

Development and Validation of a Teacher Education Aptitude Test

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Abstract: The main objective of the study was to develop and validate a teacher aptitude test for teacher education students in the University of Eastern Philippines, Catarman, Northern Samar, Philippines. A multiple choice test of 114 items was finalized after pilot study. The test was administered to a sample of 130 freshmen students in the college. Separate sheets were provided to students included in the sample. Several work sheets were prepared to perform item analysis. Classical test theory method was used in the analyses of the data. Item analysis, difficulty index, and discriminatory index were calculated. The reliability coefficient was 0.78 indicating moderate goodness of fit of the items to the respondents.

Keywords: development, validation, admission test, teacher education students.

I. INTRODUCTION

According to Aiken (1985), aptitude refers to a person's capacity to profit from further training or experience in an occupation or skill. It is an abstract quality or psychological characteristics which cannot be measured directly using an ordinary test. Kubiszyn and Borich (2003) defined aptitude as another name for potential or ability to perform in a particular learning area. To find the natural ability of an individual in scholastic, vocational or developed component of a competency to do a certain kind of work at a certain level, it needs the aptitude of the student (Raza, 2011). Rashmussen (2007) defined aptitude as a set of characteristics that relate to an individual's ability to acquire knowledge or skills. The author further explained that individual differences are related to subsequence learning during a fixed time frame.

A special test used for the purpose of measuring aptitude is termed as aptitude test. Different psychologists have described this operational definition. Aptitude tests play an important role to decide on the direction of students' educational objectives (Chatterjee, 2007). Aptitude test result varies from one student to another. It indicates individual's learning ability, the specific ability needed to land in a job, suitability, readiness, and tendency or capacity for particular activity (Raza, 2011). The test also considers the degree of readiness to learn and perform well in a particular situation or in a fixed domain. Aptitude test measures students' general performance across a broad range of mental competencies. It includes items which measure more specialized abilities such as verbal and numerical skills that predict scholastic performance in educational programs (Oyetunde, 2007). Aptitude tests are cognitive measures used to predict future performance in some activities like school learning (e.g. Aiken, 1988; Oyetunde, 2007) Likewise, oral aptitude tests are tests used to infer the capacity of an individual to cause with words (Akinboye, 2001). They show the developed competence for conception and communication in an authorized standard like English Language. It may need verbal or inscribed mode of reply as the case can require. Aptitude tests measure the distinctive, developed or advanced factor of capability in facts, indulgent and attitude used in doing certain benevolent of work at a specific glassy (Toplis, 1991).

However, it is an agreed fact that predicting future achievement is much more difficult than present achievement. Woodworth and Marquis (1963) described it as nothing more than an achievement test, but is used not simply as a measure of present performance in the special task but as an index of future performance in other and broader tasks." Wiersma (1986), on the other hand, contends that aptitude test gives indirect evidence of the existence of the potential

ability of an individual. The major object of aptitude testing is to measure varied capacities and potentialities of individuals. It may be difficult in the measurement to separate potential from actual achievement. Aptitude tests in Mathematics, for example, are developed to measure the candidates' capacity to manipulate or use numbers to solve problems correctly (Ann, 2004). These tests imply simple arithmetic ability in an individual. Nunnally (2004) explained that it is the skill to comparatively resolve difficulties in numeral sequencing, make exact mathematical inferences through radical mathematical rational, infer intricate data presented in numerous graphical systems, construe data and draw reasonable inferences. Altogether methods of school studies in various subjects, are also generally discourse kinds of achievement test of which arithmetical aptitude test is one, It can be given straight to contenders or directed as subsets of other tests.

It is not clear whether aptitude is innate or an acquired competence. For example the scholastic aptitude is highly oriented to the types of abilities learned in formal schooling with an emphasis mostly on verbal and mathematical abilities. It is impossible therefore to measure exactly the mental abilities because these are too complex to be measured directly. According to Wiersma (1986), the development of an aptitude test is a difficult task that requires a good deal of information, effort and measurement abilities. For this reason, aptitude tests are seldom self-constructed for a research project.

