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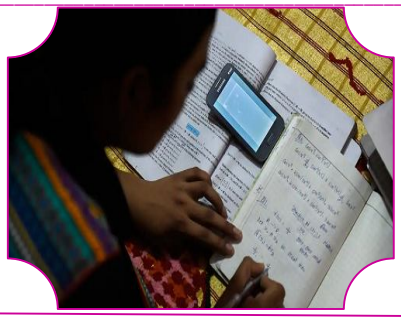
# CONSTRUCTION AND STANDARDISATION OF POWER IN MATHEMATICAL PROBLEMS OF XI STANDARD STUDENTS



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## ABSTRACT

The present study is an attempt to develop and validate the Mathematics achievement (Power) test for higher secondary school students in Vellore district of Tamil Nadu. A multiple choice test 50 items from XI standard Mathematics syllabus was selected with the help and advice of Mathematics exports. The test was administrated to a sample of 100 Maths group students of 3 schools of Vellore district of Tamil Nadu. Then all the administer test papers 100 students were scored carefully, the test papers were arranged in the descending order from the highest to the lowest score. Then the top 27% and bottom 27% of the total score has been taken for the item analysis. Through regular method of item analysis, difficulty index and discriminating index were calculated as well as the reliability and validity of the test as a whole. Thus the tool is reliable and valid for the sample.

**KEYWORDS:** Mathematics achievement (Power) test, XI standard Maths group students.

## INTRODUCTION:

Mathematics is regarded as the mother of all sciences. It is the discovery oi relationships in symbolic form in - words, in numbers, in letters by diagrams or by graphs. According to A.N Whitehead "Every child should experience the joy of discovery". Initially a child's discoveries may be observational. But later, when its power of abstraction is adequately developed, he will be able to appreciate contribute of the mathematical conclusions that has drawn. This will give it the joy of discovering mathematical truths and concepts.

According to Schuttle "Mathematics is primarily thought on account of the mental training it imparts, and only secondarily on the account of the knowledge of facts it imparts. The true end of mathematics teaching is power and not knowledge". Knowledge here stands for the accumulation of information and mastery of mathematical fact while power represents acquisition of the art of proper thinking and efficient and effective reasoning.

## ACHIEVEMENT IN MATHEMATICS

Mathematics is a handmaid of all sciences. It is a well known fact that a mere possession of knowledge is no guarantee for its wise use. Though the assumption “knowledge is power”, by itself is valid, becomes meaningless when the individual possessing it fails to utilize it to the maximum benefit of mankind.

The infinite powers of Mathematics can be used for development of any scientific or technological progress. No scientific progress can be achieved in the absence of a sound Mathematical knowledge and an analytical bent of mind alone helps’ one to utilize the Mathematics skills for the betterment of mankind.

## NEED AND SIGNIFICANCE OF THE STUDY

Mathematical problem solving has occupied very important place in the teaching of mathematics. A primary goal of mathematics teaching and learning is to develop the ability to solve a wide variety of complex mathematics problems. Learning to solve problems is the principle reason for studying mathematics.

Collier and Lerch (1969) observe that problem solving is a 'major force' in the growth of modern mathematics and Barnes (1959) stresses that it should be major concern' of the school curriculum. Now we can analyse the reasons for doing this.

One of the reason is it is a major part of mathematics. It is the sum and substance of our discipline to a set of exercises and skills devoid of problem solving is (mis-representing mathematics as a discipline and shortchanging the students. Second reason is it has many applications and often those applications represent important problems in mathematics. Mathematics is used in the work, understanding, and communication within other disciplines. Third, there is an intrinsic motivation embedded in solving mathematics problems. That it can stimulate the interest and enthusiasm of the students. Fourth reason is problem solving can be fun. Finally, problem solving must be in the school mathematics curriculum to allow students to develop the art of problem solving. This art is so essential to understanding mathematics and appreciating mathematics.

## OPERATIONAL DEFINITION OF KEY TERMS

### Power Test

A test designed to measure the level the individual can attain. On power test items are arranged in increasing order of difficulty and there is less emphasis on time limit.

Operationally, power test refers to the score obtained by the students in the power test prepared and standardized by the investigator.

