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A Quasi-Experimental Study of Enrichment Activities within a Training Programme for Remediating Dyscalculia among Fifth-Grade Primary School Pupils

دراسة شبه تجريبية لإسهام الأنشطة الإثرائية في إطار برنامج تدريبي في علاج عُسر الحساب لدى تلاميذ السنة الخامسة من التعليم الابتدائي

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Article abstract:

This study examined the contribution of a training programme employing enrichment activities to support primary school children with arithmetic difficulties. The programme aimed to remediate problems with basic elementary-level arithmetic operations. The study tested the hypothesis that there are statistically significant differences in the ability to solve basic arithmetic operations (addition, subtraction and multiplication) between Year 5 pupils with arithmetic difficulties who were instructed using enrichment activities within the training programme, and those who did not receive instruction through the programme.

The study sample comprised 24 pupils identified as having arithmetic difficulties and selected purposively from two primary schools in the Tizi Ouzou province. Twelve pupils constituted the control group, while the remaining twelve formed the experimental group, which received the training programme based on enrichment activities targeting basic arithmetic operations. Both the control and experimental groups were administered a curriculum-based achievement test of basic arithmetic operations as both a pretest and posttest. The study followed a quasi-experimental design.

The results indicated statistically significant differences in arithmetic test achievement between the two groups, favouring the experimental group. These results suggest that the enrichment activities embedded in the training programme have a demonstrable positive effect on remedying arithmetic difficulties among Year 5 pupils.

Key words : *enrichment activities; academic learning difficulties; dyscalculia; fifth-grade pupils.*

ملخص المقال :

هدفت الدراسة إلى البحث عن إسهام الانشطة الإثرائية في إطار برنامج تدريبي على الأطفال ذوي صعوبات الحساب في المرحلة الابتدائية، في علاج صعوبات حل العمليات الحسابية الأساسية في المدرسة الابتدائية. وذلك باختبار الفرضية التالية:

توجد فورقا ذات دلالة إحصائية في حل العمليات الحسابية الأساسية(الجمع، الطرح، الضرب) بين التلاميذ ذوي صعوبات الحساب الذين درسوا باستخدام أنشطة اثرائية بواسطة برنامج تدريبي، والتلاميذ الذين لم يدرسوا بواسطة هذا البرنامج في السنة الخامسة ابتدائي. تكونت عينة الدراسة من 24 تلميذ وتلميذة يعانون من صعوبة الحساب تم اختيارهم بطريقة قصديه في مؤسستين ابتدائيتين في ولاية تيزي وزو، حيث 12 منهم يمثل المجموعة الضابطة و12 منهم يمثل المجموعة التجريبية التي طبق عليه البرنامج التدريبي الذي يعتمد على الأنشطة الإثرائية في حل العمليات الحسابية الأساسية. كما اعتمدنا على الاختبار التحصيلي في حل العمليات الحسابية الأساسية في الاختبار القبلي والبعدي للمجموعتين الضابطة والتجريبية. وهذا باتباع المنهج الشبه التجريبي في الدراسة.

ولقد أسفرت على وجود فروقا دالة إحصائيا بين المجموعة الضابطة والمجموعة التجريبية في التحصيل على الاختبار التحصيلي وهذا لصالح المجموعة التجريبية .بهذا يمكن القول أن للأنشطة الإثرائية في حل العمليات الحسابية الأساسية تأثير واضح في علاج صعوبات الحساب عند تلاميذ السنة الخامسة ابتدائي.

الكلمات المفتاحية: الانشطة الإثرائية، صعوبات التعلم الاكاديمية، عسر الحساب، تلاميذ السنة الخامسة ابتدائي.

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Introduction

Academic learning difficulties constitute one of the most significant challenges facing contemporary educational systems because of their impact on pupils' academic achievement and long-term educational development. Among these difficulties, dyscalculia has received increasing attention due to its negative effects on the acquisition of basic arithmetic skills and mathematical reasoning. Pupils with dyscalculia often experience persistent difficulties in performing arithmetic operations, understanding numerical relationships, and applying mathematical procedures despite receiving conventional classroom instruction.

