DEVELOPMENT AND VALIDATION OF AN ACHIEVEMENT TEST IN STATISTICS FOR COLLEGE STUDENTS

A Dissertation

Presented to the Faculty

Of the Graduate School

Bicol University

Legazpi City

In Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy in Mathematics Education

by:

MYRNA ALPON SANTELICES

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RECOMMENDATION FOR ORAL DEFENSE

This dissertation hereto attached entitled **Development and Validation of an Achievement Test in Statistics for College Students** prepared and submitted by **Myrna A. Santelices**, in partial fulfillment of the requirements for the degree **Doctor of Philosophy**, is hereby submitted to the dissertation committee for consideration.

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February 14, 2002
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The Oral Examination of MYRNA A. SANTELICES, for the Degree of Doctor of Philosophy, major in Mathematics Education.

Title :" DEVELOPMENT AND VALIDATION OF AN ACHIEVEMENT TEST IN STATISTICS FOR COLLEGE STUDENTS"

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Date : October 30, 2002

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Upon the recommendation of the Oral Examination Committee, this dissertation entitled "DEVELOPMENT AND VALIDATION OF AN ACHIEVEMENT TEST IN STATISTICS FOR COLLEGE STUDENTS", is hereby approved in partial fulfillment of the requirements for the degree, Doctor of Philosophy major in Mathematics Education

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ABSTRACT

TITLE — DEVELOPMENT AND VALIDATION OF AN ACHIEVEMENT TEST IN STATISTICS FOR COLLEGE STUDENTS

AUTHOR — SANTELICES, MYRNA A.

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Summary

This descriptive-correlational study aimed to develop and validate an achievement test for college students at the Catanduanes State Colleges, during the school year 2000-2001. Specifically, it sought answers to the following sub-problems:

1. What are the characteristics of the achievement test developed?

2. What topics and test items do the students find easy? difficult?

3. How do the students compare in the achievement test in Statistics across colleges?

4. Which of the following student variables significantly correlate with achievement test in Statistics, in terms of:

   a. Attitude towards Statistics

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b. English proficiency

5. What are the characteristics of the teachers in Statistics?

Theories of Piaget on cognitive development, Kohler on insight and understanding, Lewin on internal and external forces, Bruner on learning process, Fehr on learning mathematics and Hammond on evaluation were pooled together in order to advance the theory of this study which states that "Learning in Statistics can be evaluated in terms of subject content and cognitive skills and it is influenced by some variables".

The instruments used were Achievement Test, Attitude Towards Statistics Questionnaire and Questionnaire for Teachers.

The study tested the following hypotheses: 1) There is a significant difference in the level of achievement of students across colleges, and 2) There is a significant relationship between student variables and the achievement test in statistics for college students.

The respondents were the faculty members teaching Statistics, freshmen and sophomore college students.

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Findings

1. Characteristics of the Test

Results of an item analysis in achievement test in Statistics revealed that the test has content validity, easy to administer and score. The reliability coefficient of 0.63 showed the test is highly reliable.

2. Topics / Test Items Found Easy and Difficult.

Four topics found easy were Introduction, Measures of Central Tendency, Contingency Tables and Analysis of Variance. Eight topics found difficult were: Collection of Data, Presentation of Data, Measures of Variation, Permutation and Combination, Simple Correlation, Tests for Goodness of Fit, Probability and Hypothesis Testing.

Two test items taken on the topic Contingency Tables were found easiest whereas ten test items were found difficult by the students.

3. Comparison of Students Achievement Test Across Colleges.

The computed F-value equals 3.9954 was greater than the tabular value of 2.65 at 0.05 level of significance. This means that there is a significant difference in the achievement test in Statistics of

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students across colleges. The Tukey test of difference revealed that the students from the College of Nursing and School of Midwifery and the College of Agriculture and Fisheries had a significantly higher achievement test result than those students from the College of Industrial Technology.

4. Correlation Between Student Variables and Achievement Tests.

The computed grand mean of 2.14 indicated that the students had a neutral attitude towards Statistics. In English proficiency, 61 percent of the students got a rating ranging from 2.1-2.5 described to be in the satisfactory level. A significant relationship existed between attitude towards Statistics. ($t = 6.3560$; $r = 0.4303$) and English proficiency ($t = 4.9758$; $r = 0.3493$) and achievement test.

5. Characteristics of Faculty Members

Majority of the faculty members are holders of Bachelor of Science in Education (BSE) and all are occupying permanent positions. Some teachers have been teaching Statistics from 8 to 15 years, while others for 1, 2, and 3 years. Some have attended seminars or workshops for several times while others have not been given a chance.

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Conclusions

The following conclusions were drawn from the foregoing findings:

1. The test was valid and reliable, easy to administer and score.

2. Four (4) topics found easy were: Introduction, Measures of Central Tendency, Contingency Tables and Analysis of Variance.

Eight (8) topics found difficult were: Collection of Data, Presentation of Data, Measures of Variation, Permutation and Combination, Simple Correlation, Tests for Goodness of Fit, Probability and Hypothesis Testing. An overall index of difficulty = 0.49 indicated that the topics were difficult for college students.

Two test items and ten test items were found easiest and difficult by the students, respectively.

3. In terms of achievement test in Statistics, it showed that the students from the Colleges of Agriculture and Fisheries and Nursing and School of Midwifery were significantly better than those from the College of Industrial Technology.

4. Attitude towards Statistics and English proficiency are significantly related to the achievement of students in Statistics.

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5. A typical professor in Statistics has not earned any degree in Statistics, has taught the subject for an average of 10 years, permanent in status and has attended few seminars in Statistics.

Recommendations

Based from the conclusions the following recommendations are herein presented:

1. The achievement test may be useful in several ways:

   a. The test may be used as a final examination in Statistics for college students.

   b. The predictive validity of the test may be established.

   c. The test may be standardized using appropriate methods.

2. There is a need for students to develop better understanding especially for difficult topics in Statistics by introducing innovative teaching strategies and by creating instructional materials.

3. The teacher having two groups of students, the low achievers and high achievers must on decide on the content and selecting cognitive processes and skills appropriate for both groups. Students repertoires of skills and strategies can be modified substantially, by effective instructional conditions and methods. This is true not only

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for high achieving and older students but also for low achievers and younger students.

4. Aside from correlating achievement test and student variables considered in this study, other criteria can be explored such as awards received in contests in Statistics, membership or hold positions in organization relevant in Statistics and success on the job or placement in related scientific fields and others.

5. Characteristics of the faculty members teaching Statistics need further improvement for effective teaching delivery. If a new faculty member is being hired or assigned to teach Statistics subjects proper screening procedures should be followed to ensure competency and efficiency in teaching.

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