



CONSTRUCTION AND STANDARDIZATION OF A TOOL TO MEASURE LEARNING DIFFICULTIES IN MATHEMATICS AMONG HIGH SCHOOL STUDENTS

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ABSTRACT

The present Study is an attempt to construct and standardize a tool for measuring the Learning difficulties in Mathematics of individual students in different dimensions which include lack of interest in learning Mathematics, teaching methodology of Mathematics, syllabus in Mathematics and basic knowledge in Mathematics. A pilot study among 100 students including 50 Male and 50 Female, was conducted in Kancheepuram District. The reliability score was found to be 0.873 and content validity was established getting opinions of the experts and scholars in the field of education. Percentile norms of the tool was also planned well to appraise the Scores of Learning difficulties in Mathematics scale of students. The final tool contains 60 items including 25 positive items and 35 Negative items. The minimum score of the scale is 60 and maximum score is 300.

KEYWORDS :Learning difficulties in Mathematics, Lack of interest in learning Mathematics, Basic knowledge in Mathematics, High school students, Kancheepuram District.

1.0. INTRODUCTION

Mathematics is a complex subject including different domains such as arithmetic, problem solving, geometry, algebra, probability, statistics, calculus, ... that implies mobilizing a variety of basic abilities associated with the sense of quantity, symbols decoding, memory, visuo-spatial capacity, logics, to name a few. Students with difficulties in any of these abilities or in their coordination may experience mathematical learning difficulties. Understanding the cognitive nature of the various mathematical domains, as well as the mechanisms mediating cognitive development, has fascinated researchers from different fields: from Mathematics education to developmental and cognitive psychology and neuroscience.

2.0. LEARNING MATHEMATICS AS A SUBJECT

The study of Mathematics requires specific ability, intelligence, interest in the subject, aptitude, attitude, creativity and independency.

3.0. DEVELOPMENT OF THE TOOL

Initially the learning difficulties in Mathematics scale consisted of 70 items with a five point rating scale viz., strongly agree, agree, undecided, disagree and strongly disagree. The tool has 4 dimensions namely lack of interest in learning Mathematics, teaching methodology of Mathematics, syllabus in Mathematics and basic knowledge in Mathematics. The statements were selected on the basis of previous studies following various Characteristics of high school students. These 70 items were classified under four - Dimensions and were given to experts for their opinions and comments with 30 teachers of secondary schools in Kancheepuram District in the state of Tamilnadu.

In view of criticisms and comments provided by experts and teachers 10 items were deleted under various dimensions while some of the statements were either rewritten or modified. Thus sixty items were selected for the final tool and thus named Learning difficulty in Mathematics Scale.

3.1. ITEM ANALYSIS

The learning difficulty in Mathematics scale thus developed was administered to 50 Male and 50 Female students randomly selected from 20 schools of Kancheepuram District. It was emphasized that no items should be omitted and there was nothing right or wrong about these questions. They were encouraged to answer each item according to their personal agreement or disagreement. They were assured that their replies would be kept confidential. No time limit was assigned.

Out of 70 items 35 items were positively worded and 35 items were negatively worded. All the positive items were scored from 5 to 1 and negative items were scored from 1 to 5, depending upon the direction of the items. The sum of these values gave the learning difficulties in Mathematics score of the students. The minimum score was 70 and the maximum score was 350.

Item analysis was done. 27% of the subjects with the higher scores and 27% of the subjects with the lower scores served as criterion groups. Discrimination index for each item was then determined. 60 items including 25 positive statements and 35 negative statements with the discriminating value of 25 and above were finally selected for the questionnaire. The minimum score was 60 and the maximum score was 300 for the tool.

3.2. RESULTS

The Mean, Median and S.D. for the sample area given in following tables:

Table: 1 The distribution seems to be slightly positively skewed.

Mean	Median	S.D
285.27	280.14	8.27

Table: 2 Showing Skewness, Kurtosis and S.E (N=100)

	Value	S.E	
Skewness	0.75	0.164	NS
Kurtosis	0.207	0.059	NS

Since the S. E. of skewness and kurtosis are less than ± 1.96 , the 5% level of Confidence, it is interpreted that the sample doesn't differ from normality.

3.3. RELIABILITY

The reliability of the scale was established by test - re-test method. It is found to be 0.873 (N=100).

3.4. VALIDITY

Only highly discriminating items were included in the questionnaire following item analysis. The upper 27% and lower 27% served as the criterion groups (Kelli 1939). The face validity of the measures is very high. The content Validity was ensured as the items have 100 percent agreement amongst judges regarding their relevancy to their learning difficulties in Mathematics scale are included in the questionnaire.

