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Differential Outcomes in Inclusive Pedagogical Interventions for Children with Profound Intellectual Disability and Autism Spectrum Disorder: A Comparative Case Study Analysis in Morocco

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ABSTRACT: This comparative case study examined the implementation and outcomes of individualized educational interventions for two children with neurodevelopmental disabilities over an eight-month period (December to July) in a specialized educational setting in Morocco. The first participant, an eight-year-old male with cerebral palsy complicated by profound intellectual disability, and the second participant, an eleven-year-old male with autism spectrum disorder (ASD), underwent multidisciplinary interventions across five developmental domains. Grounded in Vygotsky's sociocultural theory of defectology and Bronfenbrenner's ecological systems theory, the study employed specialized educators, speech therapists, psychological support specialists, and physical therapists. Systematic observation, competency assessments, and targeted interventions revealed substantially differential outcomes: the child with ASD achieved approximately 64% overall program completion compared to approximately 38% for the child with profound intellectual disability. Notable gains included gaze fixation up to two minutes with assistance and articulation of select phonemes for the child with profound intellectual disability, while the child with ASD demonstrated reduced stereotypic behaviors and acquisition of independent self-care skills. Persistent challenges included hyperkinetic behaviors, receptive language processing difficulties, and delayed self-care independence. These findings underscore the necessity of developmentally appropriate expectations, family-centered intervention models, and extended timeframes for skill acquisition in populations with complex neurodevelopmental profiles. Implications for multidisciplinary intervention design, ecological systems-informed practice, and inclusive education policy are discussed.

KEYWORDS: Inclusive pedagogy, profound intellectual disability, autism spectrum disorder, multidisciplinary intervention, ecological systems theory, sociocultural theory, special education, comparative case study

1. INTRODUCTION

The Moroccan Ministry of National Education, Vocational Training, Higher Education, and Scientific Research has developed a comprehensive framework for inclusive education targeting children with disabilities (Ministry of National Education, 2019). This framework represents a significant paradigm shift from specialized segregated classrooms toward inclusive education within mainstream educational settings. The policy transition reflects an international movement recognizing the rights of children with disabilities to equitable access to quality education, while acknowledging the heterogeneous nature of disability and the consequent necessity for differentiated pedagogical approaches.

The present study applies two complementary theoretical frameworks—Vygotsky's sociocultural theory and Bronfenbrenner's ecological systems theory—to a comparative analysis of two individual educational programs implemented over an eight-month period in a specialized educational setting. By examining the differential outcomes achieved by an eight-year-old child with cerebral palsy and profound intellectual disability and an eleven-year-old child with ASD, this research seeks to address three primary research questions:

1. What are the differential patterns of skill acquisition across five developmental domains between these two neurodevelopmental profiles?
2. What factors contribute to the disparity in overall program completion rates?
3. How do the theoretical frameworks of Vygotsky and Bronfenbrenner inform the interpretation of these outcomes and guide future intervention design?

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This investigation contributes to the growing body of literature on inclusive education in the Moroccan context, providing empirical evidence regarding the differential effectiveness of individualized interventions across disability categories. The findings offer practical implications for educators, policymakers, and multidisciplinary teams working with children with complex neurodevelopmental conditions.

2. LITERATURE REVIEW

2.1 Intellectual Disability: Characteristics and Pedagogical Considerations

The Moroccan framework provides a multidimensional conceptualization of intellectual disability, synthesizing psychometric, medical, psychological, social, and educational perspectives (Ministry of National Education, 2019). The psychometric definition establishes intellectual disability as a condition characterized by an intelligence quotient (IQ) below 60 or 70 on standardized intelligence scales, representing a significant deviation from the normal distribution of cognitive abilities. This quantitative approach, while useful for diagnostic purposes, has been critiqued for its limited capacity to capture the functional and adaptive dimensions of intellectual disability.

The educational definition emphasizes the relationship between intellectual disability and academic achievement, noting that "the child with intellectual disability does not possess the intellectual and cognitive foundations that help him understand and assimilate data related to academic achievement" (Ministry of National Education, 2019, p. 57). This recognition has profound implications for pedagogical intervention design, as it acknowledges the fundamental cognitive barriers that affect learning processes. The framework identifies specific learning needs for children with intellectual disability across multiple domains, including language and communication, mathematics and science, and adaptive behaviors.

The framework emphasizes the importance of the Individualized Pedagogical Project as a mechanism for achieving differential outcomes. This approach is described as "one of the most effective methods in education and pedagogy" (Ministry of National Education, 2019, p. 40). The Individualized Pedagogical Project operates through four stages—diagnosis, planning, management, and evaluation—allowing for individualized intervention strategies based on specific disability characteristics and learning needs. This systematic approach aligns with international best practices in special education, which emphasize the importance of individualized planning and progress monitoring.

2.2 Autism Spectrum Disorder: Distinctive Characteristics and Learning Profiles

The Moroccan framework provides a detailed characterization of Autism Spectrum Disorder, acknowledging it as a neurodevelopmental condition with heterogeneous manifestations. The reference framework for inclusive education for children with disabilities cites the WHO definition of ASD as "one of the developmental disorders characterized by deficiencies or cessation in the development of sensory perception and language, the development of communication and learning abilities, and cognitive and social development" (Ministry of National Education, 2019, p. 48). This characterization recognizes the triad of impairments—social interaction, communication, and restricted repetitive behaviors—that constitute the core features of ASD.

Children with ASD exhibit distinctive cognitive profiles that require differentiated pedagogical approaches. The framework highlights specific cognitive characteristics, including difficulties with structuring and sequencing, classification, comparison, and construction of new objects from multiple elements (Ministry of National Education, 2019). These children demonstrate particular challenges in evaluating actions, events, and individuals, often producing limited and impressionistic judgments. A notable feature of ASD is the uneven cognitive profile, where children may demonstrate "strong memorization capacity for images, sounds, words, songs, and faces, as well as formal data of sentences without sometimes understanding the meaning" (Ministry of National Education, 2019, p. 50). This dissociation between rote memorization and semantic understanding presents unique pedagogical challenges that require differentiated instructional approaches.

Emotional-affective characteristics of children with ASD include difficulties in forming and expressing emotional feelings toward objects and individuals, sometimes resulting in self-injurious behaviors such as biting hands or hitting heads against walls (Ministry of National Education, 2019). These children demonstrate limited responsiveness to others, which impedes smooth integration with peers during play or classroom group activities, often leading to isolation and withdrawal. The framework's recognition of these socio-emotional challenges underscores the need for comprehensive interventions that address not only academic skills but also social and emotional development.