Contemporary research suggests that arithmetic difficulties cannot be explained solely by inadequate instruction or lack of effort. Rather, they are associated with underlying cognitive factors, including deficits in number sense, limitations in working memory, difficulties in processing numerical information, and weaknesses in the retrieval of arithmetic facts from long-term memory. These cognitive constraints may hinder pupils' ability to acquire and automate basic arithmetic skills, resulting in a growing discrepancy between their intellectual potential and academic performance. Consequently, arithmetic difficulties frequently become evident during the primary school years, when pupils are expected to master foundational mathematical concepts and operations.

The educational consequences of dyscalculia extend beyond poor achievement in mathematics. Persistent difficulties in arithmetic may reduce pupils' confidence, increase mathematics-related anxiety, and limit their engagement in subsequent learning experiences. These challenges create concern among educators, parents, and researchers seeking effective instructional approaches capable of supporting pupils with arithmetic learning difficulties.

One instructional approach that has shown promise is the use of enrichment activities. Unlike traditional methods that rely heavily on repetition and procedural practice, enrichment activities provide opportunities for exploration, problem-solving, manipulation of concrete materials, and active engagement with mathematical concepts. From a cognitive perspective, such activities may enhance conceptual understanding, strengthen memory processes, reduce anxiety, and support the gradual development of arithmetic competence. Previous studies have reported positive outcomes associated with enrichment-based interventions; however, further evidence is needed regarding their effectiveness for pupils experiencing arithmetic difficulties in primary education.

Research Problem : Although arithmetic difficulties have been linked to cognitive deficits such as weaknesses in number sense and working memory, many classroom interventions continue to focus primarily on procedural practice without addressing these underlying learning needs. Consequently, there remains a need to investigate whether enrichment activities can provide a more effective learning environment for pupils with arithmetic difficulties by supporting both conceptual understanding and arithmetic performance.

Accordingly, the present study seeks to answer the following research question:

Is there a statistically significant difference in achievement in basic arithmetic operations (addition, subtraction, and multiplication) between Year 6 pupils with arithmetic difficulties who receive instruction through an enrichment-based training programme and those who receive conventional instruction?

1 . Research Hypothesis :

The study hypothesizes that there will be statistically significant differences in post-test arithmetic achievement between the experimental group and the control group in favour of the experimental group.

2. Research Objective :

The study aims to examine the effectiveness of enrichment activities delivered through a training programme in improving achievement in basic arithmetic operations among Year 6 pupils experiencing arithmetic difficulties.

3.Methodology Overview :

To address the research question, the study adopts a quasi-experimental design involving an experimental group that participates in an enrichment-based training programme and a control group that receives regular instruction. Achievement in basic arithmetic operations is assessed through pre-test and post-test measures to determine the effectiveness of the intervention.

1. Definitions of terms

1.1 Academic learning difficulties: In this study, academic learning difficulties are defined as deficits in the skills required to perform basic arithmetic operations (addition, subtraction and multiplication) exhibited by children in Year 5.

1.2 Arithmetic operations: Arithmetic is an empirical science created by the human mind that concerns methods of solution and patterns of thought; it functions as a universal language and a complement to the language of nature (Ahmed Abu al-Abbas & Muhammad al-Atrouni, 2002, p. 39). Operationally, arithmetic operations are procedural processes represented by symbols and numerals in contexts of addition, subtraction, or multiplication.

1.3 Learning difficulties in arithmetic: These are "factors that negatively affect the process of learning arithmetic; they may cause test anxiety in students and may be attributable to the student themselves or to teacher-related factors, the curriculum, or the textbook" (Al-Mashani, Muhammad Ahmad, 2002, p. 11). In the present study, learning difficulties in arithmetic are operationalized as the score obtained by an individual member of the sample on the curriculum-based achievement test of basic arithmetic operations (multiplication, addition, subtraction).

