The Factor Structure of the Scales for Rating the Behavioural Characteristics of Superior Students (SRBCSS): Results on an Omani Sample

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Abstract

The use of teacher-rating scales constitutes an integral component in the identification of gifted students. The purpose of this study was to explore the factor structure of the Scales for Rating the Behavioural Characteristics of Superior Students (SRBCSS, Renzulli, Smith, White, Callahan, & Hartman, 2002). Participants consisted of 672 (310 females and 362 males) students from several parts of Oman from Cycle II (grades five to ten). Exploratory factor analysis of the fourteen scales was conducted using principal components analysis with varimax rotation yielded thirteen factors. The results of the study support the factorial validity of the SRBCSS and warrants future research on the scale.

***Keywords*:** Factor structure; Scales for Rating the Behavioural Characteristics of Superior Students (SRBCSS); Gifted Rating Scales.

Teacher-rating scales are among the most widely used instruments for the screening and identification of students for later participation in programs of the gifted. The authors contend that rating scales are the second most frequently used, after the Intelligent Quotient (IQ) test, in assessing the gifted students (Pfeiffer, 2002). Some widely used teacher-rating scales exist: the Gifted Evaluation Scales (GES, McCarney & Anderson, 1998), Gifted Rating Scales (GRS, Pfeiffer & Jarosewich, 2003), Gifted and Talented Evaluation Scales (GTES, Gilliam, Carpenter, & Christensen, 1996), Scales for Identifying Gifted Students (SIGS, Ryser & McConnell, 2004), and Scales for Rating the Behavioural Characteristics of Superior Students (SRBCSS, Renzuli, Smith, White, Callahan, Hartman, & Westberg, 2002). These scales are widely used as screening instruments to identify gifted and talented students and to prepare them for enrichment programs (Renzulli, Siegle, Reis, Gavin, & Reed, 2009).

Several authors studied the use of teacher-rating or teacher-nomination scales to select students to participate in programs for the gifted (Johnsen, 2003; Siegle, Moore, Mann, & Wilson, 2010; Siegle & Powell, 2004). Also, several authors investigated the construct validity or criterion-related validity of teacher-rating scales for gifted students (Ryser & McConnell, 2004; Worrell & Schaefer, 2004).

The authors concluded that teacher-rating instruments represent a supplementary way in the identification for students who are often neglected (Stambaugh, 2007; Van Tassel-Baska, 2008). The success of teachers-as-raters depend on the explicit behaviours that students exhibit. When teachers are requested to nominate gifted children in their classrooms, the nominations or judgments might not be accurate (Peters & Gentry, 2012).

The advantages of rating scales include the ability to amalgamate a large number of observations of students in a reliable and well-organized way (Jaroewich, Pfeiffer, & Morris, 2002).

Rating scales are characterized by their simplicity and ease of administration and the possibility of involving teachers from the initial moments of the identification process (Garcia-Ros, Talaya, & Perez-Gonzalez, 2012). Teacher-rating scales are the most efficient way to identify the psychosocial aspects of giftedness (Subotnik, Olszweski-Kubilius, & Worrell, 2011; Worrell & Erwin, 2011). Teacher rating scales can provide important characteristics of student functioning such as persistence and ability to produce original solutions to problems (Elliot, Busse, & Gresham, 1993). Rating scales plays a valuable role in portfolio assessment of creative and artistic products for the gifted (Pfeiffer, 2001).

Rating scales are criticized for not providing scores that add to the predictive validity of cognitive and achievement measures (Brody, 2007; Worrell & Schaefer, 2004). Worrell and Erwin (2011) posited that "several scales result in obvious halo effects because of wording issues, use of questions that are clustered or under subheadings, or use of high-inference items. Thus, although the scores may be reliable, the validity of the inferences that can be drawn from the scores is questionable" (p. 334).

