



## Psychometric Properties of a Creativity Scale Developed by Field and Bischoff in Indian Context

*Original scientific paper*

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### Abstract

*A scale developed by Field and Bischoff to measure creativity among students of tertiary education institutions was investigated for its reliability and validity when used to measure creativity among students of tertiary education institutions in India. Confirmatory factor analysis (CFA) of the model proposed by Field and Bischoff shows acceptable model fit parameters. Structural equation modelling (SEM) based analysis for psychometric properties revealed excellent reliability and good convergent and discriminant validity of the scale. The study establishes the reliability and validity of the scale for measuring creativity among students of tertiary education institutions.*

**Keywords:** *Creativity, CFA, Construct Reliability, Convergent Validity, Discriminant Validity*

UN document on 21<sup>st</sup> century skills regarding education and employability emphasises ‘creativity’ as the most important skill. This is because the modern global economy is driven by invention and innovation which are manifestations of creativity. Therefore, the contemporary world requires a ‘Creative Class’ of professionals for driving the economy with new ideas, new technology / service and / or content to contribute for the sustainable development (Florida, R. L, 2002). With the emergence of artificial intelligence as a boon as well as a threat to human work force, being creative and innovative has become indispensable for everyone. The CEOs of

1500 leading global corporates have said that creativity is the topmost competency essential for prospective professionals. But, contrary to the need, the trend in academic training in nurturing creativity among students in educational institutions is found to be the opposite. A longitudinal survey using Torrance Tests of Creative Thinking (TTCT) has revealed a sharp decline in the creativity scores among students over the twenty years’ period from 1990 to 2010 (Puccio, G. J et.al., 2012). Consequently, there exists a ‘creativity crisis’. There is an urgent need to address this issue. Assessing the prevalence of creativity, nurturing it among youth by integrating

suitable strategies in curriculum to prepare future ready professionals is viewed as the responsibility of higher education institutions. But, measuring the construct creativity has always been a difficult task owing to multitude of definitions and tools / models which are in tune to the definitions of the construct. Four self - report scales “Creative achievement questionnaire (CAQ; Carlson, et al., 2005), the Biographical Creative behaviour inventory (Batey., 2007)), Revised Creativity Domain Questionnaire (Kaufman, J. C et al., 2009); and creative behaviour inventory (Dollinger, S. J. (2003).” were the popularly used scales to measure creativity among students and professionals. Silvia and co-workers (Silvia, P.J et al., 2012) have assessed these scales for their reliability and validity on a large and diverse sample and found to perform well. They have concluded that “self – report creativity assessment is probably much better than creativity researchers think it is”. But these scales are found to assess specific domain of creativity. The cognitive processes associated with creativity, external influence and personality traits contributing to creativity are not measured. Several researchers have critically reviewed the theoretical models, dimensions of creativity and tools available to measure creativity (Batey, M, 2012; Metwaly, S. S et al., 2017; Snyder, J. A. et al., 2019). The analyses have unravelled the multiple dimensions of the construct ‘creativity’. The tools available to measure creativity are suitable only to measure a specific dimension(s) of creativity. There is lack of a suitable tool to comprehensively measure the prevalence of the construct creativity and to understand the factors influencing creativity among youth, particularly among students of higher education institutions. Recently, Fields, Z and Bischoff, C.A (Fields, Z & Bischoff, C.A, 2013, 2014) have developed a tool to comprehensively measure creativity among youth and students of tertiary education after an extensive analysis of the dimensions of creativity and the scales / models available, and tested it among students of tertiary education institutions in South Africa. The original scale contained 73 items (Fields, Z & Bischoff, C.A, 2013). Exploratory factor analysis of the data extracted 12 factors and the number of items reduced to 39 (Fields, Z & Bischoff, C.A, 2014). The factors include

cognitive processes, external influence and personality traits. The study revealed that the scale shows good reliability and validity on the sample studied. But, the tool has not been used by other researchers and tested on populations in other cultural or linguistic context. The present study reports the results of the investigation of the scale developed by Field and Bischoff to measure creativity for the psychometric properties when used to measure creativity among students of tertiary level education institutions in India. The study reveals that the tool is suitable for adopting to measure creativity among students of higher education institutions in India.