1.4 Pupil with arithmetic learning difficulties: A pupil whose intelligence is not below average on an intelligence test, who scores below average on an arithmetic achievement test, and who attains an above-average score on a behavioural characteristics rating scale (Sami Muhammad Malham, 2006, p. 56). In this study, a pupil with arithmetic learning difficulties is defined as a fifth-grade child aged 10–11 years who suffers from dyscalculia.

1.5 Enrichment activities in arithmetic: A set of engaging, academically oriented arithmetic activities designed to stimulate pupils' interest in the subject, foster enjoyment and encourage creativity. Examples include puzzles, mental games, amusing problems and historical mathematical stories (Posamenter et al., 1991). In this study, enrichment activities comprise a series of tasks and stories containing puzzles and socially contextualised arithmetic problems, which are used during lessons to motivate pupils and encourage them to solve the presented problems. These activities were implemented within a directed training programme for pupils with arithmetic learning difficulties.

2. Factors Contributing to Difficulties in Learning Arithmetic

Arithmetic learning difficulties arise from the interaction of multiple educational, cognitive, and psychosocial factors. From an educational perspective, insufficient prior readiness and gaps in prerequisite mathematical knowledge may hinder pupils' acquisition of arithmetic concepts. Cognitively, deficits in memory, difficulties in perceiving relationships among quantities and operations, developmental learning difficulties, and weaknesses in calculation strategies can interfere with arithmetic performance. Furthermore, language disorders and reading difficulties may impede comprehension of mathematical instructions and word problems, while limited understanding of temporal concepts may affect the acquisition of sequential arithmetic procedures. Psychosocial factors, including anxiety and low academic confidence, may further exacerbate these difficulties by reducing pupils' engagement with mathematical tasks (Hallahan, 1996).

. The principal contributing factors can be summarized as follows:

- Weak or inadequate prior readiness for learning arithmetic operations.
- Impairments in perceiving mechanical relationships.
- Language disorders and difficulties in reading (dyslexia).
- Lack of conceptual understanding of time.
- Memory disorders and problems.

- Developmental learning difficulties.
- Disorders or deficits in learning calculation strategies (Halahan, 1996, p. 481).

2.1. Theoretical Rationale for Enrichment Activities

Enrichment activities are grounded in constructivist and cognitive learning perspectives, which emphasize active engagement, exploration, and meaningful learning experiences. Unlike traditional instruction that often relies on repetitive practice, enrichment activities provide varied opportunities for problem-solving, discovery, manipulation of materials, and collaborative learning. These experiences are expected to promote deeper conceptual understanding, increase motivation, and encourage flexible thinking.

Within the context of arithmetic learning difficulties, enrichment activities are hypothesized to influence achievement through several mechanisms. First, they provide concrete and visual representations that facilitate understanding of abstract mathematical concepts. Second, they increase opportunities for guided practice and feedback, thereby strengthening procedural knowledge and memory retention. Third, they reduce mathematics-related anxiety by creating engaging and supportive learning environments. Consequently, enrichment activities are expected to contribute to improved arithmetic performance among pupils experiencing learning difficulties.

3. The importance of enrichment activities

Enrichment involves augmenting the educational programme by providing pupils at different stages of schooling with novel learning experiences that differ from those typically offered in the regular classroom in terms of content and novelty. Introducing enrichment activities into the curriculum can produce many positive learning outcomes that traditional teaching methods often fail to achieve, largely because they frequently lack routine problem-solving opportunities and make limited use of mental games and puzzles (Al-Mughayrah, Abdullah bin Uthman, 1998).

