

IDENTIFICATION OF GIFTED STUDENTS BY TEACHERS: RELIABILITY AND VALIDITY OF THE COGNITIVE ABILITIES AND LEARNING SCALE

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RESUMEN

Teachers play a relevant role in screening and identifying gifted and talented students. However, many times teacher's assessments may be biased by personal beliefs about giftedness. In these cases, the quality of screening and identification can be enhanced through the use of measurement devices that present good psychometric properties of validity and reliability. This study presents the examination of the precision and factor validity of the Cognitive Abilities and Learning Scale (CAL: Escala de Habilidades Cognitivas e de Aprendizagem – EHC/A; Almeida, Olivira & Melo, 2000), with a sample of 262 students from fourth and fifth grades. Results suggest the existence of only one factor, not confirming the theoretical model of three factors (intellectual ability, motivation and creativity) that supports the scale. Principal components analysis for three factors shows some problems with item specification for ability and creativity. These problems contrast with high reliability coefficients obtained when arranging items according to the dimension they would theoretically be linked to. These findings suggest the need to include new items with more specificity in terms of the cognitive dimensions of giftedness.

Palabras clave: Giftedness; Gifted and talented students; Screening; Validity and reliability.

Inclusion models of education suggest that schools should pay special attention to the diversity of their students, adopting policies and strategies that respect each students' needs. Besides acknowledging diversity, schools and teachers should be able to define educational measures that can aid the fulfillment of gifted children and youth's potential, in various domains. In doing so, inclusive schools will address all kinds of students, providing them an education that meets their interests and capacities.

Giftedness is generally seen as related to high academic achievement. However, research has described cases of academic failure among gifted students (Brazile, 2010; European Economic and Social Committee, 2012; Merrick & Targett, 2004; McClain & Pfeiffer, 2012; Pfeiffer, 2012; Weber, 2003). Therefore, giftedness is not a stable trait that invariably conducts to success; it should be considered as a potential, which needs to be identified and stimulated by the school and family in order to fully develop. In addition, talent that is neglected or not promoted will be sure to fade.

Because giftedness is a multidimensional concept, screening for giftedness or talent will not be fully addressed by solely assessing intelligence (Pfeiffer, 2012; Sparrow, Pfeiffer, & Newman, 2005). The multidimensionality of talent includes the addition of non-cognitive aspects in its assessment, including thinking styles, self-concept, motivation and creativity, among others (Kuo, Maker, Su, & Hu, 2010; Miranda, 2003, 2008; Miranda & Almeida, 2012; Renzulli & Reis, 1997). It is also important to consider contextual variables in assessment, such as social-family factors, as they influence the development and the profiles of students' achievement.

Various authors sustain that the identification of gifted students should be seen as a process of identifying support measures and services that correctly address students' particular characteristics (Almeida & Oliveira, 2000; Delisle & Renzulli, 1982; Miranda, 2003,

2008; Renzulli & Reis, 1997). In general, this identification process is organized in two phases: a screening phase and an identification phase, or, in other words, a phase of confirmation and one of clarification of giftedness, as well as of the educational measures that should be considered regarding the student (Almeida, Fleith, & Oliveira, 2013). Screening should be aimed at the highest possible number of students in order to avoid false negatives (students that should be identified and mistakenly weren't). In this process, special caution must be taken regarding the possibility of excluding many students, especially those with a lower socioeconomic status, from ethnic and cultural minorities, or with low academic achievement (Almeida & Oliveira, 2000; Kuo, Maker, Su, & Hu, 2010; Miranda, 2008; Miranda & Almeida, 2012; Pfeiffer & Petscher, 2008).

Screening of gifted students, considering the diversity of focuses on giftedness and talents, should resort on different referral sources, including academic achievement, teachers' and parents' reports, school portfolios or students' creative productions (Miranda, 2008; Renzulli, Reis, & Smith, 1981). However, the lack of screening and identification instruments adequately validated for this subgroup of students has been an persistent educational problem (Grigorenko, 2010; Pfeiffer, Kumtepe, & Rosado, 2006), leading many professionals and researchers to exclusively base their assessments on IQ tests, despite the limitations of these tests in the process of identification (Denka, 1990; Feldhusen, 1991; Grigorenko, 2010; Jarosewich, Pfeiffer, & Morris, 2002; Pfeiffer, Kumtepe, & Rosado, 2006; Sparrow, Pfeiffer, & Newman, 2005).

