

# Development and Validation of Standardized Test in Advanced Algebra

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**Abstract-** The Development and Validation of Standardized Test in Advanced Algebra is designed for students of Ilocos Sur Polytechnic State College. Three research questions guided the study. The standardized test in Advanced Algebra was constructed using table of specification, outcomes based education syllabus, compilation of test questions as well as validation through the five Math experts. Internal consistency method was employed for its reliability. It was administered to 33 BSEd Mathematics major using an 80-item test and was trimmed down to 45 items. The validity index, index of difficulty and discrimination power was used to accept, reject and revise the test items. Kuder – Richardson 20 was used for the reliability. Recommendations were made that the standardized test can be used to assess student's performance from time to time.

The aim of this study is to develop and assess the validity and reliability of the instrument to evaluate the performance of students. The test was distributed to all the third year BSEd Math majors who had already taken the subject Advance Algebra. The validity of the test instrument was assessed by the five math experts. The reliability of the instrument was measured using the internal consistency reliability method. The findings of this study shows that the test instrument was valid and reliable. Finally, out of 80 items, 45 items were retained.

**Index Terms-** assessment, standardized test, validity , reliability

## I. INTRODUCTION

Assessment is a means by which we determine what students know and can do. It tells teachers, students, parents, and policymakers something about what students have learned: the mathematical terms they recognize and can use, the procedures they can carry out, the kind of mathematical thinking they do, the concepts they understand, and the problems they can formulate and solve. It provides information that can be used to award grades, to evaluate a curriculum, or to decide whether to review a specific topic. Assessment can play a powerful role in conveying, clearly and directly, the outcomes toward which reform in mathematics is aimed. As assessment changes along with instruction, it can help teachers and students keep track of their progress toward higher standards (<https://www.nap.edu/read/2235/chapter/4>, retrieved 17 May 2019). Many of the assessments in use today, such as

standardized achievement tests in mathematics, have reinforced the view that the mathematics curriculum is built from lists of narrow, isolated skills that can easily be decomposed for appraisal.

A standardized test is any form of test that (1) requires all test takers to answer the same questions, or a selection of questions from common bank of questions, in the same way, and that (2) is scored in a "standard" or consistent manner, which makes it possible to compare the relative performance of individual students or groups of students (The glossary of education reform. <http://edglossary.org/hidden-curriculum>, retrieved 7 May 2019). The use of standardized testing is supported by two fundamental assumptions, those being: (1) designed objectively, without bias and (2) assess a student's academic knowledge (Gawthrop, 2014).

Standardized testing is a central part, at all levels, of the current education process. Universities use standardized tests to assist in selecting applicants. For students in 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. Testing also shows teachers their own weaknesses and provides insight on how to better structure lesson plans and focus areas.

Achievement test is a form of standardized test designed to measure the knowledge and skills students learned in school or to determine the academic progress they have made over a period of time. The tests may also be used to evaluate the effectiveness of schools and teachers, or identify the appropriate academic placement for a student—i.e., what courses or programs may be deemed most suitable, or what forms of academic support they may need. Achievement tests are "backward-looking" in that they measure how well students have learned what they were expected to learn (The glossary of education reform. <http://edglossary.org/hidden-curriculum>, retrieved 7 May 2019). Keeping in mind all such things, the researcher has been encouraged to develop a standardized test in Advanced Algebra to assess student's performance and improve instruction for professional development.

### Statement of the Problem

The aim of this study is to develop a standardized test in Advanced Algebra.

Specifically, it aims to answer the following questions:

1. What is the level of validity of the researcher-made test in Advanced Algebra?
2. How reliable is the researcher-made test in Advanced Algebra?

3. What standardized test in Advanced Algebra can be developed?

#### Research Design

The researcher made use of the descriptive-developmental design which led to the construction and development of standardized test in Advanced Algebra.

#### Sources of Data

The study involved 33 students from the third year BSEd Math students and five mathematics instructors of the Ilocos Sur Polytechnic State College for the second semester, School Year 2019 – 2020. The data gathered were based from the scores of the students for which the researcher – made test was administered.

#### Instrumentation and Data Collection

An evaluation tool consisting of 10 indicators on a five-point Likert scale served as the basis of the mathematics instructors in evaluating the validity of the test items.

An 80-item researcher – made test was pilot tested to 33 third year BSEd Math major students last 18 November 2019. Through item analysis, the researcher – made test was trimmed down to 45 items and was re – tested on the same respondents on 9 December 2019.

#### Analysis of Data

In terms of validity of the researcher – made test in Advanced Algebra, weighted mean was used. To quantify the responses of the evaluators regarding the validity of the researcher – made test, a five-point Likert scale was used.

To determine the reliability of the researcher – made test in Advanced Algebra, the internal consistency reliability method was used. The reliability coefficient obtained by Kuder Richardson - 20 was used (Calmorin, 2011).

On the other hand, the items in the test were subjected for item analysis to determine the index of difficulty and index of discrimination of the items using total enumeration. The items which were retained was included in the standardized test in Advanced Algebra while some of the items that were described as improve were enhanced included also in the standardized test for Advanced Algebra.

#### SUMMARY

This study aimed to standardize a researcher - made test in Advanced Algebra. It made use of the scores of the students for item analysis to determine whether it is a good item or not for it to be included as test items in the standardized test and the validity of the test was based from the perceptions of the evaluators.

Specifically, it determined: 1) the validity of the teacher-made test in Advanced Algebra; 2) the reliability value of the test; and 3) possibly propose a standardized test in Advanced Algebra.

This study employed the descriptive - developmental design. It involved 33 students and 5 mathematics instructors for the second semester, School Year 2019 – 2020, as respondents. Moreover, a questionnaire was used to determine the validity of the test in Advanced Algebra and the Kuder Richardson – 20 was

used for the reliability value. To come up with a standardized test, item analysis was also employed.

#### FINDINGS

Based from the analysis of data, the following are the salient findings of the study:

1. The different indicators for validation of the test in Advanced Algebra are perceived as very much valid and much valid with an overall mean of 4.20. Specifically, test items focused on the particular thought or idea was observed as very much valid with a mean of 4.45. On the other hand, the evaluators perceived that the formulation of the items in accordance with the degree of difficulty is much valid with a weighted mean of 3.70.
2. The test in Advanced Algebra is reliable such that its reliability coefficient is 0.88. This means that the test constitute consistent results with something or process (Wiberg, 2014) and on this study, the scores of the students are consistent with each other.
3. There are 45 items out of 80 items considered as very good items for test standardization, hence these items were enhanced and included as part of the standardized test in Advanced Algebra.

#### Conclusions

Based from the findings of the study, the following conclusions are drawn:

1. The level of validity of Advanced Algebra test was much valid.
2. The reliability of the Advanced Algebra test was highly reliable.
3. Based from the results of the Item Analysis it was found out that there are 45 items out of 80 items considered as very good items for test standardization, hence these items were enhanced and included as part of the standardized test in Advanced Algebra.

#### RECOMMENDATIONS

In light of the findings and conclusions, the following are recommended:

1. The developed standardized test for Advanced Algebra should be used by the Mathematics teachers of Ilocos Sur Polytechnic State College.
2. The developed standardized test should be given to students enrolled in Advanced Algebra
3. The developed standardized test should be improved and enhanced to have a better output.
4. Similar studies should be conducted in other schools with the same course as respondents to find out if the same result will come out to confirm the conclusion using standardized test.

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