theory on teachers' job performance and teachers' creativity. In this research leader-member exchange theory was an independent variable of the study and teachers' creativity and job performance were the dependent variables. One of the aims was to develop a tool to measure teachers' creativity. Literature about creativity was thoroughly reviewed. Initially 50 items were constructed. Tool was sent to 05 subject experts for their opinion. After expert opinion 30 items were retained and pilot testing was conducted to ensure the reliability of the instrument. 350 questionnaires were sent to the university teachers and 289 were used for final analysis. Exploratory factor analysis was run and 15 items were selected for the final instrument. It is therefore recommended that locally developed instrument.</p>

Introduction

New techniques used by individual or by group of people in an institute are known as creativity. Most of the researchers wants to discover that how and in what terms it effects the proficiency of the employee and an institute (Mumford, 2003; Zhou & Shalley, 2008). Researches reveals that employees' creativity always show improvement in the outcomes of an institution. Employee's creativity can be used to achieve goals effectively. In the world of novelty and globalization an institute needs creative employee to be in the race of increasing competition. They should be confident and adaptable to every kind of environment. The employee who possesses optimistic approach and prefers team work proves fruitful for the institution (Zhou & George 2001). An employee who fit in himself with the new changes in no time is a practical example of a creative employee. All the above-mentioned skills allow the employee to complete difficult tasks competently. It also opens new doors of success and advancement which lead them to glory in everyday life (Runco, 2004).

Creativity is a skill which is essential for an employee to provoke the developmental process (Hennessey & Amabile, 2010). It plays vital role to adopt new skills of life, to get professional grooming and also for effective communication and collaboration (Bellanca and Brandt, 2010; Trilling and Fadel, 2009). It stimulates problem

solving ability which paves new ways to success and make him more confident (Beghetto, 2006; Moran, 2010). Educators, parents, employers, and policymakers being the part of the society agrees that creativity would prove beneficial while facing problems regarding education, health care, the environment, and the economy.(Moran, 2010).

According to Chiou (2002), creative performance of teachers is enhanced by an innovative workplace which proves that creative environment plays an important role for better outcomes of an organization (Carmeli & Schaubroeck) 2007.

The development of educational field includes numerous happenings which encouraged creative teaching. The connection between creativity and education has been introduced newly and few researchers have reviewed it. Creativity is becoming the focal point in the academic circle day by day globally (Aud et al., 2007; Hennessey and Amabile, 2010; Soh, 2000).

Previous researches shows that there is a strong relationship between creativity and education which highlight the importance of creativity-fostering behaviours in educating agents (Tan and Majid, 2011; Soh, 2000; Walker, 1969; Esquível, 1995). Research literature emphasizes that creative teachers boost students' cognitive ability, retention capacity, problem solving and student commitment. All these aspects paves road towards students' better learning and complete development (Guilford, 1967; Isaksen and Treffinger, 2004; Karpova et al., 2011; Moran, 2010; Torrance, 1963).

Development of Instrument for Creativity

Creativity is a vast domain, with different approaches in different context. There is no compromise on how best to test for creativity or measure development. Kaufman and Baer (2006) suggested that creativity is a complex domain and its factors (intellectual abilities, knowledge, styles of thinking, personality, motivation and environment) emerge from the investment theory. These factors could be assessed by using intelligent testing.

According to Proctor (2005) creative thinking ability enables one to analyze things in a more proficient way than others. Creative employee analyzes the problem dynamically and always be ready to adopt the progression which is essential for the betterment of his /her workplace. The creative manager reacts to the issues and proves successful in taking on new tasks. These challenges demand creative and unconventional solutions. The creative manager becomes a role model for others.

Review of literature on creativity revealed that every effort to measure creativity in diverse discipline Creativity often end on a grim note (e.g., Hocevar, 1981; Michael & Wright, 1989). Firstly, Hocevar (1979) developed The Creative Behavior Inventory (CBI). It was the self-report measures of creative behaviour and extensively used in research studies. Later on, Basadur and colleagues (Basadur & Hasdorf, 1996; Basadur et al., 1999) constructed questionnaire to assess divergent thinking attitudes.

