

Curriculum Project: Enhancing Mathematical Problem-Solving in Special Education

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The Proposal

This project was developed as part of my field experience for EDUC 680, focusing on improving problem-solving skills in mathematics for special education students. My participant, Sanaa, an 8th-grade student at The College School, demonstrated foundational arithmetic understanding but struggled with division fluency and solving multi-step problems independently.

The intervention aimed to support her using structured strategies, real-life context applications, and scaffolded instruction. The project aligns with broader curriculum goals of developing independence and conceptual understanding in mathematics, specifically in problem-solving and reasoning.

The Pedagogical Rationale

The foundation of this curriculum project rests on constructivist learning theory and Vygotsky's Zone of Proximal Development, which advocate for scaffolding and social interaction as means of supporting learners in acquiring new skills. The use of the CUBES problem-solving strategy—Circle, Underline, Box, Evaluate, Solve—provided a cognitive framework that reduced anxiety and helped organize thought processes.

Supporting literature (Mayer, 2001; Montague, 2003) emphasizes the value of metacognition, self-monitoring, and student engagement in learning mathematics. Additionally, integrating real-

world scenarios and collaborative learning aligns with Universal Design for Learning (UDL) principles and enhances inclusivity.

Learning Objectives

- Increase division problem-solving fluency.
 - Improve ability to complete multi-step word problems independently.
 - Develop the use of the CUBES strategy to support structured problem analysis.
 - Strengthen self-monitoring through math journaling and verbal reasoning.
 - Apply problem-solving in real-world contexts to increase relevance and motivation.
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The Intervention Plan

Setting & Timeframe:

Conducted from September to December 2024 with weekly 1:1 and small-group support.

Week 1: Initial observations and diagnostic assessments. Goals set collaboratively with student.

- Student placed at 3rd-grade level for division; initial accuracy 50%.
- Began using visuals and teacher prompts to build comfort.

Weeks 2–3: Introduction and modeling of CUBES strategy using manipulatives and number lines.

- Peer modeling introduced to support engagement.
- Adjusted pacing for extended guided practice.

Weeks 4–5: Scaffolding with regular biweekly quizzes and journaling.

- Verbal explanation of steps encouraged.
- Prompts gradually reduced to build independence.
- Accuracy improved to 75%.

Weeks 6–7: Reinforcement through real-world math tasks (e.g., shopping, distance).

- Group problem-solving activities integrated.
- Confidence increased through peer teaching opportunities.
- Post-test score reached 82%.

Strategies Used:

- CUBES strategy for structured problem-solving.

- Real-life contextualized math problems.
 - Journaling for reflection.
 - Peer modeling and collaboration.
 - Visual and verbal scaffolding with gradual release.
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Assessment & Reflections

Quantitative improvements:

- Division fluency improved.
- Multi-step problem-solving accuracy increased from 50% to 82%.

Qualitative observations:

- Increased willingness to engage with challenging tasks.
- Demonstrated greater autonomy and confidence.
- Used CUBES independently by the end of the program.

Professional Reflections:

- Scaffolding and structure foster growth but must be paired with independence-building.
 - Reflective journaling and verbal reasoning empower metacognition.
 - Real-life problem framing keeps students motivated and reinforces relevance.
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Recommendations for Future Practice

- Extend use of peer learning structures to sustain engagement and communication.
 - Incorporate more real-life math scenarios and cross-curricular connections.
 - Provide take-home activities for family involvement.
 - Use tech tools (like digital whiteboards or math apps) to complement tactile strategies.
 - Continue gradual release of support with a focus on checking and revising work.
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