### **Objectives**

The objectives of the present study were:

1. To measure the prevalence of creativity among students of higher education institutions in India using the self - report scale developed by Ziska Field and Bischoff.
2. To find out relationship between creativity and the demographic variables such as age, gender, region, program of study, year of study, CGPA in the current program and grade in higher secondary.
3. To evaluate the scale for structural equation model (SEM) based construct reliability, convergent and discriminant validity to establish its for suitability to measure the creativity among the students of higher education institutions in India.

### **Rationale**

The tool developed by Field and Bischoff (Fields, Z & Bischoff, C.A, 2013, 2014) to measure creativity among university students in South Africa consisted of 73 items under 11 theoretical dimensions that influence creativity. The items were identified by the developers after an extensive analysis of the models and tools available to measure the dimensions of creativity in general including the ones specifically meant for measuring creativity among youth in tertiary education (Fields, Z & Bischoff, C.A, 2014). The tool format was a self-report questionnaire on a 7-point Likert scale to elicit the perceptions of respondents.

The scale developers have tested the tool by collecting data by giving the questionnaire to a convenience sample of 500 full-time university students at the North-West University (Potchefstroom Campus). Only a total of 322 completed questionnaires

were received by the researchers. The researchers have analysed the data for the reliability (Cronbach's alpha) and factor structure by exploratory factor analysis (EFA). Initially the data was subjected to exploratory factor analysis using a Varimax rotation with the criteria of Eigen value  $>1$  and minimum factor loading of 0.40. The data were subjected to the Kaizer, Meyer and Olkin (KMO) test of sampling adequacy (0.820) and the Bartlett's test of sphericity to ensure that the data is adequate for factor analysis. The data was subjected to three rounds of EFA and applied the criteria mentioned above. In every round the dual loading items and non-loading items were omitted. After three rounds the scale reduced to 39 items and extracted 12 factors with good Cronbach's alpha score for each factor except factors 10 and 12. Only two items had loaded on to factors 9, 10 and 11 each and only one item had loaded on to factor 12. The label for each factor and the number of items loaded (indicated in parentheses) on each factor are: 1. Challenging the status qua (5); 2. separate (4); 3. syntheses (4); 4. cognition (3); 5. associate and communicate (5); 6. awareness (4); 7. similarity (4); 8. external motivation (3); 9. sensitivity (2); 10. experiment and combine (2); 11. dimensional thinking (2); 12. problem solving (1). Based on these results the authors had concluded and recommended that the scale is suitable for measuring the prevalence of creativity among university students. These factors can be grouped into (i) cognitive processes, (ii) external influence and (iii) personality characteristics. There are no reports of the scale being used to measure creativity among university students on other samples. The limitations of the reported study in addition to not been validated in other samples are (i) the authors did not validate the factor structure of the scale by confirmatory factor analysis; (ii) the authors also do not report structural equation modelling (SEM) based validation methods for construct reliability (CR), convergent validity and discriminant

validity of the scale. But these values are suggested to be important when the scale is used in other sample (Cheung, G.W et al., 2023). It was assumed that using the scale on other population and analysis of SEM based psychometric properties would establish the reliability and validity of the scale for use on population with diverse sociocultural backgrounds.

### Methodology

A survey type research design was adopted. The scale developed by Field and Bischoff for measuring creativity among university students which contained 73 items was used for the study (Fields, Z & Bischoff, C.A, 2013). A pilot study showed the Cronbach's alpha value of 0.981 indicating the reliability of the scale in the present study. A questionnaire along with items to collect demographic details was used both in printed format and google form format for data collection. Students of universities and colleges in India form the population. Google form format was shared with a faculty of several colleges and universities in Tamil Nadu, Karnataka, Pondicherry, Andrapradesh, Maharashtra and Assam with the request to share among the students of their institutions. The researcher visited several institutions in Tamil Nadu and Pondicherry, met the students with the consent of the head of the institution, circulated the printed form gave instructions and collected the forms. A total of 227 forms were received in google form and a total of 596 forms were collected in printed form. The data collected in printed format was entered in excel and combined with the google form responses. The data was first analysed for missing values in the variables. Data with missing value(s) in variable(s) were omitted for further analysis. A total of 755 data was used for further analysis. Statistical analysis was performed for the 39 items scale (Fields, Z & Bischoff, C.A, 2014) in SPSS version 25 and AMOS version 24.

## Results and Discussion

### *Demographic Profile*

Demographic profile of the sample is presented in Table 1.

