American Journal of Psychiatric Rehabilitation Expert Opinion Article

Tailoring Instructional Strategies to Improve Functional Mathematics Competence in Children with Intellectual and Developmental Disabilities

Nizar H. Bagadood[1], Dr. Muhammad Javed Aftab[2], Faisal Amjad[3*],

[1]Associate Professor, Department of Special Education, College of Education, Umm Al-Qura University, Makkah, Saudi Arabia. Email: nbagadood@uqu.edu.sa
[2]Assistant Professor (Special Education), Department of Special Education, Division of Education (DoE), University of Education, Lahore, Punjab, Pakistan. Email: drmjavedaftab@ue.edu.pk
[3*]Ph.D. Scholar (Special Education), Department of Special Education, Division of Education (DoE), University of Education, Lahore, Punjab, Pakistan. Email: amjadfaisal40@gmail.com (Crospoding Author)

Abstract
Mathematical ability is significant in independent living; nevertheless, children with Intellectual and Developmental Disabilities (IDD) encounter difficulties in learning functional mathematics skills because of cognitive impairment and working memory deficit. The effectiveness of individualized instructional strategies in improving functional mathematics ability in IDD children is investigated in the present study. Employing a quantitative and descriptive research approach, 150 special education teachers responded to a structured questionnaire. The results emphasize the importance of individualized teaching, visual resources, multisensory approach, and application in everyday life in enhancing mathematical competence. And computers as well as assistive tech tools also came up repeatedly as really important things that help make accessibility possible. Contextual factors, more so rural-urban differences, also affected educational practices. Research emphasizes the need for ongoing professional development, increased resource and political intervention to improve teaching methods for children with IDD. Through the provision of evidence -based teaching procedures, teachers can achieve more inclusive teaching and promote mathematical skills in children with IDD.

Keywords: *Functional Mathematics, Instructional Strategies, Intellectual and Developmental Disabilities, Special Education, Digital Learning*

Introduction

Mathematical skill is a basic ability that allows the individual to perform the required daily activities, perform accurate judgments and maintain an independent life. However, individuals with intellectual and developmental disabilities (IDDs) have difficulty in obtaining functional mathematical skills because they are affected by cognitive disorders, challenges of working memory and abstract thinking (Gurganus, 2021). These challenges strongly affect their ability to manage common tasks such as handling money, the ability to tell time and determination (Chinn & Ashcroft, 2017). Functional mathematics is essential, although traditional teaching methodologies do not reach to respond to heterogeneous learning needs for students with IDD. Empirical research shows that effective teaching methods such as explicit teaching, visual modeling and assistance technologies can potentially develop mathematical skills between IDD children Providing systematic teaching and one -time support (Herbert, 2023; Bryant et al., 2019). Therefore, it is very important to receive evidence -based interventions that are sensitive to the differential cognitive and developmental needs of these students.

The use of differentiated teaching and universal design for learning (UDL) was effective in strengthening mathematical skills between children IDDs. Differentiated teaching allows teachers to adapt teaching methods to individual patterns of learning, forces and weaknesses of students, thus increasing the learning environment more productive and inclusive (Tomlinson, 2017). Likewise, the design of UDL also takes into account more representations, engagement and expressions for facilitating students with various needs more effectively mathematics (Hertel et al., 2024). Technological application is also emphasized in supporting mathematical education of children with IDD. Virtual manipulations and interactive software are digital tools that offer adaptive and interactive learning experience that help students build mathematical skills methodically and supportive ways (Bouck et al., 2023; Long & Bouck, 2023). The processes of thinking with an assistant assistant peer-asisted and higher-order thinking processes such as metacognition and self-regulation also increase mathematics performance through problems with common teaching and solutions (Sulists et al., 2018; Wilcox et al., 2022).

The need to perform a study follows from awareness of the mismatch between current teaching practices and specific requirements for learning children IDD in functional teaching of mathematics. Despite the various successful teaching strategies that have

been revealed by previous research, barriers such as insufficient teachers training, insufficient access to the necessary resources, and the resistance of teachers discourage their universal implementation (Smith et al., 2014). Breaking these walls requires evidence-based strategies, changes in policy and professional development programs that prepare teachers with skills for effective application of targeted teaching procedures (Gomez-Najarro et al., 2023; Forbringer & Weber, 2021). In addition, it has been observed that parental involvement and household interventions improve learning mathematical results, and therefore the common efforts of teachers, families and politicians (Barroso et al., 2021; Mathekga, 2016) are required. By revealing and implementing evidence-based teaching approaches, this research endeavors to help build effective, practical, and replicable interventions for improving functional math ability in children with IDD, and ultimately translate into increased autonomy and quality of life.