2.3 Differential Outcomes in Pedagogical Interventions

The Moroccan framework recognizes that differential outcomes across disability categories necessitate differentiated pedagogical approaches. For children with intellectual disability, interventions emphasize the development of foundational academic skills and adaptive behaviors. The supporting learning activities focus on practical training involving psychomotor development, including games that develop interaction within small groups, acceptance of others' presence, and voice control (Ministry of National Education, 2019).

Key supporting learning activities for intellectual disability include: training on regulation and oral production of sounds and words; reception of oral messages and interaction with instructions; self-esteem development through targeted activities; sequential attention activities with progressive difficulty; practical skills development through modeling clay and fine motor activities; and spatial positioning practice (Ministry of National Education, 2019). These activities reflect a developmental approach that emphasizes foundational skill acquisition through structured, repetitive practice.

For children with ASD, the framework emphasizes distinct intervention priorities. Specific supporting learning activities include: graduated desensitization techniques to facilitate awareness of the external world; attention and presence programs; image-object association programs and word-picture connections; verbal and non-verbal communication development through sign programs; echoing and imitation programs to address echolalia; and sensory-motor training for fine motor skills (Ministry of National Education, 2019). These interventions reflect the unique learning profile of children with ASD, emphasizing visual supports, structured routines, and communication enhancement.

The framework notes that "it is not possible to expect similarities or comparisons between two children with disabilities attending an inclusive education class, even if they have the same disability and even the same degree" (Ministry of National Education, 2019, p. 33). This recognition of inter-individual variability underscores the necessity of differentiated pedagogical approaches across disability categories and individual profiles.

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2.4 Factors Influencing Differential Outcomes

The Moroccan framework identifies several factors that influence differential outcomes in inclusive interventions. The transition from a medical approach to a contextual understanding of disability has strengthened the rights-based approach, recognizing disability as "the result of a context, a situation, and social representations, leading to the emphasis that helping the person with a disability lies not in focusing on their impairment, but in that dynamic produced by the relationship of society to that impairment" (Ministry of National Education, 2019, p. 5). This ecological perspective aligns with Bronfenbrenner's theoretical framework, which emphasizes the importance of environmental factors in shaping developmental outcomes.

The Resource Room for Rehabilitation and Support provides supplementary support services that may contribute to differential outcomes. The framework identifies three primary support domains: medical and paramedical support, psychological and psychosocial support, and pedagogical support (Ministry of National Education, 2019). These support services are particularly critical for children with intellectual disability who require ongoing skill development, while children with ASD may benefit more from psychosocial and behavioral support. The availability and quality of these support services may vary across settings, contributing to differential outcomes.

2.5 Implications for Inclusive Education Practice

The Moroccan framework advocates for a comprehensive inclusive approach that recognizes the heterogeneity of learning needs across disability categories. The document emphasizes that "each child, regardless of their disability or disorder, possesses a zone of acquired knowledge, abilities, and capabilities that allows the emergence of a proximal zone that can be reached if effective mediation is practiced by the interveners" (Ministry of National Education, 2019, p. 33). This perspective aligns with Vygotskian concepts of the zone of proximal development and emphasizes the importance of appropriate pedagogical support tailored to individual capacities.

For children with intellectual disability, interventions may focus more on skill acquisition and practice, while for children with ASD, interventions may prioritize communication and social interaction skills. The Moroccan inclusive education framework recognizes distinct learning needs and differential outcomes for children with intellectual disability and ASD. While both disability categories benefit from inclusive pedagogical approaches, the specific characteristics of each condition necessitate differentiated intervention strategies. The framework's emphasis on individualized pedagogical projects and supporting learning activities acknowledges the heterogeneity of disability experiences and the importance of tailoring interventions to specific needs.

The differential outcomes across these disability categories reflect fundamental differences in cognitive processing, communication abilities, and social-emotional functioning. Children with intellectual disability typically require extensive practice in foundational academic skills and adaptive behaviors, while children with ASD often benefit from interventions targeting communication, social interaction, and behavioral regulation. The framework's comprehensive approach to inclusive education provides a foundation for achieving positive outcomes for children across disability categories, though the specific mechanisms of intervention must be carefully calibrated based on individual characteristics and needs.

3. THEORETICAL FRAMEWORK

This study is grounded in two complementary theoretical perspectives: Vygotsky's sociocultural theory of defectology and Bronfenbrenner's ecological systems theory. These frameworks provide a foundation for understanding how children with autism spectrum disorder and profound intellectual disability develop through social interaction, mediation, and environmental support within inclusive educational settings.

3.1 Vygotsky's Sociocultural Theory of Defectology

According to Vygotsky's defectology theory, disability is primarily biological in nature (Kozulin & Gindis, 2007). Vygotsky contended that the problem of disability is not biological disability itself, but its social implications. Any physical handicap affects children's interaction with people, thereby creating secondary social consequences that may be more disabling than the primary biological impairment. This concept contributed to the understanding of development of children with special needs based on two foundations: first, the distinction between primary and secondary defects, and second, the inter-functional relationship in mental development (Kozulin & Gindis, 2007, p. 340).

According to Vygotsky, primary defects refer to actual biological problems and dysfunctions that influence the child's development of natural functions, including perception, memory, and other cognitive processes. The secondary defect, on the other hand, refers to psychological difficulties acquired through the process of social interaction (Vygotsky, 1995). The multidisciplinary relationship between primary and secondary defects influences the individual's adaptive functioning. Any organic defect is revealed as a social abnormality in behavior. In his theory, Vygotsky emphasizes the biological need to "fit in" with society, as social interactions are necessary for human development (Vik & Somby, 2018).

The concept of the Zone of Proximal Development (ZPD) is central to Vygotsky's sociocultural theory. The ZPD represents the distance between what a learner can accomplish independently and what they can achieve with guidance and support from a more knowledgeable other. In the context of inclusive pedagogy, interactions in cultural and social settings, through the process of socialization, require the child or learner to engage in close interaction with the environment and the people. For children with autism spectrum disorder and profound intellectual disability, mediated learning and scaffolded interaction are essential in facilitating participation in inclusive classroom settings.

These concepts suggest that learning and development are shaped through guided social interaction and mediated support within educational contexts. In inclusive classrooms, the assistance provided strengthens communication, participation, and engagement among children with autism spectrum disorder and profound intellectual disability. However, learners may respond differently to mediated instruction depending on their cognitive, communicative, and adaptive functioning abilities, which may result in differential educational outcomes.

Sociocultural theory emphasizes social interaction in cognitive development and defines learning as "a social process" (Poehner, 2008). It further demonstrates "responsiveness to support, or mediation," suggesting that learners can "surpass their independent performance" through guided interaction. This is consistent with the Zone of Proximal Development, which suggests that learners can achieve higher levels of functioning when learning occurs through guided support rather than independent performance.

