Research Article

Standardizing the Cognitive Abilities Screening Test (CogAt 7) for Identifying Gifted and Talented Children in Kindergarten and Elementary Schools in Jordan [1]

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Abstract

This study aimed to standardize the Cognitive Abilities Screening Test (CogAT) Form Seven for identifying gifted and talented children ages five-eight years in Jordan. A sample of 280 students was randomly chosen from public and private elementary schools and kindergartens in the city of Amman, the capital city of Jordan, and used teachers' nomination for gifted students. The results indicated significant and high reliability correlations for the total score of the two-time administration (r = .927) and highly significant internal consistency reliability correlations where Alpha coefficients were .941 for the subtest scores and .962 for the total score and split-half reliability was .904 for the subtest scores and .927 for the total score. Furthermore, the content validity results demonstrated unanimous agreement among reviewers (6 experts and 10 teachers) about the translation match of the original test, suitability to Jordanian culture, and extracting and interpreting the results. One the other hand, the criterion validity results showed that there were no significant correlations (r = .434) between the Arabic version of CogAT Screening Test results and teachers' nomination of gifted students.

Keywords

cognitive abilities test, Jordan gifted, gifted identification, early identification

Introduction

Identifying gifted and talented students has been one of the most important topics in the field for several decades (Renzulli & Reis, 2004). Three different primary methods are used to identify gifted and talented students: Observable behaviors inside the classroom; Parents and teacher's recommendations, and Screening and evaluation (Gadzikowski, 2013).

In general, the main purpose of the gifted identification process is discovering and selecting students with specific aptitudes and developing their talent(Assouline & Lupkowski-Shoplik, 2012). Moreover, the identification process should include multiple procedures that measure many aspects of students' potentials, abilities, and background. For this reason, screening of students at an early age for all these aspects is a crucial procedure that the identification process should start with (Clark & Zimmerman, 2004).

Gifted Education in Jordan

The gifted and talented movement emerged in the Middle East during the middle of the last century by establishing a few gifted and talented schools in the area and holding conferences under the auspices of the Arab League (Alzoubi, 2003). However, researchers have combined efforts in Jordan to develop appropriate methods to identify gifted children in Jordan especially at an early age. Al Rosan and Al Batsh (1990) conducted a study aimed to factor analysis methods for a Jordanian version of the Preschool and Kindergarten Interest Descriptor (PRIDE). The study sample consisted of 194 children from 3-6 years, and the results showed acceptable reliability coefficient for five factors: multiplicity of interests, purposeful playing, imaginative thinking, independence, and originality.

Moreover, Al Rosan, Al Batsh, and Qatami (1990) conducted a study aimed to extract validity and reliability indicators of the same test by using the same study sample. The study results showed high reliability coefficients by using split-half method (r = .89), internal consistency (r = .84), and test-retest (r = .83). Validity was computed by extracting criterion validity indicators with the Jordanian version of McCarthy Scale of Cognitive Ability (r = .76).

Furthermore, Shnikat (2010) developed a scale to identify gifted children in Jordan by examining its reliability and validity indicators in a sample of 400 children at the kindergarten stage. The study finding showed acceptable content, construct, and criterion (with Stanford-Benet scale) validity indicators. Moreover, the finding found acceptable reliability indicators by using internal consistency and test-retest methods.

Early Identification

Many studies have proven the necessity of the early identification process in order to provide services and determine eligible students as early as the preschool level

(Sankar-DeLeeuw, 2002). Moreover, many scholars tried to evaluate the ability of different programs and instruments in identifying young gifted children. For example, Kuo, Maker, Su, & Hu, 2010 administered a study aimed to discover the potential gifted students in Taiwan by using a program for problem solving and multiple intelligences. By implementing this program for over a 3-year period, this study provides a new identification model that is able to identify preschool gifted children regardless of the giftedness nature, disabilities, or cultural and economic factors by using multiple procedures, such as screening all children, interviews, assessment scales, checklists, and observations. As a result, "the researchers in this program had a belief that children, whether gifted or not, did not get the satisfaction of making progress until they had opportunities to find and develop their potentials".

