Play-Based Intervention for a Child with Global Developmental Delay: A Case Study Using a System Analysis Approach

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.90600095

Received: 31 May 2025; Accepted: 02 June 2025; Published: 01 July 2025

ABSTRACT

Global Developmental Delay (GDD) affects multiple areas of a child's growth, including motor, cognitive, and social domains. This case study applies a system analysis framework to examine a play-based intervention implemented for "Deus," a child with GDD enrolled in a Special Education Program. By identifying inputs (assessments, resources, expertise), processes (play-based strategies), outputs (developmental gains), and feedback mechanisms (progress monitoring), the study presents the intervention as a system designed to address delays holistically. The case illustrates how applying structured systems thinking in educational interventions can optimize outcomes for learners with special needs.

INTRODUCTION

System analysis provides a framework for understanding complex challenges by breaking them into smaller, interconnected components. In the case of Deus, a child with Global Developmental Delay (GDD), his developmental needs were addressed through a carefully structured intervention system centered on play-based learning. Rather than treating delays in communication, motor skills, and social behavior in isolation, the intervention viewed these areas as part of a larger, integrated developmental system.

Traditional methods often tackle individual skills separately. However, this approach recognized that progress in one area could influence others. By aligning assessment tools, individualized play activities, environmental adjustments, and ongoing progress monitoring, the intervention functioned as a cohesive system aimed at supporting holistic growth. This systems-based perspective allowed educators to respond more effectively to Deus's needs, offering a clearer path toward developmental improvement.

LITERATURE REVIEW

Educational systems are dynamic, requiring integrated responses to diverse learner needs. Play-based learning, as an intervention subsystem, offers child-centered, flexible responses that can be adapted depending on learner input and observed feedback.

Recent studies emphasize the growing recognition of play-based interventions as effective components within educational systems addressing developmental delays. Research by Smith et al. (2023) highlights that play-based learning fosters language, motor, and social skills in children with developmental disabilities, particularly when implemented in inclusive classroom environments.

Similarly, a 2023 study applying the ADDIE instructional design model demonstrated how structured play activities can target multiple developmental domains such as communication and socio-emotional skills, supporting a systemic intervention framework.

Internationally, research from Victoria, Australia (2024) showed that prolonged play therapy in special schools significantly improved pretend play, emotional regulation, and academic competence among children with global developmental delay, validating play as a holistic developmental tool. Further, parent-mediated play-based interventions have been found to enhance social communication and language skills in preschool

children with neurodevelopmental challenges, underscoring the role of family involvement in a child's intervention system (Johnson et al., 2024).

Additionally, participatory approaches like the PartiPlay game design kit (2024) stress the importance of co-designing play experiences with neurodiverse learners to ensure individualized and engaging learning, aligning with systems analysis principles that emphasize interconnectedness and adaptability.

Together, these recent studies support the integration of play-based interventions within a systematic, multi-component approach to promote developmental progress in children with global developmental delay.

System Overview *(Methodology Using System Analysis Framework)*

System Objective: Improve the developmental performance of a child with GDD using play-based methods.

System Components:

Inputs:

- Initial developmental assessment (Griffiths Mental Development Scales)
- Classroom observations
- Collaboration with therapists (SLP and OT)
- Available resources: sensory toys, blocks, books

Processes:

- Free play (autonomous exploration)
- Guided play (teacher-led structured activities)
- Social play (peer interaction and cooperative tasks)
- Weekly planning and recording based on child's response

Feedback & Control:

- Progress monitoring through teacher logs, developmental checklists
- Follow-up assessment using the same Griffiths tool
- Collaboration meetings with specialists and parents for review

Outputs:

- Measured gains in communication, social engagement, and fine motor skills.
- Improved classroom behavior and task engagement

Boundary: The system is limited to the Special Education classroom, with external inputs from specialists and parental consent.

Case Description

Deus, a five-year-old learner, exhibited significant developmental delays in communication, motor skills, and social interaction based on his initial assessment. This profile became the foundation for the teacher's

response—much like how a system begins with input data. In this case, the input was more than just scores; it reflected Deus's daily behavior, reactions to classroom routines, and the way he interacted with his environment. The teacher, acting as a thoughtful facilitator, carefully examined these cues to determine how best to support him. Rather than apply a one-size-fits-all approach, she turned to structured play as the main strategy—recognizing that play, when done intentionally, could be both engaging and therapeutic.