3.2 Bronfenbrenner's Ecological Systems Theory

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While Vygotsky's sociocultural theory provides a strong explanation of how learning occurs through social interaction, mediation, and developmental potential across the Zone of Proximal Development, it primarily examines the micro-level processes of learning. However, to understand differential outcomes in inclusive education, it is also necessary to shed light on the broader environmental and contextual factors that influence development. Considering this, Bronfenbrenner's ecological systems theory provides a complementary perspective by contextualizing the learner within multiple interacting systems, including the family, school, community, socio-cultural and policy environments.

Bronfenbrenner (1975) focused on how environments change, and the implications of this change for the human beings who live and grow in these environments (p. 439). Bronfenbrenner (1979) argues that the ecology of human development consists of the following systems:

1. **Microsystem:** The people and elements of the environment that have direct contact with the child, such as parents, siblings, and teachers.
2. **Mesosystem:** The system that includes the interactions between a child's microsystems.
3. **Exosystem:** The larger formal and informal social structures that have an impact on the child, including parents' workplaces and their schedules, networks, and friendships.
4. **Macrosystem:** The general socio-cultural context that includes the legal framework, cultural values, customs, and principles.
5. **Chronosystem:** The timing and aging of the life of the child and family, as well as historical changes in the socio-cultural environment.

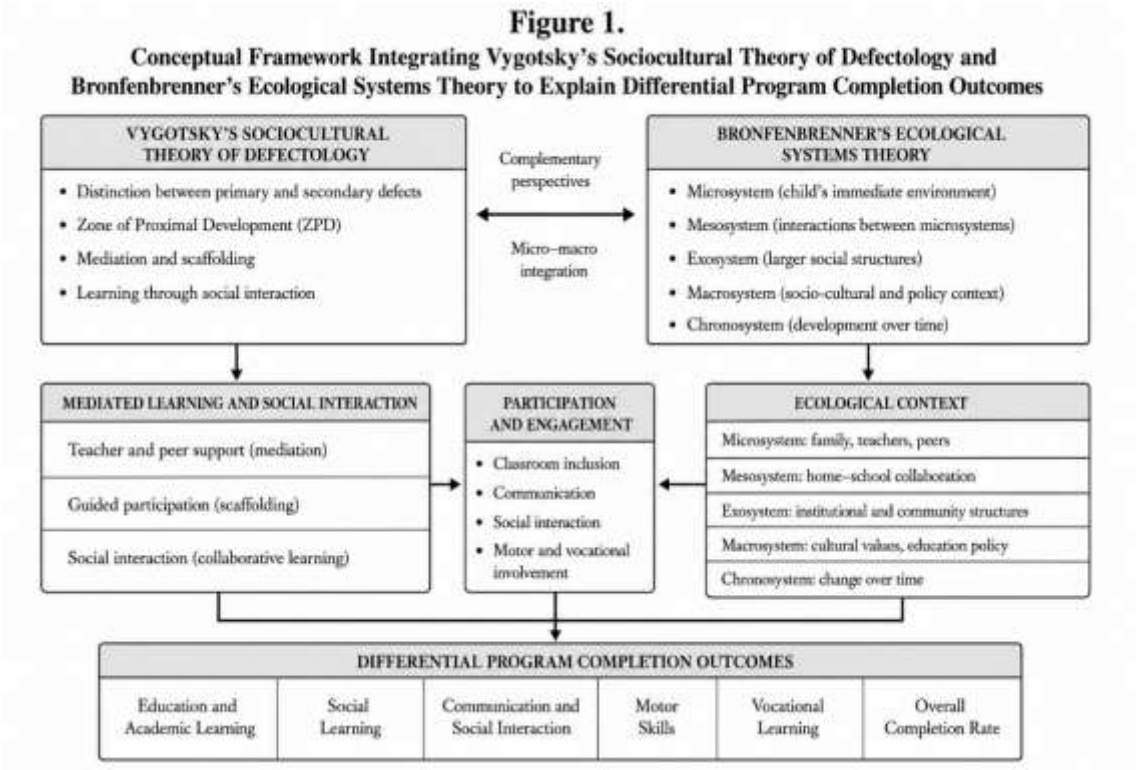
What is crucial to point out is that these five systems, as well as the individuals participating in them, change over time (Sadownik, 2023). Building on this idea, Yngvesson and Garvis (2021) argued that at the mesosystem level, the child should be regarded as an important actor whose voice is made "visible in the world of adult noise" (p. 1735). Instead of being viewed as a reflection of developmental change, the "developing person" is thus included in terms of their own opinions, views, and stories on the home-school collaboration.

Bronfenbrenner's theory captures all kinds of linkages and reflects on how the diverse actors and institutions are involved in the child's development, which can either strengthen or counteract each other's influence. Linkages are described by Bronfenbrenner as interactions between at least two actors from different microsystems. These interactions in the mesosystem have a reciprocal influence on the practices in each of the interacting microsystems, making the child's transitions between the microsystems more efficient (Sadownik, 2023).

Together with Vygotsky's sociocultural theory, Bronfenbrenner's ecological systems theory provides a comprehensive way of understanding learning and development in inclusive education. While Vygotsky focuses on how learning is shaped through social interaction and mediation at the micro level, Bronfenbrenner broadens this perspective by locating the child within a set of interconnected environmental systems. This perspective is particularly useful for understanding differential outcomes in inclusive pedagogical interventions for children with autism spectrum disorder and profound intellectual disability, as their educational experiences are shaped not merely within the classroom, but also through family, institutional, community, cultural, and policy contexts. In the Moroccan context, this framework helps to highlight how variations across these interconnected systems can contribute to differences in inclusion practices and developmental outcomes.

Figure 1.

