Effectiveness of Intervention Strategies: An Experimental Study on Pre-Academic Skills in Children with Multiple Disabilities.

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Abstract:

This paper presents the findings of an experimental study that aimed to investigate the impact of intervention strategies on pre-academic skills in children with multiple disabilities. Specifically, the study focused on the effectiveness of interventions in improving pre-math, pre-writing, and pre-reading skills and the overall pre-academic skill development in this population.

The study involved a sample of six children with multiple disabilities, aged 4–7 years, assigned to an experimental group. The experimental group received targeted interventions in one-to-one sessions for three months. Pre- and post-test assessments were conducted to measure the pre-math, pre-writing, and pre-reading skills of the participants in the experimental group.

Results indicated a significant improvement in the post-test scores of pre-math skills, pre-writing skills, and pre-reading skills among children in the experimental group. These findings highlight the positive impact of intervention strategies on the specific pre-academic skills targeted in this study.

Keywords: Multiple disabilities, Pre-academic skills, Intervention Strategies, Differentiated instruction, Multisensory approaches

Introduction

Children with multiple disabilities encounter significant obstacles in developing pre-academic skills, which are essential for their future academic achievements. These children have a combination of physical, cognitive, and sensory impairments that impact their learning and development. Traditional teaching methods and curricula often struggle to meet the diverse needs of this population, necessitating the exploration of effective intervention strategies specifically tailored to their requirements. This article presents the findings of an experimental study that investigated and

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evaluated intervention strategies for enhancing pre-academic skills in children with multiple disabilities. The study aimed to address existing gaps in knowledge, provide evidence-based approaches, and empower educators, therapists, and parents in supporting the education of these children.

The objectives for the study:

- To investigate the impact of intervention strategies on the pre-academic skills of children with multiple disabilities, specifically focusing on pre-writing, pre-reading, and pre-math skills.
- To assess the effectiveness of individualized instruction in enhancing pre-academic skills among children with multiple disabilities.
- To examine the efficacy of multisensory approaches in promoting pre-academic skill development in children with multiple disabilities.
- To evaluate the effectiveness of task analysis and structured supports in promoting pre-academic skill development in children with multiple disabilities.

Review of literature:

Keen's (2021) study on students with autism underscores lower academic skills and supporting behaviors. Inclusive settings, receptive language, motivation, and interpersonal skills play crucial roles. Addressing enabling behaviors is vital for enhancing academic achievement and educational outcomes for students with autism.

Walker's (2020) systematic survey explores non-parental interventions for language exposure disparities in young children. It emphasizes language skills' significance and identifies effective approaches. Knowledge gaps persist, particularly for infants and toddlers. The study calls for inclusive research and improved study design to enhance early language intervention programs.

Yeomans-Maldonado, Justice, and Logan (2017) underscored the significance of classroom quality and peer effects on preschool children's language development. Teacher-child interactions and peer interactions were identified as crucial factors for fostering language gains. The study emphasizes the importance of instructional quality and peer dynamics in supporting language development in inclusive early childhood settings.

Cheung, Meadan, and Yang (2020) conducted a systematic review on PMD interventions and social skills in young children with disabilities. Results showed mixed findings, indicating the need for further research to better understand the impact of PMDs on social skills development in this population.

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Research Question:

- The utilization of intervention strategies will lead to a significant improvement in the post-test scores of pre-math skills among children with multiple disabilities.
- The implementation of intervention strategies will result in a significant improvement in the post-test scores of pre-writing skills among children with multiple disabilities.
- The implementation of intervention strategies will result in a significant improvement in the post-test scores of pre-reading skills among children with multiple disabilities.
- Is there a significant relationship between the implementation of effective learning strategies, including differentiated instruction, multisensory approaches, and adaptive technologies, and the overall pre-academic skill development in children with multiple disabilities?

Multiple Disabilities:

Multiple Disabilities (more than one specified disability) including deaf blindness which means a condition in which a person may have combination of hearing and visual impairments causing severe communication, developmental, and educational problems. Right of Persons with Disabilities RPWD ACT (2016).

