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EDUC 316

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<p style="text-align:center">Formal Assessment</p>

<p style="text-align:center">Test of Early Mathematics Ability</p>

I. Test
    a. <u>Title:</u> Test of Early Mathematics Ability
    b. <u>Author</u>: Herbert P. Ginsburg and Arthur J. Baroody
    c. <u>Publisher:</u> Pro-ed, Austin, Texas
    d. <u>Copyright:</u> 2003
II. Description
    a. <u>General Purpose:</u> There are four chief purposes of the TEMA-3. The first is to identify those children who are significantly behind or ahead of their peers in the development of mathematical thinking. The second is to identify specific strengths and weaknesses in mathematical thinking. The third is to suggest instructional practices appropriate for individual children. The fourth is to document children's progress in learning arithmetic. The fifth is to serve as a measure in research projects.
    b. <u>Materials provided/needed</u>: Examiner's manual, picture books forms A and B, Profile/Examiner Record booklets for Forms A and B, manipulatives, and the assessment probes and instructional activities manual
    c. <u>Alternate Forms:</u> There is a four A and B for this test.
III. Administration
    a. <u>Age ranges</u>: This test is designed for 4 years 0 months to 8 years 11 months.
    b. <u>Administration time:</u> This test is not timed. The administration time depends on the age of the individual you are testing since you start and end at different points depending on the age and abilities of the student being tested.
    c. <u>Scoring time</u>: The scoring time of this test is not explicitly reported in the manual. However, I can say from experience that the scoring of this test takes very little time.
    d. <u>Types of scores reported:</u> Raw score, age equivalent, grade equivalent, percentile, math ability score, standard error of measurement, confidence interval, math ability score range
    e. <u>Basal and Ceiling levels:</u> A Basal is established when 5 consecutive questions in a row are answered correctly. A ceiling is established when 5 consecutive questions in a row are answered incorrectly.
    f. <u>Standard error of measurement</u>: The standard error of measurement for form A is 4 for ages 3-5 and 4 for ages 6-8. The standard error of measurement for form B is 3 for ages 3-8.

g. <u>Confidence intervals:</u> This test is at the 68% confidence interval.

IV. Reliability

   a. <u>Coefficient Alpha:</u> The coefficient alphas for the TEMA form A range from 92-95 with the average being 94 for ages 3-8. The coefficient alphas for the TEMA form B range from 95-96 with the average being 96 for ages 3-8. Obviously, this reliability test proved that the TEMA-3 is an extremely reliable test.

   b. <u>Immediate administration (alternate forms):</u> In this reliability test both forms of the test are given during one testing session. The standard scores for form A and B of the TEMA-3 were compared at six different age intervals. For this reliability test there was a sample of 46 children in Austin Texas that attended regular education classes at an elementary school. The sample consisted of 17 males and 29 females that ranged in age from 5 years 6 months to 8 years 5 months. The examiners used the counterbalanced design in this study in which they administered one student form A and then form B while they administered the next student form B and then form A. The result of this reliability test was a .97 reliability coefficient which once again proves the high reliability of the TEMA-3.

   c. <u>Test-retest:</u> For this reliability investigation 49 children were tested and retest for form A and 21 children were tested and retested for form B. For both samples and forms of the test there was a two week time lapse between the test and the retest. The coefficient for this reliability test for form A was .82 and for from B was .93.

   d. <u>Delayed administration (alternate forms):</u> This reliability coefficient is used to estimate test error that relates to both content sampling and time sampling. The sample for this study was the same 46 children from Austin, Texas that was used for the immediate administration alternate forms study. This study used the counterbalanced design in which children received one form of the test immediately followed by the other form. Then, 2 weeks later children were readministered the tests in the opposite order they were administered to them the first time. The coefficient for this test was .93 which continues to prove the tests reliability and stability over time.

