Investigating and comparing the effectiveness of methods of teaching mathematics to L.D. students of elementary schools

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Abstract

Some school students, in spite of their normal intelligence and healthy visual and hearing sensation, are not able to follow educational instructions of the classroom and have difficulties to understand special concepts while are thought by the regular methods in schools. These students are usually named as learning disabled children. Mathematical learning disability is one of L. D. problems which lead to difficulty in understanding mathematical concepts. In this research, the effectiveness of three methods of teaching mathematics, i.e. task instruction, process or ability instruction, and task-process instruction in teaching mathematics, have been investigated. Research findings indicate that 1) there are significant differences between pre-test post-test marks on mathematical achievement as a result of applying different instruction methods; 2) task instruction method and process or ability instruction

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method are significantly influencing the L. D. students' learning mathematics.

Keywords: Ability to read, Teaching methods, Teaching mathematics, Homework teaching method, Process or ability teaching method, homework-process teaching.

Introduction

One of the reasons for drop-outs from school is the special learning inability. Although having normal and or higher IQ level in one or several courses, the students having this inability are not progressing according to their personal potential. This inability includes a broad range of educational skills. In order to explain the cause for this inability, some of the authorities stress the difficulty with reading and language-learning (Delpaz & Graham, 1997). Another group concerns itself with difficulty with mathematical calculation and reasoning (Hoffman, 2003). In either case, one of the problematic fields for a group of students is the inability to learn mathematics. The American Diagnostic and Statistical Manual of Mental Disorder (2000) estimates that the percentage of persons with inabilities to learn is between 2 and 10 percent. According to the American Diagnostic and Statistical Manual of Mental Disorder (2000) one percent of the primary-school students have mathematics disability. If these children's problem is not recognized and treated immediately, its resolution will require high amounts of time and energy due to the passing of time and establishment of the inability. Therefore it is of the education system's necessities to pay attention to these children (Niazi, 2004).

In teaching mathematics, just like other domains of teaching, differences in theories of learning has caused the selection of various methods for teaching and treatment (Lerner, 1993). In general, for teaching the students who have the inability to learn mathematics four main theories have applicability which are as follows:

1. Developmental psychology: The cognitive theories of developmental psychology have had a deep impact on teaching mathematics and points to this important issue that children move through a set of cognitive development phases which includes the becoming into one set of mental processes and moving from one stage to the other (Lerner, 1993 narrating from Ramazani, 2000).

2. Behavioristic psychology and direct teaching: The teaching methods based on behavioristic theory emphasizes the necessary behaviors for learning a school/home-work or curriculum (Kerneyn, Gernzeen, & Peeker, 1988, narrated by Munro, 2001).

3. Cognitive and meta-cognitive teachings: In the recent decades, the instructors have spent time on investigating the subject of cognitive and meta-cognitive teachings and its various dimensions in the fields of teaching. The level of awareness and putting-to-work of cognitive and meta-cognitive policy, which includes an expanded range of method and operations (self-teaching, self-discipline-seeking, and self-asking), is the main element for difference between their level of understanding (Troia, Graham, & Harris, 1999).

With regards to the various theories in the field of teaching and rehabilitation methods in treating these children, Samuel Kirk (1985) offers these students' rehabilitation-teaching programs in three methods:

- Task training, in which the emphasize is on simplifying and making a chain out of the tasks that should be learned. 2. Process or ability training in which the focus is on rehabilitation and teaching a special developmental inability such as perception, memory, and attention (Aabedi, 2003). 3. Task/process training method. This method has the key concepts of both of the previous methods. In this method psychological processes are not considered as mental abilities which can be taught individually and separately. Rather, the processes are considered as a collection of mental operations, behaviors, or conditional responses to certain tasks.

Stating the Problem

Some children with especial learning problems have difficulties in understanding mathematical issues. The expression that is used for the serious cases is disability in calculation and understanding the mathematical concepts. American Diagnostic and Statistical Manual of Mental Disorders (2000) explains the students unable to learn mathematics as follows: inability to perform calculation skills with respect to intelligence capacity and the persons expected level of training, which are evaluated with the help of scaled tests.