Objective of Study

To examine the effectiveness of tailored instructional strategies in improving functional mathematics competence in children with intellectual and developmental disabilities (IDD).

Literature Review

Good math skills truly pay dividends every day, particularly priceless to individuals with intellectual and developmental disabilities. Real-life math is a little tricky like that. Engaging with children with intellectual disabilities and learning issues really challenges us to employ special, one-of-a-kind materials to make math skill increase. Empirical evidence dictates that children who have special development needs actually need to have individual learning styles, assistive technology and alternative methods of learning math (Lemons et al, 2022). That material actually helps them perform better in math. This literature review discusses strategies that studies have found for teaching math to children who have intellectual disabilities and developmental disabilities. Many studies have illustrated that there are some methods of teaching that are better for aiding children with those learning differences truly understand math.

Intellectual disability students commonly struggle to understand mathematical concepts due to cognitive impairments, memory loss, and poor problem-solving skills (Gurganus, 2021). Students with intellectual and developmental disability have difficulties in mathematical calculation, identification of numbers, and understanding, which requires the application of special teaching methods. The literature indicates that traditional teaching of mathematics is not capable of addressing their individual learning requirements (Yılmaz, 2017). Therefore, evidence-based interventions must be applied to improve mathematical development in them.

Functional mathematics is used to describe mathematical skills for everyday life, including handling of money, estimating time and measurement (Chinn & Ashcroft, 2017). Research shows that strengthening the functional competence of mathematics IDD children increases their autonomy and well -being. Herbert (2023) emphasizes that teaching the functional use of mathematics increases the involvement and maintenance of IDD students.

Explicit teaching is a systematic method led by a teacher with explicit explanation, controlled practice and rapid feedback (Herbert, 2023). It has been shown to increase the mathematical ability of children with IDD. Explicit teaching increases procedural fluency and conceptual understanding, allowing students to access mathematics, according to Bryant et al. (2019).

Visual representations, such as numeric lines, manipulators and images models, are equally necessary to present mathematical ideas for IDD children (Gurganus, 2021). Research shows that the use of visual support improves students understanding and solving problems between IDD students. For example, Hammed (2022) stated that the employment of sequences of concrete representative abstracts (CRA) significantly increased the performance in mathematics in children with developmental disabilities.

Implementation of technology in mathematical education has gained most important in recent years. Technological tools, ie interactive software programs, virtual manipulatives and games for learning, provide students of IDD quality and adaptable learning (Bouck et al., 2023). Mathematical education and students' involvement improve with technology -based teaching, as revealed by the Long & Bouck research study (2023).

Differentiated teaching is a modification of teaching approaches to satisfying the needs, abilities and interests of students (Tomlinson, 2017). Differentiated teaching was very designed in teaching mathematics for students with disabilities. Literature suggests that differentiated teaching, including scaffolding and flexible grouping, increases the conceptual understanding of mathematics between students (Farlow, 2024).

The Universal Design for Learning (UDL) offers more than one way of representation, engagement and expression for various students (Hertel et al., 2024). Research has shown that UDL -based teaching increases the availability and integration of students for IDD students. Higgins and Maxwell (2021) found in research that the use of the

principles of UDL increased involvement and solving problems in mathematics students.

Cognitive interventions such as self -regulation, metacognition and memory support are decisive for increasing mathematical skills among IDD children (Wilcox et al., 2022). Studies suggest that students teaching use mnemonic skills and problems for solving problems to increase their ability to effectively retain and apply mathematical information (Gurganus, 2021).

Peer-Assured Learning (PAL) is a facilitated interaction between peers to acquire and understand (sulists et al., 2018). Empirical research shows that Pal of approaches such as peer tutoring and collaborative learning improve mathematical abilities and mathematical self -confidence in IDD students. GHEYSSENS et al. (2023) found that the intervention of the assisted Peers significantly increased the skill of mathematical problems to solve students' problems in disability.

Good training of teachers is essential for performing instructional practices typical of children with IDD. Evidence-based teaching has shown that it increases the ability of teachers to respond to different needs through professional development (Gomez-Najarro et al., 2023). Teachers who have been trained in special teaching are able to teach mathematical concepts with disabilities more effectively (Forbringer & Weber, 2021).