Intervention Strategies:

Individualized Instruction:

Tailor instruction to the specific needs, abilities, and interests of each child. Modify teaching methods and materials to accommodate diverse learning profiles. Provide one-on-one support to address specific challenges and promote skill acquisition.

Multisensory Approaches:

Engage multiple senses (touch, sight, sound, movement) to enhance learning experiences. Utilize tactile materials, auditory cues, and visual aids to reinforce concepts. Create sensory-rich environments to facilitate comprehension and retention of pre-academic skills.

Assistive Technology:

Integrate assistive technology tools to support communication, literacy, and other skills. Use augmentative and alternative communication (AAC) devices, specialized software, or adaptive switches. Personalize assistive technology solutions based on individual needs and abilities.

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Peer-mediated Instruction:

Pair children with multiple disabilities with typically developing peers as mentors or buddies. Foster social interaction, communication, and pre-academic skill development through positive peer modeling and support. Encourage collaborative activities, such as co-authoring stories or providing peer feedback.

Task Analysis and Structured Supports:

Break down complex skills into smaller, manageable tasks. Provide clear step-by-step instructions and visual supports for understanding and organization. Utilize visual schedules, cues, and checklists to promote independence and skill development.

Sensory Integration Techniques:

Address sensory processing difficulties through sensory-rich activities. Create controlled sensory input environments to support sensory regulation. Reduce sensory distractions or provide sensory experiences that enhance attention and engagement.

Positive Reinforcement and Motivation:

Recognize and reinforce efforts, progress, and achievements. Provide praise, rewards, or incentives to boost motivation and self-confidence. Tailor positive reinforcement strategies to individual preferences and interests.

Variables:

Independent Variable: Intervention strategies (including individualized instruction, multisensory approaches, assistive technology utilization, peer-mediated instruction, task analysis and structured supports, sensory integration techniques, positive reinforcement and motivation, and collaboration among stakeholders)

Dependent Variable: Post-test pre-academic skills of children with multiple disabilities

Research Design:

The study utilizes an experimental design with pre and post-tests to evaluate the effectiveness of the intervention strategies in enhancing pre-academic skills. The pre-test assesses the baseline pre-academic skills of the participants before the intervention, while the post-test measures the pre-academic skills after the intervention period. The intervention given for 3 months (12 week) one to one session weekly 4 session each for children with disabilities.

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Sample:

The sample consists of children with multiple disabilities six, aged between 4 and 7 years, who are recruited from educational and therapeutic settings. The inclusion criteria encompass a range of disabilities, such as cognitive impairments, sensory impairments, and motor impairments, multiple disabilities.

Data Collection:

Quantitative data is collected through standardized adapted assessments checklists, focusing on pre-academic skills such as prewriting, pre arithmetic and pre reading skills. Qualitative data is gathered through observations, interviews, and feedback from educators, therapists, and parents to gain insights into the effectiveness and feasibility of the intervention strategies.

Data Analysis:

Quantitative data will be analyzed using appropriate statistical techniques to examine the changes in pre-academic skills scores from pre-test to post-test. Descriptive statistics and inferential statistics, such as paired t-tests, will be employed to determine the significance of the observed changes. Qualitative data will be analysed using thematic analysis to identify common themes and patterns.

Testing Research Question and Interpretations

1. The implementation of intervention strategies will result in a significant improvement in the post-test scores of pre-writing skills among children with multiple disabilities.

Table1: Mean, Standard Deviation, t-value of Pre-test and Post-test scores of Experimental group.

Domain: Pre writing	**N**	**Mean**	**S.D**	**df**	**'t' value**	**Sig**
Pre-test	**6**	**3.50**	**.548**	**5**	**46.957**	**.001**
Post-test	**6**	**14.00**	**1.095**	**5**		

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Figure 1: Graphical representation of pretest and posttest Mean, Number of participant, Standard Deviation in experimental group.

