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### **Adaptive Capacity of Preschoolers with Special Educational Needs in Inclusive Resource Centres**

#### **Zhanna Kondratyuk**

Director of the Communal Institution "Inclusive Resource Centre", Vyshgorod City Council of Kyiv region, Kyiv, Ukraine, Postgraduate Student of the Mykola Yarmachenko Institute of Special Education and Psychology, the National Academy of Educational Sciences of Ukraine, Kyiv, Ukraine. zhanna\_asp@ukr.net  
<https://orcid.org/0000-0002-6943-9105>

#### **Iryna Omelchenko**

DSc. Of Psychological Sciences, Full Professor, Chief Researcher of the Department of Psychological and Pedagogical Support for Children with Special Needs, Mykola Yarmachenko Institute of Special Education and Psychology, the National Academy of Educational Sciences of Ukraine, Kyiv, Ukraine. iraomel210781@ukr.net  
<https://orcid.org/0000-0002-4698-0273>

#### **Svitlana Konopliasta**

Doctor of Science in Pedagogy, Full Professor, Professor of the Department of Speech-language Pathology (SLP) and Speech Psychology, Faculty of Special and Inclusive Education, Dragomanov State University of Ukraine, Kyiv, Ukraine. s.yu.konoplyasta@gmail.com  
<https://orcid.org/0000-0001-9233-7505>

#### **Iryna Matiushchenko**

PhD in Education, Associate Professor of Department of Psychocorrective Pedagogy and Rehabilitation, Dragomanov National Pedagogical University, Kyiv, Ukraine. irina-100@meta.ua  
<https://orcid.org/0000-0002-0684-4154>

#### **Alina Synytsia**

Candidate of Pedagogical Sciences, Associate Professor of the Department of Applied Psychology and Speech Therapy at the Faculty of Preschool, Special, and Social Education of Berdyansk State Pedagogical University, Zaporizhzhia, Ukraine. alina\_starceva@ukr.net  
<https://orcid.org/0000-0001-6526-0207>

#### **Valeriia Mykhailenko**

Graduate Student, Teacher of Department of Psychocorrective Pedagogy and Rehabilitation, Dragomanov State University of Ukraine, Kyiv, Ukraine. mihaylenko.valeria@gmail.com  
valeria@gmail.com, <https://orcid.org/0000-0002-8318-2457>

**Abstract:** *This article addresses the important issue of evaluating the adaptive capacity of preschoolers with special educational needs, focusing on their inclusion alongside typically developing peers. It provides a theoretical analysis of the concept of "children's adaptive capacity." Educating children with special educational needs requires a multifaceted approach, which includes creating an environment specifically designed for their correction and growth. This environment aims to provide equal opportunities and incorporates specialised educational standards tailored to each child's unique needs. It also follows therapeutic, educational, and developmental programs to promote social adaptation and address developmental challenges. Furthermore, the article explores how children with special educational needs adapt within inclusive resource centers. This includes their adaptation to the specialists conducting assessments, the physical environment, and the methods employed. It explores the challenges of implementing inclusive education and integrating children with special needs into mainstream schools. Finally, the article examines the research foundation and the profiles of respondents involved in studying children's adaptation to specialists, environments and assessment methods.*

**Keywords:** *children with special educational needs; inclusive centre; correctional methods; inclusive centre specialists; an educational environment.*

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## 1. Introduction

The adaptation of children to preschool education is a relevant problem today. To address this problem, it is essential to identify the factors and conditions that can either help or complicate this process, as acclimating to a preschool environment is often linked to health challenges. This challenge is especially crucial for preschoolers with special educational needs (SEN) in inclusive settings, stemming from the inconsistency between the child's abilities and the demands of the environment.

While many aspects of inclusive education have been extensively studied, there remains a notable gap in research on assessing the adaptive capacity of children with SEN in preschool inclusion. The need and significance of its assessment are rooted in several factors: a rise in the number of children with SEN, an increase in opportunities for their social adaptation, changes in government policies concerning SEN children, and, finally, the availability of additional resources for facilitating their education.

Children with SEN deal with specific challenges during their adaptation period, which generally takes longer than typically developing peers. This extended duration is primarily related to the slower development of critical skills needed for successful adaptation, socialisation, and learning.

