

Individual Versus Small-Group Instruction for Students with Mathematics Learning Disabilities: A Comparative Study

Sami Ahmed Almalki¹, Salaheldin Farah Bakhiet²

¹Department of Special Education, College of Education, King Saud University, Riyadh, Saudi Arabia

Email: sahy220088@gmail.com

²Department of Special Education, College of Education, King Saud University, Riyadh, Saudi Arabia

Email: salaheldinbakhiet@gmail.com

Present address: Department of Special Education, College of Education, Administrative and Technical Sciences, Arabian Gulf University, Manama, Kingdom of Bahrain

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ABSTRACT:

This study compared individual and small-group instruction for mathematics achievement among elementary students with learning disabilities and examined whether outcomes differed by grade level. The analytic sample comprised 132 students in Grades 2, 3, and 4 enrolled in learning disabilities programs in Riyadh, Saudi Arabia. Students received either individual or small-group instruction under existing school practices. The groups were comparable in age, instructional duration, and pretest mathematics performance. Data were obtained from curriculum-based diagnostic assessments, student records, and a researcher-developed data collection form. Independent-samples t tests compared posttest and follow-up performance between instructional formats, and one-way analyses of variance examined grade-level differences. No statistically significant differences were found between individual and small-group instruction at posttest or follow-up in Grades 2, 3, or 4. Grade-level comparisons within each instructional format were also nonsignificant. These findings suggest that, when evidence-based instructional features such as explicit teaching, systematic practice, ongoing assessment, and immediate feedback are maintained, small-group instruction can produce mathematics outcomes comparable to individual instruction. The results support flexible allocation of instructional formats according to student needs, severity of difficulty, and available educational resources.

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Keywords: mathematics learning disabilities, individual instruction, small-group instruction, mathematics achievement, special education.

Introduction

mathematics is considered one of the essential academic subjects that directly affects student's academic success. It serves as a foundation for acquiring logical thinking skills, problem-solving and decision-making. Also, it is linked to success in many scientific, and future professional disciplines. Literature indicates that weakness in mathematical skills during the early school years is not limited to lowering achievement in mathematics, but extends to affect overall academic performance, enrollment in scientific disciplines, and future career opportunities (Gersten et al. (2005).

Students with mathematics learning disabilities display frequent patterns of difficulties, including impairment of sensing numbers, difficulty of recalling basic arithmetic facts, low fluency in computational operations, weak comprehension of mathematical relationships, as well as difficulties in solving verbal problems and applying appropriate strategies for solutions. Recent methodological reviews emphasize that these difficulties vary in severity and manifestations, yet they share a negative effect on academic progress if evidence-based instructional interventions are not provided early on.

Therefore, instructional interventions have become a primary principle in teaching students with learning disabilities in mathematics. Recent educational systems rely on early identification, continuous assessment, and provision of instructional interventions categorized by severity of response to intervention (RT) framework. Studies have shown that intensive intervention provided in early school years

contribute in reducing the mathematical achievement gap, improving basic skills acquisition, and reducing the need for more intensive special education services in following stages (Fuchs et al. 2012; Gersten et al. 2005).

In the Kingdom of Saudi Arabia, services for learning disabilities have witnessed significant development since the adoption of resource room programs, providing specialized educational service for students with learning disabilities in public schools. However, recent literature indicates a continuous need to develop early identification mechanisms, transformation toward evidence-based practices, and adopt more effective models in providing educational interventions, such as the Response to Intervention model, along with enhancing teacher training on effective teaching strategies in mathematics (Alsarawi, 2023).

Also, the study of Al-Rifa'i & Al-Zahrani, (2023), which was conducted in Jeddah University still requires further support and development, highlighting the importance of conducting comparative studies between different teaching methods to select the most effective ones in Saudi environment. Based on that, the comparison between individual instruction and Teaching of Small Groups represents an educational issue with applicative significance, especially under the expansion of learning disabilities programs in Kingdom of Saudi Arabia, and the need to depend on scientific evidence when choosing the method of providing educational services, which achieve best results of learning for students with learning disabilities in mathematics. Table 1 illustrates skills for students with learning disabilities in the elementary level in Saudi Arabia.

Table 1: Mathematics skills for students with learning disabilities in the elementary level in Saudi Arabia.