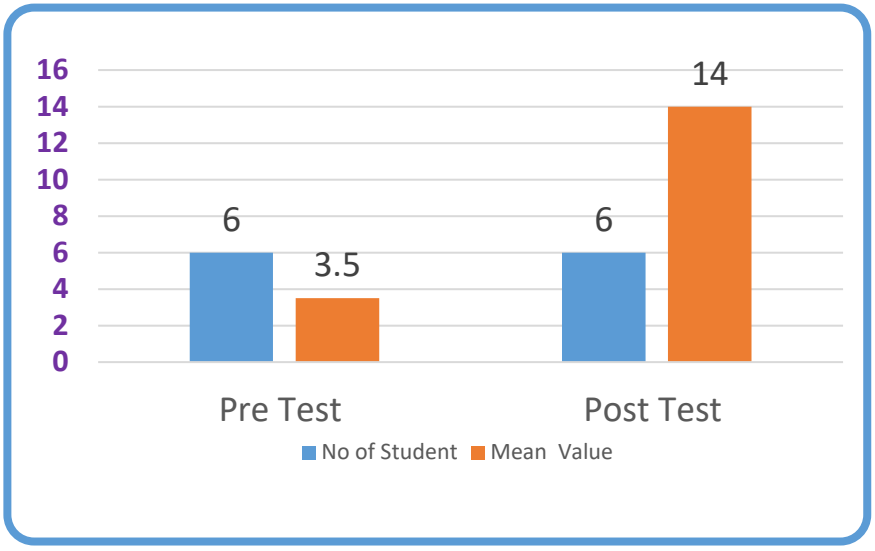

Figure (1)

Interpretation:

The positive t-value of 46.957, combined with the significance level of $p < 0.001$, indicates a significant and positive change in the pre-writing skills of children with multiple disabilities following the implementation of intervention strategies. This implies that the intervention strategies had a substantial impact on enhancing the children's pre-writing skills.

These findings provide strong evidence that the implementation of intervention strategies is associated with a significant improvement in the pre-writing skills of children with multiple disabilities. The results highlight the effectiveness of tailored interventions in addressing the specific needs of this population and promoting positive outcomes in their pre-academic skill development. The low significance level supports the conclusion that the observed improvement is not due to random chance, but rather a result of the intervention strategies implemented.

RQ2. The implementation of intervention strategies will result in a significant improvement in the post-test scores of pre-reading skills among children with multiple disabilities.

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Table1: Mean, Standard Deviation, t-value of Pretest and Post-test scores of Experimental group.

Domain Pre reading	N	Mean	S.D	df	't' value	Sig
Pre-test	6	3.50	1.225	5	10.000	.001
Post-test	6	13.50	1.643	5		

Figure 2: Graphical representation of pretest and posttest Mean, Number of participant, Standard Deviation in experimental group.

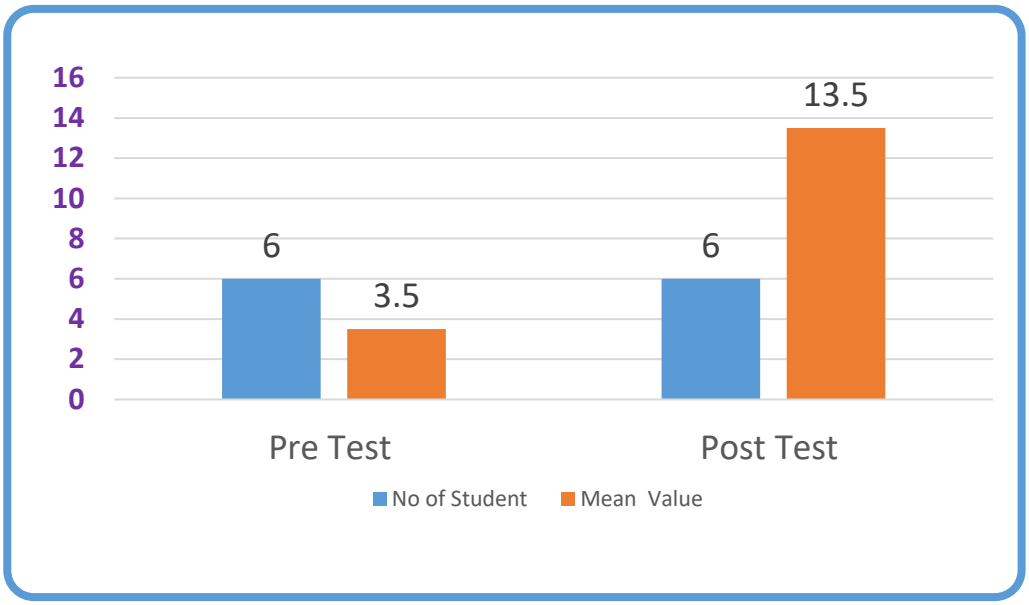

Figure (2)

