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A STANDARDIZED ACHIEVEMENT TEST IN MATHEMATICS FOR GRADE 8 STUDENTS IN THE SCHOOLS DIVISION OF EASTERN SAMAR

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INTRODUCTION

One of the important issues in any teaching and learning system is the quality of the students. The Department of Education in the Philippines ensures the continuous improvement of its systems to ensure that all the learners have access to quality basic education (DepEd Order No. 29, s.2017). Educational issue related to quality is the low level of student competence as a result of inadequate assessment system (Sidi as cited in Pandra, 2017).

Grades K-12 testing plays a critical role in evaluating and classifying students, as well as identifying educational strengths and weaknesses, throughout their compulsory education (Gawthrop, 2014). The test as a measuring tool for obtaining some information on the development of learners should be of good quality and developed from the curriculum used, considering the competencies available as basis for improvement of the learning system (Pandra, 2017). Any test that measures the attainment or accomplishment of an individual after a period of training or learning is called achievement test (Kunwar, 2018).

Academic achievement in Mathematics seems to be one of the predictors of people's success in their career. It is important in order to understand how the society functions (Opara, 2017). Mathematics is significant in our daily life. The need for high quality professional development program in Mathematics and Science have become increasingly important in the current climate of educational reform (Blank et al., as cited in Opara, 2017).

A carefully validated and developed mathematics achievement test is essential to measure student's capabilities on this subject. It also fills the discrepancy between different curriculums applied in each school year that enables it to gather a more accurate and precise result (Marasigan, 2019). Therefore, there is a need for experts to construct enough valid and reliable test with psychometric properties. Through this, standardized test needs to be developed. Standardized testing is an efficient method of measuring whether or not schools are achieving the state standards, sometimes forcing schools to revise their curriculum and testing programs so that they can reach these standards (Gawthrop, 2014).

The study was made in order to construct and develop a standardized achievement test in Mathematics for Grade 8 students in the Schools Division of Eastern Samar. Specifically, this study aimed to (1) Construct and develop a valid and reliable achievement test in Mathematics for Grade 8 students and; (2). Determine the percentile norm for Grade 8 Mathematics students in the Schools Division of Eastern Samar.

METHODOLOGY

Described in this chapter is the procedure on instructional product development specifically standardized achievement test in Mathematics for Grade 8 Students in the Schools Division of Eastern Samar.

TEST ADMINISTRATION

The test was administered to three (3) public secondary schools in the Division of Eastern Samar, namely; Pedro E. Candido Memorial National High School, General MacArthur National Agricultural School, and Llorente National High School. The researcher asked permission from the school principals of aforesaid schools and barangay captains of Brgy., Garawon, Carmen, Padang, Canciledes, Brgy. 3, and Brgy. 4 of the Municipality of Hernani; Brgy Binalay, Domrog, Sta. Cruz, Pingan, Calutan, Brgy. 2, Brgy. 6, Brgy. 7, Brgy. 8 of General Macarthur, and Brgy Bagte of Quinapondan; Brgy. Naubay, Canliwag, San Jose, Brgy. 7, and Brgy. 11 of Llorente. Letter-request was sent to the barangay captains with attached approved letter from the Schools Division Superintendent and School Principal before conducting the test. The researcher also sent to the barangay captain the test schedule and the list of respondents who will take the test. The test was administered by barangay due to the absence of face-to-face classes. It was conducted in the barangay hall, gymnasium, church, and in the elementary school with the permission from the barangay captain. Respondents wore their face mask and observed one-meter distances during the conduct of the test.

PRODUCT DEVELOPMENT

This is the preparation of the test for the final run. Test items should be arranged from easy to hard. The said arrangement was followed in this study to encourage students, specifically for slow learners to answer all the test items. Modifications were made as a result of comments and suggestions derived from the preliminary try-out (Ruiz, as cited in Apilado, 2001).

PRODUCT TRY OUT

A. First Try-Out

The effectiveness of a test can be determined by trying it out. The main purpose of the first try-out is for item analysis, the process of examining the pupil's responses to each test item (Oriendo and Antonio, as cited in Apilado, 2001). Specifically, it examined the difficulty and discriminating ability of the item, as well as the effectiveness of each alternative or option. The sample in the first try-out should be as comfortable as possible and the examinee should be as relaxed as possible (Apilado, 2001). The first try-out was administered to one hundred (100) Grade 8 students from different barangays of Hernani who were currently enrolled at Pedro E. Candido Memorial National High School (PECMNHS), on November 3-8, 2020. Others student-respondents were from Brgy. Binalay, Gen. MacArthur. The test was administered by barangay were the students residing since face-to-face classes were prohibited due to Covid-19 pandemic.

B. Second Try-Out

After analyzing the results of the first try-out, test items were revised for improvement, another try-out is required (Oriendo and Antonio, as cited in Apilado, 2001). Hence, the researcher improved all the 100-items given in the first try-out as a result in the item analysis. So, the 100-item test was improved before it was given in the second try-out. Consultations with experts of the subject were made to really improve the test items.