**Table 1.**

*Demographic Profile of the Sample*

Variable	Category	Frequency (N)	Percentage (%)
Age	18 – 22	545	72.2
	22 – 25	99	13.1
	26 – 30	91	12.1
	>30	20	2.6
Gender	Male	310	41.1
	Female	445	58.9
Region	Urban	474	62.8
	Rural	281	37.2
Program of study	Engineering	258	34.2
	Management	156	20.7
	Science	138	18.3
	Humanities	60	7.9
	Social sciences	7	0.9
	Behavioural science	14	1.9
	Law	8	1.1
	Art Design and Architecture	5	0.7
	Health sciences	45	6.0
	Others	64	8.5
Year of study	First year	284	37.6
	Second year	303	40.1
	Third year	93	12.3
	Fourth year	54	7.2
	Fifth year	21	2.8
Grade in HS	First class	538	71.3
	Second class	180	23.8
	Third class	37	4.9
CGPA in the current program	4 – 5	40	5.3
	5 – 7	208	27.5
	7 – 9	324	42.9
	9+	183	24.2

14.8 % of the respondents were from Karnataka, Andrapradesh, Maharashtra and Assam. Remaining are from students studying in institutions located in Tamil Nadu

and Pondicherry which also included students from all over India. Details pertaining to their native state was not obtained but included pan India students.

### ***Relationship Between Demographic Variables and Creativity***

It was hypothesised that there is no significant relationship between the demographic variables and creativity. The mean score of the scale was analysed for testing the hypothesis. For demographic variables with two categories

(Gender and Region) t-test was applied and variable that contained more than two categories one-way ANOVA was applied (Table 2).

H0. There is no statistically significant difference between creativity and the demographic variables.

**Table 2.**  
*Relationship Between Demographic Variables and Creativity*

<b>Creativity (Average 4)</b>	<b>Category</b>	<b>Mean</b>	<b>SD</b>	<b>T / F value</b>	<b>Sig.</b>
<b>Gender</b>	Male	4.39	1.15	0.317	0.752
	Female	4.36	1.2		
<b>Region</b>	Urban	4.44	1.17	1.91	0.057
	Rural	4.27	1.19		
<b>Age group</b>	18 – 22	4.26	1.18	10.06	0.000
	23 – 25	4.66	0.94		
	26 – 30	4.86	1.03		
	>30	3.94	1.93		
<b>Program</b>	Engineering	4.42	1.05	1.82	0.06
	Management	4.29	1.08		
	Science	4.45	1.39		
	Humanities	4.52	1.07		
	Social Sciences	4.33	1.13		
	Behavioural Science	4.83	0.65		
	Law	4.52	0.89		
	Art Design and Architecture	4.03	1.06		
	Health Sciences	3.79	1.43		
	Others	4.44	1.37		
<b>Year of study</b>	First	4.25	1.32	7.147	0.000
	Second	4.27	1.11		
	Third	4.64	1.09		
	Fourth	4.89	0.74		
	Fifth	5.05	0.68		
<b>Grade in HS</b>	I Class	4.44	1.21	4.05	0.018
	II Class	4.16	1.06		
	III Class	4.5	1.13		
<b>CGPA</b>	4-5	3.42	1.48	9.85	0.000
	5-7	4.37	1.04		
	7-9	4.44	1.12		
	9+	4.48	1.28		

The results reveal that there is no statistically significant difference between creativity and demographic variables such as gender, region and program of study. But, there is statistically significant difference between creativity and age group, year of study, grade in higher secondary and CGPA in the current program.

It can be suggested that creativity is a learned behaviour and can be cultivated by adopting appropriate strategies.

Correlation between factors of creativity indicates significant, positive, moderate correlation among the factors (Table 3).