Numerous studies conducted by Ukrainian and foreign researchers have thoroughly examined how children adjust to educational settings and the significance of inclusive centres in this process.

According to Myronova and Buiniak (2013), successful adaptation of children with SEN in inclusive resource centres requires targeted efforts across several areas. One key aspect is the implementation of specialised psychological support programs tailored to individual characteristics and existing challenges of such children. To ensure their comfort, it is essential to maintain accessibility to the educational environment, which includes pedagogical and specific equipment requirements.

Çagran and Schmidt (2010) believe that effective adaptation strategies are enhanced by focused and systematic work with families. The family serves as a vital micro-group in supporting the child during their integration into society. It plays a key role in fostering communication skills, developing essential life skills, and reinforcing knowledge and abilities acquired at school. It is also recommended to involve family members in the educational and rehabilitation processes.

Dubkovetska, Budnyk and Sydoriv (2016) highlight another significant factor in a child's adaptation: collaborating with teachers to cultivate the skills and competencies essential for effective learning and communication with peers. Indeed, teachers help shape the children's social experiences with SEN and nurture interpersonal relationships within the classroom. Successful adaptation to mainstream schools promotes participation in extracurricular activities, including sports, music, and clubs. These experiences significantly enhance communication development within the group, improve the communication skills of children with SEN, offer valuable opportunities for social interaction, inspire motivation for creativity and learning, as well as support the overall individual growth of such children in the school environment.

Vygotsky's sociocultural theory (1978) highlights the significance of the social environment, interaction, and cultural tools in children's learning and development. It stresses the importance of adaptive strategies in inclusive settings, which promote growth through collaboration and the use of educational tools. The theory also suggests that artificial intelligence tools can serve as "facilitators," helping students engage within their zone of proximal development effectively.

Bronfenbrenner's ecological systems theory (1981) explores how various levels of the environment influence child development. These levels include a child's immediate context (family, school, and peers), interactions between microsystems, as well as broader social, economic, cultural, and political factors that shape the learning environment. Successfully supporting children with SEN requires addressing all these environmental levels, including family support and

community resources. Moreover, artificial intelligence technologies offer opportunities to integrate these components through shared platforms, such as online resources for teachers and parents.

Consequently, this article aims to 1) analyse the challenges associated with implementing inclusive education and integrating children with SEN into mainstream schools; 2) outline the research foundation and the participants involved in investigating the adaptation of children with SEN to the specialists conducting assessments, the educational environment and the methods used; 3) examine adaptive strategies for preschoolers with SEN within inclusive resource centres; 4) explore the cognitive processes that support adaptation and learning in inclusive environments; 5) identify cognitive development challenges in children with SEN and propose solutions through the perspective of neuroscience; and 6) highlight the potential of AI-powered tools for designing educational programs and assessing adaptation levels in inclusive settings.

## **2. Challenges of Implementing Inclusive Education in Educational Institutions**

In inclusive education, the concept of “adaptation” has two interrelated aspects: modifying the environment to meet individual needs and fostering internal changes in the individual to support their adaptation. This approach supports inclusive education and the integration of children into mainstream schools (Palmer & Williams-Diehm, 2020).

In mainstream schools, children with SEN participate in a process that influences their inner world and is followed by changes within the school environment. Before examining various forms of adaptation as a core aspect of inclusion, it is crucial to clarify the terminology used in special needs education. Resolving this issue, along with defining key terms and their meanings, sets the course for future work. In the context of school adaptation, such terms as “developmental disorder” and “delayed development” become less central, with the emphasis shifting toward “special educational needs”.

Recognising the educational needs of newly integrated students, rather than categorising them by disorders or pathologies, shapes the educational approach and prompts a partial reorganisation of mainstream schools (Deppeler, Harvey & Loreman, 2011).

The indicators of adaptation difficulties in children with SEN may include behavioural changes such as slowness, low mood, anxiety, and reluctance to attend school. For parents, these changes should serve as warning signs, encouraging them to closely monitor their child’s adaptation process.