Worrell and Erwin (2011) listed three criteria of choosing rating scales. First, the scales should assess behaviours and attitudes that are related to learning and exceptional performance. Second, the scale items should be designed to measure the explicit behaviours by parents and teachers, not inferring behaviours. Third, the correlations among the subscales should be low to account for the different constructs that they assess.

The Three-Ring Model developed by Renzulli (1978, 2005) has viewed giftedness as the interaction of three constructs: above-average intellectual ability, creativity, and task-commitment. Renzulli has posited that each construct is essential in the development of gifted behaviour. The above-average ability is defined by Renzulli as either general ability that can apply to all domains, content areas, or specific abilities. Task commitment refers to high levels of motivation and involvement in a given problem or situation. Creativity refers to the fluency, flexibility, and originality of thought. These abilities, according to Renzulli, are possessed by those who perform in the top fifteenth to twentieth (percentile?) of any domain or content area.

The SRBCSS (Scales for Rating the Behavioural Characteristics of Superior Students, Renzulli et al., 2002) was originally developed in 1976 with ten subscales. The purpose was to provide teachers and other school personnel with a tool to select students who are eligible for specialized programs using a six-point rating scale that includes; never, very rarely, rarely, occasionally, frequently, and always (Renzulli et al., 2002). The first three subscales - learning, motivation, and creativity- were developed to support the construct of the Three-Ring Conceptions of Giftedness (Renzulli, 1978). More subscales were added including leadership, art, music, drama, communication (precision), communication (expressiveness), and planning as conceptions of giftedness have broadened. Four new subscales were added including mathematics, reading, science, and technology.

Argulewicz (1985) mentioned that

> " The SRBCSS represents a significant advancement in the expansion of the methodology for identifying intellectually gifted, creative, or talented youth. One promising area of research is the usefulness of the SRBCSS in identifying children from culturally-different backgrounds. Another research possibility is its use as a dependent variable in evaluating programs designed for the gifted". (p. 1312).

Renzulli et al., (2002) mentioned that the psychometric properties of teacher-rating scales might be different as each of these scales was compared against various assessment tools. For example, there may be a low correlation between the SRBCSS and a traditional measure of intelligence, such as the Wechsler Intelligence Scale for Children (WISC) or the Stanford-Binet, since the purpose of developing the SRBCSS was to identify strengths that are not measured in intelligence measurements.

A few rating scales involve subscales related to content areas such as Mathematics or Reading. The authors concluded that gifted and talented students excel in such academic areas (Sternberg & Davidson, 2005). However, some students exhibit different strengths. In other words, a student might excel in Mathematics, but his level in Reading might be average.

The present study had several advantages. No studies had been conducted to explore the factor structure of the SRBCSS's fourteen scales. Moreover, the use of a fairly large sample (762 participants) was advantageous to investigate such an issue. Accordingly, the current study was considered the first to investigate the factor structure of the SRBCSS in a different culture, namely, the Omani context.

Methodology

Participants

A random sample was selected to answer the questions of the study. A total of seven hundred and sixty-two students from ten schools representing the second basic education cycle in Oman (grades 5 to 10) in all governorates of the Sultanate, constituted the sample of this study. The sample was carefully selected in light of two variables: gender and grade level. Description of the sample is presented in Table 1 that follows:

Table 1: Description of the study sample.

Grade level	Male	Female	Total
Fifth	48	55	103
Sixth	63	41	104
Seventh	59	41	100
Eighth	54	58	112
Ninth	81	47	128
Tenth	57	68	125
Total	362	310	672

