ANALYSIS OF TEST ITEMS ON DIFFICULTY LEVEL AND DISCRIMINATION INDEX IN THE TEST FOR RESEARCH IN EDUCATION

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ABSTRACT

This piece of work was aimed to analyze test items of a researcher made test in the subject of Research in Education for the student-teachers of Master of Education (M.Ed). It involves the item difficulty and item discrimination. A test of multiple choice items was used as a data collection instrument in different Colleges of Education to 200 student teachers taken randomly. The sample for this study consisted of both gender. The findings show that most of the items were falling in acceptable range of difficulty and discrimination level however some items were rejected due to their to poor discrimination index.

KEYWORDS: Item analysis, Research in Education, difficulty level, discrimination index

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INTRODUCTION

Post Graduate students in teacher education are the future teacher educators. Invariably Research Methodology paper is mandatory for teacher trainees. A mastery over research will help the teacher trainees to take up the challenging teacher profession. Multiple Choice Questions are the most commonly used tool type for answering the knowledge capabilities of post graduate students in teacher education.

Item analysis refers to a mixed group of statistics that are computed for each item on a test. The item analysis helps to determine the role of each items with respect to the entire test. The main purpose of item analysis is to improve tests by revising or eliminating ineffective items. An additional important aspect of item analysis speaks about specifically to achievement tests. Here, item analysis can provide important diagnostic information on what examinees have learned and what they have not learned. There are many different procedures for determining item analysis. The procedure employed in evaluating an item's effectiveness depends to some extent on the researcher's preference and on the purpose of the test.

Item analysis of a test comes after the preliminary draft of a test has been constructed, administered on a sample and scored out. Tabulation is done to determine the following two important characteristics of each item.

1. Level of Difficulty or item difficulty, and
2. Discriminating power of the test items or item discrimination

The above two indices help in item selection for the final draft of the test. Another step which leads the calculation of item difficulty and item discrimination of a test is item selection based upon the judgment of competent persons as to the suitability of the item for the purposes of the test.(Aggarwal, 1986). There are several methods of item analysis described in various texts exclusively based on construction of tests.

Item Difficulty

Item difficulty may be defined as the proportion of the examinees that marked the item correctly. Item difficulty is the percentage of students that correctly answered the item, also referred to as the p-value. The range is from 0% to 100%, the higher the value, the easier the item. P values above 0.90 are very easy items and might be a concept not worth testing. P-values below 0.20 indicate difficult items and should be reviewed for possible confusing language or the contents needs re-instruction. Optimum difficulty level is 0.50 for maximum discrimination between high and low achievers. For example an item answered correctly by 70% examinees has a difficulty index of 0.70. If 90% of a standard group pass an item, it is easy; if only 10% pass, the item is hard or too difficult. Generally, items of moderate difficulty are to be preferred to those which are much easier or much harder.

The following formula is used to find difficulty level.

$$DL= Ru+Rl/Nu+Nl$$

Where,

Ru = the number students in the upper group who responded correctly
Rl = the number students in the lower group who responded correctly
Nu= Number of students in the upper group
Nl= Number of students in the lower group

Item Discrimination:

Item discrimination or the discriminating power of a test item refers to the degree to which success or failure on an item indicates possession of the ability being measured. It determines the extent to which the given item discriminates among examinees in the function or ability measured by the item. This value ranges between 0.0 and 1.00. Higher the value, more discrimination of the item is. A highly discriminating item indicates that the students who had high tests scores got the item correct whereas students who had low test scores got the item incorrect.

Discrimination power is estimated using the following formula:

$$Discrimination\ power = RU-RL/NU(or)NL$$

The procedure involves the following steps:

1. Administration of the draft test on a sample of about 200
2. Identification of upper 27% and lower 27% examinees having highest and lowest scores in rank order respectively on the total test.
3. Calculation of each item, of the proportion of the examinees attempting it correctly.

4. The discrimination index, DI will be given by using above mentioned formula
5. The DI can be tested for significance by using a critical ration test and items with positive and significant differences retained.
6. The value of the discrimination index can range from -1.00 to +1.00.
7. Items having negative discrimination are rejected. Items having discrimination index above .20 are ordinarily regarded satisfactory for use in most tests of academic achievement (Aggarwal, 1986)

Objectives of the Study

The main objective of the work is to find out the item difficulty and the power of discrimination of Multiple Choice test items.

Population and Sample

In this work all student-teachers who are studying Master of Education in Tamilnadu comprise the population of the study. Random sampling was adopted for this research work and 200 students were taken. The sample constituted both male and female student-teachers.

Instrument

A test of 60 items was used for data collection. This test was developed from the syllabus of Research in Education for Master of Education under Tamilnadu Teachers Education University by the researchers with the help of some subject expert. Bloom's revised taxonomy was used as framework for test construction. Total items in the test were 60. The test was administered in English.

Data Collection

Test was administered by the researcher himself for data collection. The researcher enjoyed full support from the administrators in the target Colleges of Education.