Thus, the success of integrating children with SEN into school settings is influenced by several factors. The type and severity of a child's physical and mental disorders play a crucial role in their development. Moreover, the effectiveness of customised educational programs and psychological support services that teach essential skills is important. Teachers' attitudes towards these children and the overall educational environment also significantly impact the adaptation process. Therefore, it is essential to organise the social and psychological adaptation process for children with special educational needs (SEN) within mainstream schools (Martynchuk, 2014).

Inclusive education is a highly discussed and sometimes controversial topic in today's educational landscape. It focuses on integrating children with special educational needs (SEN) into mainstream schools. The increasing emphasis on inclusion within educational institutions reflects current societal values and represents a significant step forward in ensuring that all children have the right to accessible education. Additionally, inclusive education is vital for promoting social equality and serves as a fundamental aspect of lifelong learning (Strashko et al., 2021).

An inclusive educational environment includes various participants, such as teachers, administrators, parents, typically developing children, and children with special educational needs (SEN). Each of these groups encounters different psycho-pedagogical challenges within the framework of inclusive education, although the nature of these challenges can vary significantly among them.

Around the world, there is a notable demographic trend of declining birth rates. Consequently, the integrated learning model is gaining popularity because it fosters positive

interaction experiences for students. The educational content for children integrated into mainstream schools should differ from what they would receive in specialised educational environments (Koutsouris, Stentiford, & Norwich, 2022).

Successful integration of children with SEN necessitates taking into account each child's development level, enabling the choice of an appropriate and advantageous "degree" of integration. This may involve one of the following models: a) full and permanent integration; b) significant but incomplete integration; c) partial and permanent integration; or d) partial and temporary integration. These integration models help create a customised and effective approach to collaborative learning for each child while ensuring the provision of necessary specialised support (Cotan et al., 2021).

Regardless of the integration type, a fundamental factor for the children's successful inclusion with SEN in educational settings is the training of qualified teachers. They must be well-informed about the developmental characteristics of children with medical conditions and grasp the complexities of corrective educational assistance. They should embrace progressive values and implement innovative teaching technologies to effectively address the socialisation challenges faced by children with SEN. Additionally, these teachers need to have a thorough understanding of psycho-pedagogical diagnostics and consistently achieve high performance in their roles. Furthermore, they should recognise the specifics of educational programs and use effective teaching methods tailored for children with SEN while promoting positive interactions within the institution and the wider community (Kovalenko, 2018).

The psychological adaptation of children with SEN relies on combining practical methods with concepts rooted in cognitive and developmental theories. According to Koutsouris, Stentiford, and Norwich (2022), the following approaches, based on cognitive theories, have proven to be effective.

*Piaget's Theory of Cognitive Development.* Piaget's theory (1971) outlines four stages of cognitive development: sensorimotor, preoperational, concrete operational, and formal operational. Effective strategies include: a) play-based learning (engaging children with SEN in sensory-oriented games to help them understand complex concepts in a developmentally appropriate way); b) visual prompts (using images or models to clarify abstract ideas); c) fostering cause-and-effect reasoning (designing practical tasks to teach connections between actions and their outcomes).

*Bandura's Social Cognitive Theory.* Bandura's theory (2023) emphasises learning through observation, imitation, and modelling. Key methods include a) behaviour modelling (demonstrating positive social interactions to serve as examples for children); b) positive reinforcement (rewarding desirable behaviours to encourage their repetition); and c) interactive tools (using multimedia resources to showcase ideal behaviours engagingly).

*Sweller's Cognitive Load Theory.* Sweller's theory (2011) focuses on organising information to optimise learning. Effective techniques include a) breaking down information (dividing content into smaller, manageable parts to prevent cognitive overload); b) providing additional support (using visual aids, interactive exercises, and multimodal approaches (e.g., combining images and audio)); c) customising instruction (adjusting the complexity of tasks to align with the cognitive abilities of each child).

By applying these cognitive and developmental theory-based methods, teachers can more effectively address the needs of children with SEN. With the latest technologies, these methods create new opportunities for fostering inclusive environments and promoting the harmonious development of every child (Cotan et al., 2021).