Zhbanova, Rule, & Stichter (2015) suggested an identification model of young gifted children based on leadership, creativity, and academic performance. Researchers found that African American young gifted children provided evidence that the subjects obtained confidence and leadership skills, creativity, and academic performance during the study. Furthermore, reported an identifying model, called Aurora Project that aims to identify gifted students at the elementary stage by using analytical, creative, and practical approaches.

Cognitive Abilities Screening Test

The Cognitive Abilities Test Form 7, CogAT 7, is a widely-used test for students from kindergarten through high school. The test measures student's reasoning abilities that are considered a crucial factor to distinguish gifted learners (Warne, 2015; Lohman,2012; Lohman, 2011). However, The CogAT is not a test used to identify students' intelligence or IQ, yet is used to discover the gained reasoning skills through educational experience, even skills that have not been taught at school (Lohman & Hagen, 2001). The seventh edition of CogAT is the most reliable edition of the test since its first issuance in 1968 (Warne, 2014; Lohman, 2012). Furthermore, the CogAt contains two major parts: the full battery test and the screening test. While the full battery test is used to measure children's cognitive abilities, the screening test is used to offer fast and reliable signs of children who need gifted education services. Furthermore, the screening test is just a shorter form of the full battery and includes all subtests located within the full battery test (Lohman, 2012).

Many studies have proved the validity of using the CogAT test in identifying gifted children, especially at early ages (Lohman, 2005; Lohman, Korb, & Lakin, 2008; Lohman & Lakin, 2009; Widiatmo, 2004). Dr. Lohman reported that developing the latest edition of CogAT took more than nine years of work that included large sample pilot studies, more than 20,000 pictures, four forms, two

doctoral dissertations, and more than ten research publications (Lohman & Gambrell, 2012). To develop a valid and reliable test, the seventh edition of CogAT sample contained 65,350 students from American K-12 schools representing all areas and ethnic groups (Warne, 2015).

Study Justifications

The education system in Jordan, as in many other countries in the world, still identifies gifted and talented students based on their achievement performance and general mental ability (MOE, Gifted and Talented Dept.). Therefore, the current criteria used by the MOE for identifying gifted and talented students, one that relies on academic achievement, must be changed because this criterion opposes new scientific concepts indicating that gifted students could have average and/or low achievement performance (Reis & McCoach, 2000). Many studies reported that high achievement is not the only standard that should be taken in account in identifying gifted and talented students (Bock & Ruyter, 2011). In addition, other studies did not consider high achievement as an important value in the process of identifying gifted and talented (Cross & Coleman, 2014).

More importantly, there is a crucial necessity to use comprehensive tools in the process of identifying gifted and talented students in Jordan, such as social, personal, and cognitive abilities. This identification process must be applied to all students, without exception, irrespective of their mental abilities, achievement performance, or personal abilities. Gifted students should be identified at all stages of their life, from kindergarten through high school, because giftedness is not linked to a stage. In fact, many studies indicate the importance of identifying gifted and talented students in elementary school and kindergarten (Hodge & Kemp, 2000; Silverman, Chitwood, & Waters, 1986).

Study Questions

The study addressed the following questions:
 - ➢ Do the total scores of the Jordanian version of Cognitive Abilities Test, Screening Form (CogAT 7), levels 5/6, 7, and 8, reflect significant reliability?
 - ➢ Does the Jordanian version of Cognitive Abilities Test, Screening Form (CogAT 7), levels 5/6, 7, and 8, have a significant validity?

Methodology

This study used a quantitative method to extract reliability and validity indicators for the Jordanian version of CogAt test. The targeted population of this study was gifted and talented students ages five to eight years old in Jordan. Because the gifted and talented identification process in Jordan starts at ages 12-13 years (MOE, Gifted Dept.), students aged 5-8 years have not been identified. For that reason, the study

sample was chosen randomly from public and private elementary schools and kindergartens in the city of Amman, the capital city of Jordan, and used teachers' nominations for gifted students as an alternative identification method which is a valid method used by many researchers (Hunsaker, Finley, & Frank, 1997). Twenty public and private schools were chosen randomly to cover the area of Amman by using systematic sampling method. The systematic sampling method consists of selecting the study sample from the population by randomly selecting sequential points (Fraenkel, 2012).