**Table 3.**  
*Correlation Between Factors of Creativity Scale*

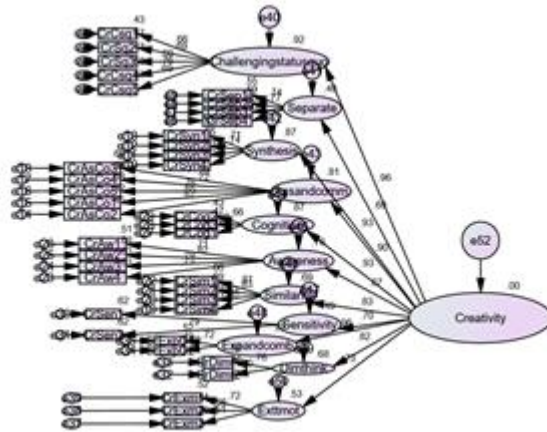
<b>Correlations</b>												
Factors	1	2	3	4	5	6	7	8	9	10	11	12
1 Challenge status quo	1											
2 Separate	.545**	1										
3 Synthesis	.708**	.561**	1									
4 Cognition	.719**	.509**	.623**	1								
5 Associate and communicate	.785**	.518**	.642**	.664**	1							
6 Awareness	.705**	.475**	.697**	.684**	.692**	1						
7 Similarity	.645**	.497**	.717**	.606**	.616**	.618**	1					
8 External motivation	.550**	.456**	.493**	.491**	.557**	.500**	.509**	1				
9 Sensitivity	.532**	.357**	.468**	.491**	.564**	.502**	.471**	.522**	1			
10 Experiment and combine	.655**	.533**	.734**	.604**	.619**	.593**	.640**	.442**	.455**	1		
11 Dimensional thinking	.587**	.463**	.619**	.540**	.547**	.506**	.575**	.425**	.392**	.555**	1	
12 Problem solving	.559**	.392**	.503**	.483**	.592**	.554**	.437**	.416**	.415**	.492**	.385**	1
Mean	4.53	4.22	4.44	4.47	4.38	4.28	4.51	4.00	4.36	4.49	4.36	4.35
SD	1.41	1.49	1.54	1.43	1.39	1.53	1.56	1.39	1.70	1.55	1.59	1.83

### **Confirmatory Factor Analysis (CFA)**

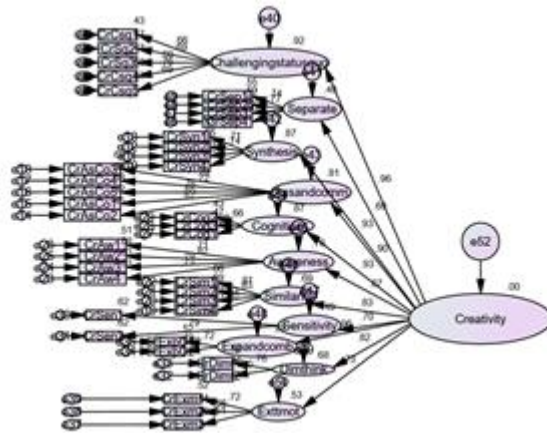
The 12 factor model reported by Field and Bischoff (both first order measurement model and second order model) were analysed by confirmatory factor analysis (Fig.1 & 2; the input variable label contains the item no in 73 items scale; CR represents creativity scale) and for validity analysis of the scale (Tables 4 -7). Since factor 12 problem solving had only one item, this factor could not be included in the model.

The model fit indices of both models indicate good model fit for several indicators. The model fit parameters for the first order measurement model are:  $p = 0.000$ , CMIN/DF = 2.645, RMR = 0.110, GFI = 0.897, AGFI = 0.874, CFI = 0.937, TLI = 0.927, NFI = 0.903, RMSEA = 0.047. The model fit indices of the second order CFA are:  $P = 0.000$ , CMIN/DF = 3.073, RMR = 0.152, GFI = 0.872, AGFI = 0.855, CFI = 0.915, TLI = 0.908, NFI = 0.879, RMSEA = 0.052.

**Figure 1.**  
*First Order Measurement Model of Field and Bischoff Creativity Model*



**Figure 2.**  
*Second Order CFA Model of Field and Bischoff Creativity Model*



The factor loading for the latent constructs of creativity and the items loaded onto the latent constructs are good (> 0.6 for all items) and significant (Table 4).

