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

Lúcia C. Miranda[1], Alexandra M. Araújo[2]*, & Leandro S. Almeida[2]
[1]Instituto Superior de Educação e Trabalho: Oporto, Portugal
[2]University of Minho, Portugal.

Aceptado 5 octubre 2013. Revisado 30 noviembre 2013. Publicado 2 diciembre 2013

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 (CALS: 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; Sgreening; 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 invariantly 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; Haydéa, 2006; Miranda, 2008; Rosemarin, 2009). Through their daily contacts with students, teachers are able to observe specific signs of higher potential and,

Correspondencia a: Lúcia C. Miranda. Email: lrcmiranda@gmail.com
*The second author received funding from the Portuguese Foundation for Science and Technology (FCT) as a Post-Doctoral Grant, under grant agreement number SFRH/BPD/85856/2012

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 ate more appropriate for the students' particular case (Prieto, Parra, Ferrándo, 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

	Component			
Item	1	2	3	h^2
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 or unusual solutions for problems	.91	1.45	.78	.83
13 – Formulates detailed and different questions compared with most of his/her peers	.37	1.05	.78	.83
15 – Shows imagination in his/her answers or solutions for problems	.96	.98	.74	.84
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.

REFERENCES

Almeida, L. S., Fleith, D. S., & Oliveira, E. P. (2013). *Sobredotação: Respostas educativas.* Braga: ADIPSIEDUC.

Almeida, L. S., & Oliveira, E. P. (2000). Os professores na identificação dos alunos sobredotados. In L. S. Almeida, E. P. Oliveira, & A. S. Melo (Orgs.), *Alunos sobredotados: Contributos para a sua identificação e apoio*. Braga: ANEIS.

Almeida, L. S., Oliveira, E. P., & Melo, A. S. (2000). *Bateria de Instrumentos para a Sinalização de Alunos Sobredotados e Talentosos.* Braga: Universidade do Minho.

Araújo, M. E. B. G. (2011). *Sinalização de alunos com altas habilidades: Relação das perceções dos professores com o rendimento escolar dos alunos*. Dissertação de mestrado. Braga: Universidade Católica Portuguesa, Faculdade de Ciências Sociais.

Borland, J. H. (1978). Teacher identification of the gifted: A new look. *Journal for the Education of the Gifted, 2*, 22-32.

Brazile, R. D. (2010). *Selection process for third and fourth grade African American gifted and talented: A case study in one urban school district***.** Doctoral dissertation. Texas: Texas University.

Brown, S., Renzulli, J. S., Gubbins, E., Siegle, D., Zhang, W., & Chen, C. (2005). Assumptions underlying the identification of gifted and talented students. *Gifted Child Quarterly, 49* (1), 68-79.

European Economic and Social Committee (2012). *Libertar o potencial das crianças e dos jovens sobredotados na União Europeia.* Bruxelas: Comunidade Europeia, Parecer da Secção Especializada de Emprego, Assuntos Sociais e Cidadania.

Delisle, J. R., & Renzulli, J. S. (1982). The revolving door identification and programming model: Correlates of creative production. *Gifted Child Quarterly, 26*, 89-95.

Denka, R. D. (1990). Waiting for entry: What determines admission to gifted programs. *Early Childhood Development and Care, 63*, 55-63.

Feldhusen, J. F. (1991). Identification of gifted and talented youth. In M. C. Wang, M. C. Reynolds & H. B. Walberg (Eds.), *Handbook of special education: Research and practice, Vol. 4, Emerging programs* (pp.7-22). New York: Pergamon Press.

Fraiser, M. M., Hunsaker, S. L., Lee, J., Finley, V. S., Frank, E., Garcia, J. H., & Martin, D. (1995). *Educators' perception of barriers to the identification of gifted children from economically disadvantaged and limited English proficient backgrounds*. Storrs, CT: The National Research Center on Gifted and Talented.

Frasier, M. M., Garcia, J. H., & Passow, A. H. (1995). *A review of assessment issues in gifted education and their implications for identifying gifted minority students*, Research Monograph 95204. Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Grigorenko, E. L. (2010). Recent research in the field of giftedness: The field in 30 minutes or less. *Online Educational Research Journal.* Available from http://www.oerj.org/View?action=viewPDF&paper=8

Guenther, Z. C. (2000). Identificação de talentos: Recurso a técnicas de observação directa. *Sobredotação, 1*(1,2), 7 – 36.

Haydéa M. M. S. R.(2006). *Educação inclusiva é para todos? A (falta de) formação docente para altas habilidades/superdotação no Brasil.* Tese Doutoramento em Educação. Rio de Janeiro: Universidade Estadual do Rio de Janeiro.

Hunsaker, S. L., Finley, V. S., & Frank, E, L. (1997). An analysis of teacher nominations and student performance in gifted programs. *Gifted Child Quarterly, 41*, 19-24.

Jarosewich, T., Pfeiffer, S. I., & Morris, J. A. (2002). Identifying gifted students using teacher rating scales: A review of existing instruments. *Journal of Psychoeducational Assessment, 20*, 322-336.

