

---

# Is There Gender Difference between Learning Disabled Students' Performances in Mathematical Activities? (Case Study)

Somayeh Karimi

*Department of Mathematics, Science and Research Branch, Islamic Azad University, Tehran, Iran*

---

Copyright 2013 © Somayeh Karimi. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

---

## Abstract

Recent studies show that mathematics disorder is a learning disorder. Children with this disorder have math skills is much lower than mean for their age, intelligence, and education. The disorder affects the child's success at school. It is thought that up to 7% of children have this disorder. It affects boys and girls equally. It is also caused dyscalculia. The cause of this disorder is not known. Like other learning disorders, it occurs more in some families. Mathematics disorder may also be the result of damage in certain parts of the brain. It also has led to a weak understanding of mathematical concepts and increased realization of mathematics. In this study, it is tried that studied gender difference between learning disabled students' performances in mathematical activities. Findings indicated that there is not meaningful difference between genders. Since this research was case study, it seems that this difference will be indicated in vast studies. Then it suggests that have to do more study in this field for its causes.

**Keywords:** Learning disabled students, gender, mathematics, performance, difference.

## 1 Introduction

When the term "learning disabilities" is used, it describes a group of disorders characterized by inadequate development of specific academic, language, and speech skills [17]. Types of learning disabilities include reading disability (dyslexia) mathematics disability (dyscalculia) and writing disability (dysgraphia) [17]. Nonverbal learning disabilities often manifest in motor clumsiness, poor visual-spatial skills, problematic social relationships, difficulty with math, and poor organizational skills [4]. Mathematics disorder, formerly called developmental arithmetic disorder, developmental acicula, or dyscalculia, is a learning disorder in which a person's mathematical ability is below the level normally expected based on his or her age, intelligence, life experiences, educational background, and physical impairments substantially. This disability affects the ability to do calculations as well as the ability to

understand word problems and mathematical concepts [5]. Ginsburg, Klein, and Starkey (1998) emphasized, "we live in a society in which mathematical knowledge is commonly portrayed as vitally important for economic success, and indeed for everyday functioning". Given such importance of mathematics in our society, many researchers in the field of special education have made efforts to facilitate the mathematics performance of students with learning disabilities (LD) over the past few decades (Fuchs et al. 2008; Gersten, Jordan, & Flojo, 2005). According to the definition of LD, students with LD do not achieve adequately for their age or grade level standards in various academic skills, such as listening and reading comprehension, basic reading skills, and mathematics calculation and problem solving (Fletcher, Lyon, Fuchs, & Barnes, 2007). Evidences have demonstrated that a majority of students with LD have serious difficulties learning mathematics with much lower mathematics achievement levels than their same-age peers without LD (Bryant, 2005; Fuchs et al. 2008). For example, the mathematical achievement of 8- and 9-year-old students with LD was comparable to that of 6-year-olds (Cawley & Miller, 1989). At the secondary level, the performance of 16- and 17-year-old students with LD was equivalent to that of 10-year-olds (Cawley & Miller, 1989). Even in basic mathematics skills for daily life, such as telling time and counting money, students with LD did not have the same competent level of their same-age peers without LD (Bransford, Hasselbring, Barron, Littlefield, & Goin, 1989) [16]. Gender differences in cognitive, social, and personal characteristics have investigated since the early 1900s. Research has identified differences in several specific cognitive skills as well as in a range of social and personal characteristics. For some variables, context affects whether gender differences was found. For example, when participants was told that gender differences had been found on previous administrations of a math test, males taking the test performed better than females. In contrast, when the participants were told the test was gender-fair, no gender differences were found (Spencer, Steele, & Quinn, 1999) [12]. Many experts suggest that while there are learning differences between the genders, there are just as many differences within the genders. Each student learns differently and has his or her own set of strengths and weaknesses. Single-sex classrooms are a popular choice among parents looking for the right fit for their child, and teachers in public and private schools alike take gender (as well as different learning styles) into account when developing lesson plans. Washington Parent talked to D.C.-area experts and educators about what they see as either inherent or environmental differences between the genders. Their answers run the gamut but several differences surfaced again and again with researches and observations to back it up: 1) boys are more likely to be diagnosed with learning disabilities including ADHD and exhibit signs earlier, 2) boys tend to lag behind girls in language, attention and fine motor skills especially in lower grades, 3) girls are more likely to struggle with spatial learning, including math, and 4) girls are more likely to exhibit signs of anxiety or depression due to schoolwork. Boys often maturing slower than girls in the areas of language, attention and fine motor skills, they are at a disadvantage during the early years of education, many experts say. Boys, in particular, may struggle in lower grades because their brains are not developed enough to grasp the concepts of reading and writing. Compounded by an inability to sit still for as long as girls, and you have gotten a sizable disparity between genders, says William Stixrud, a clinical neuropsychologist in Silver Spring [13]. The aim of this study is that response to this question: Is there gender difference between learning disabled students' performances in mathematical activities?