The study participants were 280 students, 136 males and 144 females (Table 1) ranging in age from 5 to 8 years (M = 7.22, SD = 1.17), who were randomly chosen from kindergarten, first grade, second grade, and third grade classes at 20 schools in Amman.

Table 1
Demographic Characteristics for the Sample

Grade	Gender		Total	M	SD
	F	M			
K	27	34	61	5.63	.382
1	38	36	74	6.69	.398
2	40	31	71	7.65	.378
3	39	35	74	8.65	.393
Total	144	136	280	7.22	1.17

Among those students, teachers nominated 19 students as gifted students (M = 7.17, SD = 1.17) (Table 3), based on criteria that was explained to them before applying the test. Teachers were asked to nominate students based on the definition that this study adopted which is the US Department of Education's definition: "Children and youth with outstanding talent who perform or show the potential for performing at remarkably high levels of accomplishment when compared with others of their age, experience, or environment." (US Department of Education, 1993). Therefore, teachers nominated students that they think they are gifted in their classes regardless of their language skills, achievement performance, intellectual ability, and/or gender.

Table 3
Demographic Characteristics for the Nominated Students Sample

Grade	Gender		Total	M	SD
	F	M			
K	2	1	3	5.50	.458
1	2	1	3	6.60	.100
2	4	2	6	7.60	.424
3	4	3	7	8.58	.353
Total	12	7	19	7.17	1.17

Translation Procedures

The translation procedure of the CogAT Screening Test form 7, levels 5/6, 7, and 8, includes three main steps, which are: a) the primary translation, b) the back-translation (from Arabic to English), and c) the professional revision.

Primary Translation

The original CogAT Screening Test form seven, levels 5/6, 7, and 8 was translated by the researcher into the Arabic language to guarantee that the original version of the test matches the translated version in terms of culture, instructions, and score conversion. At the primary translation, the researcher translated the original tools from English (the original language of the tests) into the Arabic language (the native language in Jordan). That said, the CogAT screening form seven, levels 5/6, 7 and 8, is a nonverbal test, includes pictured items in all tests' questions; therefore, the primary translation procedure included a non-literal translation for the test administration instructions and score conversion. Then, the researcher prepared a primary Arabic version of CogAT Screening Test, levels 5/6, 7, and 8 as well as an Arabic version of the instructions and score conversion.

Back-Translation (from Arabic to English)

A Jordanian doctoral student from Wayne State University, who is proficient in both Arabic and English, translated all test materials from Arabic language into English language (Back Translation). This back-translation version was compared with the original English version to verify that the translation is matching to the original test in terms of: administration instruction, key scores, and conversion tables. Then, the back-translation was compared with the original version of the test materials, and the two copies generally matched each other with slight differences in some vocabulary due to the translation process.

Professional Revision

The original tests, including their instructions, scores conversion, and primary translated tests, were sent to five experts, who are proficient in both languages in the field of gifted and talented education, and to ten randomly selected teachers from elementary schools and kindergartens in Jordan for professional revision. The aim of this revision was to gather experts and teachers' comments about cultural appropriateness of use, the clarity of the application guidelines, and the accuracy of extracting results based on the following standards:

➤ The suitability of pictures and figures to the Jordanian culture.
➤ Translation matching (non-literal translation) with the original test, so teachers can easily read and understand the procedural guidelines when they intend to give the test.

> ➢ The clarity of extraction and interpretation of the results based on the test manual of norms and score conversion.

Subsequently, the researcher computed the percentage of agreement among experts and teachers' revision on subtest and overall test by using one/two scale for each item on the tests, where one refers to the appropriateness of use and two refers to the inappropriateness of use. Then, the researcher applied the experts and teachers' comments and suggestions to finalize the formal version of Arabic CogAT test that was used to identified gifted and talented children among the study sample.

Administration Procedures

After obtaining formal approval from the Ministry of Education (the sole responsible party for schools in Jordan) to commence the study, twenty elementary schools and kindergartens in Amman were randomly chosen. In addition, Teachers were asked to nominate gifted children among the study participants based on the giftedness definition explained above. More importantly, according to the CogAT guidelines, children's teachers administered the test to ensure accuracy of the results because they are familiar with children. Finally, a retest day was determined after four weeks of the administration day, and the previous steps were repeated accurately on that day.