	N0	Skill
	1	Counting numbers within (20), reading them, writing them, identifying them using concrete objects and illustrative drawings.
	2	Comparing numbers within (20) and ordering them using a number line.

First grade	3	Counting numbers from 1 to 100 in sequence on the hundreds chart, reading them, writing them in different ways.
	4	Writing addition facts and subtraction facts within (12) horizontally and vertically.
	5	Finding the results of (adding to zero, subtracting zero or whole).
	N0	Skill
	1	Determining the place value of a digit in a number within (1000).
	2	Reading numbers within (1000) , and writing them in different ways.
Second grade	3	Ordering numbers within (100).
	4	Comparing two numbers using symbols (<, >, =) within (1000).
	5	Adding two or three numbers, each consisting of 3 digits at most, with regrouping and without it.
	6	Subtracting two or three numbers, each consisting of 3 digits at most, with regrouping and without it.
	7	Identifying 20 geometric shapes (square, rectangle, triangle, circle, trapezoid, hexagon) and describing them according to the number of their sides and vertices.
	N0	Skill
	1	Determining a place value of a digit in numbers within ten of thousands.
	2	Reading numbers within ten of thousands and writing them in different ways.
	3	Comparing and ordering numbers within ten of thousands.
Third grade	4	Rounding numbers to the nearest (ten, hundred, thousand).
	5	Adding two numbers, each up to three digits, with or without regrouping.
	6	Subtracting two numbers, each up to three digits, with or without regrouping.
	7	Finding the result of multiplying numbers (2, 3, 4, 5, 6, 7, 8,9,10).
	8	Finding the quotient result of dividing numbers (2, 3, 4, 5, 6,7,8).
	9	. Writing fractions (as parts of a whole or parts of a set) and writing them.
	N0	Skill
	1	Determining the place value of a digit in numbers within millions.
	2	Reading numbers within millions and writing them in different ways (standard, verbal, analytic).
	3	Comparing and ordering numbers within millions.

Fourth grade	4	Rounding numbers within millions.
	5	Adding and subtracting numbers consisting of multiple digits.
	6	Multiplying a number up to three digits by a minimum of two-digit number with or without regrouping.
	7	Performing division where the quotient is up to three digits with or without a remainder.
	8	Identifying proper fractions, reading, writing and representing them on the number line.
	9	Comparing and ordering fractions.
	N0	Skill
	1	Multiplying a number up to three digits by a minimum two-digit number.
Fifth grade	2	Dividing a number up to three digits with a number greater than three digits.
	3	Adding and subtracting fractions (having the same denominator/ similar denominator).
	4	Finding the area of (rectangle, square).
	No	Skill
	1	Analyzing a number into its prime factors.
	2	Finding the greatest common divisor (GCD) of two or more numbers.
Sixth grade	3	Comparing and ordering proper fractions.
	4	Comparing and ordering proper fractions.
	5	Finding the space of (parallelogram, rectangle, surface space, quadrilateral).

Ministry of Education (2016)

Individualized instruction for students with mathematics learning disabilities.

individual instruction is deemed one of the most commonly used methods of intervention for students with learning disabilities, and it is based on providing learning for student according to individual educational plan that considers the level of his performance and educational needs.

This method is based on explicit principles of education, organized and sequential teaching, and immediate feedback, with intensification of intervention according to response to intervention (RTI) model, which allows the remedy of errors first and foremost, and enhances student's progress (Archer & Hughes,

2011; Fuchs & Fuchs, 2006; Hallahan et al., 2022).

Research evidence has ensured the effectiveness of individual instruction in enhancing mathematics learning among students with learning disabilities; since the Gersten et al., (2009) indicated that individual Interventions based on explicit education enhance mathematical concepts, sensory fluency and solving of matters. Also, Fuchs et al. (2012) Pointed out that early intensive interventions contribute in decreasing achievement gap and enhance the response of students who are subjected to the danger of academic failure. In addition, the methodological review conducted by Nelson et al. (2022) concluded that the most effective interventions are those which rely on explicit education, intensive practices and continuous feedback.

individual instruction is characterized by its ability of considering individual differences and intensification of teaching according to each student needs, however, the rise of its cost and need in time and greater human resources challenge the possibility of applying it widely. Therefore, the literature recommends employing it with cases that require highly intensive intervention, benefiting from small group instruction for the least severe cases to achieve an optimal use of resources (Gersten et al., 2009; Fuchs et al., 2012).