### **3. Adaptive Strategies for Preschoolers with SEN in Inclusive Resource Centres: An International Perspective**

The adaptation of preschoolers with SEN is a critical challenge for today's educational systems. Inclusive resource centres play a pivotal role in supporting these children and their

families by fostering conditions conducive to learning and development. Adaptive strategies differ across countries, influenced by cultural, economic, and educational factors.

In the USA, the individualised learning approach is a cornerstone of support for children with SEN. Multidisciplinary teams, including teachers, psychologists, and speech therapists, create personalised plans tailored to each child. Effective strategies include the use of multimedia tools such as sensory boards and tablets, behavioural therapies such as applied behaviour analysis, and active parental involvement through regular training sessions (Bystrova & Kovalenko, 2018).

In Germany, early intervention programs are emphasised through an integrative model. Diagnostic and intervention strategies are initiated before children enter kindergarten, accompanied by intensive parental support to encourage readiness and involvement. Children with SEN are often integrated into mixed groups, supported by teacher assistants to facilitate their learning and socialisation.

In Finland, a holistic, inclusive education model prevails. Individualised tasks are seamlessly integrated into general education programs, supported by interactive materials and sensory spaces designed to reduce stress. Regular consultations with multidisciplinary teams ensure tailored interventions.

In Ukraine, however, the inclusive education system is in a developmental stage. Efforts include the establishment of inclusive resource centres for the diagnosis and support of children with SEN, the provision of teacher assistants and psychological services, and the gradual adoption of multimedia technologies, even though their use remains limited (Buinyak, 2019).

To improve adaptive strategies, the following steps are recommended:

- incorporating successful practices from countries such as the USA, Germany, and Finland into Ukraine's context;
- offering specialised training for teachers and professionals in inclusive education;
- expanding the use of multimedia tools to support individualised learning processes;
- enhancing collaboration between inclusive resource centres, parents, and local authorities to create a cohesive support network.

The diverse strategies employed by inclusive resource centres worldwide reflect both the distinct characteristics of educational systems and universal principles of support for children with SEN. A promising way forward lies in integrating proven international practices while strengthening local capabilities to create inclusive environments that address the unique needs of every child.

#### **4. Overview of the Research Foundation and Participants in the Study on How Children with SEN Adapt to Assessment Specialists, the Environment, and Assessment Methods**

The study of adaptation within the inclusive resource centre has focused on three main areas: 1) adaptation to assessment specialists, 2) familiarity with the environment, and 3) adaptation to assessment methods.

The experimental research took place at an inclusive resource centre in Kyiv over 10 days in January 2023. A total of 18 participants were involved, including 8 preschool teachers and 10 students with SEN, with two assessment methods applied.

The experiment was organised into three stages: the first stage involved specialists working with children with SEN, the second stage focused on adapting to the environment, and the third stage assessed the effectiveness of the methods used. As the inclusive resource centre operates as a "child development centre", it employs a complete team of educational specialists. This includes two speech therapists, a psychologist, a special education teacher, a physical education teacher, an art teacher, two music teachers, and a drama teacher.

In the first stage of the research, 8 participants took part, including teachers, the centre's administrator, and a nurse. The educators ranged in age from 24 to 60. Five had advanced degrees

in pedagogy, while three held specialised secondary qualifications. Four educators had over 20 years of teaching experience, and the others had between 4 and 18 years. Four staff members had been with the institution since its founding, with 25 years of service there. Four held the highest qualification category, three held the first qualification category, and two were employed in roles aligned with their expertise. Additionally, 10 children with SEN, aged 6 to 17, participated in the study.

The initial findings on adaptation to assessment specialists are summarised in Table 1.

*Table 1. Research on the adaptation to assessment specialists at the initial stage (Source: the authors' own conception)*

Adaptation levels		
A high level	An average level	A low level
0 students with SEN – 0%	3 students with SEN – 10%	7 students with SEN – 70%

A key factor in a child's adaptation is working with teachers to develop skills that are crucial for learning and effective communication with peers. Teachers also help address the social experiences of children with SEN and support the development of interpersonal relationships within the classroom (Bystrova & Kovalenko, 2018).