Reliability Indicators extraction

To answer the first question in the study, test-retest and internal consistency correlations coefficients were used to extract reliability indicators. In the study children were given four weeks to retest using the same test that they were given at the first administration. Hence, the reliability coefficient was computed for the two measurements. Moreover, the researcher computed the reliability indicators by using the coefficient Alpha and split-half reliability coefficient procedures.

Validity Indicators extraction

To answer the second question, the researcher extracted content and criterion validity indicators. To extract content validity indicators, five experts in the field of gifted education and ten teachers from elementary schools and kindergarten in Jordan were asked to review the Arabic version of CogAT Screening Test, levels 5/6, 7, and 8 and the instructions and score conversion to verify the instrument content validity. Experts and teachers were asked to review the suitability of pictures and figures to the Jordanian culture and whether they match with the original test regarding the application and interpretation guidelines. The percentages of agreements among experts and teachers were computed to extract the content validity.

Regarding the criterion validity, the original form of the CogAT "is correlated with IQ scores from individually administered ability tests as well as IQ scores from different individually administered tests correlate with each other" (Lohman &

Lakin, 2009). Furthermore, there is an acceptable correlation indicator between the CogAt form six, the Raven Standard Progressive Matrices (Raven), and the Naglieri Nonverbal Ability Test (NNAT) (Lohman, Korb, & Lakin, 2008; Warne, 2014). In addition, there is a strong correlation coefficient between the CogAT and the Iowa test (Warne, 2014). However, none of the previous instruments or equivalent instruments are used in Jordan to identify gifted and talented children ages 5-8 years. More importantly, those students have not been identified in Jordan either in public or in private schools, and there are no standards required by the Department of Gifted at the MOE in Jordan to identify these children. Based on that, the researcher extracted criterion validity indicators between the Jordanian Arabic version of the Cognitive Abilities Screening Test and teachers' nomination for gifted children. All validity and reliability Indicators were obtained by using the Statistical Package for Social Sciences (SPSS).

Results

To answer the first question of this study, two types of reliability indicators were computed: (a) test-retest reliability, and (b) internal consistency reliability. First, the reliability coefficient for the total score was computed for the two-time testing. The Pearson Correlation coefficients were computed (Table 3) and indicated significant and high correlations for the total score of the two-time administration ($r = .927$, $p=.01$).

Table 4

Test-retest Correlations Coefficients for the Total Scores of the Two-Time Administrations

Total Score	Pre-test	Post-test
Pre-test	-	.927**
Post-test	.927**	-

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

For the reliability indicators of the sub-tests' scores, which are Verbal, Quantitative, and Nonverbal Batteries, the Pearson Correlation coefficients were computed (Table 4) and indicated significant correlations for the total score of the two-time administration for the Verbal Battery ($r = .845$, $p=.01$), the Quantitative Battery ($r = .835$, $p=.01$), and the Nonverbal Battery ($r = .761$, $p=.01$).

Table 5

Test-retest Correlations Coefficients for the Sub-Tests Scores of the Two-Time Administrations

CogAT Sub-test	Verbal Battery	Quantitative Battery	Nonverbal Battery
Verbal Battery	.845**	-	-
Quantitative Battery	-	.835**	-
Nonverbal Battery	-	-	.761**

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

For the internal consistency reliability, Cronbach's Alpha coefficients were computed for the subtest scores and for the total score. Results indicated that Alpha coefficients were .941 for the subtest scores and .962 for the total score. These results indicate a highly significant internal consistency reliability for the Arabic version of CogAT Screening Test (Table 5).

Likewise, split-half reliability was computed for the subtest scores and for the total score. Results indicated that split-half reliability was .904 for the subtest scores and .927 for the total score. These results indicate a highly significant internal consistency reliability for the Arabic version of CogAT Screening Test (Table 5).

Table 6
Cronbach Alpha and Split-Half Reliability Coefficients for Subtests and Total Score of The Two-Time Testing

Reliability Coefficient	Subtests Score	Total Score
Cronbach Alpha	.941	.962
Split-half	.904	.927

To answer the second question of this study, content validity was extracted by computing percentages of agreements among experts, teachers, and overall agreement. Moreover, experts and teachers were asked to give any suggestions, comments, or modifications for any item, if necessary. Subsequently, the total number of agreement was divide by the total number of items and multiplied by 100 for each revision and for overall revision (Table 6).