Conceptual Framework Integrating Vygotsky's Sociocultural Theory of Defectology and Bronfenbrenner's Ecological Systems Theory to Explain Differential Program Completion Outcomes



4. METHODOLOGY

4.1 Research Design and Setting

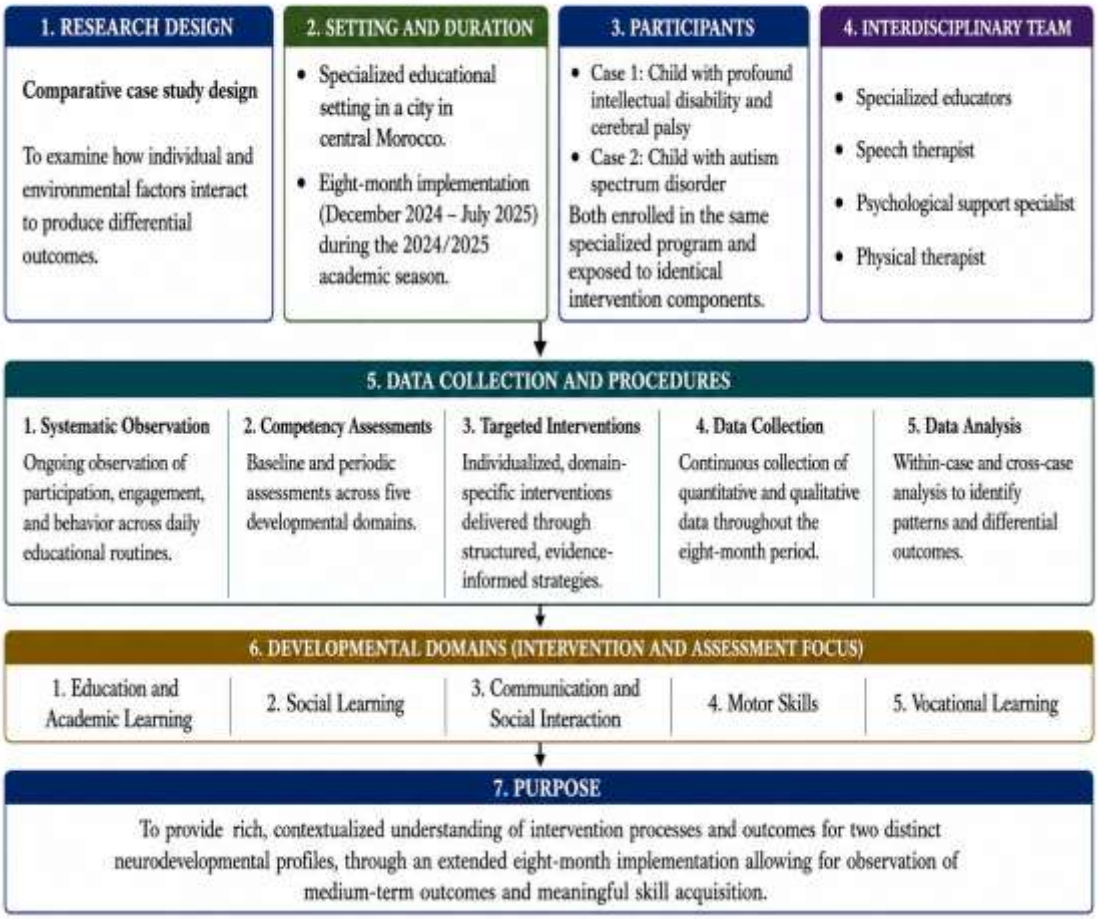
This study employed a comparative case study design over an eight-month period (December to July of the 2024/2025 academic season) within a specialized educational setting in a city in central Morocco. The research design incorporated systematic observation, competency assessments, and targeted interventions across five developmental domains. The study utilized a multidisciplinary approach involving specialized educators, a speech therapist, a psychological support specialist, and a physical therapist. This interdisciplinary team configuration aligns with best practices

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in the field of profound intellectual and multiple disabilities (PIMD), where interdisciplinary collaboration has been identified as essential for providing increased stimulation and development opportunities for people with complex neurodevelopmental conditions.

The comparative case study design was selected for its capacity to provide rich, contextualized understanding of intervention processes and outcomes. This approach allows for the examination of how individual and environmental factors interact to produce differential outcomes, consistent with the study's theoretical frameworks. The extended duration of the study (eight months) permitted observation of medium-term intervention outcomes while maintaining sufficient intensity for meaningful skill acquisition to occur.

Figure 2. Methodological framework of the comparative case study.



4.2 Ethical Considerations

Ethical approval for this study was obtained from the relevant institutional review board. Informed consent was obtained from the legal guardians of both participants prior to the commencement of the study. The consent process included comprehensive explanation of the study purpose, procedures, potential benefits, and risks. Guardians were informed of their right to withdraw consent at any time without consequence. Where developmentally appropriate, child assent was also sought through age-appropriate communication. All data were anonymized and stored securely. Identifying information has been removed or generalized in this manuscript to protect participant confidentiality. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

4.3 Participants

Case 1: Child with Cerebral Palsy and Profound Intellectual Disability

The first participant was an eight-year-old male child residing with his family as the firstborn of two children. The child presented with profound intellectual disability complicated by motor cerebral palsy. Competency assessments revealed a constellation of difficulties including:

- Weakness in presence and attention
- Limited self-reliance and autonomy
- Motor skill deficits
- Body hyperactivity (hyperkinetic movements)
- Self-injurious behaviors including face-slapping
- Rapid head twisting
- Tongue protrusion
- Weak perception and response
- Significant delays in eating

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Case 2: Child with Autism Spectrum Disorder

The second participant was an eleven-year-old male child with ASD residing with his family. Assessment revealed behavioral challenges including:

- Weakness in classroom adaptation and adjustment
- Fine motor skill deficits
- Weakness in presence and attention
- Biting of the back of the hand
- Spitting
- Mood variability in work engagement
- Self-stimulatory behaviors
- Inappropriate social behaviors
- Weakness in both expressive and receptive language

4.4 Assessment Instruments and Procedures

The assessment process employed criterion-referenced measures aligned with the individualized objectives for each participant. Given the nature of the participants' disabilities, standardized assessment instruments were supplemented with functional and ecological assessment approaches. The primary assessment tools and procedures included:

Systematic Observation Protocol: Structured observation was conducted across multiple settings (classroom, therapy sessions, outdoor activities) using predetermined observation schedules. Each observation session lasted 30-45 minutes and focused on specific target behaviors and skills. Observers recorded the frequency, duration, and quality of targeted behaviors and skill performance.

Competency Assessment Checklists: Domain-specific checklists were developed for each of the five intervention domains. These checklists contained discrete, observable objectives that were rated as "achieved," "in progress," or "not achieved" based on predetermined criteria. The checklists were completed collaboratively by team members during weekly review meetings.

Functional Skills Assessment: For both participants, functional skills were assessed through direct observation during routine activities (eating, dressing, toileting, communication). Performance was rated based on the level of assistance required (independent, verbal prompt, physical prompt, full assistance).

Communication Assessment: Speech and language assessment incorporated observation of vocalizations, articulation, receptive language, and expressive language. For the child with profound intellectual disability, assessment focused on pre-linguistic communication skills including gaze, vocalization, and gesture. For the child with ASD, assessment included receptive vocabulary, expressive vocabulary, and functional communication.