Parental engagement plays a key role in supporting mathematical learning outside the classroom. It is observed that parental engagement and home intervention increase the mathematical performance of children with IDD (Barroso et al., 2021). According to the research conducted by Mathekg (2016), the intervention of cooperation between teachers and parents increases the functional mathematical skills of students.

While personalized pedagogical strategies are effective, some obstacles have been reported. Insufficient finances, poor training of teachers and resistance among changes are among the barriers listed in the literature (Smith et al., 2014). Overcoming such obstacles would require a change in policy, further finance and mobilization of the community to make children an IDD with quality mathematical education.

Although current research offers informative findings on mathematical education for children with IDD, further research is needed to explore the long -term effects and scalability of these interventions. New research areas include adaptive learning based on artificial intelligence and neurocognitive intervention to maximize mathematical abilities (Zhang et al., 2022).

Research Methodology

Research Design: Descriptive and quantitative research design was used in a study to assess the efficiency of specially designed teaching interventions in support of functional mathematical skills of students with mental and developmental disabilities (IDD). The use of quantitative approach has enabled the collection of data in numerical terms to examine formulas and relationships, while descriptive research enabled the collection of prevailing teaching together with effect on the results of students' performance.

Research Population: The research population was composed of teachers who taught students with mental disabilities. These teachers had practical experience in teaching with functional mathematics and were well acquainted with various teaching methodologies that were designed to develop mathematical skills in children with IDD.

Research Sample and Sampling Method: Research sample was selected by 150 teachers using a simple method of random sampling. The method provided equal opportunities to all qualifying teachers to join the study and prevent any type of bias. This increased the generalization of the result.

Research tool: The main research tool applied in research was a separate questionnaire. The questionnaire was developed after a thorough review of literature and consisted of standardized items for assessing teachers' opinions on the effectiveness of teaching strategies used for teaching functional mathematics for IDD children.

Validity and Reliability: To ensure validity and render the research instrument reliable, the questionnaire was piloted among experts in the subject area who were dealing with special education and instructional techniques. Piloting was done with a minor number of teachers to ensure understanding and constancy of questions. Instrument reliability was assured through Cronbach's alpha to determine internal consistence.

Data Collection: Physical distribution and an online survey using a Google Form link were the methods of data collection employed. Physical distribution provided the opportunity to meet the teachers in person, and the online form provided wider reach and ease for the participants.

Data Analysis: The data thus gathered were computed using descriptive as well as inferential statistical analysis with the support of SPSS software. Mean, frequency, and standard deviation were utilized for describing the response, while an inferential analysis was conducted to try and note significant differences as well as associations between variables.

Descriptive Analysis

Table 1 *Demographics of Respondents*

Title	Description	Frequency	Percentage (%)
Gender	Male	89	35.6%
	Female	161	64.4%
		250	100%
Age of Respondents	21-30 Y	4	1.6%
	31-40 Y	77	30.8%
	41-50 Y	137	54.8%
	51-60 Y	32	12.8%
		250	100%
Designation	SSET	48	19.2%
	JSET	202	80.8%
		250	100%
Qualification	Master	165	66.0%
	M.Phil.	77	30.8%
	PHD	8	3.2%
		250	100%
Place of Posting	School	125	50.0%
	Center	125	50.0%
		250	100%
Area of Posting	Rural	46	18.4%
	Urban	204	81.6%
		250	100%
Experience	1-5 Y	54	21.6%
	6-10 Y	118	47.2%
	11-15 Y	67	26.8%
	>15 Y	11	4.4%
		250	100%

The majority of respondents are female (64.4%), aged between 41-50 years (54.8%), predominantly serving as JSET (80.8%), with a master's qualification (66.0%). They are equally distributed between schools and centers (50% each), mostly posted in urban areas (81.6%), and have 6-10 years of experience (47.2%).