Instrument

The Scales for Rating the Behavioural Characteristics of Superior Students (SRBCSS) was originally developed in 1976 by Renzulli and his colleagues, to help teachers and other school staff to assess the behavioural characteristics of gifted students. The instrument started with four scales, namely, learning, motivation, creativity, and leadership. In 2002, the four content area scales were added: Reading, Mathematics, Science, and Technology. The study of construct validity of teacher judgments for high-ability students has been scarce (Renzulli et al., 2010). The SRBCSS was first published in 1976 with reliability and validity available for ten scales in the areas of learning that included: motivation, creativity, learning, leadership, art, music, drama, communication (precision), communication (expressive), and planning (Renzulli et al., 2009). Few researchers have used the principal-component analysis to explore the construct of the first four scales of the SRBCSS (learning, creativity, motivation, and leadership). Renzulli et al., (2010) conducted exploratory factor analysis to investigate the relationships between the four scales. The results indicated a four-factor solution that accounted for seventy-one percent of the variance. The four factors were learning, creativity, motivation, and learning. Confirmatory factor analysis was used to investigate the latent structure of the SRBCSS-III four domains (Reading, Mathematics, Science, and Technology). The content validity of the SRBCSS has been investigated for each subject scale.

A review of literature in the content areas has been conducted by specialists who investigated the research related to the behavioural characteristics of the students with high ability in areas such as Reading, Mathematics, Science, and Technology. A list of the most frequently cited characteristics was created in each area and was given to professionals such as scientists, computer technology specialists, mathematicians, and teachers. These experts reviewed and rated the characteristics. Then,

the experts reported how strongly they felt that each item described the behavioral characteristics (Renzulli et al., 2002).

After the initial content validation, subscales in each subject area were developed. Teachers rated students on the frequency of the behaviours displayed on a six-point Likert-type scale from 'never' to 'always'. After merging the four scales and randomizing the items in a single instrument consisting of seventy-three items, they were sent to elementary school teachers to rate students. To investigate the factorial validity of the SRBCSS, a confirmatory factor analysis, using Amos 4, was carried out to assess the latent structure of the four areas in Reading, Mathematics, Science, and Technology (Renzulli et al., 2002). Results of the confirmatory factor analysis for the Reading scale model was reduced to six items, Mathematics to ten items, Science to seven items, and Technology to seven items. For reliability, separate Cronbach alpha- estimates indicated that the four scales had high internal consistency (Renzulli et al., 2002).

For the reliability of the SRBCSS for the current sample, the Cronbach Alpha-coefficients were high and ranged from .87 to .96 (Planning Characteristics) as indicated in Table 2.

Table 2: Cronbach's alpha coefficients for the study sample (N = 100).

Subscales	Number of items	Alpha
Learning characteristics	11	.93
Reading characteristics	6	.88
Leadership characteristics	7	.90
Science characteristics	7	.90
Dramatics characteristics	10	.94
Creativity characteristics	9	.91
Motivation characteristics	11	.91
Artistic characteristics	11	.95
Musical characteristics	7	.95
Communication characteristics (Precision)	11	.95
Communication characteristics (Expressiveness)	4	.87
Planning characteristics	15	.96

For the concurrent validity, high correlations were found between the GATES (Gifted and Talented Evaluation Scales, Gilliam, Carpenter, & Christensen, 1996) and the SRBCSS subscales as shown in Table 3.

Table 3: Pearson correlation between the GATES and the SRBCSS (N = 110).

SRBCSS	GATES				
	Intellectual ability	Academic skills	Creativity	Leadership	Artistic talent
Learning	.56**	.60**	.68**	.62**	.60**
Reading	.63**	.67**	.56**	.51**	.46**
Technology	.32**	.29**	.25**	.24**	.24**
Leadership	.53**	.58**	.52**	.75**	.58**
Science	.67**	.60**	.68**	.62**	.58**
Dramatics	.30**	.22**	.34**	.35**	.33**
Creativity	.42**	.30**	.50**	.45**	.41**
Motivation	.46**	.44**	.54**	.53**	.52**
Artistic	.16	.13	.17	.19*	.21*
Musical	.07	.03	.14	.14	.10
Communication (Precision)	.51**	.46**	.54**	..52**	.39**
Communication (Expressiveness)	.41**	.37**	.43**	.48**	.29**
Mathematics	.61**	.55**	.62**	.53**	.57**

Note. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). (Explain meaning of '2-tailed'.)