Kaufman and Baer (2004) investigate the structure and correlates of self-rated creativity. A short scale of 11-item was developed called "Creativity Scale for Different Domains" (CSDD). This instrument is used in different research studies to measure performance and creativity (Rawlings & Locarnini, 2007; Silvia & Kimbrel, 2010; Silvia et

al., 2009). Later on, it was felt that CSDD was very short to assess creativity. So, a new larger version was developed in 2006 by Kaufman having 56 items on a six-point scale called Creativity Domain Questionnaire (CDQ). EFA and CFA (Kaufman, Cole, & Baer, 2009) identify seven factors: "performance, math/science, problem solving, artistic-visual, artistic-verbal, entrepreneurial, and interpersonal".

Davia Rubenstein, Mccoach, Siegle (2013) designed Teaching for Creativity Scales to measure four constructs: teacher self-efficacy, environmental encouragement, societal value, and student potential.

Creative employees are always the dire need of companies who introduced new marketing techniques and become helpful to produce new stuff (Florida & Goodnight, 2005). According to European University Association in 2007, formulation of creative questions and new research methodologies are becoming essential for higher education. According to Lapeniene and Dumciene (2013) a teacher got exceptional chances to promote and assist a student in a proper way to expedite his abilities for creativity. Now a days teachers' creativity holds a special attention in the field of scientific inquiry in behavioral sciences. Creativity not only provides the bases for societal advancement and development of disciplines; however, it also fulfills the inner contentment and self-actualization (Runco, 2004). In a student, creativity foster the motivational level, optimistic approach, scholastic attainment, and their characterization (Freund & Holling, 2008; Mindham, 2004; Torrance, 1976).

One of the aims of this study was to develop an instrument to measure the creativity of the teachers. Creative teacher is the major source of developing creative behavior among their students. Explicitly the aim to develop this instrument was to answer the following questions: Do teachers believe that all students can strive to be more creative? Are all teachers capable of creating a creative environment in their classroom? Do they perceive creativity as an important tool to promote?

Theoretical Background of Creativity

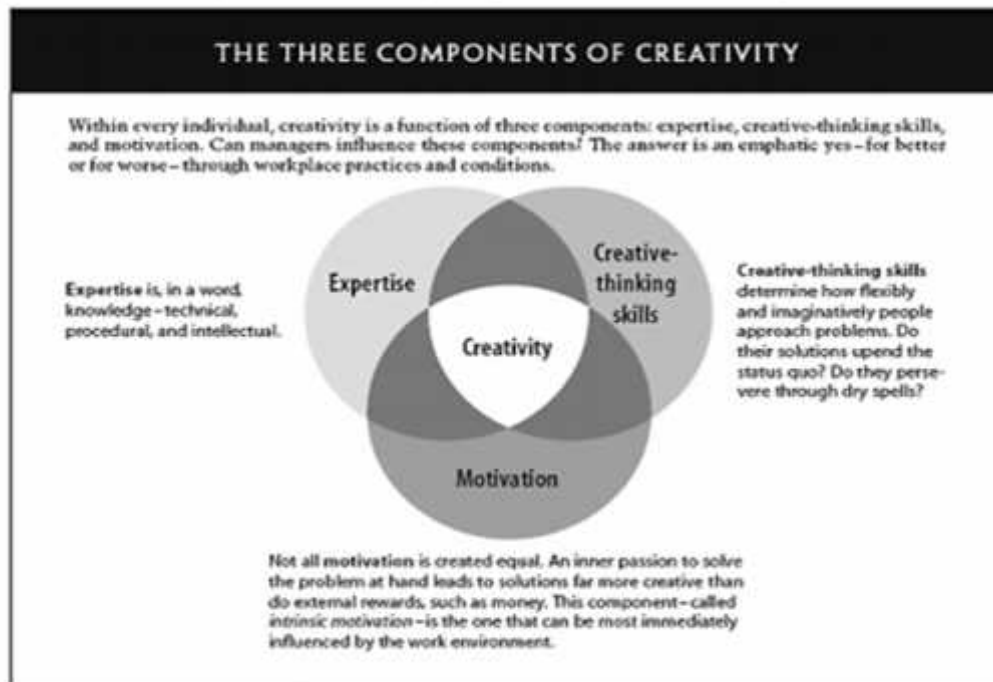
After reviewing the literature and theory and already developed scales to measure creativity, it was found that any specific scale to measure teachers' creativity at university level is not available. Not a single scale of creativity is available as far as Pakistan is concerned, aim of this research paper is to describe the steps of tool development and development of valid and reliable tool to measures teacher creativity at university level. Componential theories of creativity are used to develop teachers' creativity scale.