### Fresher of higher secondary course

The target group of the present study consists of the students, who have completed their Secondary School Leaving Certificate examination and Matriculation examination and just joined the higher secondary course.

### Achievement

Achievement is the knowledge attained or skills developed in schools, usually designed by the test scores or by marks assigned by teachers or both. In the present study Achievement Test in Mathematics refers to the scores secured in the Mathematics test constructed by the investigator.

### Mathematics

Mathematics is the Science in which calculations are prime. In this way on the basis of these assumptions of Mathematics, we can say Mathematics is the Science of numbers, word, sign, etc., with which we can know about magnitude, direction and space.

## REVIEW OF RELATED LITERATURE

**Dupeyrat et al. (2011)** have studied about positive biases in self-assessment of Mathematics competence, achievement goals and Mathematics performance. In this study they reported that the study examined how biases in self-evaluations of math competence relate to achievement goals and progress in math achievement. It was expected that performance goals would be related to overestimation and mastery goals to accurate self-assessments. A sample of French high-school students completed a questionnaire measuring their math achievement goals and their perceived competence in math. Students math grades for the three trimesters of the school year were collected from school records. Bias in self-evaluations was computed by comparing students rating on the perceived competence in math scale with their actual math

achievement as measured by their second trimester math grades. Students were classified into one of three groups (over-rates, accurate raters, or under-raters) depending on whether their self-perceptions of competence in math were higher than, similar to, or lower than their relative math achievement in their class. As expected, overrating of one's performance was related to performance goals. Furthermore, the over-raters were the only group who progressed in their math achievement from Trimester 2 to 3. No relation was found between mastery goals and accurate self-assessment.

**Ellison et al. (2012)** have combinely studied about heterogeneity in high math achievement across schools. This study explores difference in the frequency with which students from different schools reach high levels of math achievement. Data from the American Mathematics competitions is used to produce counts of high-scoring students from more than two thousand public, coeducational, non-magnet, non-charter U.S. high schools. High-achieving students are found to be very far from evenly distributed. There are strong demographic predictors of high achievement. There are also large differences among seemingly similar schools. The unobserved heterogeneity across schools includes a thick tail of schools that produce many more high-achieving students than the average school.

**Pilliand and Aksu (2013)** conducted a study to see the impact of CAI (educational software) on the academic achievement and retention scores of students in Mathematics and also find out the attitude towards Mathematics of class IV students. The result showed the students who intervened though CAI achieved higher test scores, had more positive retention and attitudes towards mathematics than the students taught through traditional method of teaching.

**Gambari, Falode and Adegbenro (2014)** conducted a study to compare the academic achievement and retention of the junior secondary school students of Mathematics through computer animation and geometry instructional model in Minna, Nigeria. The perusal of the study concluded that mean achievement scores and retention scores of the junior secondary school students exposed to computer animation was higher than the students who taught through instructional model and conventional method of teaching. It can also be concluded that with the inclusion of computer animation in geometrical concept could enhance the meaningful learning in Mathematics.

**Valencia (2016)** conducted a study to determine the impact of Computer Assisted Instruction and traditional Direct Instruction (DI) on Mathematics' achievement in Seventh Grade students. The results suggested that the use of CAI increased students' academic achievement as compared to those who received traditional Direct Instruction.

## METHODOLOGY

In this present study the researcher has used the normative survey research method. In order to develop the test at the preliminary stage of the test construction, the investigator referred many books, journals, related studies, websites, Ph.D works and discussed with experts in the field of Education, Psychology and Mathematics. Further with the expert advice from the guide, the investigator constructed the test. This test involves describing, recording analyzing and interpreting the data which all directed towards a better understanding of the educational problem and findings solutions among XI standard Maths Group students for a Power test in Mathematics.

This achievement test consists of 50 multiple choice questions with four educational specific objectives. Each correct response of the question is given One mark for correct answer and Zero if the answer is wrong. Total score is recorded by adding the correct responses. After having constructed the achievement test in mathematics the investigator administered it to a sample of 100 Maths group students of standard XI from 3 schools are located in Vellore district of Tamil Nadu.