Motor Skills Assessment: Gross and fine motor skills were assessed through observation of performance on specific motor tasks. Gross motor assessment included balance, coordination, and mobility skills. Fine motor assessment included manipulation of objects, hand-eye coordination, and precision tasks.

Reliability and Validity: To enhance reliability, all assessments were conducted by multiple team members, and ratings were discussed in weekly team meetings to reach consensus. Inter-rater reliability was established through periodic calibration sessions where team members independently rated performance and compared ratings. The criterion-referenced nature of the assessment tools, with clearly defined performance criteria, supported consistency in rating. The instruments were developed based on the Moroccan framework for inclusive education and were reviewed by experts in special education and pediatric rehabilitation.

4.5 Intervention Domains and Procedures

Individualized programs were developed collaboratively by the multidisciplinary team and implemented with parental assistance. Five developmental domains were targeted:

4.5.1 Education and Academic Learning

Case 1: This domain included recognition of family members, execution of simple requests ("take," "give me"), and visual focus activities (fitting rings onto poles, tracking soap bubbles).

Case 2: This domain included recognition of family members and body parts through pictures, vegetable and animal identification, transport and clothing vocabulary, letter recognition (phonemes /b/, /t/, /m/), fruit identification and matching, visual focus activities (geometric shape fitting, colored ring sorting), simple and compound command execution, and real-world object recognition.

4.5.2 Social Learning

Case 1: This domain focused on reducing obstinacy, eliminating face-slapping and body hyperactivity, reducing stereotypic finger movements, learning greeting gestures (hand-clasping), and developing self-reliance in drinking and eating.

Case 2: This domain included modifying eating behaviors, developing bathroom independence (correct use, door closure), preparing to accept others, implementing group rules, reducing maladaptive behaviors (standing, spitting, biting, inappropriate behaviors), and maintaining discipline inside and outside the classroom.

4.5.3 Communication and Social Interaction

Case 1: Interventions targeted non-verbal and verbal communication for expressing needs (drinking, eating), eye contact development, gaze fixation (up to two minutes with assistance), and articulation training for phonemes /m/, /b/, /kh/, /'ayn/, and words "father," "mother," "brother."

Case 2: This domain included gaze fixation (up to five minutes), articulation training for a broader range of phonemes and multisyllabic vocabulary, and responsiveness to name calling.

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4.5.4 Motor Skills

Case 1: Gross motor goals included balanced sitting/standing, safe stair climbing/descending, and balanced walking. Fine motor goals included hand-strengthening activities (grasping large balls, grip tightening).

Case 2: Gross motor goals included jumping, running, targeted throwing, and jumping within spaced rings. Fine motor goals included cutting with scissors, bead threading (large and small beads), cube assembly, clapping, sorting colored objects by color, and fine visual coordination.

4.5.5 Vocational Learning

Case 1: This domain involved recognition of the "teacher" profession through pictures.

Case 2: This included mastery of the "educator" and "butcher" professions.

4.6 Data Collection and Analysis

Data was collected through systematic observation, competency assessments, and ongoing progress monitoring by the multidisciplinary team. Program completion percentages were calculated for each domain based on observed achievement of individualized objectives. Data was triangulated across team members to ensure reliability. The study duration (eight months) allowed for observation of medium-term intervention outcomes while maintaining sufficient intensity for meaningful skill acquisition to occur.

The assessment process employed criterion-referenced measures aligned with the individualized objectives for each participant. Progress was documented through structured observation protocols and periodic team meetings where achievement of objectives was reviewed, and consensus was reached regarding completion status. This collaborative approach to assessment minimized individual bias and enhanced the reliability of outcome measurement.

5. RESULTS

5.1 Overall Program Completion Rates

Substantially differential outcomes were observed between the two cases. The overall program completion rate for the child with ASD (Case 2) was approximately 64%, compared to approximately 38% for the child with profound intellectual disability (Case 1).

Table 1. Domain-Specific Program Completion Rates

Domain	Case 1 (PID/Cerebral Palsy)	Case 2 (ASD)
Education and Academic Learning	46%	76%
Social Learning	49%	54%
Communication and Social Interaction	46%	58%
Motor Skills	50%	68%
Vocational Learning	0%	64%
Overall	**38%**	**64%**

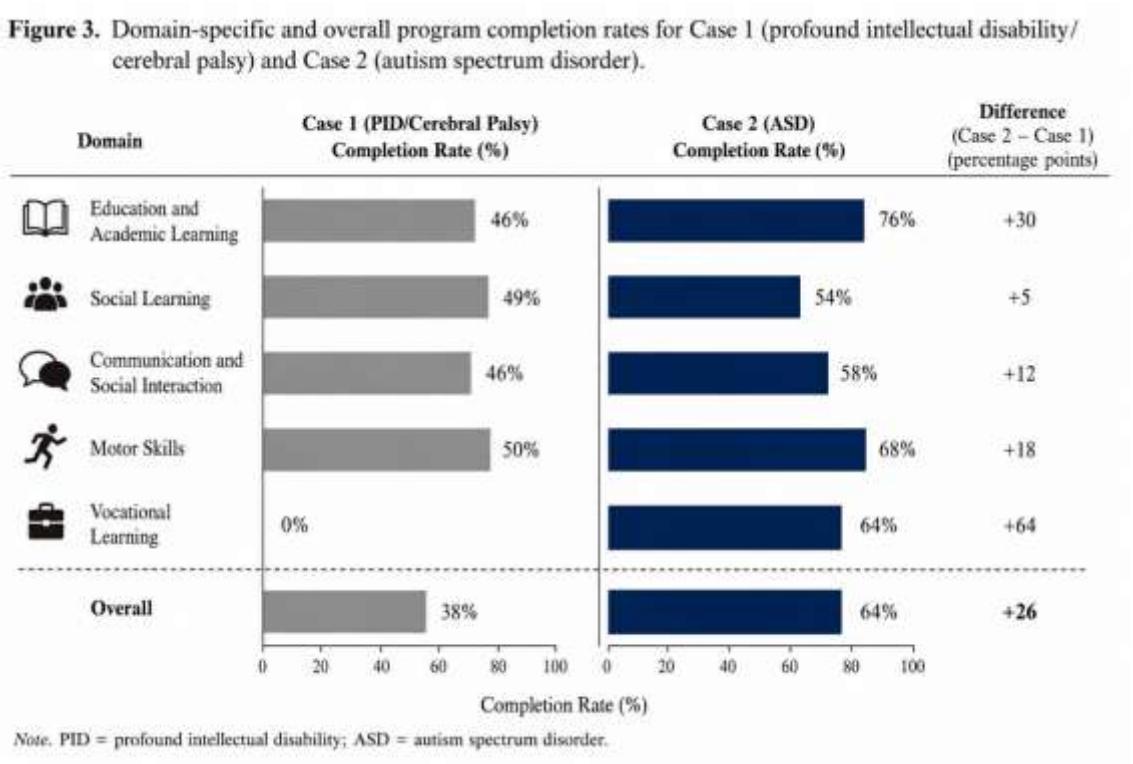


Figure 3. Domain-specific and overall program completion rates for Case 1 (profound intellectual disability/ cerebral palsy) and Case 2 (autism spectrum disorder).