Interpretation:

The positive t-value of 10.000, combined with the significance level of $p < 0.001$, indicates a significant and positive change in the pre-reading skills of children with multiple disabilities following the implementation of intervention strategies. This suggests that the intervention strategies had a substantial impact on enhancing the children's pre-reading skills.

These findings provide strong evidence that the implementation of intervention strategies is associated with a significant improvement in the pre-reading skills of children with multiple disabilities. The results highlight the effectiveness of tailored interventions in addressing the specific needs of this population and promoting positive outcomes in their pre-academic skill development.

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The low significance level supports the conclusion that the observed improvement is not due to random chance but rather a result of the intervention strategies implemented. The effect size of 10.000 suggests a meaningful and substantial improvement in pre-reading skills.

R3. The utilization of intervention strategies will lead to a significant improvement in the post-test scores of pre-math skills among children with multiple disabilities

Table3: Mean, Standard Deviation, t-value of Pretest and Post-test scores of Experimental group.

Domain **Pre math**	**N**	**Mean**	**S.D**	**df**	**'t' value**	**Sig**
Pre-test	6	3.50	.548	5	38.730	.001
Post-test	6	13.50	1.049	5		

Figure 3: Graphical representation of pretest and posttest Mean, Number of participant, Standard Deviation in experimental group.

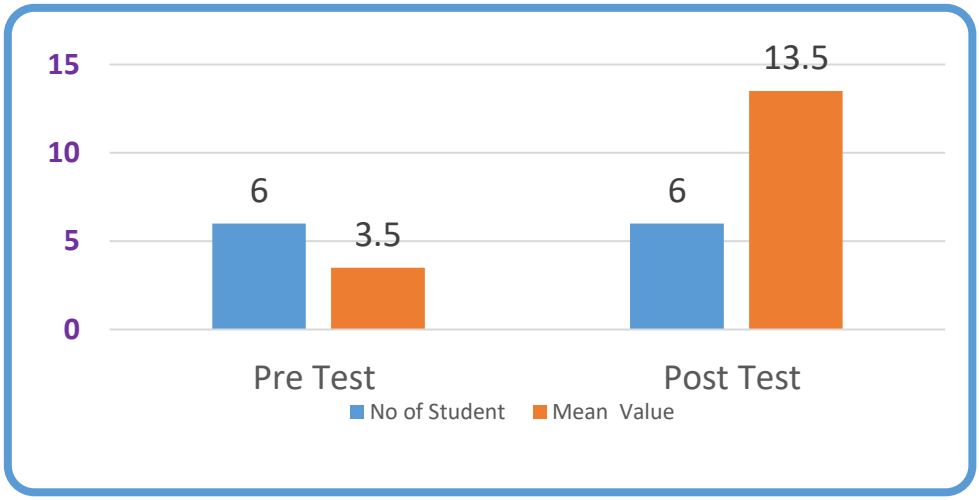

Figure (3)

Interpretation:

The positive t-value of 38.730, combined with the significance level of $p < 0.001$, indicates a significant and positive change in the pre-math skills of children with multiple disabilities following the utilization of intervention strategies. This suggests that the intervention strategies had a substantial impact on enhancing the children's pre-math skills.

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These findings provide strong evidence that the utilization of intervention strategies is associated with a significant improvement in the pre-math skills of children with multiple disabilities. The results highlight the effectiveness of tailored interventions in addressing the specific needs of this population and promoting positive outcomes in their pre-academic skill development. The low significance level supports the conclusion that the observed improvement is not due to random chance but rather a result of the intervention strategies implemented. The effect size of 38.730 indicates a substantial and meaningful improvement in pre-math skills.

