A Study of Dyscalculic Primary School Children from Salem District and Evaluation of Applicability of Innovative Strategies as Remedial Measures

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Mathematics is a universal language which comprises numbers, measurement, form, probability, and algorithms. It is meaningful and purposeful to all people as quantitative information. The mathematics learning difficulties which affects child's ability to understand basic number concepts and its application is called "Dyscalculia". It is another word for math disability, that is, a specific learning disability involving innate difficulty in learning or comprehending arithmetic. It is reported that other learning disorders, such as dyslexia, could go hand in hand with dyscalculia. About 5 – 8 per cent of school-age children experience difficulties that interfere with their acquisition of mathematical concepts or procedures. Lack in understanding of mathematics concepts at an early stage affects students' interest and confidence in learning new mathematics knowledge. The present study was undertaken with the aim to screen out the dyscalculic primary school children and find out remedial strategies for them.

The main objectives of the study included the followings.

(a) To screen and identify the dyscalculic students studying in grade 5;

(b) To examine the performance of dyscalculic students in visual perception and processing disability, sequencing disability, abstraction disability, memory disability, and motor disability;

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(c) To find the correlations among screening test and mathematics achievement in the above stated components of dyscalculia;
(d) To study the performance of dyscalculic grade 5 students in output as numerical difficulty, organisation/sequential difficulty, motor difficulty, language difficulty, cognition difficulty, visual and spatial difficulty, and multiple task;
(e) To find out the correlations among screening test and mathematics achievement in the components of dyscalculia; and
(f) To develop and implement suitable remedial measures.

Method

Design: The study was conducted in three phases. First phase of the study was administration of screening and mathematics achievement test. Second phase of the study comprised screening test and mathematics achievement test to confirm that the sample consisted of dyscalculic students. Third phase of the study included the development and implementation of remedial intervention programme and post test results.

Sample: A total of 2180 students of 5th grade from 20 schools of Salem District initially participated in the study. On the basis of mathematics achievement test, 50 students were identified as dyscalculic and were then given remedial interventions.

Tools used: The investigator adopted the following tools from the internet and modified to suit to the Indian students. Reliability and validity of the modified tools were maintained.

- Screening tests
- Achievement tests
- Remediation strategies
- Observation
- Interview

Procedure: The present project was carried out in 3 phases. In the first phase, a screening test with 20 items was used to screen dyscalculic students. In the 2nd phase, a mathematical achievement test, which was constructed by the investigator, was used to confirm student's dyscalculic nature. And they were also formally confirmed by a clinical psychologist. The 3rd phase of the study included intervention programmes for dyscalculic students.

Results and Discussion

The investigator used descriptive statistics for analysis of data.

Phase 1 - Screening and mathematics tests were administered on different dimensions. The mean scores of the dyscalculic children in visual perception and processing is 3.2 which indicate 80 per cent of difficulty on this dimension. A mean score of 4.9 was obtained on abstraction indicating 100 per cent difficulty. Similarly, on mathematics achievement test, in sequencing process, the mean score was found to be 3.3 that shows 83 per cent of difficulty; 3.8 were the mean score on memory dimensions, which shows 72.4 per cent difficulty. In motor difficulties 2.6 was the mean score that indicates 93.3 per cent of difficulty.

Phase 2 - Screening and mathematics tests were administered again, in order to confirm mathematical learning difficulty of the sample constituted for remedial interventions. The mean score of the dyscalculia children in verbal dyscalculia was 3.7 which indicate 98 per cent difficulty. In practognostic dyscalculia the mean score was found to be 5.6 that shows 94 per cent of difficulty; 3.8 was the mean score of benical dyscalculia indicating 96 per cent difficulty. The mean score of the dyscalculia children in operational dyscalculia was 3.6 which indicated 90 per cent difficulty.

An achievement pre-test was also administered that included items that test the said difficulties. After the difficulties were screened then the intervention programme for improving dyscalculic students were given for 140 days.

Post-test I was administered to the learners after the remedial stratergies including worksheets, repeated drill and practice. Only 10 per cent and 20 per cent of students were observed showing numerical and visual spatial difficulty and sequential difficulty, respectively. Thus, the intervention programme was found to be effective with dyscalculia students.

Post-test II was administered to the learners after multimedia remediation. Numerical, motor, visuo-spatial, cognition and language difficulties were reduced to 7 per cent, 11 per cent, 5 per cent, 20 per cent, and 12 per cent, respectively.

The intervention programme, thus, showed positive results. It helped the students with mathematical learning difficulties, that if not attended can take a shape of severe difficulties. There are

many things in mathematics that the learner must learn to do, for example: the skills of counting, of adding and subtracting, of multiplication and division, visual perception, visual memory, and logical thinking (which makes problem solving possible) are the most important foundational skills of math. Sample selected for giving interventions, showed remarkable improvement on the pre-requisite skills needed to do maths. Scores indicated that dyscalculic children faced fewer difficulties on numerical dimension (10%), sequencing process (20%), cognition (34%), multi tasking dimension (20%) respectively, that seek for serious consideration during initial screening. Also, teachers' responses, collected during interviews, confirmed the effectiveness of interventions for numeracy, counting, visual, cognition and multiple tasks were energetic and impressive to the students. Both the multi-media and classroom interventions were found to be useful in treating dyscalculia. The study highlighted some of the specific mathematics learning disabilities faced by school children that are not actively attended by the authorities in Indian schools. Thus, it is necessary for schools to incorporate required steps to deal with this emerging problem.

Limitations of the Study

One of the major limitations of the present study was that it was restricted to 20 schools only. In order to increase the generalisability of the findings, other districts of Tamil Nadu could also be included. However, owing to the constraints of time and other facilities available to the investigator, the study was limited to 50 students. Though, the sample was drawn randomly, but only 18 students from Government schools, 20 students from government aided schools and 12 students from private schools participated in the study. All other primary classes except 5th standard were exempted from the study. Also, ratio of boys and girls participated in the study was different (32 boys, 18 girls).

Despite of the shortcomings of the research, it can be concluded that maths learning difficulties need serious instructional attention and these difficulties manifest in variety of ways. However, it can be treated with effective remedial methods.