Procedure

The scale was translated into Arabic and was shown to experts in educational psychology, measurement, and evaluation to revise the translated version and the appropriateness of the items for the Cycle II (grades five to ten) students in the Omani context. The judges approved the sound translation by professors in English language teaching to explore the translation. The scale was then implemented on a sample of teachers in Cycle II (grades five to ten). Research assistants were recruited to collect the data from the selected schools. The classroom teachers were informed to nominate the high-achieving students in some subject area that included language, mathematics, and science. Then, the SRBCSS was used to rate the different behavioural characteristics of the nominated students.

Results

The KMO (Kaiser-Mayer-Olkin Measure of Sampling Adequacy) for the sample was .84. This refers to a sufficient number of significant correlations among the items to justify conducting the factor analysis (Pett, Lackey, & Sullivan, 2003). The exploratory factor analysis was employed using principal component analysis with Varimax rotation. According to Pett et al., (2003), the criteria used to decide on the number of factors were the Kaiser criterion and the Scree Test (a technique for determining the number of factors to retain in a factor analysis or a principal components analysis), the interpretability of the factors, and the amount of variance explained. Items should load greater than .40 on the pertinent factor. Only one item in the planning characteristics factor (H11: is good at breaking down an activity into step-by-step procedures) had a loading of .31. The procedure resulted in thirteen factors. As shown in Table 4, the eigenvalues were 44.40 (35.24%), 7.41 (5.88%), 4.95(3.93), 4.08 (3.23), 3.66 (2.91), 3.31 (2.63%), 2.70 (2.14%), 2.34 (1.86%), 2.26 (1.80%), 1.93 (1.53%), 1.71 (1.35%), 1.65(1.31%), and 1.41 (1.12%).

Table 4: SRBCSS-III factor loading matrix with Varimax rotation (N=672).

Items	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
M12	.685												
M10	.680												
M13	.669												
M14	.656												
M11	.650												
M9	.650												
M8	.646												
M4	.643												
M6	.639												
M2	.623												
M7	.599												
M15	.599												
M3	.597												
M1	.528												
M5	.502												
I2		.778											
I8		.759											
I5		.754											
I7		.754											
I4		.735											
I1		.718											
I3		.717											
I6		.716											
I9		.707											
I11		.682											
I10		.625											
A5			.676										

A10			.674										
A6			.656										
A8			.654										
A9			.653										
A7			.639										
A2			.635										
A11			.622										
A4			.619										
A1			.590										
A3			.553										
K5				.647									
K2				.622									
K4				.616									
K9				.598									
K3				.595									
K7				.592									
K6				.580									
K10				.576									
K11				.574									
K1				.569									
L1				.566									
K8				.557									
L4				.505									
L3				.493									
L2				.477									
F5					.791								
F4					.778								
F3					.749								
F1					.746								
F2					.734								
F6					.696								
F9					.676								
F8					.674								
F7					.666								
F10					.614								
N4						.710							
N1						.709							
N3						.654							
N2						.649							
N7						.643							
N6						.636							
N5						.625							
N8						.615							
N9	.405					.588							
N10						.471							
J4							.885						
J1							.861						
J6							.859						
J3							.856						
J2							.856						
J5							.837						
J7							.774						
H7								.621					
H5								.618					
H10								.578					
H4								.575					
H8								.550					

H6								.533					
H9								.523					
H2								.519					
H3								.499					
H1								.439					
H11								.309					
C2									.761				
C4									.759				
C1									.746				
C3									.737				
C7									.720				
C5									.718				
C6									.697				
D2										.740			
D6										.728			
D4										.713			
D3										.671			
D1										.658			
D7										.623			
D5										.618			
G6											.639		
G8											.618		
G2											.572		
G4											.571		
G9											.566		
G3											.555		
G7											.519		
G5											.468		
G1											.454		
E3												.619	
E5												.604	
E4												.602	
E2												.601	
E6												.598	
E1												.490	
E7												.437	
B5													.661
B4													.647
B6													.604
B3													.600
B1													.579
B2													.566
E	44.4	7.41	4.95	4.08	3.66	3.31	2.70	2.34	2.26	1.93	1.71	1.65	1.41
% of V	35.2	5.88	3.93	3.23	2.91	2.63	2.14	1.86	1.80	1.53	1.35	1.31	1.11
M	4.50	4.43	4.75	4.61	4.21	4.58	3.59	4.78	4.40	5.16	4.58	4.79	4.95
SD	.84	.87	.78	.81	1.03	.85	1.37	.72	.93	.70	.81	.83	.78
alpha	.96	.94	.93	.95	.93	.94	.94	.90	.92	.89	.91	.90	.88