To select the item for the final study the investigator analyzed the pilot study data into difficulty index. It may be recalled that each item in the learning difficulties in Mathematics scale is followed by five different responses such as "Strongly Agree", "Agree", "Undecided", "disagree" and "strongly Disagree". Based on the scoring key, weights were given to the responses category in respect of each item. Then each item was taken individually and the number of sample subjects who responded "Strongly Agree", "Agree", "Undecided", "Disagree" and "Strongly Disagree" was found out in both the high and low groups separately. A work sheet was prepared for each item for calculations of 't' values. Thus the 't' values for all the 60 items were calculated.

3.5. PERCENTILE NORMS

Table: 3 Showing percentile (N=100) for learning difficulties in Mathematics.

PERCENTILE	SCORE	CATEGORY IN LEARNING DIFFICULTIES IN MATHEMATICS
90	270	VERY GOOD
80	240	
75	225	GOOD
70	210	
60	180	AVERAGE
50	150	
40	120	
30	90	POOR
25	75	
20	60	VERY POOR
10	30	

LEARNING DIFFICULTIES IN MATHEMATICS SCALE

S.NO	STATEMENTS	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
1.	There are more difficult areas in Mathematics.					
2.	There are too much of formulas in Mathematics book.					
3.	There are many theorems in Mathematics book.					
4.	I feel more Homework is given Mathematics.					
5.	Mathematics periods are conducted in afternoon sessions in our school.					
6.	There is lack of understanding in continuity in Mathematics.					
7.	I am unable to concentrate in learning Mathematics.					

8.	I prefer learning Mathematics during sports class.					
9.	Mathematics Teacher takes special care on my studies.					
10.	I am not interested in Mathematical activities.					
11.	There are many formulas for a same problem.					
12.	Mathematics subject is isolated from other subject.					
13.	I welcome special classes in Learning Mathematics.					
14.	Mathematics club functions well in our school.					
15.	Frequent Quiz programmes in Mathematics are conducted in our school.					
16.	Our Teacher teaches Mathematics with interest.					
17.	Our Mathematics Teacher teaches the concepts so that I can understand clearly.					
18.	Our Teacher refuses to clarify our doubts.					
19.	Our teacher adopts simple techniques in teaching.					
20.	Our Mathematics teacher utilizes more teaching Aids.					
21.	Our Mathematics teacher does consider our mind set while teaching.					

22.	Our Mathematics teacher teaches citing examples.													
23.	Our Mathematics teacher shows partiality while teaching.													
24.	Our Mathematics Teacher helps students to use symbols properly.													
25.	Our Mathematics teacher encourages students to questions.													
26.	Our Mathematics teacher corrects our homework daily.													
27.	Our Mathematics Teacher is very keen in completing the portion.													
28.	Our Mathematics teacher prefers frequent tests in Mathematics.													
29.	Our Mathematics teacher begins the class with daily useful articles every day.													
30.	There are too many topics in Mathematics book.													
31.	The sub-unit in various topics are very difficult for me.													
32.	There are many theories in Mathematics book.													
33.	There are too many pages in Mathematics book.													
34.	There are too many exercises in each topic.													
35.	There is no relationship between example sum and exercise sum in each topic.													
36.	Exercise sums are very difficult for me.													
37.	There are too many exercises in each topic.													
38.	There are many errors in key answers in Mathematics book.													
39.	It is very difficult to understand as the formulas are similar to one other.													
40.	Solutions in different steps for a problem interest me.													
41.	There is proper introduction for every topic in Mathematics book.													
42.	More symbols are used in Mathematics book.													
43.	The Mathematics syllabus is of same type to above Average and Average students.													
44.	There is no scope to teach Mathematics using teaching aids.													
45.	Mathematics concepts cannot be used in daily life.													
46.	I don't have strong foundation in Mathematics in lower classes.													
47.	I have more confusion in addition and subtraction.													
48.	I memorize formula without understanding.													

49.	I memorize difficult sums as I cannot understand them.					
50.	I show interest in all mathematical activities.					
51.	I do not memorize tables in lower classes.					
52.	I listen to my Mathematics class sincerely.					
53.	I don't know basically which formulas to use which sum.					
54.	I can identify the Geometrical structures shapes correctly.					
55.	I draw the diagrams in Geometry with the help of teachers.					
56.	I find confusion in calculating H.C.F and L.C.M.					
57.	I cannot understand the decimal numbers correctly.					
58.	I identify the constant and variable in algebra correctly.					
59.	I don't have clarification in polynomial expression.					
60.	I know the difference between square and square root.					

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