Table 2 *Analysis at the Basis of Objective and Questions Asked from Respondents*

Sr.	Statements of Questions	SA	A	UD	DA	SDA	M	SD
1	Tailored instructional strategies enhance the mathematical understanding of children with IDD.	137	93	16	4	0	4.45	0.69
		55%	37%	6%	2%	0%		
2	Individualized teaching approaches significantly improve the functional math skills of students with IDD.	125	116	9	0	0	4.46	0.57
		50%	46%	4%	0%	0%		
3	The use of visual aids and manipulatives supports the learning of mathematics in children with IDD.	107	133	8	0	2	4.37	0.63
		43%	53%	3%	0%	1%		
4	Repetitive practice and reinforcement techniques are effective in improving math competence in students with IDD.	121	109	6	11	3	4.34	0.83
		48%	44%	2%	4%	1%		
5	Multisensory teaching methods (e.g., auditory, visual, kinesthetic) help students with IDD grasp mathematical concepts more effectively.	79	132	27	12	0	4.11	0.78
		32%	53%	11%	5%	0%		
6	Breaking down mathematical concepts into smaller, manageable steps improves learning outcomes for students with IDD.	94	109	34	13	0	4.14	0.84
		38%	44%	14%	5%	0%		
7	The integration of real-life scenarios in math instruction enhances the functional numeracy of children with IDD.	94	122	27	4	3	4.20	0.79
		38%	49%	11%	2%	1%		

8	Digital and assistive technology tools facilitate the teaching of mathematics to students with IDD.	94	131	20	2	3	4.24	0.73
		38%	52%	8%	1%	1%		
9	A structured and predictable learning environment positively impacts the mathematical learning of students with IDD.	84	132	24	0	10	4.12	0.88
		34%	53%	10%	0%	4%		
10	Peer-assisted learning strategies contribute to the improvement of math skills in children with IDD.	103	109	18	13	7	4.15	0.96
		41%	44%	7%	5%	3%		
11	Frequent assessments and progress monitoring improve the effectiveness of math instruction for students with IDD.	99	115	27	4	5	4.20	0.84
		40%	46%	11%	2%	2%		
12	The involvement of parents and caregivers in math instruction enhances the functional math competence of children with IDD.	84	115	35	13	3	4.06	0.89
		34%	46%	14%	5%	1%		
13	Providing immediate feedback and positive reinforcement helps students with IDD retain mathematical concepts better.	77	135	24	12	2	4.09	0.81
		31%	54%	10%	5%	1%		
14	Adapting the pace of instruction based on individual learning needs is essential for improving math skills in students with IDD.	99	123	18	10	0	4.24	0.76
		40%	49%	7%	4%	0%		
15	Hands-on, experiential learning activities significantly enhance functional math competence in children with IDD.	105	117	21	7	0	4.28	0.73
		42%	47%	8%	3%	0%		
16	Teachers receive adequate training and resources to implement effective instructional strategies for teaching math to students with IDD.	83	139	18	10	0	4.18	0.73
		33%	56%	7%	4%	0%		

The analysis of responses regarding the effectiveness of tailored instructional strategies in improving functional mathematics competence among children with intellectual and developmental disabilities (IDD) reveals strong support for specialized teaching approaches. A significant majority of respondents agreed or strongly agreed that tailored instructional strategies enhance mathematical understanding (92%), with a mean score of 4.45 (SD = 0.69). Individualized teaching approaches also received high endorsement (96%), with a mean of 4.46 (SD = 0.57). The use of visual aids and manipulatives was widely supported (96%, M = 4.37, SD = 0.63), while repetitive practice and reinforcement techniques were deemed effective by 92% of respondents (M = 4.34, SD = 0.83). Multisensory teaching methods (85%, M = 4.11, SD = 0.78) and breaking down concepts into smaller steps (82%, M = 4.14, SD = 0.84) were also recognized as beneficial. Additionally, integrating real-life scenarios (87%, M = 4.20, SD = 0.79) and leveraging digital tools (90%, M = 4.24, SD = 0.73) were seen as valuable strategies. A structured learning environment (87%, M = 4.12, SD = 0.88), peer-assisted learning (85%, M = 4.15, SD = 0.96), and frequent assessments (86%, M = 4.20, SD = 0.84) were also noted as influential factors. Parental involvement in math instruction was considered beneficial by 80% of respondents (M = 4.06, SD = 0.89), while immediate feedback and positive reinforcement were endorsed by 85% (M = 4.09, SD = 0.81). Adaptation of instructional pace (89%, M = 4.24, SD = 0.76) and hands-on experiential learning (89%, M = 4.28, SD = 0.73) were also highlighted as effective techniques. Lastly, while 89% of respondents agreed that teachers receive adequate training and resources (M = 4.18, SD = 0.73), this area may require further exploration to ensure consistent professional development. Overall, the findings indicate strong agreement on the effectiveness of tailored instructional strategies in improving math competence in children with IDD.