Kolo, I. A. (1999). The effectiveness of Nigerian vs. United States teacher checklist and inventories for nominating potentially gifted Nigerian preschoolers. *Roeper Review, 21*, 179-183.

Kuo, C. C., Maker, J., Su, F., L., & Hu, C. (2010). Identifying young gifted children and cultivating problem solving abilities and multiple intelligences. *Learning and Individual Differences, 20*, 365–379.

Landau, E. (2003). Quiénes serán los superdotados del futuro?. In J. Alonso, J. Renzulli & Y. Benito (Eds.), *Manual internacional de superdotados: Manual para profesores y padres* (pp. 409-416). Madrid: EOS.

McClain, M. C., & Pfeiffer, S. (2012). Identification of gifted students in the United States today: A look at state definitions, policies, and practices. *Journal of Applied School Psychology, 28*(1), 59-88.

Melo, A. S. (2003). Sinalização dos alunos sobredotados e talentosos pelos professores. *Sobredotação, 4*(1), 29-46.

Merrick, C., & Targett, R. (2004). *Gifted and Talented Education: Module 2.* Department of Education, Science and Training: School of Education, UNSW.

Miranda, L. C. (2003). *Sinalização de alunos sobredotados e talentosos: O confronto entre sinalizações dos professores e dos psicólogos*. Dissertação de mestrado. Coimbra. Universidade de Coimbra, Faculdade de Psicologia e Ciências da Educação.

Miranda, L. (2008). *Da identificação às respostas educativas para alunos sobredotados: Construção, aplicação e avaliação de um programa de enriquecimento*

escolar. Tese de doutoramento. Braga: Universidade do Minho, Instituto de Educação e Psicologia.

Miranda, L. C., & Almeida, L. S. (2012) Sinalização de alunos sobredotados e talentosos: Perfil de desempenho em provas psicológicas e perceção dos professores. *Revista AMAzônica*, *5*(3), 146-164.

Oliveira, E. P. (2007). *Alunos sobredotados: A aceleração escolar como resposta educativa*. Tese de doutoramento. Braga: Universidade do Minho, Instituto de Educação e Psicologia.

Oakland, T., & Rossen, E. (2005). A 21st-century model for identifying students for gifted and talented programs in light of national conditions: An emphasis on race and ethnicity. *Gifted Child Today*, *28*(4), 56-63.

Pfeiffer, S. I. (2012). Current perspectives on the identification and assessment of gifted students. *Journal of Psychoeducational Assessment*, *30*, 3-9.

Pfeiffer, S. I., & Petscher, Y. (2008). Identifying young gifted children using the gifted rating scales-preschool/kindergarten form. *Gifted Child Quarterly*, *52*(1), 19-29.

Pfeiffer, S. I., Kumtepe, A., & Rosado, R. (2006). Gifted identification: Measuring change in a student's profile of abilities using the gifted rating scales. *The School Psychologist*, *60*(3),106-111.

Pfeiffer, S. I., Petscher, Y., & Kumtepe, A. (2008). The Gifted Rating Scales-School Form: A validation study based on age, gender, and race. *Roeper Review*, *30*, 140-146.

Prieto, M. D., Parra, J., Ferrándo, M., Ferrándiz, C., Bermejo, M. R., & Sánchez, C. (2006). Creative abilities in early childhood. *Journal of Early Childhood Research*, *4*(3), 277-290.

Renzulli, J. S. (1976). The enrichment triad model: A guide for developing defensible programs for the gifted and talented. *Gifted Child Quarterly*, *20*, 303-326.

Renzulli, J.S., & Reis, S.M. (1997). *The schoolwide enrichment model: A how-to guide for educational excellence* (2a Ed.). Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., Reis, S. M., & Smith, L. H. (1981). *The revolving door identification model*. Mansfield Center, CT: Creative Learning Press.

Robinson, A., Shore, B., & Enerson, D. (2007). *Best practices in gifted education: An evidence-based guide*. Waco, TX: Prufrock Press.

Rosemarin, S. (2009).The significance of teacher's characteristics as perceived by teachers and college students. *Gifted Education International*, *25*(2), 194-199.

Shaugnessy, M. J., Stockard, J. W., Stanley, N. V., & Siegel, J. (1996). Gifted children's, teachers', and parents' perceptions of influential factors on gifted development. *Gifted Education International, 11,* 76-79.

Siegle, D., & Powell, T. (2004). Exploring teacher biases when nominating students for gifted programs. *Gifted Child Quarterly*, *48*, 21-29.

Sparrow, S. S., Pfeiffer, S. I., & Newman, T. M. (2005). Assessment of children who are gifted with the WISC-IV. In A. Prifitera, D. H. Saklofske, & L. G. Weiss (Eds.), *WISC-IV: Clinical use and interpretation* (pp. 282-299). Burlington, MA: Elsevier Academic Press.

Speirs, N. K. L., Adms, C. M., Pierce, R.L., Cassady, J. C., & Dixon, F. A. (2007). Fourth-grade teachers` perceptions of giftedness: Implications for identifying and serving diverse gifted students. *Journal for the Education of the Gifted*, 30, 479-499