Componential Theories of Creativity

There are two componential theories of creativity. First one is presented by Amabile in 1983, further updated in 1996. The second one is proposed by Runco and Chand in 1993. Researcher used Amabile model of creativity to develop instruments to measure employees' creativity. According to this model employees' creativity may be accomplished when three major constructs are congregated together: expertise, creative-thinking skills, and motivation. If employee is teacher expertise can be defined as competence in terms of task performance. Second construct is creative thinking. It is the ability of an individual to put together existing ideas in new schema to solve problems.

Intrinsic motivation is the third construct which regulates about what individual is enthusiastic and ready to do (Adil, et al,2018). Intrinsic motivation is also compelled individual to eradicate obstacles. In addition, the components of this model are multiplicative in nature which reflects that creativity is at peak when intrinsically motivated person with possession of high competence worked in supportive environment (Rennick& Mackay, 2018).

Figure 1 Three components of creativity (adapted from Amabile, 1998, p. 78)



Teachers' creativity scale is developed which is based on three factors: intrinsic motivation, critical thinking and competence.

The first factor is competence which observes the capability of a teacher to promote creative thinking among students. Bandura (1997) said that individual motivation and actual actions are dependent upon individual's ability. If a teacher thinks that he or she is capable to promote or work for the creativity of his/her student than he/she could do so. Hence, this subscale emphasis on the beliefs of the teachers that they are proficient enough to make their students more creative. If a teacher scores high on this factor it shows that he /she is working efficiently on fostering students' creativity. However, low scores on this factor indicate the teachers' incompetency to promote the creativity of the students.

The second factor is critical thinking which studied how teachers observe their existing general settings and how they relate them to their workplace situations. It is discussed in many researches that creativity belongs to a number of factors from the surroundings (Simonton, 2012). In 1998 Amabile explained organizational environment had a great impact on one's critical thinking skills. Combination of tasks, liberty,

resources, suitable group work atmosphere, managerial appraisal, and administrative provision are the major elements which boost one's critical thinking ability. Through this subscale it would be helpful to measure teacher's perception about their workplace. Duff et al. in 2013, describe creativity as an ability to generate new ideas and to identify innovative and unpredicted connections of distinct aspects. According to Cropley in 2001 creativity is emerging from different fields due to distinct interactions. Therefore, this factor measures teachers' insight about their surroundings while keeping general settings and administrative provision as their focal point. Concluding, it is proved that creativity varies directly with factor score; high scores in critical thinking subscale favors creativity while low scores hamper the skills of creativity.

The third factor of creativity is intrinsic motivation. In 2007, George emphasized the need to analyze and study the hypothesized relationship between intrinsic motivation and creativity openly and deeply. Moreover, Grant and Berry in 2011 argued that the pragmatic evidence which is joining intrinsic motivation and creativity is still ambiguous. Other researchers such as Shalley, Zhou and Oldham in 2004 claimed that optimistic approach, mental versatility and determination are improved by intrinsic motivation and has a positive impact on creativity. Now a days, it is becoming more complex to understand the relationship between creativity and intrinsic motivation because "employee creativity requires various cognitive skills that only intrinsically motivated people are likely to achieve" (Hon, 2012, p. 53). Resultantly, creativity depend on factor scores; high scores in intrinsic motivation factor improves creativity while low scores hinder the creativity.

Generation of Items

Componential theory of creativity is based on three sub-construct intrinsic motivation, competence and critical thinking. Initially, 20 items were constructed for intrinsic motivation, 15 items were constructed for competence and same no of items for critical thinking. Cumulatively, there were 50 items. These items were developed on 5-point Likert scale (strongly agree= 5, agree= 4, undecided=3, disagree=2, strongly disagree=1). This tool was sent to two subject experts, two competent researchers and one psychometrician for appropriateness and validation. These experts thoroughly studied and scrutinized the scale and give suggestions there off. They examined each item and analyzed it according to its relevant domain / factor. Some items were found irrelevant and ambiguous as per suggestions of experts 30 items were remained in the scale.

Pilot Testing of the Scale

After the validation of the instrument data were collected from 350 university teachers through google form and face to face interaction. Out of 350 questionnaires 290 questionnaires were found complete. The instrument was evaluated for factor structure by running an exploratory factor analysis.

Exploratory Factor Analysis

One of the parts of multivariate statistical method is exploratory factor analysis. It tried to recognize the minimum quantity of proposed or supposed factor, sub-construct or

sub-scale of a variable. It can sparingly describe the co-variation noted among a set of measured variables. In other words, it is to recognize the factors that brief us about the order and structure of measured variables. Factors are characterized as unnoticeable characteristics of people in the field of social and behavioral sciences. These characteristics are expressed by differences in the scores achieved by various people on the measured variable (Tucker & MacCallum, 1997).