Successful adaptation to mainstream schools helps integrate children into extracurricular activities, such as sports clubs, music studios, and hobby groups. These activities positively influence communication development within the group, enhance communication skills in children with SEN, provide opportunities for social interaction, and foster motivation for creativity and learning. Ultimately, they support the overall personal development of children with SEN within the school environment (Demchenko & Pyzhyk, 2017).

Signs of disrupted adaptation in children may include changes in behaviour such as slowness, mood swings, anxiety, and a reluctance to attend school. Parents should consider these behavioural changes as critical indicators that require more consideration during the child's adaptation process (Kolupaieva & Taranchenko, 2016).

The final findings on adaptation to assessment specialists are summarised in Table 2.

*Table 2. Research on the adaptation to assessment specialists at the final stage (Source: the authors' own conception)*

Adaptation levels		
A high level	An average level	A low level
0 students with SEN – 10%	3 students with SEN – 60%	7 students with SEN – 30%

The study was conducted in two stages: initial and final. The changes in the adaptation levels are presented in Tables 1 and 2.

Several factors contributed to the transition from a low to an average adaptation level. In particular, the use of individualised education plans (IEPs) helped enhance academic engagement and social interaction. Meanwhile, the introduction of regular corrective lessons significantly improved students' language and cognitive skills. Finally, the interventions applied in the study demonstrated strong potential.

The study's findings highlight the effectiveness of a holistic approach to the adaptation of children with SEN. The methods used, including IEPs, interactive technologies, and psychological support, led to a substantial improvement in the adaptation process. These interventions can be effectively implemented in other environments, given the appropriate resources and training.

The next stage of the study focuses on the adaptation of children with SEN to the school environment. One of the school's primary goals is to integrate children with SEN into the social

space of a mainstream classroom. This process should be guided by teachers and support specialists (psychologists, special education teachers, speech therapists, and tutors) to ensure it minimises discomfort for both children with SEN and their peers.

The key requirements for designing the educational process in inclusive settings involve integrating children with SEN alongside their typically developing peers, ensuring equal participation. This inclusion must take into account the specific needs of children with SEN when creating their environment. The process should be approached from several angles, including adapting the school environment through the implementation of specialised programs (Nilholm, 2021).

It is also crucial to generate the necessary resources and technological framework to ensure that children with SEN can access education comfortably. A core principle of an adapted educational environment is its accessibility for children with medical conditions. Educational institutions must consider both general pedagogical standards and the specific needs related to organising and arranging personal space for children with SEN. This includes providing technical support across all areas of the child’s daily life, such as meeting basic needs, fostering social skill development, and encouraging active social participation (Rojo-Ramos et al., 2023).

The initial findings on adaptation to the environment are summarised in Table 3.

*Table 3. Research on the adaptation to the environment at the initial stage(Source: the authors’ own conception)*

Adaptation levels		
A high level	An average level	A low level
0 students with SEN – 10%	3 students with SEN – 20%	7 students with SEN – 70%

Children with SEN often struggle to adjust to school life, the daily schedule, lesson durations, and changes. To make the adaptation process easier, a visual timetable can be provided. The teacher, caregiver, or psychologist can review this plan with the child at the start of each school day. It is essential to inform the child in advance about any possible changes, such as changes in the schedule or classrooms. Additionally, teachers and support specialists should help children develop a routine for different situations, such as a) what to do when they need to go to the restroom, b) how to get to the cafeteria, c) what to do if the next lesson is physical education, d) when it is time for a class break or outdoor activity, e) how to prepare for the next lesson, f) what to do when the bell rings, etc.

It is also important to arrange the classroom and surrounding spaces in a way that allows children to have some quiet time away from noise. This could be a screen, a “tent”, or another quiet area. Typically, after spending time alone during a break or in the classroom, the child will be ready to rejoin the group and participate in work and social interactions (Darling-Hammond, 2010).

If a child cannot remain still for 35-40 minutes during a lesson (getting up, talking, or moving around the classroom), the teacher or caregiver should allow them to take a break. For instance, they could walk to the play area or sit in a designated “quiet” space. However, it is vital to regulate the duration of this rest period. Using a timer, such as an hourglass, can help manage the time, and the teacher should encourage the child to return to classwork after a set amount of time. The goal is for the child with SEN to begin and finish work in the classroom along with the other children.