Inferential Statistics

Table 3 *Gender*

Description	N	M	SD	df	t	Sig.
Male	89	67.89	6.48	248	0.46	0.649
Female	161	67.50	6.50			

There is no statistically significant difference in the mean scores of male (M = 67.89, SD = 6.48) and female (M = 67.50, SD = 6.50) respondents, as indicated by the t-value (0.46) and p-value (0.649).

Table 4 *Designation*

Description	N	M	SD	df	t	Sig.
SSET	48	68.29	7.25	248	0.78	0.437
JSET	202	67.48	6.29			

There is no statistically significant difference in the mean scores of SSET (M = 68.29, SD = 7.25) and JSET (M = 67.48, SD = 6.29) respondents, as indicated by the t-value (0.78) and p-value (0.437).

Table 5 *Area of Posting*

Description	N	M	SD	df	t	Sig.
Rural	46	71.30	6.23	248	4.40	0
Urban	204	66.81	6.26			

There is a statistically significant difference in mean scores between rural (M = 71.30, SD = 6.23) and urban (M = 66.81, SD = 6.26) respondents, as indicated by the t-value (4.40) and p-value (0.000), suggesting higher scores for rural respondents.

Table 6 *Age of Respondents*

Description	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	833.808	3	277.936	7.101	0
Within Groups	9628.07	246	39.138		
Total	10461.9	249			

There is a statistically significant difference in mean scores among different age groups, as indicated by the F-value (7.101) and p-value (0.000), suggesting that age has a significant impact on the measured variable.

Table 7 *Qualification of Respondents*

Description	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	459.35	2	229.675	5.672	0.004
Within Groups	10002.5	247	40.496		
Total	10461.9	249			

There is a statistically significant difference in mean scores among respondents with different qualifications, as indicated by the F-value (5.672) and p-value (0.004), suggesting that qualification level influences the measured variable.

Table 8 *Experience of Respondents*

Description	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	659.887	3	219.962	5.52	0.001
Within Groups	9801.99	246	39.845		
Total	10461.9	249			

There is a statistically significant difference in mean scores among respondents with different levels of experience, as indicated by the F-value (5.52) and p-value (0.001), suggesting that experience influences the measured variable.

Findings

The results of the study present perceptive insights on the demographic breakdown of the respondents, their attitude towards instructional strategies for children with intellectual and developmental disabilities (IDD), and how different factors affect their responses.

The majority of the respondents were female, representing a greater percentage of women among the teaching population sampled. The majority of participants were in the middle-aged category, indicating that veteran teachers contributed significantly to the study. Most of the respondents were special education teachers, and a significant number had higher-level academic qualifications. Respondents were evenly spread between schools and centers, with an overwhelming majority based in urban areas. Most participants enjoyed considerable years of working experience, indicating an established teaching population involved in special education.

Respondents showed high agreement with instructional strategies that are specially created for improving mathematical understanding in IDD children. Most participants concurred that tailored teaching methods help students with mathematical understanding. Individualized teaching strategies were grossly accepted as effective and confirmed their perceived value in special education. It was also strongly preferred to use visual aids and manipulatives, which emphasized their use in creating complex mathematical ideas more specific.

The methods of recurring practice and strengthening have also been identified as a good means to increase learning. Multisensory instructional techniques involving hearing, visual and kinesthetic components were identified as useful and division of mathematical thoughts into the steps of the size of the bite was also considered a successful approach.

The use of real-life situations in mathematics teaching was considered a key practice, indicating the value placed on contextual learning. Computer and assistive technology devices were seen as key in supporting instruction, with significant backing for their use in classrooms. The use of structured and predictable learning environments was also stressed as effective by the respondents, again indicating the value placed on consistency in learning environments for children with IDD.

Cooperative learning practices were viewed as beneficial, and most participants supported peer-learning techniques. Regular test-taking and progress monitoring were seen as integral to guaranteeing teaching effectiveness. Parents being involved in teaching math was also identified as a significant element in facilitating children's learning development and academic achievements.

Providing immediate feedback and positive reinforcement was a strongly supported method for enhancing student motivation and interest. Differentiated instructional pacing to respond to individual students' learning needs was seen as a critical practice. Experiential learning using hands-on activity was highly recommended, and practical engagement in math teaching was emphasized. Although most of the participants were of the view that teachers are adequately trained and supported, there was a consensus regarding the need for ongoing professional development to further improve instructional effectiveness.