Small groups instruction for students with mathematics learning disabilities.

Small groups instruction provides intensive educational intervention for a limited number of students with convergent educational needs, allowing teacher to present more specialized education, with maintenance of effective use of time and resources, the size of group usually ranges between two to five students, and the success of this method depends on the quality of teaching, homogeneity of students' needs, duration of intervention, commitment to its application, more than its reliance on the size of the group itself (Dietrichson et al. 2021; Fuchs et al., 2021). This method is based on explicit education, blending, oriented practice,

immediate feedback and continuing assessment to follow students' progress (Fuchs et al., 2021).

Research literature supported the effectiveness of small-group instruction in enhancing mathematics learning among students with learning disabilities. The study of Al-Zaabi, (2012) has shown that a program based on active learning strategies, including working in groups, led to enhancement of achievement and trend towards mathematics. Also, Jitendra et al. (2013) Revealed that small-group instruction has contributed in improving the solution of mathematical matters and achievement compared to traditional method, whereas the study of Ebrahim (2017) showed the effectiveness of cooperative learning in developing arithmetic operations and skills of solving matters, and the study of Ismail (2018) clarified that active learning strategies have contributed in mitigating mathematics learning disabilities, and in enhancing self-concept among students.

These results align with evidence derived from methodological reviews; as Dietrichson et al., (2021) concluded that small-group instruction achieves positive and significant impacts in mathematics learning among students with academic disabilities, with average effect size reached (0.39). Moreover, the study of Rosholm et al. (2025) Revealed that small-group instruction represents an effective option with regard to achievement and economic competence, with difference of results based on study level and size of group and quality of programs' implementation. These results indicate that small groups provide an intensive intervention allows increase of opportunities for participation, interaction and use of mathematical language, with high competence in investing resources compared to individual instruction.

Comparison between individual instruction and small-group instruction

Previous studies show that both individual and small-group instruction contribute in improving mathematics learning among students with learning disabilities. The studies of Al-Omari

(2010), Shihab (2011) and Adani et al. (2012) Have proved effectiveness of individual instruction in developing achievement, mathematical concepts, arithmetic skills and solving problems, whereas studies of Al-Zaabi (2012), Jitendra et al. (2013), Ebrahim (2017) and Ismail (2018) supported the effectiveness of teaching in groups to enhance mathematical achievement and sentimental aspects associated with mathematics learning.

Despite of the agreement of studies on the effectiveness of both methods, most of them compared each method with traditional teaching, and did not dare direct comparison between individual instruction and small-group instruction, with adjustment of programs content and duration of intervention. Also, the majority of studies focused on direct post effect, with little interest in the retention of learning effect or economic competence or effect of group size and severity of difficulty, which makes the current evidence inadequate to emphatically judge the outdoing of any of these methods (Dietrichson et al., 2021; Nelson et al., 2022).

Research gap

Despite of a growing study that investigated educational interventions for students with mathematics learning disabilities, studies of direct comparison between individual instruction and small-group instruction are still limited,

especially in Arabic environments. Furthermore, in the capacity of researchers' knowledge, no Saudi studies have been found that compared between both methods in the programs of learning disabilities, as the local studies have limited to the assessment of programs or individual instruction strategies. Therefore, the current study seeks to bridge this gap through direct field comparison between individual instruction and small-group instruction among primary grades students with mathematics learning disabilities in Riyadh district, including provision of scientific evidence that can contribute in directing educational practices and decision-making related to organization of learning disabilities services.

Participants

The researchers selected the sample according to what was indicated previously concerning the size, however, the method of selection was based on random stratified sampling. The sample consisted of (132) students of the subject of mathematics from different study grades (first, second, third, fourth, fifth and sixth primary level), and to represent the characteristics of population, the researcher was satisfied with grades in which there were a great number of students with learning disabilities, and to conduct comparison; these grades are (second, third and fourth), as it is clear from the characteristics of population in the following figure.

Table 2: Distribution of students across grade levels.