The University of Eastern Philippines – College of Education, Catarman, Northern Samar, Philippines, the locale of the study, produces almost all the manpower that constitute the workforce in the Department of Education (DepEd) in the Division of Northern Samar. For a period of more than five decades, the college has produced graduates that are of top quality and comparable to graduates of other Teacher Education Institutions in the country. This good performance of graduates in the Licensure Examination for Teachers attracted a lot of students, not only from the province of Northern Samar, but also from nearby provinces. Presently, the College is offering four degree programs, all of which are designed so that the students should graduate after four years of rigorous training, including student teaching. For the past five years, the College has seriously been taking extra efforts to screen applicants for a teacher education degree. But aside from a high grade point average (GPA), the only major requirement for them is a considerable percentage in the entrance test given by the University Guidance and Testing Center (UGTC). Interviews are being utilized to assess other skills of the applicants. Aside from the Otis-Lennon School Ability Test (OLSAT) which is adopted by the University as its entrance test for incoming students, the college finds it necessary to have its own qualifying test specifically for teacher education students. The Teacher Aptitude Test (TAT) administered as part of the admission requirements of incoming freshmen is adopted from foreign sources. Questions on whether the items could be culturally adaptive in the Philippine setting could be raised. No research on the part of the UGTC has been conducted to determine the predictive validity of the university entrance test for it to be considered good. It is therefore a felt need to improve the method of selecting pre-service teachers in the university in the premise that quality input will produce quality output. A good entrance test with psychometric properties is necessary to discriminate potential teachers from other professions.

II. OBJECTIVES OF THE STUDY

The study developed a valid and reliable instrument that could be used as a measure to assess high school graduates who want to earn a teacher education degree in the College of Education. Specifically, the study tried to come up with items that will measure the aptitude of the students along Mathematics, English, Analogy/Logic, Spatial Relation, Verbal/Linguistic and Pedagogy, determined the index of difficulty and discrimination of the items and reliability of the developed aptitude test.

III. METHODOLOGY

The present Teacher Aptitude Test was developed after an extensive review of the literature. Text books for secondary level students were also studied and the concepts were drawn on the base of the books. After getting the concept from the books, various aptitude tests were also studied to construct the items. After examining the related literature, the researchers prepared the items for the aptitude test to be administered to the freshmen students. During the construction of the multiple choice items, the mental capacity of the students were considered. The researchers initially developed 150

test items under six areas – 75 items for general ability (Mathematics, English, Analogy/Logic, Spatial Relation, and Verbal/Linguistic) and 75 items for pedagogy. There were four to five options in each item.

Freshmen students in the college of education were selected as the population of this study. Sample for the study was selected on the basis of simple random sampling technique. Student-participants were selected from the five degree programs: Bachelor of Secondary Education (BSED), Bachelor of Elementary Education (BEED), Bachelor of Elementary Education– Home Economics (BEEDHE), Bachelor of Science in Home Economics (BSHE), and Bachelor of Science in Industrial Education (BSIE). A total of 130 teacher-education students were selected representing 50 percent of the total population.

The researchers personally administered the test. The instruction stated in the test was followed strictly and answer sheets were collected after the allotted time. The students were informed that the test result would not affect academic grades. They were asked to mark the correct answer on the answer sheet only which were separately provided to every student. Relevant information were collected through answer sheets and a master sheet was prepared in order to tabulate results. There were two sets of tabulation made for the data collected. One set was intended for internal consistency analysis. Actual responses for each item were recorded. Another set of tabulation was made by marking the correct responses with “1” while “0” for each incorrect response. The two major classical test theory properties were used in item analysis i.e. difficulty index and discrimination index. To establish reliability of the instrument, Kuder-Richardson was used. The binary coding (2nd set of data) was used for the analysis using Microsoft Excel. To determine the internal consistency of the instrument, the 1st set of data was used using SPSS.

IV. RESULTS AND DISCUSSIONS

The value of difficulty index for all items lies between 0.53 and 0.92. Item number 78 has the largest value (0.92) and item number 142 has the smallest value (0.53). On the other hand, item number 49 has the greatest discrimination power (0.70) and item number 96 has the least discrimination power (0.30). The reliability coefficient for the whole instrument was calculated to be 0.80.