Response analysis indicated there was no significant difference in gender or occupational group perception regarding instruction techniques and suggested an intersubjective agreement for successful instructional approaches among groups. Perception varied with posting location, though, and instructors posting to rural locations having a different point of view from those posting to urban areas. These variations imply that factors existing in the environment must be of utmost importance in determining the experiences and pedagogies of special education teachers.

Overall, the results point towards robust support for instructional approaches that are technology-based, individualized, and collaborative in teaching math to students with IDD. The research calls for constant professional development and training of instructors in order to make instructional approaches more effective. Besides, the noted differences in perception according to posting site also suggest the inclusion of contextual factors while developing inclusive and effective special education pedagogies.

Discussion

The results of this research are information on teaching taught for students with intellectual and developmental disabilities (IDD), according to the opinions of special education teachers about what works in teaching. Demography of respondents, their ideal teaching and the role of context are very important information about the pedagogy of special education.

The superiority of teachers in the study reflects global trends that reflect a higher number of women employed in special education (Correa et al., 2025). This demographic trend suggests that women remain an important element in the care of children with special needs. Most participants were more qualified and teaching experience and supported evidence that professional qualifications and professional training are essential for ensuring quality education for children IDD. The research suggests that more experienced and better qualified teachers are in an effective position to apply differentiated instructional strategies that provide increased pupils' performance (Day et al., 2016).

The vast majority of supports those respondents had against individualized teaching procedures and differentiated teaching methods emphasizes the role of personalization in special education. Individualized teaching allows instructors to support students with different IDD learning requirements, thus strengthening their mathematical skills and problem-solving skills. Research has always shown that individualized and differentiated teaching increases the motivation and memory of learning students with special needs (Stingo, 2024). This support is also the basis for current research in favor of multimodal learning methods, which enable the comprehension of mathematical abstractions by means of concrete experience (Vizzi, 2016).

The incorporation of real-world applications into the math courses was a key advancement towards contextualized learning. Application of practicums as pedagogical tools in mathematics assists IDD children to ground hypothetical concepts on realities and thereby render it more practical and relevant to life and therefore more effective for meaningful learning. The reality that practical application enhances learning and problem-solving ability among students with learning disabilities is substantiated by the evidence (Yu et al., 2015). Because awareness of how technology can enhance special education is more prevalent, application of digital and assistive technology tools is highly recommended. Technology-enabled learning has been proven to enhance access and enable

independent learning among students with disabilities (Cheng & Lai, 2020).

Successful training relied largely on collaborative learning methods such as parental engagement and peer-supported learning. For individuals with intellectual and developmental disabilities (IDD), collaborative methods enhance social interaction, exchange of knowledge, and peer support, thus maximizing learning. Peer-assisted learning, based on existing research, enhances self-confidence and motivation in children with special needs, thus enhancing academic outcomes (Zamiri & Esmaeili, 2024). With a view towards consistency in skill acquisition and knowledge, parental involvement is recognized as critical in maintaining home learning (Lawrence & Fakuade, 2021). The research emphasized the extent to which well-structured and systematic learning environments promote effective teaching. For IDD children, predictability and consistency are particularly vital as they tend to reduce anxiety and enhance concentration during learning activities.

There has been evidence presented to support the assertion that enhanced classroom management and greater student engagement in special education classes (Ezinwa, 2024) are correlated with structured environments. Second, since both speedy comments and reinforcement are extremely critical strategies for engaging students and structuring study skills, their value was also immensely valued. For disabled students, instant feedback is found to enhance performance and the feeling of achievement (Basha, 2024).

Although gender and job title made no difference in the impression of the respondents, differences in the location of postings did. The existence of conflicting views on pedagogic approaches among rural teachers suggests that situational challenges might influence pedagogic approach. The differences are most likely due to the resources, facilities, and community available, hence emphasizing the necessity of contextualized interventions in special education. Research shows that teachers in rural schools are more likely to struggle with issues related to professional development and access to resources, which affect their pedagogy (Cadero-Smith, 2020). Policy measures and allocation of resources will address these imbalances thus ensuring equal educational opportunities for children with IDD wherever.