**Table 4.**  
*Estimates of CFA Model of Field and Bischoff Creativity Scale*

			Estimate	S.E.	C.R.	Second order	First order	P
						FL	FL	
Challenging Status quo	<---	Creativity	1.000			.961	-	
Separate	<---	Creativity	.802	.056	14.410	.693	-	***
Synthesis	<---	Creativity	1.098	.062	17.583	.932	-	***
Associate and communicate	<---	Creativity	.910	.057	15.857	.900	-	***
Cognition	<---	Creativity	1.009	.061	16.605	.932	-	***
Awareness	<---	Creativity	.936	.057	16.559	.873	-	***
Similarity	<---	Creativity	1.004	.058	17.228	.830	-	***
Sensitivity	<---	Creativity	.915	.065	14.132	.702	-	***
Experiment and combine	<---	Creativity	1.047	.062	16.864	.957	-	***
Dimensional thinking	<---	Creativity	.917	.062	14.776	.823	-	***
External motivation	<---	Creativity	.570	.053	10.706	.726	-	***
CR35	<---	Challenging status quo	1.000			.689	.684	
CR34	<---	Challenging status quo	1.170	.061	19.218	.761	.749	***
CR73	<---	Challenging status quo	1.082	.062	17.491	.687	.694	***
CR72	<---	Challenging status quo	1.012	.058	17.535	.689	.696	***
CR71	<---	Challenging status quo	.993	.059	16.819	.659	.669	***
CR17	<---	Separate	1.000			.751	.751	
CR16	<---	Separate	1.064	.051	20.678	.792	.791	***
CR15	<---	Separate	1.015	.051	20.024	.765	.766	***
CR14	<---	Separate	.996	.051	19.346	.739	.738	***
CR19	<---	Synthesis	1.000			.746	.756	
CR12	<---	Synthesis	.979	.049	19.894	.734	.730	***
CR11	<---	Synthesis	.946	.047	20.016	.738	.733	***
CR1	<---	Synthesis	1.121	.058	19.317	.714	.709	***
CR48	<---	Associate and communicate	1.000			.674	.688	
CR46	<---	Associate and communicate	.994	.062	15.941	.645	.648	***
CR69	<---	Associate and communicate	1.169	.064	18.387	.760	.763	***
CR68	<---	Associate and Communicate	1.068	.060	17.658	.725	.715	***
CR67	<---	Associate and communicate	1.145	.061	18.724	.776	.765	***
CR23	<---	Similarity	1.000			.795	.792	
CR22	<---	Similarity	1.060	.042	25.139	.833	.830	***
CR21	<---	Similarity	1.060	.042	25.141	.833	.832	***
CR20	<---	Similarity	1.046	.043	24.276	.810	.815	***
CR43	<---	Awareness	1.000			.727	.724	
CR42	<---	Awareness	1.143	.055	20.862	.794	.795	***
CR41	<---	Awareness	1.187	.055	21.549	.822	.823	***
CR40	<---	Awareness	1.162	.062	18.767	.715	.716	***
CR39	<---	Cognition	1.000			.702	.707	
CR38	<---	Cognition	.979	.057	17.118	.685	.680	***
CR37	<---	Cognition	.903	.055	16.518	.659	.658	***
CR55	<---	Sensitivity	1.000			.785	.786	
CR57	<---	Sensitivity	.952	.057	16.846	.788	.786	***
CR7	<---	Dimensional Thinking	1.000			.702	.699	
CR6	<---	Dimensional Thinking	1.042	.063	16.598	.763	.766	***
CR26	<---	Experiment and Combine	1.000			.699	.677	



**Table 4 (continued).**

*Estimates of CFA Model of Field and Bischoff Creativity Scale*

CR10	<---	Experiment and Combine	.973	.054	18.084	.718	.741	***
CR49	<---	External motivation	1.000			.514	.550	
CR31	<---	External motivation	1.336	.119	11.270	.662	.484	***
CR30	<---	External motivation	1.440	.124	11.610	.724	.535	***

Analysis for construct reliability, convergent validity and discriminant validity by applying master validity test plugin in AMOS (Tables 5 – 7) indicates good CR (>0.7) for several constructs except dimensional thinking, experiment and combine and external motivation (CR >0.6, close to 0.7). The Cronbach’s alpha values for each factor reflect the same trend (table 5). The convergent validity of the latent constructs in addition to good model fit of CFA model, comply with the method suggested by G. W. Cheung, G.J et al., (2023) that “the standardised factor loading shall be (>0.4) and is statistically significant”. The standardised factor loading of all items are above 0.5 and are statistically significant. According to the AVE method, the value of AVE is 0.5 and above for all factors except for factors challenging status quo (0.488), cognition (0.465) and external motivation (0.406). Malhotra N. K and Dash S. (2011) have suggested that “AVE is often

too strict, and reliability can be established through CR alone”. Therefore, the scale can be considered to show convergent validity. Regarding the recommended methods for discriminant validity the scale shows (i) no cross loading items, and (ii) correlations between factors are significantly lower than 0.9. But, as per the method of AVE – SV method (from master validity test plugin), the values deviate from recommended criteria. The scale shows discriminant validity between several factors as per HTMT analysis (correlations <0.9) except between challenging status quo and associate and communicate (0.943), challenging status quo and cognition (0.928), and between synthesis and experiment and combine (0.994). But based on other criteria, the scale can be suggested to show discriminant validity. Overall, SEM based validity analysis of the scale developed by Field and Bischoff show good reliability and validity in the sample studied.