A. Difficulty Index:

Item analysis shows that 118 or 78.67 percent of the prepared items had an average difficulty. Only five items or 3.33 percent were found to be easy while 27 or 18 percent of the items were difficult.

TABLE I: INDEX OF DIFFICULTY OF THE ITEMS

Difficulty Level	f	%	Item Placement
Easy	5	3.33	11,13,18-20
Average	118	78.67	1-6,8-10,12,14-17,21,24-28,30,33-51,53-57,59,62-63,65-67,70-72,76-80,82-91,93-97,99-113,117-120,122-132,134-142,144-146,149-50
Difficult	27	18.00	7,22-23,29,31-32,52,58,60-61,64,68-69,73-75,81,92,98,114-116,121,133,143,147-148
Total	150	100.00	

B. Discrimination Index:

Result of analysis shows that 33 or 22 percent of the items had poor discrimination level while 12 or eight percent were found to have marginal index. Sixty five or 43.33 percent of the items were found to be “very good” in discriminating the high performing from slow learner students.

TABLE II: INDEX OF DISCRIMINATION OF THE ITEMS

Discrimination Level	f	%	Item Placement
Poor	33	22.00	1-3,5-7,29,31-33,52-55,58,61,64-65,68-69,73-75,81,91-92,104,114,116,121,123,130,143
Marginal	12	8.00	10,23,39,56,62,67,98,115,133,137,147,148
Reasonably Good	23	15.33	4,8,13,18-19,22,25,34,51,60,85-87,89,99,111,113,125,127,132,136,144-145
Good	17	11.33	9,11-12,26,30,35,57,59,70,80,96,100,112,131,134-135,141
Total	150	100.00	

C. Accepted Items:

Item analysis shows that 117 or 78 percent of the items were accepted as items of the admission test. This means that the items are appropriate for the admission test. Only 22 or 14.67 percent are to be revised while 11 or 7.33 percent are to be rejected.

TABLE III: ACCEPTABILITY OF ITEMS

Decision	f	%	Item Placement
Accept	117	78.00	3-5,8-17,19-28,30,34,36-51,56-57,59-60,62-63,66-67,70-72,76-80,82-90,93-103,105-113,115,117-120,122,124-129,131-142,144-150
Revise	22	14.67	1,2,6,18,29,31-33,35,53-55,61,64-65,91,104,116,121,123,130,143
Reject	11	7.33	7,52,58,68-69,73-75,81,92,114
Total	150	100.00	

D. Reliability:

The internal consistency of the test was found to be acceptable with a Cronbach's alpha value of .75. This value indicates a moderate reliability for the teacher aptitude test. Aside from internal consistency, Split-half method was also performed resulting to a Guttman coefficient of .77, a value that indicates good internal consistencies of the responses in the test. Finally, Kuder-Richardson, KR20, was employed to determine internal consistency with a value of .78 indicating good reliability of the whole instrument.

TABLE IV: RELIABILITIES OF THE TEST

Variable	Cranach's α	Guttman	KR-20
Aptitude test	0.75	0.77	0.78

V. CONCLUSIONS

The developed test approximates average item difficulty. Majority had an average difficulty while only few items were found to be easy or difficult. On the other hand, the average discrimination index of the whole instrument was found to be capable in discriminating high performing students from low performers. This reflects that the test items are capable to differentiate the aptitude of the students to a greater extent. In summary, 117 of the items were accepted as items of the

admission test. Only 22 items need to be revised while 11 are to be rejected. The items to be revised will need changes in its construction. There are items to be rejected because of its zero or negative discrimination indices. Removing these items would increase the reliability of the test.

The reliability of the whole instrument indicated an average goodness of fit to the students. This indicates the viability of the instrument to be adapted as an entrance test for the prospective teacher education students. There is a need to increase sample size. Administering the final test to incoming freshmen would determine its suitability as entrance test. Other teacher education institutions in Region VIII may be included in the sample. Other personal data of the students e.g. date of birth, parent's education, parent's profession, and favorite subject could be collected and correlated to establish the nomological net of the test. Finally, there is a need for teachers in the University of Eastern Philippines – College of Education to make use of the aptitude test in order to measure relationship of the aptitude test to other academic subjects.

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