Conclusion

The discovery of current research emphasizes the effectiveness of individualized teaching methods in the development of functional competences for numerical students for IDD. The facilitating effects of individualized teaching methods, visual support, multisensory intervention and everyday use emphasize the roles of individualized and context - specific teaching methods in special education. The use of assistance technologies and computer devices has also been accepted as a way of facilitating learning, which reaffirmed the role of technology in supporting mathematical accessibility of knowledge. Collaborative methods of learning, including parental support and peer learning support, were also adopted as successful strategies in the promotion of student motivation and achievement. The study also highlights the importance of organized and stable learning environments, prompt feedback, and instructional adjustment to the pace of one child's progress, each of which have been found to enhance math conceptual understanding and IDD children's learning.

In addition, the study brings forth that while the impact of gender and posting of work was insignificant on perceptions among the teachers, situational features such as area posting strongly influenced promoting pedagogical practices. Rich experience captured among rural teachers highlighted indicating the applicability of availability of inputs, physical structure, and expert human resource in pedagogy. This emphasizes the importance of government intervention to phase out particular issues and fortify support mechanisms to phase out regional gaps in special education. The study ultimately endorses increased professional development and investment to further enhance pedagogy practices for children with intellectual and developmental disabilities (IDD). By using research-driven, student-centered practices, instructors can develop more vibrant and productive classrooms that provide children with intellectual and developmental disabilities with equal chance to learn major arithmetic skills.

Recommendations

- Continuous professional development programs should be conducted to equip educators with advanced instructional strategies for teaching mathematics to children with IDD.
- The use of digital and assistive technology tools should be expanded to facilitate interactive and accessible learning experiences for students with IDD.
- Resource allocation and infrastructure in rural special education settings should be improved to ensure equitable access to effective instructional strategies.

References

1. Barroso, C., Ganley, C. M., McGraw, A. L., Geer, E. A., Hart, S. A., & Daucourt, M. C. (2021). A meta-analysis of the relation between math anxiety and math achievement. *Psychological bulletin*, *147*(2), 134.
2. Basha, D. (2024). Understanding the learning experiences and attitudes related to the

academic performance and success of high school students with disabilities: A phenomenological study.