3.1.Objectives of Using Enrichment Activities: The use of enrichment activities in arithmetic instruction serves several interconnected objectives:

- Identifying arithmetic concepts that pupils find difficult to understand.
- Stimulating curiosity, exploration, and mathematical inquiry.
- Enhancing conceptual understanding of arithmetic operations and relationships.
- Developing higher-order thinking and problem-solving skills.
- Supporting creative and flexible approaches to mathematical tasks.
- Reducing anxiety and increasing pupils' confidence in performing arithmetic operations.
- Assisting teachers in diversifying instructional methods and adapting learning experiences to pupils' needs.
- Contributing to curriculum development through the integration of innovative learning experiences (Muhammad Hefni Ismail, 2005).

4. Remediation of Academic Arithmetic Difficulties

The remediation of arithmetic difficulties requires instructional approaches that address both cognitive processes and learning outcomes. Task analysis provides a useful framework by breaking complex arithmetic skills into manageable components and identifying the prerequisite abilities needed for successful performance. Effective remediation therefore involves:

- Defining clear instructional objectives.
- Analysing arithmetic tasks into sequenced sub-skills.
- Assessing pupils' developmental readiness and learning needs.
- Providing sufficient opportunities for guided and independent practice.
- Facilitating the transfer and generalisation of learned skills to new situations.
- Building on individual strengths while addressing identified weaknesses.
- Establishing strong conceptual foundations before introducing more advanced procedures.

- Integrating appropriate instructional resources and educational technologies.

This framework suggests that enrichment activities function as a mediating instructional strategy linking cognitive support, increased engagement, and conceptual understanding to improved arithmetic achievement.

4 .1 .Instructional Strategies for Pupils with Arithmetic Difficulties

Consistent with cognitive-developmental theories, instruction should progress from concrete experiences toward abstract reasoning. Effective teaching therefore involves:

1. **Concrete (Sensory) Stage:** Pupils interact with real objects and manipulatives to develop an initial understanding of arithmetic concepts.
2. **Representational Stage:** Concepts are reinforced through pictures, diagrams, and visual representations.
3. **Abstract Stage:** Pupils apply mathematical symbols and abstract reasoning to solve arithmetic problems independently.

This progression facilitates conceptual development by enabling pupils to construct meaning gradually, thereby reducing cognitive overload and strengthening long-term understanding of arithmetic concepts and procedures (Muhammad Hefni Ismail, 2005).

Field procedures:

1. **Research design**: This study employed a quasi-experimental pre-test/post-test control group design to investigate the effectiveness of a training programme incorporating enrichment activities in improving arithmetic achievement among fifth-grade pupils experiencing difficulties in basic arithmetic operations. Due to practical constraints within the school setting, random assignment of participants was not feasible. Therefore, two existing groups from two primary schools were selected and assigned as the experimental and control groups.

To reduce selection bias, both groups were selected according to identical inclusion criteria, including age range, achievement level, and teacher identification of arithmetic difficulties. Furthermore, a pre-test was administered to establish baseline comparability between groups before the intervention

2. **Spatial boundaries of the study:** Fieldwork for this study was conducted in two primary schools in the Tizi-Ouzou province (see Table 1).

Table 1: Primary schools comprising the spatial boundaries of the study

Primary schools	District	State
Al-Ikhwa Tiyab Primary School	Tizi Ouzou	Tizi Ouzou
5July Primary School	Tigzirt	Tizi Ouzou

3. Sample The study sample comprised fifth-grade pupils who experience difficulties performing basic arithmetic operations (addition, subtraction, multiplication). A purposive sample of 24 pupils was selected, with 12 pupils chosen from each of the two participating schools. The following table presents the sample distribution by sex:

Table 2: Distribution of sample members by sex

Sample	Al-Ikhwa Tayab Primary School		5July Primary School	
Males	Number	Percentage	Number	Percentage
	7	58.33%	4	33.33%
Females	5	41.66%	8	66.66%
Total	12	100%	12	100%

The table above shows the distribution of the sample by sex in each of the two schools. Females and males are represented in roughly equal numbers in the study sample. Pupils from "Al-Ikhawa Tayab" Primary School were selected as the control group, while pupils from "5 July" Primary School were selected as the experimental group.