	Grade	Subject. mathematics
	First	181
	Second	489
Primary Level	Third	483
	Fourth	502
	Fifth	243
	Sixth	204
	Total	2102

General Directorate of Special Education (2016).

Secondly: Equivalence of students in the subject of mathematics.

Table 3: shows Equivalence tests between two groups (group taught individually versus the group taught in small groups) in Mathematics.

grade	variable	Group	N0	mean	Standard deviation	t-value	Significance level	
Second grade	age	individual	22	8.00	0.00	1.0	0.32	Not sig
		Small groups	22	7.95	0.21			
	Instruction duration	individual	22	5.50	1.71	0.21	0.83	Not sig
		Small groups	22	5.41	1.01			
	Pretest of skill	individual	22	0.91	1.38	0.13	0.90	Not sig
		Small groups	22	0.86	0/94			
Third grade	Age	individual	20	9.00	0	-	-	Not sig
		Small groups	25	9.00	0			
	Instruction duration	individual	20	4.90	1.619	1.38	0.18	Not sig
		Small groups	25	5.60	1.75			
	Pretest of skill	individual	20	0.35	489	0.21	0.84	Not sig
		Small groups	25	0.32	476			
Fourth grade	Age	individual	21	10.00	0.00	0.98	0.33	Not sig
		Small groups	22	10.05	0.21			
	Instruction duration	individual	21	4.48	0.81	0.06	0.95	Not sig
		Small groups	22	4.45	1.47			
	Pretest of skill	individual	21	0.57	0.75	1.59	0.12	Not sig
		Small groups	22	1.23	1.74			

It is clear from the results illustrated in the table above that all (I) values are not significant regarding (age, duration of teaching and pretest of skill) for mathematics students in second, third and fourth grades. All values of significance level were higher than (.05), which indicate that there were no statistically significant differences

between the group taught individually and the group taught in small groups regarding the subject of mathematics, and this shows Equivalence of two groups.

Measures

1. Data collection form (prepared by researchers).
2. Diagnostic tests for students with mathematics learning disabilities (General directorate of special education, 2016; Riyadh Special Education Department, 2018).
3. Student's folios (permanent resource room files, teaching folios).

Firstly: Data collection form

The researchers prepared a data collection form that includes all variables and factors that answer a study question in an organized manner that facilitate data coding and collection, as well as to compare and evaluate the methods used in teaching students with learning disabilities (individual, small groups). This form includes (student name or ID number, age, grade, subject, teaching method, diagnostic test level, skill number [objective], pretest of the skill [objective], teaching duration [number of sessions], posttest of the skill [objective], skill review [maintenance]).

Face Validity and Content Validity of the Data Collection Form

The researcher ensured the presentation of data collection form to a number of referees in diverse disciplines serving the research goals. The referees were specialists in the field of learning disabilities, general special education, psychology, curricula, teaching methods, as well as educational supervisors and doctoral students in learning disabilities working as teachers in schools. The researcher benefited from the diversity of the referees' fields, as they provided substantial feedback regarding face and Content. Based on this, data collection form was modified and developed until it reached its final form, which was used in the procedures of the field study. Thus, the validity of the tool used was confirmed.

Second: Diagnostic tests for Learning Disabilities in Arabic language and mathematics at the primary level

Diagnostic tests are considered essential pillars in Identifying the strengths and weaknesses among students with learning disabilities, as they provide academic information about the students' level that helps in building and designing individual educational plans suitable for their needs. Therefore, the specialists of special education ensured the preparation of informal tests based on curriculum standards for Arabic language (reading, writing, spelling, expression) and mathematics for each primary grade level. Diagnostic tests determine the extent of the gap between actual level and expected level of the student and attempt to narrow this gap during the implementation of the remedial program.

These diagnostic tests consist of teacher's booklet and student's booklet prepared according to the necessary standards for measuring academic achievement for students with learning disabilities. These booklets include instructions specific to each question, answer key samples and error analysis if present, in addition to carefully set criteria to judge performance levels against the required benchmark to achieve.

Validity and Reliability of Diagnostic tests for Primary Level Students with Learning Disabilities

Test Validity

The diagnostic tests used in this research for students with learning disabilities are curriculum-based diagnostic tests, as the skills are derived from curriculum studied by the student, thereby assessing the student's mastery of the skill for lesson planning. What distinguishes this measurement is that it relies on direct observation, where correct and incorrect student responses are counted in actual tasks within a specific timeframe (Mitchell, John & Canney, 2013).