Results and Discussion

Table 1
Reliability Statistics

Cronbach's Alpha	N of Items
.871	16

Table 2
Item Statistics and Item-Total Correlations of Teacher's Creativity Scale

Item No.	Mean (Difficulty Index)	Item-Total Correlation (Discrimination)
01	4.1	0.43
02	4.3	0.51
03	4.1	0.47
04	4.0	0.46
05	4.1	0.51
06	3.9	0.52
07	4.0	0.46
08	4.1	0.53
09	4.2	0.50
10	4.1	0.54
11	4.2	0.51
12	4.2	0.43
13	4.0	0.53
14	4.2	0.53
15	4.1	0.59
16	4.2	0.57

Table above shows *Item-Total Correlation* means correlations between each item and with sum of the total score. Majority of the items have 0.5 value of correlation. Items with low correlations may have to be dropped. Further, Exploratory Factor Analysis was applied. Before applying the exploratory factor analysis, Kaiser Meyer Olkin (KMO) and Bartlett's test was applied to check the sample adequacy. KMO measure of sample adequacy value was 0.876 with significant .000 and df value 120. According to Pallant (2011), the value of KMO test 0.6 or above and Bartlett's test of sphericity is significant. This refers that the data were accepted for factor analysis.

Then the scree plot analysis was applied. The scree plot shows the Eigen Values against the items of the scale. Scree plot analysis helped in diagnosing the factor loading.

The results of initial factor solution concluded the 16 factors with cumulative variance 64.93, eight factors with cumulative variance 62.72 and three factors with cumulative variance was 50.85.

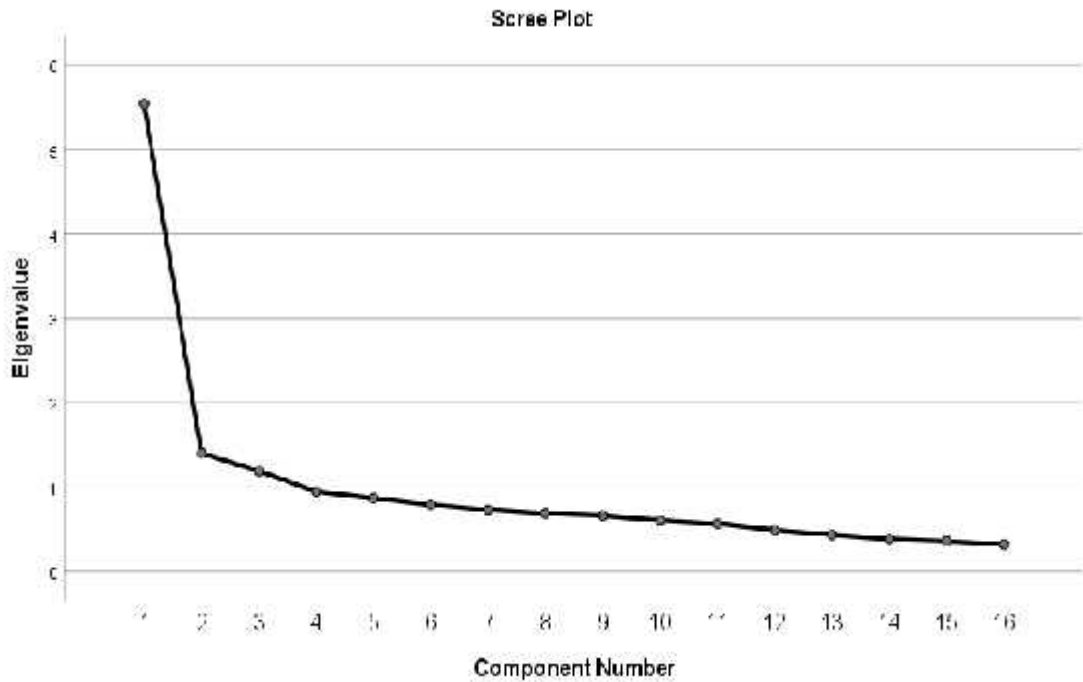


Figure 1 Scree Plot of Teacher's Creativity Scale

It is a line graph showing eigen values of factors. It is used to identify the number of factors to while using principal component analysis (PCA). A scree plot shows the eigenvalues on the y-axis and the number of factors on the x-axis. It always displays a downward curve. The point where the slope of the curve is clearly leveling off (the "elbow") indicates the number of factors that should be generated by the analysis. Above scree plot indicated that three factors were loading distinctively. Then the line showed almost flat.