Sample selection procedures

Participants were selected according to the following criteria:

- Identification of pupils with learning difficulties in arithmetic, particularly with multiplication, addition and subtraction, based on teachers' evaluations in mathematics.
- A pretest achievement score below 50%.
- Age between 8 and 11 years.
- No physical, sensory or intellectual disabilities, as verified from the students' school records.

4. Study instruments:

4 .1.Arithmetic Achievement Test : An arithmetic achievement test was developed to assess pupils' mastery of basic arithmetic operations.

4.2.Test Development : The initial version of the test was constructed in accordance with the fifth-grade mathematics curriculum and consisted of items assessing:

- Single-digit multiplication.
- Multiples of numbers.
- Addition and subtraction of two-digit numbers.
- Multiplication of two-digit numbers by one-digit numbers.
- Multiplication of three-digit numbers by one-digit numbers.

4.3.Content Validity : The test was reviewed by a panel of specialists in mathematics education and arithmetic instruction. Experts evaluated item relevance, clarity, linguistic accuracy and alignment with the intended learning objectives. Based on their recommendations, several items were revised and two items were removed.

4.4.Pilot Testing :A pilot administration was conducted with a convenience sample of fifth-grade pupils to determine the appropriateness of instructions and testing procedures and to estimate administration time. The final testing time was established at 30 minutes.

It should be noted that the present study focused primarily on content validation through expert review. Future studies are encouraged to report additional psychometric indicators, including reliability coefficients and construct validity evidence.

4.5.Test Reliability and Validity: After administering the test to the pilot sample, its reliability was examined using the Split-Half Method. The test items were divided into two equivalent halves, and the correlation coefficient between the scores of the two halves was calculated and corrected using the Spearman–Brown formula. The reliability coefficient reached 0.78, indicating a satisfactory level of reliability. The test's self-validity coefficient was then calculated by taking the square root of the reliability

coefficient, yielding a validity coefficient of 0.88. This result indicates that the test possesses a high degree of validity and is suitable for measuring pupils' achievement in the targeted arithmetic operations.

. **Content Validity:**

To establish the content validity of the test, it was submitted to a panel of experts specializing in arithmetic education, mathematics teaching methods, and educational measurement and evaluation. The experts were asked to judge the extent to which the test items were relevant to the objectives being measured, linguistically appropriate, and suitable for the targeted grade level. They were also requested to determine the necessity of each item for assessing the intended skill.

Based on the experts' ratings, the Content Validity Index (CVI) was calculated by dividing the number of experts who judged an item as relevant by the total number of experts. After computing the CVI for all items and obtaining the overall average, the test achieved a content validity coefficient of 0.88. This high value indicates that the test items adequately represent the content domain they were designed to measure.

In light of the experts' feedback, several modifications were made to the wording of some items, and two items were removed because they were deemed inappropriate for the targeted level. Consequently, the final version of the test became more accurate and better aligned with the objectives of the study.

5. Intervention Procedures : Following pre-test administration, the experimental group participated in a 15-day instructional programme incorporating enrichment activities designed to support arithmetic learning. Activities included:

- Manipulatives and concrete learning materials.
- Coloured instructional aids.
- Real-life problem-solving situations.
- Educational stories.
- Mental arithmetic games.
- Mathematical puzzles.

The activities were designed to increase engagement, motivation and attention during arithmetic instruction and to provide multiple representations of mathematical concepts.

Meanwhile, the control group received conventional classroom instruction covering the same arithmetic content without the enrichment programme.

After completion of the intervention period, the arithmetic achievement test was re-administered to both groups as a post-test.

Given the relatively short duration of the intervention, results should be interpreted as reflecting short-term learning outcomes rather than long-term cognitive change.