Among the types of validity that this measure distinguished by is face validity, as learning disability teachers agree on its appearance, title and sentence consistency. It includes instructions and clear directions that facilitate application, as well as content validity, measuring what it was set to measure within the measured skill. For

example, if we want to test the student's ability to read alphabet letters, we ask a direct question about a number of written alphabet letters on the page, observe student's behaviors and response rate to this question.

This question does not tolerate different interpretations or meanings, and this is what occurs in all stages of measurement and all skills, which require determination of actual level of student to start successful planned teaching process, also this type of measurement is characterized by the conduct of multiple measurements during teaching to ensure the level of student's progress toward achieving the objective and acquiring skill. Since the new curriculum-based assessments are still under preparation and development in various fields, it is important for the teacher to ensure that these assessments possess validity and reliability, and to verify that they are suitable and valid for the use.

These standardized diagnostic tests are applied in all schools affiliated to Ministry of Education; however, their validity and reliability have not been measured so far, which is considered an informal measurement. In this context, I would like to draw the attention of the Ministry of Education to conduct validity and reliability calculation, especially given that a massive application dataset is available across all schools, to produce a national official scale.

Test Reliability

Test-retest (Stability coefficient)

The test was applied to an exploratory sample consisting of (60) students outside the research sample in mathematics. The names of respondents were recorded in the first application. Then, two weeks after the application, the researcher applied the test again to same previous sample. Similarly, the name of each respondent on the scale was recorded so that the researcher could obtain two scores for each respondent. Then, The Pearson correlation coefficient was calculated between the first and second applications in mathematics, reaching (0.926), which indicates that the test possesses high reliability.

Third: Student Files and Records

Student files in the resource room include all information about student in both its parts (permanent file, teaching file). They complement each other, as the information we need for teaching is found in teaching file, while other information regarding personal data, diagnosis, and statement of student's level in regular class is found in permanent file.

Procedure

The two researchers conducted the study relying on a number of previously mentioned instruments, through which those study tools were applied according to several stages. The first was preparing instruments and scales, reviewing them, and learning their application methods along with their special and general instructions. The followed steps will be presented in the following order.

Preparing a data collection and tabulation form for the purpose of comparison.

Relying on diagnostic tests for students with learning disabilities at primary level in both reading and mathematics to determine needs (pretest) . Two weeks after teaching process, I reviewed student records to determine the progress achieved in the skill, considering the different teaching methods used (individual or groups) (posttest). The final procedure involved reviewing after mastering the skill that had been previously taught to measure the retention effect of learning, and therefore determine the extent of student's reach toward flexibility and fluency in skill acquisition. These steps and procedures are collected and organized in data form prepared by the researcher to facilitate the process of comparing teaching methods under study.

Results

First: to determine whether there are statistically significant differences in mathematics achievement among students with learning difficulties, who study using individual teaching method and those who study using small-group instruction, the researcher used the independent

samples t test for two independent samples, and the results came as shown in the following tables.

First: Second grade

Table 4: t test for significance of differences between Mean scores of second grade students with learning disabilities taught individually and those taught in small groups in Mathematics skills test.

grade	scale	Teaching method	N0	Mean	Standard deviation	T-value	df	Sig level	Statistical decision
Second	Posttest of skill	individual	22	9.45	0.80	0.51	42	0.61	Not sig
		Small groups	22	9.34	0.68				
	Follow-up measurement of skill	individual	22	9.50	0.80	0.50	42	0.60	Not sig
		Small groups	22	9.39	0.69				

From table 4, it is clear that:

There are no statistically significant differences at the significance level ($\alpha = .05$) between the mean scores of second-grade students with learning disabilities who were taught individually and those who were taught in small groups in the mathematics skill post-test. The calculated (T) value reached (0.51), which is less than its critical value, and the significance level reached (.61), which is greater than ($\alpha = .05$). This indicates the absence of statistically significant differences between scores of second-grade students with learning disabilities taught individually and those taught in small-groups in mathematics skill test. The mean score of second-grade students with learning disabilities taught individually was (9.45 out of 10), and the mean score of those who were taught in small groups was (9.34 out of 10).