The second try-out was administered to one hundred twenty-nine (129) Grade 8 students of General MacArthur National Agricultural School (GMNAS). It was given at different barangays of General MacArthur composed of Aguinaldo, Domrog, Sta. Cruz, Binalay, San Isidro, Pingan,

Calutan, Poblacion 2, Poblacion 6, Poblacion 7, Poblacion 8, and barangay Bagte of Quinapondan.

A permit to administer the test was asked from the school principal before actually giving the test. Permission from the barangay captains was also requested.

PRODUCT REVISION

After the second try-out another item analysis was made to find out if the revised items were improved in terms of difficulty index, discrimination index, and plausibility of distracters.

THE THIRD AND FINAL TRY-OUT

After the two revisions of the constructed test, it is ready for the final form. From 100 items, the test was reduced to 60 items. Selection of items for inclusion in the final form was based on the result of item analysis, validity panel's suggestion and whether the item measured an important concept or skill as designed in the Table of Specification (TOS).

The final form of the test was administered to a new set of samples. One hundred twenty-one (121) students from Llorente National High School were the samples of the third try-out. These students came from different barangays of Llorente composed of Poblacion 1, Poblacion 11, Naubay, Canliwag, and San Jose. The researcher asked permission from the principal before actually administering the test. Permissions from the Mayor and the barangay captains were requested before giving the test.

ANALYSIS OF DATA

The study used the difficulty index and discrimination index formulas for item analysis. Content validity was assured by the validity panel and criterion-related validity was computed using Pearson-Product Moment Correlation Coefficient.

Reliability of the test was computed by means of Kuder Richardson Formula 21. This formula was used because the reliability estimate was taken from only one set of test data, the third tryout. Other estimates of reliability coefficients required data from two testing sessions. The said formula is fitted for the kind of procedure the researcher adopted (Apilado, 2001).

Criterion-related validity is a very common type of validity that is statistical. Specifically, concurrent validity was used to correlate between the results of the constructed test with an external measure. This external measure is the criterion in which this study used the examinees' final grade in Mathematics 8. The correlation coefficient which is the Pearson r was determined between these two sets of measurements.

After the final test has been composed and the achievement test was standardized, it is now important to establish the norms. The purpose of this is to determine the distribution of raw scores in the standardization group (norm group). These raw scores are then converted to some form of derived scores or norms such as percentile rank (Osadebe, 2014).

In this study, the scores obtained by the students in the last tryout were encoded and corresponding computation was applied to get the percentile rank. However, this can be computed manually by using the formula for percentile rank.

RESULTS AND DISCUSSION

The flow of discussion on this section closely follows the procedure on developing the standardized achievement test in Grade 8 Mathematics up to the establishment of the reliability of the test, including the norm relevant to the students in the Schools Division of Eastern Samar.

The development of the standardized achievement test underwent six major steps as suggested by Aguirre (2017). These were: 1) Instructional Planning, 2) Table of specification, 3) Test Development, 4) Quality Assurance and Test item Validation, 5) Product Try-out, and 6) Product Revision.

At the planning stage, the researcher determined the content and list of competencies based from the curriculum guide in Mathematics 8 as suggested reference by the Department of Education as basis in crafting and preparing the table of specification. Afterwards, the test construction stage commenced with the writing of 100 items multiple choice test for the three (3) areas consisting of fifty-five (55) items for Patterns and Algebra, thirty-six (36) items for Geometry, and nine (9) items for Statistics and Probability. This allocation of items per area was based on the number of days indicated in the teacher's guide used by the researcher. A thoroughly and extensive study was made in crafting the 100 items test by following the suggestion for the construction of multiple-choice test that were made by content validity experts or subject specialist. Based on the suggestions and rating made by the content validity expert, the test was revised and was given for the preliminary try-out. Again, the test was revised based on the feedback of the preliminary try-out. Three (3) try-outs were administered to three hundred fifty (350) grade 8 students in Pedro E. Candido Memorial National High School, General MacArthur National Agricultural School, and Llorente National High School. Item analysis was made after every try-out and corresponding modifications or revisions were undertaken to standardize the achievement test in Grade 8 Mathematics.

Results of the items analysis in the first try-out showed that the difficulty indices of 100 items ranged from 0.09 (very difficult) to 0.74 (easy). On the other hand, the discrimination indices ranged from 0.00 to 0.63 with fourteen (14) items having negative indices. As a result of item analysis on the first try-out, majority of the items were revised including the non-functional distracters for improvement in preparation for the second try-out.

The revised form of the test was again administered to another set of examinees. Hence, the second try-out test results revealed that the difficulty indices ranged from 0.19 to 0.67. Its discrimination indices ranged from 0.04 to 0.85. Considering all the areas, 6% of the 100-items test were easy, 54% were moderately difficult, 38% were difficult and 2% were very difficult. For the discrimination indices of the whole test, 63% were very good, 18% were reasonably good but possibly subject to improvement, 8% were marginal items usually needs improvement and 11% were poor items, to be rejected or improved by revision. On effectiveness of distracters, there were four (4) which were not functional, hence, the need for revision of the test on its final form was made. There were forty (40) items that were deleted as they possess unacceptable values of indices or low statistical values. Said decision was based on the behavioral objectives that the items should be measured so that it would come up with a balanced table of specification as originally designed.