6. Data Analysis

Descriptive statistics, including means and standard deviations, were calculated for both groups. Group differences were examined using independent-samples t-tests.

Because the study employed non-randomised groups, the findings should be interpreted with caution. Future research should consider the use of more robust statistical procedures, such as Analysis of Covariance (ANCOVA), to control for potential baseline differences and strengthen causal inference.

6.1. Justification for Using the Independent-Samples t-Test Instead of ANCOVA :

The independent-samples t-test was employed to compare the achievement scores of the control and experimental groups because the study adopted a quasi-experimental design involving two groups of equal size and a pre-test/post-test procedure. Prior to the intervention, the equivalence of the two groups was examined through the pre-test results, which revealed no statistically significant differences between the groups ($t = 1.82$, $p = .08$). This finding indicates that the two groups were comparable before the implementation of the enrichment activities programme.

Given the absence of statistically significant pre-existing differences, the post-test comparison using the independent-samples t-test was considered appropriate for testing the study hypothesis. Furthermore, the relatively small sample size ($n = 12$ per group) may reduce the stability and statistical power of more complex procedures such as Analysis of Covariance (ANCOVA), particularly when the assumptions of

homogeneity of regression slopes and linearity between the covariate and the dependent variable cannot be robustly verified.

Therefore, the use of the independent-samples t-test was deemed methodologically adequate for assessing differences between the two groups, while the inclusion of effect size indices (Cohen's d) provided additional evidence regarding the practical significance of the intervention beyond statistical significance alone.

7. Presentation of results and Discussion :

Following the administration of the arithmetic achievement test at both pre-test and post-test stages, means and standard deviations were calculated for the control and experimental groups. Independent-samples t-tests were then conducted to examine differences between groups.

Pre-test Results

Table 3 shows the means, standard deviations , t-test results and Effect Size (Cohen's d) for the sample on the pre-test of the achievement test.

Test	Control group (n = 12)		Experimental group (n = 12)		t-test	Degrees of freedom	sig	Cohen's d	Significance
	S1	X 1	S2	X2					
Achievement test	1.62	1.05	2.16	1.00	1.82	23	0,08	0.53	Not significant at the 0.01 level

Where:

X1: The mean achievement score of the control group.

X2: the mean achievement score of the experimental group.

S1: standard deviation of the control group's achievement scores.

S2: The standard deviation of the experimental group's achievement scores.

Table 3 presents the means, standard deviations and t-test results for both groups before implementation of the enrichment programme.

The results indicate that the obtained significance value (Sig = 0.08) exceeded the adopted significance level ($\alpha = 0.01$), suggesting that there were no statistically significant differences between the control and experimental groups at pre-test. This finding provides preliminary evidence that the two groups demonstrated broadly comparable levels of arithmetic achievement before the intervention.

Nevertheless, because the groups were drawn from different schools and were not randomly assigned, the absence of statistically significant differences at pre-test does not entirely eliminate the possibility of pre-existing differences in contextual variables such as instructional practices, classroom environment, teacher characteristics or socioeconomic background.

Furthermore, the effect size was moderate (Cohen's d = 0.53); however, the difference did not reach statistical significance, supporting the equivalence of the two groups at the pre-test stage.

Post-test Results

Table 4 shows the means, standard deviations and t-test results for the sample on the post-test of the achievement test.

Test	Control group (n = 12)		Experimental group (n = 12)		t-test	Degrees of freedom	sig	Cohen's d	Significance
	S1	X1	S2	X2					
Achievement test	0.97	3.45	6.39	2.27	9.80	23	0.00	1.68	Significant at the 0.01 significance level

The results show a statistically significant difference between the two groups in favour of the experimental group (Sig = 0.00, p < .01). Pupils who participated in the enrichment programme achieved higher post-test scores than those who received conventional instruction

These findings suggest that the enrichment activities may have contributed positively to pupils' arithmetic performance. The use of manipulatives, games, puzzles and real-life problem-solving situations may have enhanced engagement and sustained attention during learning activities, thereby supporting improved achievement.