There are no statistically significant differences at the significance level ($\alpha = .05$) between the mean

scores of second-grade students with learning disabilities who were taught individually and those who were taught in small groups in the follow-up mathematics skill test. The calculated (t) value reached (0.51), which is less than its critical value, and the significance level value reached (.62), which is greater than ($\alpha = .05$). This indicates the absence of statistically significant differences between the scores of second-grade students with learning disabilities taught individually and those were taught in small groups in the follow-up test of mathematics skill. The mean score of those who were taught individually was (9.50 out of 10), while the mean score of those who were in small groups was (9.39 out of 10).

Second: Third grade

Table 5: t test for significance of differences between Mean scores of third-grade students with learning disabilities taught individually and those taught in small groups in Mathematics skill test.

grade	Scale	Teaching method	N0	Mean	Standard deviation	t-value	Degree of f	Sig level	Statistical decision
Third	Posttest of skill	individual	20	9,40	0.70	0.49	43	0.62	Not sig

		Small groups	25	9.28	0.89				
	Post-measurement of skill	Individual	20	9.48	0.72	0.79	43	0.43	Not sig
		Small groups	25	9.28	0.89				

From the previous table, it is clear that

There are no statistically significant differences at ($\alpha = .05$) between the mean scores of third-grade students with learning disabilities who are taught individually and those who are taught using small-group instruction in the mathematics skill test. The calculated t-value was (0.49), which is less than its critical value, while the significance level value was (.62), which is greater than (.05). This indicates the absence of statistically significant differences between the mean scores of third-grade students with learning disabilities taught by individual instruction and those who are taught by small-group instruction in the mathematics skill test. The mean score for third-grade students with learning disabilities taught by individual instruction reached (9.40 out of 10), whereas the mean score of third-grade students with learning disabilities taught by small-group instruction reached (9.28 out of 10).

There are no statistically significant differences at (.05) between the mean scores of third-grade students with learning disabilities taught using individual instruction method and who taught using small-group instruction in the follow-up mathematics skill test. The calculated t-value reached (0.79), which is less than its critical value, while the significance level value reached (.43), which is greater than (.05). Thus indicates the absence of statistically significant differences between the mean scores of third-grade students with learning disabilities taught by individual method and those taught by small groups in the follow-up mathematics skill test. The mean score of third-grade students with learning disabilities taught individually reached (9.48 out of 10), whereas the mean score of third-grade students with learning disabilities taught by small groups reached (9.28 out of 10).

Thirdly: Grade four

Table 6: Results of the t test for the significance of differences between the mean scores of third-grade students with learning disabilities taught using individual instruction and those taught using small-group instruction in mathematics skill test.

grade	Scale	Teaching method	N	Mean	Standard deviation	t-value	Degree of freedom	Significance level	Statistical decision
fourth	Posttest of skill	Individual	21	9.57	0.60	0.58	41	0.56	Not sig
		Small groups	22	9.68	0.65				
	Follow-up measurement of skill	Individual	21	9.67	0.58	0.33	41	0.74	Not sig
		Small groups	22	9.73	0.63				

From the previous table, it is evident that

There are no statistically significant differences at the significance level ($\alpha = .05$) between the mean scores of fourth-grade students with learning disabilities who were taught individually and those who were taught in small groups on mathematics skill test, as the calculated (t) value reached (0.58), which is less than its tabular value. Furthermore, the significance level value reached (.56), which is greater than (.05), indicating the absence of statistically significant differences between the scores of fourth-grade students with learning disabilities taught individually and those taught in small groups. The mean score of those taught individually was reached (9.59 out of 10) and the mean score of those taught in small groups reached (9.68 out of 10).

There are no statistically significant differences at the significance level ($\alpha = .05$) between the mean scores of fourth-grade students with learning disabilities who were taught using individual instruction and those who were taught using small-group instruction on the follow-up mathematics skill test, as the calculated (t) value

reached (0.33), which is less than its tabular value. Furthermore, the significance level value reached (.74), which is greater than (.05), indicating the absence of statistically significant differences between the mean scores of fourth-grade students with learning disabilities taught individually and those taught in small groups on the follow-up mathematics skill test. The mean score of fourth-grade students with learning disabilities taught individually reached (9.67 out of 10), while the mean score of fourth-grade students with learning disabilities taught in small groups reached (9.73 out of 10).