The teacher has a relevant role in screening for giftedness and talent, due to the specific information that he or she has about students (Frasier, Hunsaker, Lee, Finley, Frank, García, & Martin, 1995; Guenther, 2000; Haydée, 2006; Miranda, 2008; Rosemarin, 2009). Through their daily contacts with students, teachers are able to observe specific signs of higher potential and,

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therefore, be in particular conditions to conduct a preliminary identification of talent, to be complemented with further observation and psychological assessment. In addition, teachers' relations with students can also provide sound information to confirm this first intuition, and to provide educational services that are more appropriate for the students' particular case (Prieto, Parra, Ferrándó, Ferrándiz, Bermejo, & Sánchez, 2006; Siegle & Powell, 2004).

The acknowledgement of teachers' centrality for screening is not without problems. Many times, teachers misread talent or higher ability in their students due to their focus on learning difficulties or behavior problems (Brazile, 2010; Delisle & Lewis, 2003; Fraiser, Garcia, & Passow, 1995; Landau, 2003; McClain & Pfeiffer, 2012; Robinson, Shore, & Enersen, 2007). In addition, teachers' stereotyped conceptions about giftedness, based on expectations for idyllic behavior characteristics and attitudes, as well as for high levels of school achievement, may explain their reduced objectivity in screening (Brown, Gubins, Siegle, Zang, & Chen, 2005; Miranda, 2008; Oakland & Rossen, 2005; Shaughnessy, Stockard, Stanley, & Siegel, 1996; Speirs, Adms, Pierce, Cassey, & Dixon, 2007). Without specific training, teachers seem to continue to relate giftedness to high academic achievement, placing it as the first and most determinant factor for identification of giftedness and talent (Araújo, 2011; Hunsaker, Finley, & Frank, 1997; Miranda, 2008; Miranda & Almeida, 2012).

Due to the central role of teachers in screening and identification of gifted and talented students, and regarding the difficulties that they show in this process, it is important to use reliable instruments in this assessment. Precision in identification is enhanced when the identification measures have good reliability and validity properties (Borland, 1978; Guenther, 2000; Kolo, 1999). Based on this assumption, this study aims to analyze the psychometric properties of a screening measure for teachers, used in Portugal: *the Cognitive Abilities and Learning Scale* (CALs; Escala de Habilidades Cognitivas/Aprendizagem, EHC/A; Almeida, Oliveira, & Melo, 2000).

METHOD

Participants

A total of ten teachers completed the CALs for a sample of 262 students in fourth and fifth grades (M age = 10.1; SD = .53), at two schools in the north of Portugal (districts of Porto and Braga). One hundred and thirty-six were boys (46.6%) and 126 girls (43.2%). Most students (42.5%) came from families with a low socioeconomic status, as 38.1% were middle-class and 19.4% had a high socioeconomic background.

Measure

The Cognitive Abilities and Learning Scale (CALs; Escala de Habilidades Cognitivas/Aprendizagem, EHC/A; Almeida, Oliveira, & Melo, 2000) is based on a multidimensional definition of giftedness, as proposed in the three rings theory by Renzulli (1976). The scale is composed of 16 items, included in three dimensions: intellectual ability (8 items; Cronbach's alpha = .77); motivation (4 items; Cronbach's alpha = .57); and creativity (4 items; Cronbach's alpha = .70) (Melo, 2003). Answers were

provided on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always or almost always*), and teachers were also given the choice of answering *without* information, if they acknowledged not to have enough information about the question.

Procedure

Parents and school principals gave informed consent for data collection. The scale was completed by the head-teacher of the class, regarding each student in their class. Written instructions were provided along with the instrument, as well as information about the study's goals. Confidentiality was guaranteed. Statistical analyses were conducted using IBM SPSS Version 20.

RESULTS

An exploratory principal components analysis was conducted to assess the component structure of the 16-item measure, using varimax rotation, in order to identify the main components of the instrument. The Keiser-Meyer-Olkin (KMO) measure of sampling adequacy was .90 and Bartlett's Test of Sphericity (BTS) was statistically significant, $\chi^2(120, N = 262) = 3919.97, p < 0,001$, indicating that the correlation matrices were suitable for factor analysis. The initial factor solution presented only one factor with an eigenvalue greater than 1.0, using Kaiser's criterion (Hill & Hill, 2000), which explained 66.8% of the total items' variance.

Following, the component analyses was repeated for three components, based on the definition of three dimensions in giftedness, as suggested by Renzulli's theoretical model, the model which the scale is based on (Almeida, Oliveira, & Melo, 2000; Melo, 2003). The three components explained 76.9% of the total variance: the first component contributed with 66.8% of the total variance, the second factor with 5.7% and the third factor with 4.4%. Table 1 presents items arranged by components, setting item loadings for inclusion in a component at .50. Eigenvalues and the explained variance for each of the factors, as well as communalities for the CALs items are also presented. The first factor presented an eigenvalue of 10.7, the second factor of 0.91 and the third of 0.61.