Table 7
The Percentages of Agreements Among Experts, Teachers and the Overall by the Revision Level

Level of Revision	Experts Revision	Teachers Revision	Overall Revision
Suitability of Jordanian culture	99.7%	99.5%	99.6%
Translation matching	100/%	100%	100%
Extracting and interpreting the results	100%	100%	100%

The results indicate that almost all reviewers (experts 99.7% agreement, teachers 99.5% agreement, and overall 99.6% agreement) agreed that pictures and figures for all test levels are suitable with the Jordanian culture. Moreover, the results indicate that reviewers unanimously (100% agreement) agreed that the translation (non-literal

translation) matches the original test, and teachers could easily read and understand the procedural guidelines when they administer the test. Finally, the results show that all reviewers unanimously (100% agreement) agreed that teachers could clearly extract and interpret the results based on the test manuals.

To compute criterion validity, two equivalent methods of identifying gifted students ages 5-8 years in Jordan must be compared to measure the correlation between these methods. In Jordan, there are no methods used to identify gifted children at this age. For this reason, this study used the teachers' nomination method as an equivalent method for identifying gifted students in elementary schools and kindergartens in Jordan. The results of the Pearson Correlation (Table 7) found that there were no significant correlations (r = -.434, p=.05) between the Arabic version of the CogAT Screening Test results and teachers' nomination for gifted students.

Table 8

Correlations Coefficients between the Arabic Version of CogAT Screening Test Results and Teachers' Nomination for Gifted Students.

Identification Method	Teacher Nomination	CogAT Results
Teacher Nomination	-	.434*
CogAT Results	.434*	-

*. Correlation is significant at the 0.05 level (2-tailed).

To illustrate, from the 19 students (M = 7.17, SD = 1.17) who were nominated by teachers as gifted students, the Arabic version of the CogAT Screening Test results found only nine students (M = 7.27, SD = 1.12) eligible for a comprehensive evaluation for gifted education services. The other nominated students were found not eligible for further evaluation. Indeed, the Arabic version of CogAT Screening Test results found five other students (M = 7.06, SD = 1.31), who were not nominated by teachers, eligible for a comprehensive evaluation for gifted education services.

By comparing the results between the Arabic version of the CogAT Screening Test results and teachers' nominations for gifted students, the Arabic version of CogAT found that among the study sample (280 students) there were 13 students (4.6%) eligible for comprehensive evaluation for gifted education services Screening Test while the teachers' nominations for gifted students suggested that 19 students (6.7%) were eligible for comprehensive evaluation for gifted education services.

Discussion

The study found that teachers' nominations of gifted children did not associate with the CogAT results. That means, teachers nominated non-gifted students, or they missed some gifted students and considered them as non-gifted. However, by

looking carefully at these results, one would notice that even though the correlation between the two identification methods were not significant, the value of this correlation was not too low. These results tell us that teachers could identify some of the gifted students in the sample. However, these results did not meet the assumptions of the study. This study assumed that the teachers' nominations and the study results would reflect sufficient correlations. The reason behind this assumption is the quantity of research that investigated this topic and indicated that teacher nominations are a valid method in identifying gifted students.

In my opinion, these results could be attributed to the lack of understanding by teachers of the giftedness definition and the gifted identifying criteria. This study explained to teachers a specific criteria to nominate gifted students that include nominate students that teachers that they believe they are gifted based on the following definition: "Children with outstanding talent who perform or show the potential for performing at remarkably high levels of accomplishment when compared with others of their age, experience, or environment" (National Society for the Gifted and Talented adopted from the United States Department of Education definition, 1993). Moreover, this study asked the teachers to identify students in their classes that they think are gifted regardless of their language skills, achievement performance, intellectual ability, and/or gender. A lack of understanding of the above criteria and the presumptions by teachers about the students' "Academic Level" could be the reason behind this result.

However, the overall results gathered from the quantitative phase of this study reflect sufficient indictors that the Arabic version of the CogAT Screening Test is valid and reliable. These results increase the confidence of users about the validity of using of the test results and the reliability of this test, so this test will give similar results when using it again for the same reasons.

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