**Table 5.**

*Construct Reliability, Cronbach’s Alpha and Convergent Validity of Field and Bischoff Creativity Scale*

	CR	Cronbach’s alpha	AVE
Challenging status quo	0.827	0.83	0.488
Separate	0.847	0.85	0.581
Synthesis	0.822	0.82	0.536
Ass. and communication	0.841	0.84	0.514
Similarity	0.890	0.89	0.669
Awareness	0.850	0.85	0.586
Cognition	0.723	0.72	0.465
Sensitivity	0.764	0.76	0.618
Dimensional thinking	0.699	0.697	0.538
Experiment and combine	0.670	0.67	0.504
External motivation	0.669	0.64	0.406

**Table 6.**  
*Discriminant Validity of Field and Bischoff Creativity Scale*

	1	2	3	4	5	6	7	8	9	10	11
1 Challenging status quo	0.699										
2 Separate	0.649	0.762									
3 Synthesis	0.866	0.676	0.732								
4 Association and communication	0.937	0.609	0.773	0.717							
5 Similarity	0.757	0.570	0.850	0.705	0.818						
6 Awareness	0.843	0.557	0.831	0.813	0.706	0.766					
7 Cognition	0.930	0.649	0.813	0.846	0.752	0.875	0.682				
8 Sensitivity	0.667	0.443	0.597	0.700	0.571	0.623	0.661	0.786			
9 Dimensional thinking	0.777	0.600	0.821	0.710	0.729	0.652	0.752	0.542	0.733		
10 Experiment and combine	0.878	0.711	0.997	0.822	0.823	0.782	0.858	0.631	0.823	0.710	
11 External motivation	0.691	0.576	0.646	0.687	0.637	0.619	0.664	0.703	0.588	0.626	0.637

**Table 7.**  
*HTMT Analysis of Field and Bischoff Creativity Model*

	1	2	3	4	5	6	7	8	9	10	11
1 Challenging status quo											
2 Separate	0.652										
3 Synthesis	0.858	0.676									
4 Associate and communicate	0.943	0.615	0.776								
5 Similarity	0.752	0.573	0.842	0.714							
6 Awareness	0.843	0.565	0.834	0.825	0.712						
7 Cognition	0.928	0.650	0.806	0.852	0.754	0.874					
8 Sensitivity	0.668	0.443	0.593	0.705	0.572	0.628	0.659				
9 Dimensional thinking	0.774	0.603	0.819	0.716	0.731	0.661	0.759	0.538			
10 Experiment and combine	0.881	0.710	0.994	0.828	0.831	0.792	0.867	0.637	0.816		
11 External motivation	0.757	0.620	0.684	0.761	0.675	0.684	0.722	0.747	0.637	0.677	

### Conclusion

The scale developed by Field and Bischoff to measure creativity among university students, when used on a sample in India shows good psychometric properties in terms of scale reliability, construct reliability, convergent validity and discriminant validity, thus the quality of the scale is good and the

scale can be used to assess creativity among students of higher education institutions. Also, the relationship between creativity and demographic variables indicates that creativity can be suggested to be a learned behaviour and can be nurtured through education by integrating suitable strategies in curriculum.

### Appendix

#### *Measuring Creativity Among Students of Tertiary Education Developed by Ziska Fields & Christo A. Bisschoff (73 items version)*

S.No	Item	1	2	3	4	5	6	7
1	To help me find solutions or generate ideas I look for the uniqueness in processes							
2	To help me find solutions or generate ideas I look for the uniqueness in processes objects							
3	To help me find solutions or generate ideas I look for the uniqueness in processes features							
4	To help me find solutions or generate ideas I look for the uniqueness in processes situations							
5	I consider the dimensionality of an issue to create ideas in terms of space							
6	I consider the dimensionality of an issue to create ideas in terms of time							
7	I consider the dimensionality of an issue to create ideas in terms of cost							
8	I consider the dimensionality of an issue to create ideas in terms of colour							
9	I determine if things can be done from different points of view							
10	To find creative solutions, I combine objects							
11	To find creative solutions, I combine concepts							
12	To find creative solutions, I combine processes							
13	To find creative solutions, I separate concepts							
14	To find creative solutions, I separate processes							
15	To find creative solutions, I separate resources							