Exploratory factor analysis (EFA) was applied for factor analysis. Principle component analysis method was used. Varimax rotation method was used for rotation. The factor analysis was done against the 16, eight and three factors' rotations simultaneously. Then view the best alignment of factors. In the end, three factor rotations were accepted with the cumulative variance value 50.85. Total 16 items were selected out of 55 items as a result of factor analysis. The factor loading values are given in Table 3.3.

Table 3
Factor Loading for Teacher's Creativity Scale (TPES)

Items	F1	F2	F3
	Teacher's Competence Items (06)	Intrinsic Motivation Items (05)	Critical Thinking Items (05)
01	0.516		
02	0.413		
03	0.679		
04	0.658		
05	0.715		
06	0.674		
07		0.696	
08		0.715	
09		0.593	
10		0.630	
11		0.679	
12		0.485	
13			0.708
14			0.729
15			0.696
16			0.763

Note. Values less than < 0.10 are suppressed.

According to Table 3.3, three factors were concluded finally. The first factor was labeled as 'Teacher's Competence' with 06 items. The second factor was labeled as 'Intrinsic Motivation' with 06 items. The third factor was labeled as 'Critical Thinking' with 04 items. Cronbach's alpha value of total scale and for each factor is given below in the Table 3.4.

Table 4
Descriptive Statistics, Reliability Coefficients, Discriminative Validity (mean correlations with other subscales) of Teacher's Creativity Scale

Name of Factor (Sub Scale)	No. of Items	Mean	SD	Cronbach's Alpha	Mean Correlations	Serial number in final scale
Teacher's Competence	06	24.63	3.29	0.756	0.338	01 to 06
Intrinsic Motivation	06	25.09	2.96	0.768	0.356	07 to 12
Critical Thinking	04	16.74	2.40	0.785	0.480	13 to 16

Correlation among Subscales

Table 5
Correlations

	competence	CT	IMT
competence	Pearson Correlation	1	.478**
			.572**

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	Sig. (2-tailed)		.000	.000
	N	249	249	249
CT	Pearson Correlation	.478**	1	.570**
	Sig. (2-tailed)	.000		.000
	N	249	249	249
IMT	Pearson Correlation	.572**	.570**	1
	Sig. (2-tailed)	.000	.000	
	N	249	249	249

** . Correlation is significant at the 0.01 level (2-tailed).

Table 5 shows the correlation coefficient of sub-constructs of teachers' creativity scale. All are related positively which shows the consistency among scale. So, scale is valid and reliable to measure the teachers' creativity.

Discussion

Creativity and originations became the crux of new educational policies. It has been documented that preliminary education is nurturing and evolving grassroots' creativity. This creativity is fostering peoples' working style and advance learning. Universal teacher is fortunate enough for having great opportunities to boost up the creative abilities of every single child. In behavioral sciences, the description and exploration of teachers' creativity has turned into a significant area of scientific inquiry. Creative teaching or teaching for creativity has become commonly used notion in present educational research.

Teachers' creativity is the part of teachers own perception, disposition and his / her expressions. In scientific literature, teaching for creativity is getting worldwide prominence as most researched area (e.g. Zachopoulou et al., 2006; Hodges Kulinna, 2008). Creative teaching is based on teachers own creativity and its demonstration can be seen in his/her daily life actions (Craft, 2009). Creative teacher works on individual growth of a student in mystical, communal, and traditional domains (Eaude, 2009). The preconditions of the phenomenon of creative teaching is little known however it is clearly conceptualized. Historically, it is assumed that creativity is a mixture of personal and social factors. Not much is known about those factors. Different researches have noted some of the factors such as motivation, (Lapeniene, 2011; Hong, Hartzell & Greene, 2009), epistemological beliefs (Hong, Hartzell & Greene, 2009), awareness (Tahereh & Mahnoush, 2012), self-confidence (Tahereh & Mahnoush, 2012), organizational climate (Lapeniene, 2010) and leadership style (Mousavi, Heidary & Khamse Pour, 2011). However, personal factors have more significance than social ones, but there are some contradictions and intricacies found in facts and figures (Lapeniene, 2011). It was revealed that previously developed instrument on creativity were measures creativity while considering social, environment and novelty factors to measure creativity. But this instrument purely focusses on the cognitive side of creativity.

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