Note. PID = profound intellectual disability; ASD = autism spectrum disorder.

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The largest difference occurred in **Vocational Learning**, where Case 1 recorded **0%** completion compared with **64%** for Case 2. Substantial differences were also observed in **Education and Academic Learning** (46% vs. 76%) and **Motor Skills** (50% vs. 68%). The smallest difference was in **Social Learning**, with completion rates of 49% and 54%, respectively.

5.2 Achieved Objectives

Case 1: Profound Intellectual Disability/Cerebral Palsy

Notable achievements included:

- **Communication:** Gaze fixation up to two minutes with relative assistance; pronunciation of select phonemes (/m/, /b/, /kh/, /'ayn/, /gh/ with fatha) and words ("father," "mother," "brother").
- **Motor Skills:** Standing against wall, stair climbing/descending with relative assistance and safety, balanced walking with assistance, appropriate sitting positioning, and hand-grip tightening.
- **Social Learning:** Hand-clasping; reduction of face-slapping, rapid head twisting, and body hyperactivity (with assistance).

Case 2: Autism Spectrum Disorder

Notable achievements included:

- **Communication:** Pronunciation of an extensive vocabulary including multisyllabic words; improvement in eye contact with prolonged gaze fixation and responsiveness when called.
- **Academic Learning:** Recognition of family members, body parts, vegetables, fruits, clothing, transport, animals; execution of simple and compound commands; visual focus improvement (geometric shape fitting, soap bubble tracking).
- **Motor Skills:** Bead threading (both large and small beads), colored object sorting, cube assembly, chair manipulation, and gross motor skills (running, jumping, targeted throwing).
- **Social Learning:** Bathroom independence (correct use, door closure, privacy maintenance); near-complete eating independence; peer acceptance; reduction of spitting, biting, inappropriate behaviors, and repetitive standing.
- **Vocational Learning:** Mastery of "educator" and "butcher" occupations.

5.3 Persistent Challenges and Unachieved Objectives

Case 1: Profound Intellectual Disability

Despite eight months of intervention, significant challenges persisted, including:

- Lack of independent eating and drinking
- Inability to independently recognize family members
- Failure to execute the "give me" request
- Incomplete elimination of face-slapping, tongue protrusion, and body hyperactivity
- Continued need for assistance in stair climbing and safe walking
- Distractibility, weak concentration, activity refusal, body hyperactivity, and delayed eating

Case 2: Autism Spectrum Disorder

Unachieved objectives included:

- Non-recognition of certain body parts (ears, hands, nose, head)
- Non-recognition of select vocabulary items
- Inability to pronounce select phonemes (/sh/, /q/)
- Persistent maladaptive behaviors (spitting, biting, inappropriate behaviors, clothing manipulation)

6. DISCUSSION

6.1 Differential Patterns of Skill Acquisition

The findings of this comparative case study reveal substantially differential patterns of skill acquisition across five developmental domains between a child with profound intellectual disability complicated by cerebral palsy and a child with autism spectrum disorder. The overall program completion rate of approximately 64% for the child with ASD compared to approximately 38% for the child with profound intellectual disability represents a notable disparity that warrants careful examination through the theoretical lenses of Vygotsky and Bronfenbrenner.

The most pronounced disparity was observed in the vocational learning domain, where the child with profound intellectual disability achieved 0% completion compared to approximately 64% for the child with ASD. This finding reflects fundamental differences in cognitive functioning and learning capacity between the two neurodevelopmental profiles. The child with profound intellectual disability, characterized by significant cognitive impairment and motor limitations, faces substantial barriers to abstract concept acquisition and generalization of learning. In contrast, the child with ASD, despite challenges in social communication and behavioral regulation, demonstrated capacity for rote learning and concrete association, consistent with the literature on ASD learning profiles (Ministry of National Education, 2019).

The education and academic learning domain showed the largest discrepancy, with the child with ASD achieving approximately 76% completion compared to approximately 46% for the child with profound intellectual disability. This finding aligns with the Moroccan framework's recognition that "the child with intellectual disability does not possess the intellectual and cognitive foundations that help him understand and assimilate data related to academic achievement" (Ministry of National Education, 2019, p. 57). The child with ASD's relative success in this domain reflects the uneven cognitive profile characteristic of ASD, where children may demonstrate strong memorization capacity for images, sounds, and words, while experiencing difficulties with semantic understanding and generalization (Ministry of National Education, 2019).

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Motor skills development showed more moderate differences, with the child with profound intellectual disability achieving approximately 50% completion compared to approximately 68% for the child with ASD. This relatively smaller disparity may reflect the fact that both children experienced motor impairments, albeit of different etiologies and severities. The child with profound intellectual disability's motor challenges were complicated by cerebral palsy, while the child with ASD's motor difficulties were primarily related to fine motor coordination and sensory-motor integration. The physical therapy interventions appeared to yield meaningful gains for both children, though the child with ASD demonstrated greater independence in motor skill execution.

6.2 Factors Contributing to Differential Outcomes

Several factors contribute to the disparity in overall program completion rates between the two cases. These factors can be understood through the theoretical frameworks of Vygotsky and Bronfenbrenner, which highlight the interaction between individual characteristics and environmental supports.

Primary Biological Factors: The most fundamental factor contributing to differential outcomes is the nature and severity of the primary disability. The child with profound intellectual disability presents with significant cognitive impairment that affects all domains of functioning, including attention, perception, memory, and executive function. The biological basis of intellectual disability (primary defect, in Vygotskian terms) creates fundamental barriers to learning that cannot be fully overcome through environmental supports. In contrast, the child with ASD presents with a different neurobiological profile characterized by strengths in rote memory and visual processing, alongside challenges in social communication and behavioral regulation. The child with ASD's ability to acquire vocabulary, recognize objects, and perform structured tasks reflects the uneven cognitive profile characteristic of ASD.