Note: 1- Loadings 0.400 and above were included except item (H11) it is loading was 0.309.

2- E= eigenvalue, V= variance, M= mean, SD= standard deviation.

3- I = Planning Characteristics, II = Artistic Characteristics, III = Learning Characteristics, IV = Communication Characteristics (Precision and Expressiveness), V = Dramatics Characteristics, VI = Mathematics Characteristics, VII = Musical Characteristics, VIII = Motivation Characteristics, IX = Technology Characteristics, X = Leadership Characteristics, XI = Creativity Characteristics, XII = Science Characteristics, XIII = Reading Characteristics

Factor One captured the Planning Characteristics Scale (fifteen items). Factor Two contained the Artistic Characteristics Scale (eleven items). Factor Three captured the Learning Characteristics

Scale (eleven items). Factor Four contained the Communication Characteristics Scale (both precision and expressiveness with fifteen items). Factor Five contained Dramatics Characteristics Scale (ten items). Factor Six captured the Mathematics Characteristics Scale (ten items). Factor Seven contained the Musical Characteristics Scale (seven items). Factor Eight captured the Motivation Characteristics Scale (eleven items). Factor Nine contained the Technology Characteristics (seven items). Factor Ten captured the Leadership Characteristics (seven items). Factor Eleven contained the Creativity Characteristics Scale (nine items). Factor Twelve captured the Science Characteristics Scale (seven items). Factor Thirteen contained the Reading Characteristics Scale (six items).

Discussion

The purpose of this study was to explore the factor structure of the SRBCSS (Renzulli et al., 2002). The current study is advantageous as it provides the first research study regarding the investigation of the fourteen subscales of the SRBCSS. No single study has been conducted to investigate the factor structure of the fourteen subscales of the SRBCSS. The results of the study indicated a thirteen-factor solution. Although extensive research has been carried out on the scale, no single study exists which adequately covers the factor structure of the fourteen subscales.

As stated in the technical and administration manual (Renzulli et al., 2010), several studies that were investigated, used the principal component analysis. For example, Lowrance and Anderson (1977) found a two-factor solution accounting for 87. 6% of the variance. Also, Burke, Haworth, and Ware (1982) found five more factors, namely, learning, motivation, creativity, leadership, and resistance. Principal component analysis was performed on the SRBCSS-R ratings that resulted in a four-factor solution that accounted for seventy-two percent of the variance. A second field test of the SRBCSS-R yielded a four-factor solution that accounted for seventy-one percent of the variance.

Renzulli et al., (2009) stated that "Creating research-based scales to identify the characteristics of gifted and high-ability students in specific content areas has been the subject of limited previous research, and most checklists used for these purposes, if they are available, are anecdotal" (p. 101). He also stated that finding research-based methods to explore the characteristics of gifted students in several areas such as Reading, Science, Mathematics, and Technology can add richness to the existing instruments in the field.

This finding has important implications for conducting more studies on the factor structure of the SRBCSS. Possible future research studies might include the exploration of the confirmatory factor structure of the scale, the comparison among two or more (similar/dissimilar) cultures regarding factor structure, and exploration of measurement invariance in gender. This combination of findings provides some support for the conceptual premise that using the rating scales is an alternative to exploring the detailed behavioural characteristics of bright students. However, more research on this topic needs to be undertaken to investigate the cultural differences on the scale.

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