However, the findings should be interpreted cautiously for several reasons. First, the study employed a quasi-experimental design involving participants from two different schools, making it difficult to exclude alternative explanations for the observed differences. Factors related to school context, teacher effectiveness or classroom climate may have influenced outcomes alongside the intervention itself.

The effect size was very large (Cohen's d = 1.68), exceeding the threshold for a large effect (d = 0.80) proposed by Cohen. This finding suggests that the enrichment activities programme had a substantial practical and educational impact on improving pupils' performance in basic arithmetic operations.

Third, improvement was observed not only in the experimental group but also, to some extent, in the control group. This pattern may reflect normal classroom learning, increased familiarity with the test format, or developmental progress occurring during the study period. Therefore, not all observed gains can necessarily be attributed exclusively to the enrichment programme.

Finally, the intervention lasted only fifteen days. While the results indicate short-term improvement in arithmetic achievement, the study does not provide evidence regarding the durability of these gains over time. Future research should incorporate longer intervention periods and follow-up assessments to determine whether improvements are maintained in the long term.

Overall, the findings provide preliminary support for the potential value of enrichment activities in addressing arithmetic difficulties among primary school pupils. However, given the methodological limitations of the study, conclusions regarding causal effectiveness should be considered tentative and interpreted with appropriate caution.

Summary of Findings and Conclusion

The findings of this quasi-experimental study indicate that the enrichment-activity programme was associated with improved arithmetic achievement among Year 6 pupils experiencing arithmetic difficulties. The absence of meaningful differences between the experimental and control groups on the pre-test suggests that the two groups were broadly comparable before the intervention. Following programme implementation, the experimental group achieved substantially higher post-test scores than the control group, indicating that participation in enrichment activities may have contributed to enhanced performance in basic arithmetic operations.

Within-group comparisons further revealed notable gains in the experimental group between the pre-test and post-test, whereas improvements in the control group were relatively modest. These findings suggest that enrichment activities provided additional learning opportunities that supported pupils' understanding and practice of arithmetic concepts. The statistically significant differences identified through the t-test lend support to the effectiveness of the intervention within the context of the study.

However, these findings should be interpreted with caution. The quasi-experimental design limits the extent to which causal conclusions can be drawn, as factors such as classroom environment, teacher influence, and school-level characteristics may also have contributed to the observed outcomes. In addition, the study focused on a specific sample and a relatively short intervention period, which restricts the generalizability of the findings to other educational contexts. Future research should incorporate larger and more diverse samples, longer intervention periods, and additional measures such as effect sizes to assess both statistical and practical significance.

Overall, the study provides evidence that enrichment activities can play a valuable role in supporting the remediation of arithmetic difficulties among primary school pupils, while highlighting the need for further investigation to confirm and extend these findings.

Recommendations : Based on the findings and limitations of the study, the following recommendations are proposed:

1. Develop structured enrichment programmes targeting specific arithmetic skills that pupils find particularly challenging, such as multiplication and problem-solving tasks.
2. Provide professional development workshops for mathematics teachers on the effective design and implementation of enrichment activities within regular classroom instruction.
3. Ensure the availability of instructional resources, including manipulatives, visual materials, and interactive learning tools that facilitate hands-on arithmetic learning.
4. Incorporate periodic diagnostic assessments to identify pupils experiencing arithmetic difficulties and provide timely intervention.
5. Review and revise mathematics curriculum materials to improve the clarity, sequencing, and accessibility of arithmetic concepts for learners with diverse needs.
6. Encourage schools to allocate dedicated time for enrichment-based remedial activities within the mathematics programme.
7. Conduct further studies using larger samples, multiple schools, and longer follow-up periods to examine the sustainability and broader applicability of enrichment-based interventions.

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