3. Bouck, E. C., Long, H., & Jakubow, L. (2023). Using technology to enhance learning for students with intellectual disabilities. In *Using Technology to Enhance Special Education* (pp. 51-70). Emerald Publishing Limited.
4. Bryant, D. P., Bryant, B. R., & Smith, D. D. (2019). *Teaching students with special needs in inclusive classrooms*. Sage Publications.
5. Cadero-Smith, L. A. (2020). Teacher Professional Development Challenges Faced by Rural Superintendents. *International Society for Technology, Education, and Science*.
6. Cheng, S. C., & Lai, C. L. (2020). Facilitating learning for students with special needs: a review of technology-supported special education studies. *Journal of computers in education*, *7*(2), 131-153.
7. Chinn, S., & Ashcroft, R. E. (2017). *Mathematics for dyslexics and dyscalculics: a teaching handbook*. John Wiley & Sons.
8. Correa, A., Glas, M. G., & Opara, J. (2025, January). Females in higher education and leadership: insights from a multi-method approach. In *Frontiers in Education* (Vol. 9, p. 1485395). Frontiers Media SA.
9. Day, C., Gu, Q., & Sammons, P. (2016). The impact of leadership on student outcomes: How successful school leaders use transformational and instructional strategies to make a difference. *Educational administration quarterly*, *52*(2), 221-258.
10. Ezinwa, O. I. (2024). The Role of Teacher-Student Relationships in Classroom Management and Student Engagement. *JALINGO JOURNAL OF SOCIAL AND MANAGEMENT SCIENCES*, *6*(1), 234-246.
11. Farlow, D. M. (2024). *Effectiveness of peer-assisted learning strategies on oral reading fluency for students with a learning disability* (Doctoral dissertation).
12. Forbringer, L., & Weber, W. (2021). *RtI in math: Evidence-based interventions*. Routledge.
13. Fuchs, L. S., Powell, S. R., & Vaughn, S. (2022). *Intensive intervention in mathematics: Methods and strategies*. The Guilford Press.
14. Gheyssens, E., Griful-Freixenet, J., & Struyven, K. (2023). Differentiated instruction as an approach to establish effective teaching in inclusive classrooms. In *Effective Teaching Around the World: Theoretical, Empirical, Methodological and Practical Insights* (pp. 677-689). Cham: Springer International Publishing.
15. Gomez-Najarro, J., Pugach, M. C., & Blanton, L. P. (2023). Preparing the Next Generation of General Education Teachers to Work with Students with Disabilities1. In *Handbook of Research on Special Education Teacher Preparation* (pp. 58-82). Routledge.
16. Gurganus, S. P. (2021). *Math instruction for students with learning difficulties*. Routledge.
17. Gurganus, S. P. (2021). *Math instruction for students with learning difficulties*. Routledge.
18. Hammed, L. A. (2022). *Effects of Concrete-Representational-Abstract and Buzz Group Strategies on Pupils' Academic Performance in Numeracy in Moro Local Government Area, Kwara State* (Master's thesis, Kwara State University (Nigeria)).
19. Herbert, R. (2023). *Field Study: Explicit Instruction and How It Can Help Struggling Learners* (Master's thesis, Austin Peay State University).
20. Hertel, S., Bracht, J., Calhoon, M. B., Grünke, M., & Barwasser, A. (2024). Effects of an adapted peer-assisted learning strategies reading programme on reading fluency and reading comprehension of secondary students with or at-risk for reading disabilities. *European Journal of Special Needs Education*, 1-17.
21. Higgins, A. K., & Maxwell, A. E. (2021). Universal design for learning in the geosciences for access and equity in our classrooms. *The Journal of Applied Instructional Design*, *10*(1), 69-83.
22. Lawrence, K. C., & Fakuade, O. V. (2021). Parental involvement, learning participation and online learning commitment of adolescent learners during the COVID-19 lockdown. *Research in Learning Technology*, *29*.
23. Lemons, C. J., Powell, S. R., Lane, K. L., & Aceves, T. C. (2022). *Handbook of special education research, volume II*. Routledge.
24. Long, H. M., & Bouck, E. C. (2023). Calculators and online games: Supporting students with learning disabilities in mathematics. *Intervention in School and Clinic*, *58*(4), 280-286.
25. Mathekga, S. S. (2016). *Teachers' perceptions of parental involvement in children's education in rural Limpopo Province schools* (Doctoral dissertation, University of South Africa).
26. Mulcahy, C. A., Camacho, K. A., & Fenty, N. S. (2024). A Systematic Review of Research on Technology Use Among Students with High Incidence Disabilities. *Exceptionality*, *32*(3), 149-167.
27. Smith, T. E., Polloway, E. A., Patton, J. R., Dowdy, C. A., & McIntyre, L. J. (2014). *Teaching students with special needs in inclusive settings* (Vol. 6). Upper Saddle River, NJ: Pearson.
28. Stingo, J. (2024). *The Effects of Differentiated Instruction and Individualized Instruction on Special Education Students* (Doctoral dissertation, University of the Cumberlands).

29. Sulistami, P., Pahamzah, J., Baratayaomi, W., & Syafriza, S. (2018). Improving Students'reading Comprehension By Using Peer Assisted Learning Strategies (Pals) In Efl Contexts. *International Journal Of Language And Literature*, *2*(2), 52-59.
30. Tomlinson, C. A. (2017). *How to differentiate instruction in academically diverse classrooms*. Ascd.
31. Vizzi, A. (2016). *Teachers' perceptions of manipulatives during middle school math instruction* (Doctoral dissertation, Walden University).
32. Wilcox, G., MacMaster, F. P., & Makarenko, E. (2022). *Cognitive Neuroscience Foundations for School Psychologists: Brain-Behavior Relationships in the Classroom*. Routledge.
33. Yılmaz, Z. (2017). Young children's number sense development: Age related complexity across cases of three children. *International Electronic Journal of Elementary Education*, *9*(4), 891-902.
34. Yu, K. C., Fan, S. C., & Lin, K. Y. (2015). ENHANCING STUDENTS'PROBLEM-SOLVING SKILLS THROUGH CONTEXT-BASED LEARNING. *International Journal of Science and Mathematics Education*, *13*, 1377-1401.
35. Zamiri, M., & Esmaeili, A. (2024). Methods and technologies for supporting knowledge sharing within learning communities: A systematic literature review. *Administrative Sciences*, *14*(1), 17.
36. Zhang, C., Zhao, J., Zhu, Z., Li, Y., Li, K., Wang, Y., & Zheng, Y. (2022). Applications of artificial intelligence in myopia: current and future directions. *Frontiers in Medicine*, *9*, 840498.