The main issue in this research is to investigate and compare the effectiveness of task training methods, teaching the process or the ability, as well as teaching task-process for students having the mathematics learning disability in the primary-school period (in interactive and small groups).

The research hypotheses

1. The task training method is effective in training the students with mathematics learning disability.

2. Process or ability training is effective in training the students with mathematics learning disability.

3. Task/process training method is effective in training the students with mathematics learning disability.

4. The effect of task training methods, teaching the process or the ability, and teaching task/process in the training of the students who have mathematics learning disability is different.

In this research the research-methodology that has been used is experimental with stating pre-test and post-test with the control group and random selection of the testing material. Its independent variable includes training methods for mathematics (task-training, process or ability training, and task/process training) and its dependent variable is the testing-individuals experimental scores in the mathematics test.

In this research, the first group was trained with the help of the training method, the second group was trained with the help of process or ability training, and the third group was trained with the help of task/process training. The number of sessions held for each of the groups was eighteen, where the lessons structure was related to each method and the class being held for thirty minutes.

Research methodology

The population, the sample, and the method for sampling: The statistical population of the research is the students who are unable to learn math during the primary-school period in the city of Isfahan in the school year 2002-2003. During the first stage of selecting the sample, 83 of students of the third and fourth grade whose report-card mark for mathematics was less than 10 (out of 20) were selected. In the second stage, with respect to tests for recognizing the math-learning-disability (Ryon's I.Q. Test, Bender Geshtalt Test, Andrea-ee Test, and the Dot-Counting Test) were place in the test and control group through random-sampling method.

Assessment instruments

For collecting the data in this research, four tests were used to identify the students with mathematics learning disability and one mathematics test was used to evaluation the educational math achievement (dependent variable). The description is as follows: 1.Ryoun test; 2.Bender-Geshtalt test; 3.Andrea-ee test for assessment of the type of perception activity and visual memory; 4.Point-counting test for assessment the level of preciseness, attention, and speed of the material being tested cases; 5.Math test (Teachers' monthly evaluation tests for recognition of the ability to learn Math).

Statistical Analysis Method: In order to analyze the data in this research, the descriptive and inferential statistic was used. In the descriptive statistics stage several tools were used which included

the tables, graph and variation means as well as standard deviations. On the inferential statistics level, the correlation and t-test (for dependent variable) was used for the first, second, and third hypothesis. The analysis of variance test for checking the fourth hypothesis was used. As well, Tuckey test has been used for comparing the methods means after having significance of analysis and variation.

Research findings and conclusion

The findings of this research confirmed the results of researches and investigation by Samuel Kirk and James Chalfanet (1985). Through their researchers and scientific activities these experts of teaching to unable students in learning had concluded that the task teaching method, process or ability teaching and teaching task-process is effective with regards to the special needs of each student in his learning.

As well, the research findings confirmed the results of researches and investigations by Swanson and colleagues (1999). These researchers found out that teaching in small and interactive groups is effective in teaching students who have the learning disability. In this research as well the teaching to the students with learning-disability was carried-out individually or in groups of two or three in all three test groups. The research results showed that this method is very effective in their teaching.

As well the research finding confirmed the researches by Swanson and Huskin (1998). In their research investigations, these researchers had pointed out that while teaching to children with learning disability, the factor of controlling the task difficulty level and teaching in small interactive groups has considerable effect on their learning level.

The research findings showed that from the three teaching methods under the investigation, the method of teaching task-process is more effective compared to the other two methods. Therefore it is understood that teachers consider the two following

points when teaching to unable children in mathematics: Firstly, to consider the process or ability difficulties of these children, which might block their path to learning (Fagino & Fagino, 2000) and (Plaza et. al., 1997). Secondly, teaching math concepts by the help of objective behavior analysis method or task analysis meaning step-by-step and chained teaching to unable students in learning mathematics.

Among other findings of the research is that the most effective treatment and education plan for children with inability to learn mathematics is the make-up that is planned based on individual education. In this plan various education methods are used and children are taught either individually or in small groups. These teaching methods included combination of senses, teaching of large and delicate perceptional and movement methods, cognitive and meta-cognitive methods, strengthening the hearing memory, visual memory, and multi-sensory rehabilitation models. The effectiveness of such method has been confirmed in many researches.

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