MPOWERME, LLC (Pediatric OT & SLP Services) Play To Do™ (Education Consulting • Toy/STEAM Design • Research) OT-Informed Project-Based Learning for Inclusive K–5 Classrooms

Zoo Pilot: Full Quantitative Report

Executive Summary

The Zoo Pilot evaluated an occupational therapy–informed Project-Based Learning (PBL) model designed to strengthen executive function, collaboration, problem-solving, and STEM identity among upper elementary learners. Six sessions engaged students in designing animal habitats using 3DuxDesign architectural materials. Quantitative and qualitative data showed measurable growth across 11 developmental domains, including planning, cognitive flexibility, task initiation, collaboration, emotional regulation, material fluency, and communication.

Study Design & Methods

Participants included 16 learners, ages 8–10, from microschool, homeschool, and private school settings. Students represented diverse learning profiles, including autism, ADHD, dyslexia, dyscalculia, anxiety, and typically developing learners. Each session included a structured warm-up, an engineering design challenge, reflection routines, and embedded OT-informed supports aligned to UDL and CASEL SEL competencies.

Learning Environment Photos

PHOTO 1 — Students engage in hands-on material exploration during warm-up.

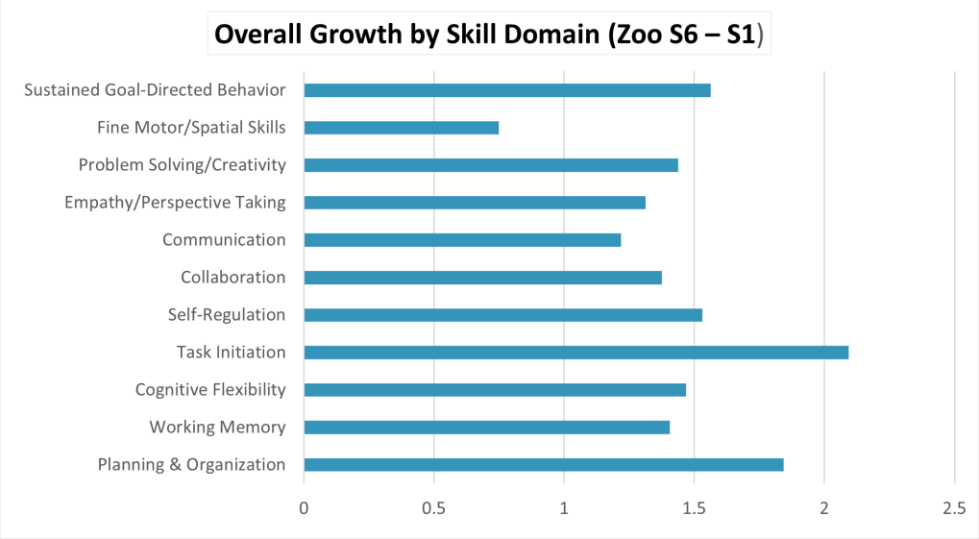
Antonia Llull, MOT, OTR/L -- Founder, MPOWERME, LLC & Play To Do™ Email: mpowermekids@gmail.com

PHOTO 2 — Students collaborate to refine structure stability.

PHOTO 3 — Student-designed habitat demonstrating reinforcement strategies.

Quantitative Findings Across 11 Developmental Domains

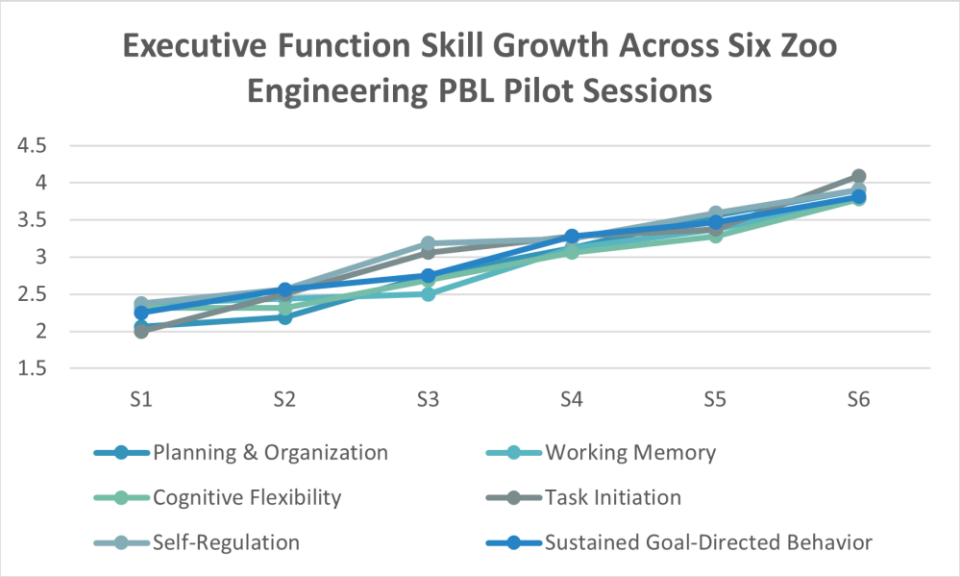
Across the six-session pilot, students demonstrated measurable growth in all 11 developmental domains. The greatest improvements emerged in planning, organization, cognitive flexibility, frustration tolerance, and collaborative communication.