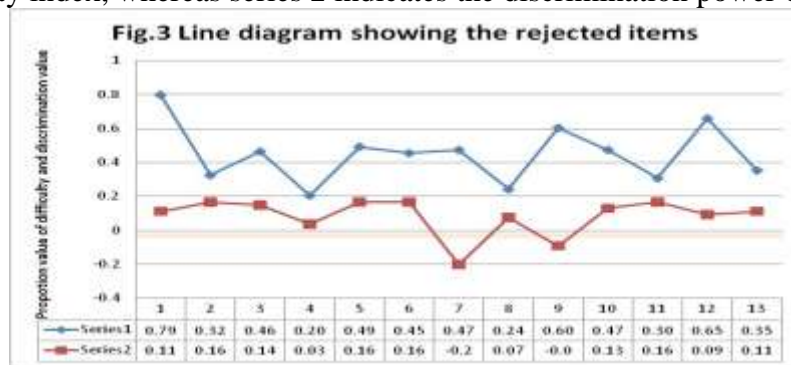## Data Organization and Analysis

Total scores of the students were entered in Microsoft Excel sheet and it was arranged in descending order, then 54 (27%) high and low achiever students were selected for item analysis. The middle 46% were excluded from the analysis with the assumption that they behave in the similar pattern. The formulae for difficulty levels and discriminating index discussed above were used for analysis.

The item in a test should neither be too easy nor too difficult; hence a balance between these two must be maintained. Any test to be called a good measuring instrument must have some items of higher indices of difficulty which should be placed at the beginning of the test, some items of moderate indices of difficulty ranging from 40% through 60% which should appear in the middle and sometimes of lower indices of difficulty which should appear at the end. But normally the items having the item difficulty between 20% to 80% are included in the test. (Singh. Y.K. 2012). According to the above mentioned criteria the researcher chooses the items. Only 7 items were found in 80% discrimination power and those items were selected. The following diagram shows that the selected items based on item difficulty and item discrimination.

Fig 1 Bar diagram showing the selected items based on item difficulty

Fig 2 Bar diagram showing the selected item based on power of discrimination
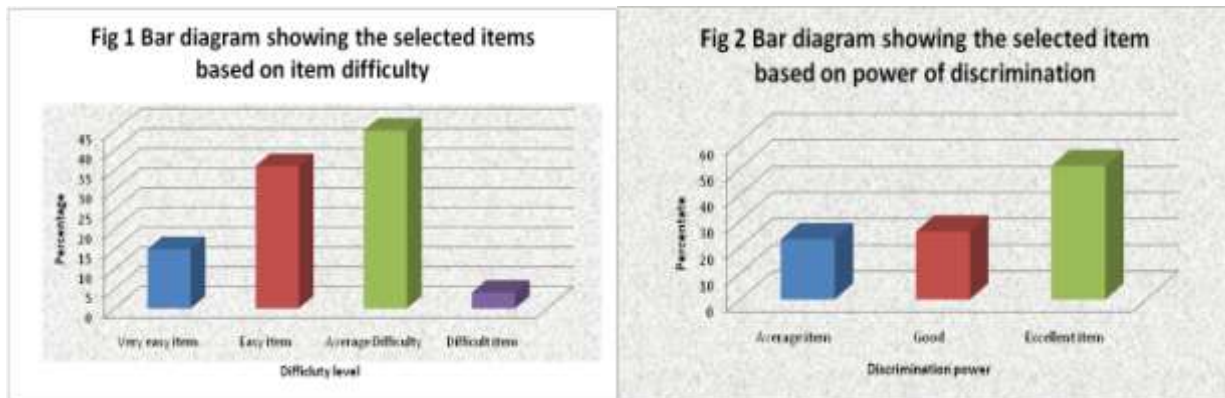
Discussion

Thirteen items out of 60 (21%) were rejected either due to difficulty level or discrimination index. Thirty five items (58%) were accepted without revision while 12 items were accepted provided that necessary revision. The following diagram shows the rejected item. Series 1 indicates the difficulty index, whereas series 2 indicates the discrimination power of the items.

Fig.3 Line diagram showing the rejected items

	1	2	3	4	5	6	7	8	9	10	11	12	13
Series1	0.70	0.32	0.46	0.20	0.49	0.45	0.47	0.24	0.60	0.47	0.50	0.65	0.55
Series2	0.11	0.16	0.14	0.03	0.16	0.16	-0.2	0.07	-0.0	0.13	0.16	0.09	0.11

Findings and conclusion

The findings of this paper have significance for student teachers and test developer. They should be very careful while selecting items. The size of an acceptable item will depend upon the length of the test, the range of difficulty indices and the purposes for which the test has been designed. The poor items are removed or improved for inclusion in the final test. This work can be repeated in other subjects to develop a good item bank for student community. The principle function of an instrument used in any educational research is to infer student's capacities and it offers information on which to base the making of correct decisions. Developing and administering Multiple Choice Questions on the content knowledge of research methods in education helps teacher educators in molding future teachers. Hitherto item analysis is an important phase in the development of a test or instrument.

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