The final findings on adaptation to the environment are summarised in Table 4.

Table 4. *Research on the adaptation to the environment at the final stage (Source: the authors' own conception)*

Adaptation levels		
A high level	An average level	A low level
0 students with SEN – 30%	3 students with SEN – 60%	7 students with SEN – 10%

Adaptation is an ongoing process, as the child continuously adjusts to different conditions throughout their schooling. The support team's role is to assist the child throughout this process.

The third stage of the research involves selecting and studying assessment methods. Before starting the assessment, the psychologist must review materials provided by other specialists (educators, speech therapists, and medical specialists). This includes examining educational documentation such as reports from the school or kindergarten, drawings, and school notebooks. If possible, additional information about the child's family and the nature of family dynamics should be gathered from the teacher or parents, with particular attention given to the child's early development.

The main goal of psychological assessment is to identify the child's development milestones, including any deviations, and determine the preserved abilities that can help compensate for these deviations within an appropriate educational setting.

Drawing on the anamnesis and developmental insights provided by other specialists, psychologists formulate the primary hypothesis for the assessment. From this hypothesis, the psychologist selects the most suitable diagnostic tools. The specialist needs to have a comprehensive set of diagnostic instruments, allowing flexibility in adjusting the assessment process and minimising the number of methods used.

The psychological assessment framework is as follows: 1) evaluating knowledge about the surrounding world; 2) analysing mental development (perception, attention, memory, cognitive activity); 3) studying personal and behavioural traits.

During the psychological assessment, the psychologist employs methods such as interviews, observations, experiments, testing, analysis of work samples, review of documentation, and others. Besides, they focus on how the child approaches tasks, thinks through actions, demonstrates critical thinking in task execution, uses assistance (when needed), completes tasks independently through analogy, and shifts between activities (Vincent-Lancrin et al., 2019). The psychologist's conclusions must be cross-referenced with the opinions of other specialists involved in the consultation.

The initial findings on adaptation to the methods used are summarised in Table 5.

Table 5. *Research on the adaptation to the methods used at the initial stage (Source: the authors' own conception)*

Adaptation levels		
A high level	An average level	A low level
0 students with SEN – 0%	3 students with SEN – 40%	7 students with SEN – 60%

The following methods can be selected for the third stage of the assessment:

*Method No. 1: "The Postbox"* (Demchenko & Pyzhyk, 2017)

Objective: To assess the child's ability to perceive moulded shapes, distinguish between two-dimensional and three-dimensional figures and match them to corresponding cutouts; to evaluate their ability to analyse the positioning of shapes in space.

Materials: Various versions of the "Postbox"

Instructions: A box with figures is placed in front of the child, and the figures are removed. The examiner chooses one of the figures, shows its base, traces the corresponding cutout shape, and places the figure into the cutout. This indicates that the task should continue. Alternatively, the child



may be given the instruction: “Put all the figures into the box”. It is recommended to start with simple shapes for the task.

**Result Analysis.** Children with typical cognitive development usually engage with the task positively. However, at around 3.5 years old, they may push the figure forcefully into the cutout without considering the shape. By age 4, children can complete the matching task, and by age 5, they can visually match the shapes. Children with intellectual disabilities show interest in the task but are generally more careful than children with developmental delays, producing higher-quality work. They ask for help when needed, acknowledge their mistakes, and avoid repeating them. Children with developmental delays often struggle to complete the task independently. Their actions lack focus, and they may force the figure into the cutout using a trial-and-error approach. At times, the task is replaced with a manipulation of numbers. Assistance is often ineffective, and errors are repeated when the task is attempted again.

*Method No. 2: “Separate Images” (Zaierkova & Treitiak, 2016)*

**Objective:** To assess the child’s ability to model perception, recognise and distinguish parts from a whole, and synthesise these elements on a physical level; to evaluate the development of their visual and imaginative thinking, along with combinatorial skills; to assess hand coordination and fine motor skills.

**Materials:** Pictures depicting familiar objects, cut into two, three, four, five, or six parts, both vertically and horizontally.