Secondary Psychological Factors: Vygotsky's distinction between primary and secondary defects is particularly relevant to understanding differential outcomes. The primary biological defects in both cases give rise to secondary psychological difficulties acquired through social interaction. For the child with profound intellectual disability, the secondary difficulties include limited self-efficacy, reduced motivation for exploration, and learned helplessness in the face of persistent challenges. For the child with ASD, secondary difficulties include anxiety, frustration, and behavioral challenges that interfere with learning. The multidisciplinary team's interventions addressed both primary and secondary defects, but the severity of the primary cognitive impairment in Case 1 limited the extent to which secondary difficulties could be ameliorated.

Environmental Factors: Bronfenbrenner's ecological systems theory provides a framework for understanding how environmental factors contribute to differential outcomes. At the microsystem level, both children were supported by dedicated multidisciplinary teams and engaged families. However, the quality and intensity of interventions varied based on individual needs and responsiveness. At the mesosystem level, the coordination between home and school environments was critical. The child with ASD's greater progress in self-care skills (bathroom independence, eating independence) may reflect more effective home-school coordination and generalization of skills across settings. At the exosystem level, access to specialized services, including speech therapy, physical therapy, and psychological support, was available to both children, but the child with ASD may have benefited more from these services due to greater cognitive capacity to engage with therapeutic interventions.

At the macrosystem level, cultural values and attitudes toward disability in the Moroccan context may influence intervention outcomes. The Moroccan framework emphasizes inclusive education as a right for all children, but the implementation of inclusive practices varies across settings. The specialized educational setting in which this study was conducted provided a supportive environment for both children, but the child with ASD's greater social awareness may have allowed him to benefit more from the inclusive environment.

Temporal Factors: The chronosystem, representing the timing of interventions and developmental trajectories, is also relevant. The child with ASD was older (eleven years) compared to the child with profound intellectual disability (eight years), which may have provided more time for skill acquisition. Additionally, the developmental trajectory of ASD, while characterized by persistent challenges, often shows gradual improvement in core symptoms with appropriate intervention. In contrast, profound intellectual disability represents a more stable cognitive impairment with limited potential for dramatic improvement, though functional gains can be achieved with intensive intervention.

6.3 Theoretical Implications

The findings of this study offer several theoretical implications for understanding learning and development in children with neurodevelopmental disabilities.

Vygotsky's Sociocultural Theory: The differential outcomes observed in this study are consistent with Vygotsky's emphasis on the social nature of learning and the importance of the Zone of Proximal Development. Both children demonstrated capacity to achieve beyond their independent performance when provided with appropriate support and mediation. The child with ASD's greater progress reflects a larger ZPD, allowing for more substantial gains through guided interaction. The child with profound intellectual disability's smaller ZPD limited the extent to which mediated learning could promote development. This finding underscores the importance of individualized assessment of the ZPD and the provision of developmentally appropriate mediation.

Vygotsky's distinction between primary and secondary defects is also supported by the findings. The multidisciplinary interventions effectively addressed secondary difficulties for both children, reducing maladaptive behaviors and promoting social engagement. However, the primary cognitive impairment in Case 1 limited the extent to which secondary gains could be consolidated and generalized. This finding highlights the need for interventions that address both primary and secondary defects while maintaining realistic expectations for developmental progress.

Bronfenbrenner's Ecological Systems Theory: The findings support Bronfenbrenner's emphasis on the importance of environmental factors in shaping developmental outcomes. Both children demonstrated progress across multiple domains, reflecting the supportive educational environment provided by the specialized setting. However, the differential outcomes suggest that individual characteristics interact with environmental factors to produce developmental trajectories. The child with ASD's greater progress may reflect a more favorable interaction between individual capacities and environmental supports.

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The ecological systems framework also highlights the importance of mesosystem coordination in promoting generalization of skills. The child with ASD's greater independence in self-care skills may reflect more effective home-school coordination, allowing skills learned in the educational setting to be practiced and reinforced at home. This finding suggests that interventions should prioritize collaboration between educational and family settings to promote skill generalization.

Integration of Theoretical Frameworks: The integration of Vygotsky's sociocultural theory and Bronfenbrenner's ecological systems theory provides a comprehensive framework for understanding differential outcomes in inclusive education. Vygotsky's theory explains the micro-level processes of learning through social interaction and mediation, while Bronfenbrenner's theory contextualizes these processes within broader environmental systems. Together, these frameworks highlight the multiple levels of influence on developmental outcomes, from individual neurobiology to family dynamics to cultural values and policy contexts.

The findings suggest that effective inclusive education requires attention to all levels of the ecological system, including the quality of classroom interactions, the coordination between home and school environments, the availability of specialized services, and the broader policy and cultural context. Interventions that address only one level of the system are unlikely to produce optimal outcomes for children with complex neurodevelopmental disabilities.

6.4 Practical Implications

The findings of this study have several practical implications for the design and implementation of individualized educational interventions for children with neurodevelopmental disabilities.

Developmentally Appropriate Expectations: The substantial differential outcomes between the two cases underscore the importance of developmentally appropriate expectations in educational planning. The child with profound intellectual disability achieved only approximately 38% of program objectives, despite intensive multidisciplinary intervention over eight months. This finding highlights the need for realistic goal-setting that accounts for the severity of cognitive impairment and motor limitations. Goals should focus on functional skills that enhance quality of life and independence, rather than academic achievement that may be beyond the child's capacity.

Family-Centered Intervention Models: The importance of family involvement in intervention is highlighted by the differential outcomes in self-care skills. The child with ASD's greater independence in eating and bathroom use may reflect more effective family involvement in skill practice at home. Family-centered intervention models that engage parents as active partners in skill development are likely to produce better outcomes than interventions that are limited to the educational setting. This finding aligns with Bronfenbrenner's emphasis on the importance of mesosystem coordination in promoting developmental outcomes.

Extended Timeframes for Skill Acquisition: The eight-month intervention period was sufficient for meaningful progress in both cases, but the incomplete achievement of objectives suggests that longer timeframes may be necessary for skill acquisition in populations with complex neurodevelopmental profiles. The child with profound intellectual disability, in particular, may require extended periods of intensive intervention to achieve meaningful gains. Educational planning should account for the slow pace of skill acquisition in this population and provide ongoing support over multiple academic years.

Multidisciplinary Collaboration: The multidisciplinary team approach employed in this study was effective in addressing the complex needs of both children. The involvement of specialized educators, speech therapists, psychological support specialists, and physical therapists allowed for comprehensive assessment and intervention across multiple developmental domains. This collaborative approach should be maintained and strengthened, with regular team meetings to coordinate intervention strategies and monitor progress.