## ITEM ANALYSIS

In the process of Item analysis, after a pilot study highest 27% of the subjects with the highest total scores and the lowest 27% of the subjects with the lowest total scores were sorted out for the item analysis. After sorting, the difficulty index and discriminating index for each item was find out, which is the basis for

item selection. After find out item difficulty and discriminating index value, only those items were having item difficulty value from 40% to 90% and discriminating index values from 0.30 to 0.70 only selected.

**Table 1**
**ITEMS SELECTION**

| Item no. | Index 0f Difficulty(%) | Index of Discrimination | Selected / Not selected |
|---|---|---|---|
| 1. | 83.33 | 0.26 | Not selected |
| 2. | 64.81 | 0.56 | Selected |
| 3. | 79.63 | 0.11 | Not selected |
| 4. | 85.19 | 0.22 | Not selected |
| 5. | 88.89 | 0.22 | Not selected |
| 6. | 74.07 | 0.30 | Selected |
| 7. | 70.37 | 0.37 | Selected |
| 8. | 64.81 | 0.19 | Not selected |
| 9. | 75.93 | 0.33 | Selected |
| 10. | 59.26 | 0.52 | Selected |
| 11. | 62.96 | 0.44 | Selected |
| 12. | 66.67 | 0.44 | Selected |
| 13. | 59.26 | 0.44 | Selected |
| 14. | 61.11 | 0.56 | Selected |
| 15. | 61.11 | 0.48 | Selected |
| 16. | 87.03 | 0.11 | Not selected |
| 17. | 59.26 | 0.59 | Selected |
| 18. | 74.07 | 0.22 | Not selected |
| 19. | 62.96 | 0.59 | Selected |
| 20 | 74.07 | 0.15 | Not selected |
| 21. | 81.48 | 0.22 | Not selected |
| 22. | 61.11 | 0.55 | Selected |
| 23. | 70.37 | 0.37 | Selected |
| 24. | 59.26 | 0.44 | Selected |
| 25. | 72.22 | 0.48 | Selected |
| 26. | 75.93 | 0.41 | Selected |
| 27. | 53.70 | 0.48 | Selected |
| 28. | 64.81 | 0.48 | Selected |
| 29. | 51.85 | 0.59 | Selected |
| 30. | 55.56 | 0.44 | Selected |
| 31. | 61.11 | 0.41 | Selected |
| 32. | 72.22 | 0.19 | Not selected |
| 33. | 61.11 | 0.48 | Selected |
| 34. | 68.52 | 0.41 | Selected |
| 35. | 66.67 | 0.52 | Selected |
| 36. | 59.26 | 0.22 | Not selected |
| 37. | 59.26 | 0.22 | Not selected |
| 38. | 35.19 | 0.11 | Not selected |
| 39. | 48.15 | 0.52 | Selected |
| 40. | 50.00 | 0.48 | Selected |

| | | | |
|---|---|---|---|
| 41. | 57.41 | 0.41 | Selected |
| 42. | 72.22 | 0.56 | Selected |
| 43. | 55.56 | 0.30 | Selected |
| 44. | 66.67 | 0.30 | Selected |
| 45. | 55.56 | 0.22 | Not selected |
| 46. | 70.37 | 0.15 | Not selected |
| 47. | 64.81 | 0.48 | Selected |
| 48. | 62.96 | 0.44 | Selected |
| 49. | 55.56 | 0.59 | Selected |
| 50. | 40.74 | 0.30 | Selected |

It may be remembered that the sample used in the pilot study has 60 items in total. Out of these 50 items only 35 items were selected. These 35 items constituted the final form of the Power test in Mathematics Scale.

## VALIDITY AND RELABILITY OF THE TEST

In the beginning of the process of tool construction the selected multiple choice questions were given to experts on Mathematics and testing for the approval. They agreed that the items were in the test are relevant and worthwhile for collecting the data from the sample and thereby the content validity was ensured. Reliability refers to the accuracy (consistency) of measurement by the test. In this study reliability was found to be 0.88 by using a split-half technique followed by using of spearman-brown prophecy formula (co-efficient of internal consistency). Thus the Mathematics achievement test has validity and reliability.

## CONCLUSION

This tool will be of immense use for measuring the XI standard Maths group students' achievement in Mathematics(Power) and many other schools form other districts.

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