**Instructions:** A picture, cut into two parts, is placed in front of the child. The parts are arranged in such a way that the child must not just move them into place to complete the picture, but instead must reconstruct the image. The child is instructed to assemble the picture. If the child does not start immediately, it is necessary to ask them what the picture should look like. It is also advisable to repeat the task with pictures cut into three, four, five, or six parts, both vertically and horizontally.

*Results Analysis*

**Typically developing children:** By around age 3, children can assemble a picture from two parts, using a primarily experimental approach. After age 4, they begin using visual correlation to solve the task. Pictures cut into four parts (vertically and horizontally) are introduced from age 4, and by age 5, they can complete the task using visual matching. Children show interest in the task and complete it with increasing skill.

**Children with intellectual disabilities.** Children with intellectual disabilities begin assembling two-part pictures before age 4. For pictures divided into four parts (vertically and horizontally), difficulties arise by age 5. However, after a demonstration by the consultant (assembling the image and then disassembling it), the child can complete the task. When working with pictures divided into three, four, five, or six parts, they may require assistance. While they show interest in the task, their attention may fluctuate, and they may not finish the task.

**Children with mild intellectual disabilities.** These children can follow instructions and assemble pictures split into two or three parts. For more complex images, they need two to three demonstrations before they can complete them. When working with pictures divided into four to six parts, the children may display disorganised or inappropriate behaviour, such as misplacing pieces or stacking them incorrectly.

**Children with moderate intellectual disabilities.** These children often struggle to understand verbal instructions and require demonstrations and joint participation. They are generally able to assemble a picture split into two parts but often fail to assemble pictures with three to six parts independently.

The final findings on adaptation to the methods used are summarised in Table 6.

Table 6. Research on the adaptation to the methods used at the final stage (Source: the authors' own conception)

Adaptation levels		
A high level	An average level	A low level
0 students with SEN – 40%	3 students with SEN – 40%	7 students with SEN – 60%

Thus, an assessment of the research foundation and participants in the study on the adaptation of children with SEN to specialists, environments, and assessment methods shows that adaptation levels have significantly improved by the final stage.

### 5. Cognitive Processes Essential for Adaptation and Learning in Inclusive Environments

Effective adaptation and learning in inclusive settings rely on several key cognitive processes. These processes play a crucial role in developing the cognitive, social, and behavioural skills necessary for integrating children with SEN into the general education system.

One of the most critical cognitive processes is attention. It plays a pivotal role in learning by directly influencing a child's ability to focus on tasks, which can vary in both complexity and duration. Children with SEN often require additional strategies to help sustain their attention. These strategies may include the use of colours, symbols, and other visual tools to capture focus. Additionally, reducing cognitive overload by gradually introducing tasks and implementing adaptive programs tailored to the child's attention level can be highly beneficial (Kovalenko, 2018).

Memory is another crucial component in the integration of children with SEN into general education. There are different types of memory that play a significant role in adaptation. One of these is working memory, which supports the short-term retention of information for ongoing tasks. Another important type is long-term memory, which is responsible for storing skills and knowledge necessary for learning and integration.

Thinking and problem-solving are vital cognitive processes, as a decline in abstract thinking can hinder the ability to absorb new material. To address this, it is essential to provide practical examples and real-life situations that help children understand abstract concepts.

Language, as the primary means of communication, is fundamental for integrating children into a social group. Strategies for language development include the use of pictograms or applications for those with verbal communication challenges. Teachers or assistants demonstrate correct language usage through short stories, illustrating to children how to behave and communicate appropriately in specific contexts.

Emotional regulation and self-regulation are key factors in creating an inclusive environment. The ability to control emotions and behaviour helps children adapt to social norms and expectations (Eisenberg, Spinrad, & Eggum, 2010).

When children are aware of their cognitive processes, they are better able to plan, monitor, and evaluate their learning. Effective metacognitive strategies include tasks that help children assess their strengths and challenges. Personalised learning approaches also support children in developing their strategies for completing tasks. Additionally, digital platforms that track progress can encourage self-reflection.