Differentiated Pedagogical Approaches: The differential outcomes across domains highlight the need for differentiated pedagogical approaches based on individual learning profiles. The child with ASD benefited from interventions emphasizing visual supports, structured routines, and communication enhancement, while the child with profound intellectual disability required interventions emphasizing foundational skills, repetitive practice, and motor development. Educational planning should be individualized based on comprehensive assessment of strengths and needs, with regular reassessment to adjust intervention strategies as progress occurs.

6.5 Policy Implications

The findings of this study have implications for inclusive education policy in Morocco and similar contexts.

Resource Allocation: The substantial resources required for effective intervention for children with profound intellectual disability and ASD highlight the need for adequate resource allocation in inclusive education settings. Multidisciplinary teams, specialized equipment, and extended intervention timeframes require significant investment. Policymakers should ensure that inclusive education programs are adequately resourced to meet the needs of children with complex neurodevelopmental disabilities.

Teacher Training: The importance of specialized knowledge and skills in working with children with neurodevelopmental disabilities underscores the need for enhanced teacher training in inclusive education. Teachers should be trained in evidence-based practices for working with children with intellectual disability and ASD, including behavior management, communication enhancement, and social skills development. Ongoing professional development should be provided to ensure that teachers maintain current knowledge and skills.

Family Support: The importance of family involvement in intervention highlights the need for family support services in inclusive education programs. Families should be provided with training and resources to support their children's development at home, as well as emotional support to cope with the challenges of raising a child with a disability. Family-centered policies that recognize the crucial role of families in intervention are likely to produce better outcomes than policies that focus exclusively on educational settings.

Longitudinal Monitoring: The incomplete achievement of objectives in both cases suggests that longitudinal monitoring of educational outcomes is necessary to assess the effectiveness of inclusive education programs. Short-term evaluations may not capture the gradual progress that occurs over extended periods. Policymakers should implement longitudinal monitoring systems that track outcomes over multiple years, allowing for assessment of program effectiveness and identification of areas requiring improvement.

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7. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Several limitations of this study should be acknowledged. First, the small sample size (two participants) limits the generalizability of findings. The comparative case study design provides rich, contextualized understanding of intervention processes and outcomes, but findings may not be representative of the broader population of children with neurodevelopmental disabilities. Future research should employ larger sample sizes and quantitative designs to examine differential outcomes across disability categories.

Second, the study was conducted in a single specialized educational setting in one city in Morocco, which may not be representative of inclusive education settings in other regions of Morocco or other countries. Cross-cultural comparative studies are needed to examine how cultural factors influence intervention outcomes. The role of cultural values, attitudes toward disability, and policy contexts in shaping inclusive education outcomes should be investigated.

Third, the study duration of eight months, while sufficient for observing medium-term outcomes, may not capture long-term developmental trajectories. Extended longitudinal studies are needed to examine how skill acquisition progresses over multiple years and how early intervention influences long-term outcomes. The chronosystem level of Bronfenbrenner's framework highlights the importance of considering developmental trajectories over time, and future research should employ longitudinal designs to capture these trajectories.

Fourth, the study did not include direct measures of family involvement or home-school coordination, which may have contributed to differential outcomes. Future research should incorporate measures of family engagement and mesosystem coordination to examine how these factors influence intervention outcomes. The quality and intensity of family involvement, as well as the effectiveness of communication between educational and family settings, should be investigated.

Fifth, the study did not examine the specific intervention strategies that were most effective for each child. Future research should employ single-case experimental designs to identify the active ingredients of intervention that produce meaningful gains. Component analyses of intervention packages can identify which strategies are most effective for specific populations and outcomes.

Future research should also examine the transition from specialized educational settings to mainstream inclusive education settings. Both children in this study received intensive intervention in a specialized setting, but the transferability of skills to mainstream settings is uncertain. Research on the factors that promote successful inclusion in mainstream settings is needed, including the role of peer support, teacher attitudes, and environmental accommodations.

Finally, future research should examine the cost-effectiveness of inclusive education interventions. The substantial resources required for intensive, multidisciplinary intervention raise questions about the optimal allocation of resources in inclusive education programs. Cost-effectiveness analyses that examine the relationship between resource allocation and outcomes can inform policy decisions about resource distribution.

8. CONCLUSION

This comparative case study examined the implementation and outcomes of individualized educational interventions for two children with neurodevelopmental disabilities in a specialized educational setting in Morocco. Grounded in Vygotsky's sociocultural theory of defectology and Bronfenbrenner's ecological systems theory, the study revealed substantially differential outcomes across five developmental domains. The child with autism spectrum disorder achieved approximately 64% overall program completion compared to approximately 38% for the child with profound intellectual disability complicated by cerebral palsy.

The findings underscore the necessity of developmentally appropriate expectations, family-centered intervention models, and extended timeframes for skill acquisition in populations with complex neurodevelopmental profiles. The differential outcomes reflect fundamental differences in cognitive functioning, learning capacity, and environmental responsiveness that must be accounted for in educational planning. The integration of Vygotsky's and Bronfenbrenner's theoretical frameworks provides a comprehensive lens for understanding these differential outcomes, highlighting the interaction between individual characteristics and environmental supports across multiple levels of the ecological system.

The study has several implications for inclusive education practice and policy. Practitioners should employ developmentally appropriate expectations, family-centered intervention models, and extended timeframes for skill acquisition. Multidisciplinary collaboration and differentiated pedagogical approaches are essential for addressing the complex needs of children with neurodevelopmental disabilities. Policymakers should ensure adequate resource allocation, enhanced teacher training, family support services, and longitudinal monitoring of educational outcomes.

While the study provides valuable insights into the differential outcomes of individualized educational interventions, several limitations should be acknowledged. The small sample size, single setting, and limited duration constrain the generalizability of findings. Future research should employ larger sample sizes, cross-cultural comparative designs, extended longitudinal follow-up, and examination of active intervention ingredients.

In conclusion, this study contributes to the growing body of literature on inclusive education in the Moroccan context, providing empirical evidence regarding the differential effectiveness of individualized interventions across disability categories. The findings highlight the importance of theoretically grounded, ecologically informed, and individually tailored approaches to intervention for children with neurodevelopmental disabilities. The integration of Vygotsky's sociocultural theory and Bronfenbrenner's ecological systems theory provides a robust framework for understanding how learning and development occur through the interaction of individual characteristics, social interaction, and environmental systems. This framework has the potential to guide future research and practice in inclusive education, ultimately improving outcomes for children with neurodevelopmental disabilities and their families.

Competing Interests

The authors declare that they have no competing interests.

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Ethics Approval and Consent to Participate

Ethical approval for this study was obtained from the relevant institutional review board. Informed consent was obtained from the legal guardians of both participants. Child assent was sought where developmentally appropriate. All procedures performed were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments.

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