GRAPH 1— Overall Domain Growth (Session 6 vs. Session 1)

Executive Function Growth Across Sessions

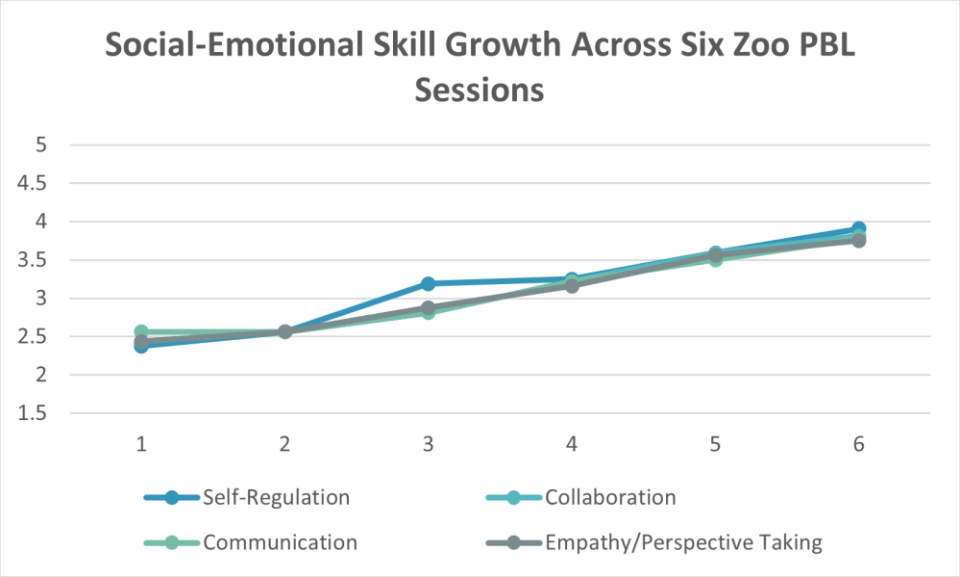
Executive function gains were consistently observed over time. Students demonstrated stronger planning and sequencing strategies, increased persistence in problem-solving, more flexible thinking when structures failed, and more intentional decision-making during engineering tasks.



GRAPH 2 — EF Skill Growth Across 6 Sessions.

SEL Growth Across Sessions

Students developed collaboration, perspective-taking, and self-regulation skills through team-based problem-solving. Repeated opportunities to evaluate structures, negotiate decisions, and recover from setbacks supported CASEL-aligned growth in SEL competencies.



GRAPH 3 — SEL Skill Growth Across 6 Sessions.

Warm-Up vs. Main Task: Readiness Trends

Warm-ups were essential for reducing cognitive load, supporting sensory regulation, and preparing students for the demands of engineering work. Warm-up tasks improved material fluency, motor planning, frustration tolerance, and collaboration readiness.

Skill Domain	Warm-Up Trends	Main Task Trends	Interpretation
Material Fluency	Comfort with handling materials and connectors increased session by session.	More independent, efficient building behaviors observed.	Warm-ups established fluency that transferred into confident engineering actions.
Motor Planning	Improved sequencing of tool-use actions.	More coordinated, intentional movements during construction.	Rehearsal improved readiness for multi-step engineering tasks.
Frustration Tolerance	Lower initial frustration and smoother entry into sessions.	Greater persistence during troubleshooting and redesign.	Emotional regulation supported engagement during complex work.
Spatial Reasoning	Students practiced predicting angles and testing stability.	Applied concepts to reinforcement, balance, and load-bearing decisions.	Warm-ups acted as low-stakes rehearsal for spatial decision-making.
Collaboration Readiness	Social and cognitive readiness increased during warm-ups.	Students communicated more effectively and coordinated roles.	Warm-ups supported SEL growth and teamwork.

Interpretation Through an OT Lens

Engineering challenges inherently activate executive functioning. Students must plan, sequence actions, shift strategies, and maintain working memory while coordinating motor actions. OT-informed warm-ups and scaffolds reduced barriers to access, allowing more students -- including neurodivergent learners -- to demonstrate their full cognitive and creative potential.

Hands-on materials supported sensory regulation and grounded attention. Students who typically struggle with frustration tolerance demonstrated resilience, flexible thinking, and confidence as they engaged in iterative problem-solving.

Recommendations for Schools & Educators

- Use 5–7 minute warm-ups to prime EF and reduce cognitive load.
- Provide visual scaffolds and predictable routines to support UDL-aligned access.
- Allow students to externalize planning through sketching or modeling.
- Normalize iteration and error as essential engineering tools.
- Use collaboration roles to teach SEL competencies and strengthen teamwork.
- Provide multisensory materials to support regulation and engagement.

Conclusion

The Zoo Pilot demonstrated that OT-informed PBL meaningfully strengthens executive function, SEL skills, material fluency, and STEM identity for diverse learners. With thoughtful scaffolding, multisensory materials, and predictable routines, PBL offers an accessible and impactful model for K–5 learning environments.