## 2 What are Learning Disabilities in Mathematics?

Considering direction of the present study, the findings of implemented researches in use of learning disorders-mathematical are considered and we review some of these studies. Mathematics disorder described as a developmental disorder in 1937. Since then, it has come to encompass a number of distinct types of mathematical deficiencies. These include:

- Difficulty reading and writing numbers,
- Difficulty aligning numbers in order to do calculations,

- Inability to perform calculations, and
- Inability to comprehend word problems

The range and number of mathematical difficulties that have documented, suggests that there are several different causes for mathematics disorder. In addition, several known physical conditions cause mathematics disorder. Turner syndrome and fragile X syndrome, both genetic disorders that affect girls, are associated with difficulty in mathematics. Injury to certain parts of the brain can also cause inability to perform calculations. These conditions appear to be independent of other causes of mathematics disorder. Mathematics disorder is often associated with other learning disorders-involving reading and language, although it may also exist independently in children whose reading and language skills are average or above average [5]. The term disability suggests a biologically based disorder; a disability in learning mathematics further implies a disorder characterized by specific cognitive deficits [14]. Likewise, some studies find no gender difference in the prevalence of mathematics disorder, while others find that girls are more likely to be affected. Mathematics disorder, like other learning disabilities, however, appears to run in families, suggesting the existence of a genetic component to the disorder. To receive a diagnosis of mathematics disorder according to the criteria established by the American Psychiatric Association, a child must show substantially lower than expected ability in mathematics based on his or her age, intelligence, and background. In addition, the child's deficiencies must cause significant interference with academic progress or daily living skills. The causes of mathematics disorder are not understood. Different manifestations of the disorder may have different causes. Symptoms of the disorder however can be grouped into four categories: language symptoms; recognition or perceptual symptoms; mathematical symptoms; and attention symptoms. People with language symptoms have trouble naming mathematical terms; understanding word problems; or understanding such mathematical concepts as "greater than" or "less than." People with recognition symptoms have difficulty reading numbers and such operational signs as the plus or minus signs, or aligning numbers properly in order to perform accurate calculations. Mathematical symptoms include deficiencies in the ability to count; to memorize such basic arithmetical data as the multiplication tables; or to follow a sequence of steps in problem solving. Attention symptoms are related to failures in copying numbers and ignoring operational signs. Sometimes these failures are the result of a person's carelessness. At other times, however, they appear to result from a lack of understanding of the factors or operations involved in solving the problem. In practical terms, parents and teachers may see the following signs of mathematics disorder in a child's schoolwork:

- Problems counting,
- Difficulty memorizing multiplication tables,
- Inability to grasp the difference between such operations as addition and subtraction,
- Poor computational skills; many errors in simple arithmetic,
- Slowness in performing calculations,
- Difficulty arranging numbers in order (from smallest to largest, for example),
- Inability to grasp information on graphs,
- Difficulty copying numbers or problems,
- Inability to grasp the concept of place value,
- Inability to align two or three digit numbers to do calculations,
- Difficulty understanding word problems, and
- Inability to understand mathematical symbols

These symptoms must be evaluated in light of the person's age, intelligence, and education experience, exposure to mathematics learning activities, and general cultural and life experience. The person's mathematical ability must fall substantially below the level of others with similar characteristics. In most cases, several of these symptoms are present simultaneously [5].

### 3 Methodology

#### 3.1. Method and Participants

Causal-comparative research method has been used for this study. At least two different groups are compared on a dependent variable or measure of performance (called the "effect") because the independent variable (called the "cause") has already occurred or cannot be manipulated. Then two groups of LD boys and girls are selected that included 15 boy and 12 girl students at fifth grade of elementary in learning disability center of Tehran. These students have difficulties in the field of computation of basic operations; addition, subtraction, multiplication and division.

#### 3.2. Instrumentations

Public and clinical questionnaires and WISC tests indicated that these samples have difficulties for mathematics and other items. Public and clinical questionnaires and WISC tests were implemented by teachers and leaders of learning disability center. General intelligences score of samples was medium. In addition, math exam is used as research tool in this study. The questions of this exam are planned based on final exams and the goals and opinions of mathematical specialists. Numbers of 10 questions for exam are selected from all the sections; addition, subtraction, multiplication and division included one, two, three and... digits. The reliability and validity of the math exam is discussed through the guidance and counseling professors and they are approved it.

### 4 Findings

As it clears in Table 1, girl and boy students have same maximum score; 15. The mean of two groups are same almost. The mean of boys group is higher than girls group partially. In addition, Std value for girls group is higher than boys group that indicate, scores have more variety.

Table 1: Findings of two groups of learning disabled students

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Girl students	12	2.5	15	10	4.11
Boy students	15	3	15	10.53	3.51

Since data were normal regard to the results of One-Sample Kolmogorov-Smirnov test ( $P>0.05$ ), then it is used of T-test for comparing two independent groups. The results of Levene test have indicated that variances of two groups are same ( $P>0.05$ ). In addition, accord to T-test, this test has indicated that there is not meaningful difference between two groups ( $P>0.05$ ).