Second: To determine whether there were statistically significant differences in mathematics achievement among students with learning disabilities taught individually versus those taught by small groups attributed to differences in grade levels, a one-way ANOVA test was conducted. The results are presented in the following tables.

Differences in mathematics achievement among students with learning disabilities taught individually across different grade levels.

Table 7: The Results of the One-Way ANOVA test to identify statistically significant differences in mathematics achievement among students with learning disabilities taught individually attributed to different grade levels.

Measure	Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-value	Significance level
Posttest of math skill	Inside groups	0.32	2	0.16	0.32	0.73
	Outside groups	29.90	60	0.50		
	Total	30.21	62			
Follow-up measurement of math skill	Inside groups	0.45	2	0.23	0.64	0.64
	Outside groups	29.90	60	0.50		
	Total	30.36	62			

It is clear from table 7 The following

1. There are no statistically significant differences at the significance level (.05) or less

in the post-test of mathematics skill achievement among students with learning disabilities taught

individually across different grade levels, as the significance level reached (.73), which is greater than the significance level (.05). Consequently, there are no differences among the three grade levels (second, third, fourth) in mathematics skill achievement among students with learning disabilities taught by individual instruction.

There are no statistically significant differences at the significance level (.05) or less in the follow-up test for mathematics skill among students with learning disabilities taught using individual

instruction across different grade levels, as the significance level reached (.064), which is greater than the significance level (.05). Consequently, there are no differences among the three grade levels (second, third, fourth) in the follow-up measurement of mathematics skill among students with learning disabilities taught individually.

Differences in mathematics Skill Achievement among Students with learning disabilities taught by small-group instruction across grade levels.

Table 8: Results of one-way ANOVA test to determine statistical significance of differences in mathematics skill achievement among students with learning disabilities taught using the small-group instruction across grade level.

measure	Source of variation	Sum of squares	Degrees of freedom	Mean squares	F-value	Statistical significance
Posttest of mathematics skill	Between groups	2.13	2	1.07	1.88	0.16
	Within groups	37.51	66	0.57		
	Total	39.64	68			
Follow-up measurement of mathematics skill	Between groups	2.50	2	1.25		
	Within groups	37.37	66	0.57	2.21	0.12
	Total	39.87	68			

It is clear from table 8 that

There are no statistically significant differences at the significance level (.05) or less in the post-test mathematics skill achievement among students with learning disabilities taught using small-group instruction across different levels, as significance level reached (.16), which is greater than the significance level (.05). consequently, there are no differences among the three grade levels (second, third, and fourth) in mathematics skill achievement among students with learning disabilities taught using small groups

There are statistically significant differences at significance level (.05) or less in the follow-up test for mathematics skill among students with learning disabilities taught using small-group

instruction across different grade levels, as the significance level reached (.12), which is greater than (.05). consequently, there are no differences among the three grade levels in the follow-up measurement for mathematics skill among students with learning disabilities taught using small groups.

Discussion

The study aimed to compare the effectiveness of individual instruction and small-group instruction in developing achievement in mathematics among primary school students with learning disabilities. The results showed no statistically significant differences between the two methods in posttest or follow-up

measurement among second, third and fourth grade students, nor were there differences attributable to grade level within each teaching method. These results indicate that both methods are capable of achieving comparable level of improvement in learning mathematics whenever implemented according to evidence-based educational foundations.

This result can interpret in light of the fact that decisive factor in the success of intervention was not represented in the number of students within the group, but in the quality of teaching itself. All sample participants received intervention based on explicit instruction, systematic teaching, continuous assessment and immediate feedback; components that literature indicates are among the most effective elements in improving mathematics learning among students with learning disabilities, whether provided individually or in small groups (Gersten et al., 2009; Fuchs et al., 2012; Nelson et al., 2022). Therefore, the similarity of these practices in both methods may interpret the convergence of results between them.