*Note: (1) Strongly disagree, (2) Disagree, (3) Somewhat disagree, (4) Neither agree nor disagree, (5) Somewhat agree, (6) Agree, (7) Strongly agree*

		1	2	3	4	5	6	7
	continuation							
16	To find creative solutions, I separate objects							
17	To find creative solutions, I separate dimensions							
18	I like to modify my creative solutions							
19	I look for similarity in concepts							
20	I look for similarity in problems							
21	I look for similarity in solutions							
22	I look for similarity in patterns							
23	I look for similarity in processes							
24	To find the best creative solution, I estimate							
25	To find the best creative solution, I simulate							
26	To find the best creative solution, I experiment							
27	I have the ability to produce a great number of ideas							
28	I have the ability to produce solutions to problems in a short period of time							
29	I can simultaneously propose a variety of solutions to a specific problem							
30	I am driven by external pressures (including other people) to solve problems							
31	I am driven by external pressures (including other people) to solve self-discovered problems							
32	I am self-motivated to resolve externally defined problems							
33	I am self-motivated to solve self-defined problems							
34	I am always motivated to be creative in my own interest areas							
35	I am motivated to be creative in an environment that tears down my barriers to creative thinking.							
36	I am always motivated by other people to use my creative skills							
37	I attain understanding from a variety of information sources without difficulty							

*Note: (1) Strongly disagree, (2) Disagree, (3) Somewhat disagree, (4) Neither agree nor disagree, (5) Somewhat agree, (6) Agree, (7) Strongly agree*

		1	2	3	4	5	6	7
	continuation							
38	I can discover different links and relationships (obvious and not so obvious) when I look at different information sources							
39	I can cope with complexities when I need to resolve a problem							
40	I do not get stuck on a set of rules to solve a problem							
41	I can easily see different aspects of a problem							
42	I can recognise gaps in my existing knowledge							
43	I can identify contradictions in accepted knowledge							
44	I can predict appropriate creative solutions to a problem after analysing the contradictions in a problem							
45	I agree that the use of scientific approaches outside a specific field of study can be helpful to develop creative solutions							
46	I am able to persuade others that my ideas are valuable							
47	I use communication as a tool to reveal my creative ideas to knowledgeable others							
48	I propose new ideas on a regular basis							
49	I intentionally engage in unpopular ideas							
50	I am able to redefine a known problem from a completely different perspective							
51	I can find the connection between items							
52	I find new solutions by using associations between items							
53	I like to combine various concepts to find solutions to problems							
54	I am able to see problems in a novel way							
55	I am a sensitive person							
56	I can recognise difficulties within a task easily							
57	I am sensitive to the various aspects of a problem							
58	I consider the consequences for humanity when I look for solutions to a problem							

*Note: (1) Strongly disagree, (2) Disagree, (3) Somewhat disagree, (4) Neither agree nor disagree, (5) Somewhat agree, (6) Agree, (7) Strongly agree*

		1	2	3	4	5	6	7
	continuation							
59	I consider immediate personal gains when I look for solutions to a problem							
60	I think about the consequences of my ideas							
61	I can anticipate consequences							
62	I do not prematurely judge ideas							
63	I think ideas through carefully and developing on it							
64	I develop ideas to find the best solutions for a given situation							
65	I make random attempts to solve a difficult problem							
66	I prefer to break away from preconceived perceptions to find solutions to problems							
67	I generate new ideas by actively searching for associations among concepts							
68	I use brainstorming to make associations regarding a given concept							
69	I make the effort to actively search for associations							
70	I generate ideas by finding as much alternatives as possible							
71	I always look at the big picture							
72	I like to take initiative and challenge assumptions							
73	I like to challenge assumptions							

Note: Source: Ziska Fields and Christo A. Bisschoff  
*Developing and Assessing a Tool to Measure the Creativity of University Students J Soc Sci*, 38(1): 23-31 (2014); Ziska Fields, Thesis submitted for the degree Doctor of Philosophy at the Potchefstroom campus of the North-West University, Promoter: Prof. C.A. Bisschoff, March 2012 page 175 – 176;  
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