V. Validity

   a. <u>Author's intent:</u> The authors intent for the TEMA was to measure the mathematical ability of young learners from the age of 3-0 to 8-11.

   b. <u>Does test measure what the author purports to measure?</u> Through the three different validity studies that were performed one can be assured that this test validly measures the mathematical ability of young learners.

   c. <u>Content-Description Validity:</u> The TEMA uses three different demonstrations to prove the content-description validity. First, the TEMA gives a detailed description for the rationale of each test item. Second, the TEMA gives the results of classical item analysis procedures used during the creating of each of the test items. Third, the validity of the test is supported by the results of differential item functioning methodology that is used to prove the absence of test bias in each of the test's items. Throughout all three of these demonstrations the TEMA's validity proves to be superior.

d. <u>Criterion-Prediction Validity-</u> Through the study of the TEMA's criterion-prediction validity the TEMA was compared to four other diagnostic tests. Those four tests were the basic concepts and operations composites from the KeyMath-R/NU, the applied problems subtest from the Woodcock-Johnson III Tests of Achievement, the mathematics reasoning and mathematic calculation subtests and the mathematics quotient from the diagnostic achievement battery- third edition, and the mathematics quotient from the Young Children's Achievement Test. The relationship between the TEMA-3 and the other four criterion tests ranged from a .54 to .91 with the most important score being .91; because this was a test that also measured the mathematics ability of young children. Overall, the coefficients were large enough to prove that the TEMA-3 possesses criterion-prediction validity.

e. **<u>Construct-Identification Validity-</u> There was a three-step procedure used to prove the TEMA's construct-identification validity. First, several constructs presumes to account for test performance were identified. Second, hypotheses were generated based on the identified constructs. Thirds, the hypotheses were verified by logical or empirical methods. After these three steps were performed there were three basic constructs thought to encompass the TEMA-3. First, performance on the test should be strongly correlated with chronological age. Second, the TEMA's results should be different between groups of people known to be average or below average in mathematical ability. Third, the items should be high correlated with the total score.**

VI. Norming Procedures:

a. **<u>Sampling Procedures:</u> I could not find much information recorded on the sampling procedure. However, I did find that a weighting of the sample occurred to ensure that the norming sample was similar to population characteristics.**

b. <u>Size of sample:</u> The size of the sample for the norming procedures for the TEMA-3 was 1,228 children in which 637 took form A and 591 took form B. The children in this test were from 15 states including California, Connecticut, Florida, Kentucky, Massachusetts, Missouri, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Oregon, Pennsylvania, Texas, Virginia, and Wisconsin. In this sample population 51% was males and 49% was females. In regards to race, 79% were white, 16% black, and 5% other. The ages of the sample ranged from age 3-8 with the largest sample size being children who were 6 and 7 years old.

c. **<u>Was item analysis conducted and indexes reported?</u> I could not find any mention of item analysis conducted within the normative information. Page 38**

d. <u>Date of norms:</u> The date of the norming procedure was the fall of 2000 and the spring of 2001.

VII. Classroom Uses

a. <u>As Suggested by authors:</u> There are no specific classroom use suggestions by the authors within the TEMA test manual. However, the TEMA test kit includes a book titled Assessment Probes and instructional activities. This book provides you specific probes and activities that you can do with a student for each question the student gets incorrectly. The probes allow you to see more closely inside the students head to

discover why they are making the specific mistakes that they are. This would be very helpful inside a classroom to more closely discover the thought processes of a student in order to better help them.

b. <u>Your opinion of appropriate uses</u>: I think that this is an excellent test to test the mathematical ability of young learners. I would use this test specifically if a young learner around the age of 7-6 did not seem to be developing math skills appropriately. This test would help me discover where that student was getting hung up in math concepts so I would know how to better help him/her inside the classroom. Overall, this test is an excellent assessment and I would see appropriate uses for it to test early struggling learners in their mathematical ability.

<u>Desirable Features</u>	<u>Undesirable Features</u>
- Easy to score - Easily interpreted scores - The Assessment Probes and Instructional Activities book is a great resource - Easy to administer - User friendly - Very easy and understandable charts and graphs - The coefficients for both validity and reliability were excellent, very well done test	- An easel format would make it easier to administer - Some items seem to be excessively repetitive - At times the validity and reliability information seemed excessively worded - Transition with materials seem to slow down the flow of the test (worksheet, coins, etc)