Table 2: Findings of T-test for two groups of learning disabled students

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	0.66	0.42	-0.36	25	0.71	-0.53	1.46	-3.55	2.49
Equal variances not assumed			-0.35	21.74	0.72	-0.53	1.49	-3.63	2.56

## 5 Conclusion

All students, including those with disabilities and those at risk of school failure, need to acquire the knowledge and skills that will enable them to "figure out" math-related problems that they encounter daily at home and in future work situations. Unfortunately, there is considerable evidence to indicate that this objective is not being met, especially for children exhibiting learning difficulties. Hasselbring, Goin, and Bransford (1988) found that students with math difficulty are substantially less proficient than their non-math-difficulty peers in retrieving the answers to basic math facts in addition and subtraction [11]. Learning disabled students who have special needs, teachers and educators have to apply special and efficient methods and techniques for better learning. Before teaching process, teachers and educators have to inform of learning disabled students' status. Informing and knowing differences and performances of learning disabled students can help to choose of proper methods for teaching and learning. In this research, it is tried that performances of learning disabled students and gender difference estimated. The results indicated that there is not meaningful difference between boy and girl students in this case study. Teachers of learning disabled have to note following items:

- Differences among capacities and abilities of LD students, because it will be ignored some capacities that make to remove of disability among them,
- It seems that there is difference between LD boy and girl students, then it must note to skills for each groups for better teaching mathematics,
- It is better that LD boy and girl participated in unit group or class, with this work, they will cooperate their capacities of mathematics together

Then it suggests that researchers have to study the gender differences among LD students in the vast level, since via knowing it, teachers of mathematics can inform of capacities and abilities of them in mathematics.

## References

- [1] D. P. Bryant, Commentary on early identification and intervention for students with mathematics difficulties, *Journal of Learning Disabilities*, 38 (2005) 340-345.  
<http://dx.doi.org/10.1177/00222194050380041001>

- [2] J. D. Bransford, T. Hasselbring, B. Barron, J. Littlefield, L. Goin, The uses of macro contexts to facilitate mathematical thinking, In R. Charles & E. Silver (Eds.), The teaching and assessing of mathematical problem solving. Hillsdale, NJ: Erlbaum, (1989).
- [3] J. F. awley, J. H. Miller, Cross-sectional comparisons of the mathematics performance of children with learning disabilities: Are we on the right track toward comprehensive programming?, Journal of Learning Disabilities, 22 (1989) 250-254.  
<http://dx.doi.org/10.1177/002221948902200409>
- [4] Dyscalculia expert Jane Emerson explains number sense and its relevance to dyscalculia, (2009).  
[www.dystalk.com](http://www.dystalk.com).
- [5] Encyclopedia of Mental disorders.  
[www.minddisorders.com](http://www.minddisorders.com).
- [6] L. S. Fuchs, D. Fuchs, S. R. Powell, P. M. Seethaler, P. T. Cirino, J. M. Fletcher, Intensive intervention for students with mathematics disabilities: Seven principles of effective practice, Learning Disability Quarterly, 31 (2008) 79-92.
- [7] J. M. Fletcher, G. R. Lyon, L. S. Fuchs, M. A. Barnes, Learning disabilities: From identification to intervention, NY: Guilford, (2007).
- [8] H. P. Ginsburg, A. Klein, P. Starkey, The development of children's mathematical thinking: Connecting research with practice. In W. Damon, I. E. Sigel, & K. A. Renninger (Eds.), Handbook of child psychology: Child psychology in practice (5th ed.), New York: Wiley, 4 (1998) 401-476.
- [9] R. Gersten, N. C. Jordan, J. R. Flojo, Early identification and interventions for students with mathematics difficulties, Journal of Learning Disabilities, 38 (2005) 293-304.  
<http://dx.doi.org/10.1177/00222194050380040301>
- [10] T. S. Hasselbring, L. Goin, J. D. Bransford, Developing math automaticity in learning handicapped children: The role of computerized drill and practice, Focus on Exceptional Children, 20 (1988) 1-7.
- [11] T. S. Hasselbring, A. C. Lott Janet, M. Zydney, Technology-supported math instruction for students with disabilities: two decades of research and development, American Institutes for Research, (2000).
- [12] J. L. Cook G. Similarities and Differences between Boys and Girls, (2010).
- [13] J. Jeanette Der Bedrosian, Boys vs. Girls: Do They Learn Differently?, (2012).  
<http://www.washingtonparent.com/articles/1201/gender.php>.
- [14] M. Mazzocco, Defining and differentiating mathematical learning disabilities and difficulties, (2007).
- [15] Psychiatric Professional Services. (2012). Inc. Pediatric Adviso, published by Relay Health.  
[www: cponline.org](http://www.cponline.org)

- [16] Y. J. Seo, D. P. Bryant, Analysis of studies of the effects of computer-assisted instruction on the mathematics performance of students with learning disabilities, *Computers & Education*, 53 (2009) 913-928.  
<http://dx.doi.org/10.1016/j.compedu.2009.05.002>
- [17] T. Wadsworth, *Childhood Voyages in Development*, Third Edition, (2008) P 387.