Table 1. Loading Matrix of the CALs Items from a Principal Components Analysis with Varimax Rotation for Three Components

Item	Component			h ²
	1	2	3	
9 (ability)	.78			.79
12 (ability)	.73			.73
3 (creativity)	.73			.77
2 (ability)	.69			.78
6 (ability)	.69			.80
10 (ability)	.68			.80
7 (creativity)		.81		.81
13 (creativity)		.77		.80
1 (ability)	.74			.79
14 (ability)	.65			.73
15 (creativity)	.63			.70
4 (motivation)			.80	.82
8 (motivation)			.69	.72
11 (motivation)			.68	.70
16 (motivation)		.57	.63	.81
5 (ability)	.54		.62	.80
Eigenvalue	10.69	.91	.61	
% Variance	66.8	5.7	4.4	

Some items of the scale are not restricted to the factor in which they load, although if loadings are set for .50 only two items (item 5 and item 6) are in this situation. With the identification of three factors, there seems to be some item differentiation regarding the three dimensions of the scale (intellectual ability, creativity and motivation), although some intellectual ability and creativity items seem to load on each other's factor. In addition, one ability item also loads on the motivation factor, and one motivation item loads on the creativity factor.

Table 2 presents items arranged according to the dimension they would theoretically be linked to, presenting means and standard deviation of scores for each item, corrected item-total correlation (*ritc*) and Cronbach's *alpha* if item deleted, as well as the total dimension's alpha coefficient.

Table 2. Item Analyses Arranged by the Scale's Three Theoretical Components

Item	M	SD	ritc	alpha if item..
Intellectual ability				
1 – Presents an advanced vocabulary level for age and school year	3.01	1.01	.78	.94
2 – Easily solves a problem, based on an example or previous explanation	3.44	.93	.82	.94
5 – Organizes thinking and the steps to follow in a specific task	3.30	.93	.81	.94
6 – Identifies the most important elements in a problem to solve or in a subject to learn	3.37	.87	.85	.94
9 – Comprehends information easily or quickly	3.39	.99	.80	.94
10 – Memorizes or evokes information easily	3.44	.91	.87	.94
12 – Requires little assistance from the teacher, i.e., works well by him/herself	3.35	1.02	.77	.94
14 – Has a lot of information about certain subjects	3.10	.11	.77	.94
Cronbach's alpha = .95				
Motivation				
4 – Is engaged for long periods of time in learning situations	.35	.88	.75	.85
8 – Seeks, on his/her own initiative, for complementary sources of information	.27	1.06	.75	.85
11 – Feels stimulated by new items, ideas or problems	.56	.89	.72	.86
16 – Has higher levels of goals than his/her peers	.97	1.02	.76	.84
Cronbach's alpha = .88				
Creativity				
3 – Thinks about new solutions or alternatives when solving a problem	.21	.97	.65	.88
7 – Presents original	.91	1.45	.78	.83

or unusual solutions for problems

13 – Formulates detailed and different questions compared with most of his/her peers

15 – Shows imagination in his/her answers or solutions for problems

Cronbach's alpha = .88

The coefficients for the corrected item-total correlations and dimensions' internal consistency are high. Despite the identified problems with the scale's components structure, reliability coefficients vary between .87 and .95.

DISCUSSION AND CONCLUSION

Based on the evidence of the central role that high-quality measurement devices play in aiding teachers in screening and identification of giftedness and talent, this study aimed to examine the psychometric properties of the CALS (EHC/A) used in Portugal, ten years after the scale's construction. Results suggest that the three dimensions theoretically assessed by the 16 items do not seem sufficiently differentiated, and that a general factor may emerge in this assessment by teachers (cf. Araújo, 2011; Miranda, 2008; Oliveira, 2007). The components analysis for three main components conducted to the identification of some ability and creativity items that appear to be mixed in the factors on which they are loaded, as other items load simultaneously on more than one factor. Finally, if we do not attend to internal validity problems and proceed to the examination of reliability of the dimensions as composed by the items arranged accordingly to their theoretical dimensions, high reliability coefficients (Cronbach's *alphas*) are observed. This situation suggests that internal consistency analyses should not be conducted without previously considering the component structure of the scale.

The observed validity problems of the CALS (EHC/A) may be supported by a global appreciation of students' achievement by the teachers, without distinguishing achievement in the three dimensions theoretically considered in the scale (intellectual ability, creativity, and motivation). The introduction of new items and a reformulation of the existing problematic items may improve the specificity of each assessed dimension.

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