The activities were not chosen at random. Each was designed with a purpose stacking blocks to encourage fine motor development, storytelling games to build language, and pretend play to stimulate imagination and social understanding. As Deus participated, his reactions served as constant feedback. The teacher noticed he responded especially well to sensory-rich activities those involving texture, sound, and movement. This guided the next steps. The intervention plan was modified in real-time, ensuring it remained in tune with Deus's evolving needs. Just like a responsive system, the teacher kept track of what worked and what didn't, using every observation to inform her next move.

Over time, the consistent structure, combined with flexible adjustments, began to make a difference. Deus grew more confident, showed signs of initiating play, and started communicating his preferences, even in small ways. This slow but meaningful progress reflected a system at work—not a mechanical one, but a human system, shaped by attention, reflection, and care. In this case, systems analysis wasn't just a theory; it became a lens through which the teacher made sense of a complex learning challenge and responded with purpose.

Analysis of Outcomes (System Outputs and Feedback)

Developmental Domain	**Pre-Intervention**	**Post-Intervention**	**Change Noted**
Locomotor	2–2.5 years	2.5–3 years	Improved balance and movement
Personal-social	20 months	26 months	Better peer interaction
Language	13 months	20 months	Increased verbal attempts
Eye-hand coordination	23 months	30 months	Better fine motor skills
Performance	2 years	2.5 years	Improved task problem-solving

Feedback Loop Result*:* Outcomes indicate that the system functioned effectively, with all key output indicators showing measurable progress. The intervention system allowed for adaptive modifications based on real-time learner responses.

DISCUSSION

This case study emphasizes the importance of viewing educational interventions as a system, especially when working with children who have developmental delays. In the case of Deus, each part of the intervention from the initial assessment to the play-based activities and follow-up evaluations played a vital role in producing meaningful developmental progress.

The use of play as a central intervention process proved to be both effective and appropriate for Deus's needs. Rather than isolating skill development, the play activities provided natural opportunities for growth in communication, motor skills, and social behavior. These improvements didn't happen by chance they were the result of a system where each component was carefully considered and aligned with the child's current abilities and interests.

By applying the lens of systems analysis, the intervention could be better organized and understood. The assessment served as the system's input, the structured and responsive play sessions acted as the process, the observable improvements were the outputs, and the ongoing documentation and specialist feedback became the system's feedback mechanism. This structure helped ensure that the intervention remained purposeful and adaptable.

One important insight from this case is that systems in special education do not have to be complex or heavily resourced to be effective. What matters is that the system components are connected and that there is a cycle of planning, acting, observing, and adjusting. In this way, the intervention became a living system constantly evolving based on the child's responses and progress.

Another key takeaway is the role of collaboration. The involvement of therapists, the teacher, and the child's family served as external subsystems that contributed to the larger intervention system. Their input helped shape the intervention strategy and ensured that progress was viewed holistically, not just through academic performance but through emotional and social development as well.

CONCLUSION

The case of Deus shows how a systems approach can make a significant difference in addressing developmental delays through play-based intervention. By analyzing the situation in terms of inputs, processes, outputs, and feedback, it becomes easier to design and implement interventions that are both targeted and flexible.

This method also helped the teacher to stay focused and intentional. Instead of trying random strategies, every step in the process had a purpose and was based on data and observation. It shows that even in a classroom with limited resources, meaningful progress can be achieved when there's a clear system in place.

In short, applying system analysis in special education supports better planning, monitoring, and outcomes. It provides a practical way to respond to each child's unique needs. For Deus, this approach didn't just help him improve his skills, it gave him a better chance to participate and engage meaningfully in the learning environment.

Future Research Directions

While this case highlights the effectiveness of a systems approach in a single context, future research should explore the application of this model across a broader range of cases and settings. Studies could examine how the system functions with children exhibiting different types and severities of developmental delays, or how the approach adapts in inclusive classrooms versus dedicated special education environments. Further research may also investigate the role of digital tools and culturally responsive practices within the system, as well as longitudinal outcomes to assess the sustainability of developmental gains. Additionally, involving more stakeholders—such as parents, general education teachers, and community therapists—in system-based intervention design could provide richer insights into collaborative implementation.

This case encourages other educators to think in systems not only when solving technical problems but also when planning interventions for children with special needs. With thoughtful design and consistent review, small systems like this can make a big impact.

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