The results of the study align with systematic review conducted by Dietrichson et al. (2021), demonstrated that Interventions provided in small groups achieve positive effects in learning mathematics, but did not find sufficient evidence predicting superiority of a specific group size over another when controlling for teaching quality. They also align with the results of Rosholm et al. (2025), which indicated that instruction in small groups can achieve high educational outcomes with best economic competence, especially when implemented by trained teachers and according to organized educational programs. In contrast, the results also agree with evidence emphasizing the effectiveness of individual instruction in improving mathematical concepts and problem-solving skills (Gersten et al., 2009; Fuchs et al., 2012), supporting the conclusion that both methods represent an effective choice if requirements of evidence-based intervention are met.

The current results are also interpreted in light of the nature of educational environment, as learning disabilities programs in schools rely on individual plans, diagnostic tests based on curriculum, and continuous monitoring of student progress, regardless of the delivery method. This organization contributed in unifying teaching objectives, content skills and assessment mechanisms, which reduced the possibility of differences appearing between individual and small-group instruction. Furthermore, the equivalence of the two groups in age, duration of instruction, and pre-performance level prior to Intervention enhanced the validity of comparison between the two methods.

Among the key findings was also the absence of differences between grade levels (second, third and fourth) in both individual and small-group instruction. This shows the effectiveness of both methods is not connected to grade level as much as it is to the quality of implementing intervention, the alignment of educational skills with student's level, and adherence to the principles of explicit instruction and continuous assessment. This result also suggests the possibility of applying both methods effectively across more than one grade level in primary school without the need for fundamental changes in the delivery format.

The current study differs from most previous studies in that it did not compare either method to traditional teaching; rather, it conducted a direct comparison between individual and small-group instruction with similar instructional content intervention duration, and measurement instruments. This aspect is considered one the study's key contributions, as the majority of previous studies focused on providing the effectiveness of one method compared to traditional method, while direct comparisons between them remained limited, especially in the Arab and Saudi environments. Consequently, the study's results provide practical evidence that selecting and instructional method should be based on student characteristics, severity of difficulty, and available resources, rather, than

assuming superiority of one method over the other.

These results hold practical important implications: they indicate that schools do not need to rely solely on individual instruction in all cases, especially given time and human resources constraints. small-group instruction when implemented according to the same quality standards, can achieve similar educational outcomes while utilizing available resources more efficiently. Conversely, individual instruction remains a practical option suited for students requiring more intensive intervention provided in small groups which aligns with (philosophy of multi-tiered systems of support (MTSS/RTT)).

Conclusions

The study aimed to compare the effectiveness of individual instruction and small-group instruction in developing mathematics achievement among students with learning disabilities in second, third and fourth grades of primary school. Results showed no statistically significant differences between two methods in both post assessment and follow-up measurement. Similarly, no differences revealed attributable to grade level variations within each instructional method. These findings indicate that individual instruction and small-group instruction achieve a comparable level of effectiveness when delivered according to organized program based on accurate diagnosis and skill-focused teaching, along with continuous monitoring of student progress. Accordingly, the choice of instructional method should be based on student needs, severity of difficulty and available resources, rather than an assumption of the absolute superiority of one method.

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Limitations

The findings of this study are subjected to several limitations that should be considered when interpreting the results. The sample was restricted to second, third and fourth grade primary students in learning disabilities programs in the city of Riyadh, which may delimit generalizing the results into other grade levels or educational environment. Additionally, the study focused solely on target mathematics skills measured by standardized diagnostic tests approved by Ministry of Education and did not address other variables, such as attitude toward mathematics, motivation, self-efficacy or cost-effectiveness of the intervention. Furthermore, the follow-up assessment was limited to a relatively short period, highlighting the need for longitudinal studies to verify the long-term sustainability of learning effects.

Implications

It is recommended to continue using both instructional methods currently employed in teaching students with learning disabilities (individual instruction and Small-groups instruction), given the absence of significant differences them. What suits one student may not suit another, thus, continuing to use a variety of teaching methods meets the diverse needs of students, provided there is adherence to evidence-based instructional practices.

Also, the researchers propose preparation of a guide that outlines placement mechanism for students with learning disabilities across appropriate instructional methods (individual and group). This guide should take into account the severity of difficulty, as well as student characteristics suited to each teaching method, such as introversion and severe difficulty fitting individual instruction and light difficulty fitting group instruction, and not to leave the distribution of students for teachers' efforts.

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