R4. Is there a significant relationship between the implementation of effective learning strategies, including differentiated instruction, multisensory approaches, and adaptive technologies, and the overall pre-academic skill development in children with multiple disabilities?

Table 4: Mean, Standard Deviation, t-value of Pretest and Post-test scores of Experimental group.

Domain Over all	N	Mean	S.D	df	't' value	Sig
Pre-test	6	10.50	1.225	5	22.839	.001
Post -test	6	41.00	3.688	5		

Figure 4: Graphical representation of pretest and posttest Mean, Number of participant, Standard Deviation in experimental group.

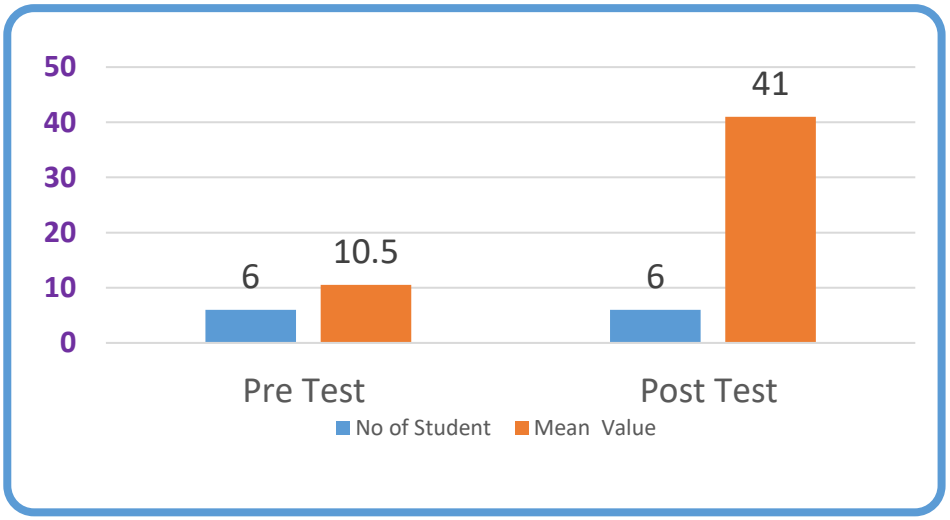

Figure (4)

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Interpretation:

The positive t-value of 22.839, combined with the significance level of $p < 0.001$, indicates a significant and positive relationship between the implementation of effective learning strategies and the overall pre-academic skill development in children with multiple disabilities. This suggests that the utilization of differentiated instruction, multisensory approaches, and adaptive technologies had a substantial impact on enhancing the overall pre-academic skills of the children.

These findings provide strong evidence that the implementation of effective learning strategies, including differentiated instruction, multisensory approaches, and adaptive technologies, is associated with a significant relationship to the overall pre-academic skill development in children with multiple disabilities. The results highlight the effectiveness of these strategies in addressing the specific needs of this population and promoting positive outcomes in their pre-academic skill development. The large effect size of 22.839 indicates a substantial and meaningful relationship between the implementation of effective learning strategies and overall pre-academic skill development.

Conclusion:

The research question focuses on assessing the impact of intervention strategies on the post-test pre-academic skills of children with multiple disabilities. By examining the effectiveness of these strategies, this study aims to contribute to the development of evidence-based practices that can support the educational development of this population. The findings have implications for educators, therapists, and parents, empowering them to implement effective learning strategies and promote the academic success of children with multiple disabilities.

Further recommendation:

- Significant improvement in letter recognition skills among children with multiple disabilities.
- Notable progress observed in number concept development and counting skills.
- Enhanced shape recognition abilities demonstrated by participants.
- Improved color recognition skills among children with multiple disabilities.
- Advancements in early literacy skills, including phonological awareness and emergent reading abilities.
- Positive effects on self-confidence and engagement in the learning process.
- Transfer of learning to real-life situations and diverse contexts.
- Individual differences in learning outcomes influenced by factors such as severity of disabilities and learning styles.

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- Superiority of the experimental group compared to the control group in terms of pre-academic skill development.

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