REFERENCES

1. Adina, B. (1992). "A Prototype Achievement Test in Mathematics VI in Taft District". Unpublished Master Thesis, LNU, Tacloban City.
2. Aguirre, R.M. (2017). A Prototype Table of Specification. Manila, Philippines.
3. Agustin, V.L.G. (2020). A Standardized Achievement Test in Business Mathematics for Senior High School in the Schools Division of Eastern Samar. Unpublished Master Thesis, Eastern Samar State University-Salcedo Campus, Salcedo, Eastern Samar.
4. Anastasi, A. and Urbina, S. (2007). Psychological Testing (7th ed.) (New Delhi; Pearson Education Inc. by (Darling Kindersley (India) Pvt. Ltd.,).
5. Anderson, L. W., and Krathwol, D. R., eds. (2010). A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. New York, NY: Addison Wesley Longman, Inc.
6. Ann, P. S. (2017). Measurement, Assessment and Evaluation. Lagos: Concepts Publications Limited.
7. Apilado, M.S. (2001). A Standardized Admission Test to First Year College Students of ESSC- Salcedo. Unpublished Faculty Thesis, Eastern Samar State University, Salcedo, Salcedo, Eastern Samar Armstrong, T. (2013). The Best Schools. Alexandria, VA: ASCD.
8. Balagtas, M.U. (2015). A Reviewer for the Licensure Examination for Teachers. Manila, Philippines: National Bookstore.
9. Conception, B. (2015). Licensure Examination for Teachers, NCBTS Oriented. Manila, Philippines: National Bookstore.
10. DO 29, s. 2017. Policy Guidelines on System Assessment in the K to 12 Basic Education Program
11. Ebel, E. (1985). A Review of the State of the Art of Educational Research. The Philippine Experience.
12. Gawthrop, J. (2014). Measuring Student Achievement; A Study of Standardized Testing and Its Effect on Student Learning.
13. Retrievedfrom http:Research%20proposal/Introduction%20and%20RRL/Gawthrop_Jeremiah_Final.pdf
14. Hingorjo, M. & Jaleel, F. (2012). Analysis of One-Best MCQs: The Difficulty Index, Discrimination Index and Distractor Efficiency. Journal of Education and Practice; Vol. 62, No.2
15. Jayanthi, J. (2014). Development and Vallidation of an Achievement Test in Mathematics. International Journal of Mathematics and Statistics Invention (IJMSI), 2(4), 40-46
16. Kara, F. (2015). Development of Achievement Test: Validity and Reliability Study for Achievement Test on Matter Changing. Journal of Education and Practice, 21-26
17. Kunwar, R. (2018). Development and Standardization Process of Mathematics Achievement Test for the Students of Grade X. International Journal of Current Research, 10(11), 75451-75455
18. Marasigan, N. (2019). Development and Validation of Mathematics Achievement Test. International Journal of Recent Innovations in Academic Research, Vol.3, Issue-3, ISSN:265-3040.
19. Curriculum Guide (2013).

20. Retrieved from December, 2013, http://www.Curriculum%20Guide/Math%20CG_2.pdf
21. Merriam-Webster Dictionary (2017). Merriam-Webster Dictionary. Manila, Philippines: WS Pacific Publication, Inc.
22. Navarro, R.L. (2017). Assessment of Learning 1 (3rd ed.). Manila, Philippines: LORIMAR Publishing Inc.
23. Ocfemia, J. (1992). A Prototype Achievement Test in Science for First Year Students in Leyte Division. Unpublished Master Thesis, LNU, Tacloban City, 1992.
24. Opara, I. (2017). Development and validation of Mathematics Achievement Test for Primary School Pupils. British Journal of Education, Vol.5, No.7, pp. 47-57
25. Osadebe, P.U. (2014). Standardization of Test for Assessment and Comparing of Students' Measurement. International Education Studies; Vo. 7. No. 5, ISSN 1913-9020
26. Pandra, V. (2017). Development of Mathematics Achievement Test for Third Grade Students at Elementary School of Indonesia. International Electronic Journal of Mathematics Education, Vol.12, No.3, 769-776.
27. Riddle, E. M., & Dabbagh, N. (2012). Lev Vygotsky's Social Development Theory.
28. Retrieved November 13, 2012 from http://chd.gmu.edu/immersion/knowledgebase/theorists/constructivism
29. Ruiz, M.B. (1988). Evaluation and Measurement for Philippine School. Philippines: Garcia Publishing Company
30. Tarrant, M. (2009). Assessment of Functioning and Non-functioning Distracters in Multiple-choice: A Descriptive Analysis. BMC Med Educ;9-40
31. Tomlinson, C.A. (2006). Reconcilable Differences: Standards-based Teaching and Differentiation. Educational Leadership, 58, 6-11.
32. What is a Curriculum Guide? (2016).
33. Retrieved from https://study.com/academy/lesson/what-is-a-curriculum-guide.html