Cognitive processes such as attention, memory, thinking, language, emotional regulation, social cognition, and metacognition form the foundation for successful adaptation and learning in inclusive environments. The development of these processes is supported by integrating effective teaching strategies, adaptive technologies, and individualised approaches for each child. An inclusive environment that recognises and nurtures these cognitive processes creates the conditions necessary for harmonious learning and development. This approach ensures that every child, regardless of their special educational needs, can thrive (Sivaguru & Irudhaya Mary, 2023).

## **6. Cognitive Development Challenges in Children with SEN and How to Address Them Through Neuroscience**

Children with SEN often face challenges that affect their cognitive, emotional, and social development. Viewing these challenges through the lens of neuroscience opens up new possibilities for creating effective interventions that consider the neurobiological mechanisms driving their development.

One of the critical factors in understanding the potential for development in children with SEN is neuroplasticity. It implies the brain's ability to reorganise itself by forming new neural connections in response to experiences. Children with cognitive delays can use alternative neural pathways to achieve results similar to their peers. To illustrate, regular training in memory, attention, and language can promote the formation of new neural pathways in the brain's cortex, reinforcing existing networks (Strashko et al., 2021).

Individualised interventions are essential in addressing the needs of each child. Interactive technologies and artificial intelligence-based platforms can adjust the difficulty of tasks to align with a child's cognitive development level.

Children with SEN are frequently exposed to chronic stress, which may stem from social isolation, academic challenges, or high expectations from adults. Neuroscience shows that stress activates the hypothalamic-pituitary-adrenal (HPA) axis, influencing brain structures responsible for memory, emotional regulation, and attention. Prolonged activation of the HPA axis can lead to hippocampal dysfunction, impairing the child's capacity to learn new information. To reduce stress, interventions such as mindfulness practices, relaxation techniques, and music therapy can help normalise the HPA axis, fostering better cognitive function.

Another common issue for children with SEN is difficulty with working memory, which is essential for processing and retaining short-term information. Impairments in the prefrontal cortex, responsible for executive functions, may affect a child's ability to plan, concentrate, and control impulses.

Technologies, particularly multimedia learning platforms, offer an opportunity to enhance working memory through progressively challenging tasks. These platforms also support the development of cognitive control through interactive scenarios that simulate real-life situations (Strashko et al., 2021).

Children with SEN may also face difficulties in developing social skills. This challenge is often linked to dysfunction in specific brain areas, such as the amygdala and medial prefrontal cortex. These areas are crucial for emotion recognition, empathy, and social interaction, associated with effective communication and building relationships.

Advanced neurotechnologies provide tools to aid in the development of social skills. Interactive programs with virtual characters enable children to practice social interactions and emotional regulation in a safe environment. These technologies offer opportunities for behavioural correction and positive reinforcement.

By applying neuroscientific principles, cognitive development issues in children with SEN can be significantly alleviated. Interventions that encourage neuroplasticity, reduce stress, and tailor learning materials to the child's individual needs are vital in creating an effective and inclusive learning environment.

## **7. The Potential of AI-Driven Tools in Developing Educational Programs and Evaluating Adaptation Levels in Inclusive Environments**

Inclusive education requires a tailored approach for each participant, especially for children with SEN. In this context, artificial intelligence (AI) presents innovative solutions for designing educational programs, tracking progress, and evaluating the adaptation of students. AI tools are designed to transform how learning is delivered in inclusive settings.

AI plays a crucial role in creating personalised educational programs. Through AI algorithms, the unique characteristics of students, such as learning styles, knowledge levels, and

behavioural traits, are analysed to develop adaptive learning plans. Platforms such as DreamBox and Smart Sparrow use AI to adjust tasks according to individual student needs automatically (Huang & Zhang, 2021).

AI tools also evaluate the effectiveness of various educational programs and recommend the most effective strategies. Using generative AI models, these tools can create interactive multimedia content while also assisting in the development of assignments, tests, and lesson plans.

AI can assess students' adaptation to inclusive environments through emotion recognition technologies, such as Affectiva, which analyses facial expressions, gestures, and voice tone to determine emotional states. This helps detect stress or anxiety in students with SEN, allowing for timely interventions.

Learning analytics tools examine how students engage with the material, considering factors such as login frequency, time spent on tasks, and error rates. These tools provide objective insights into student engagement and progress. Interactive assessment assistants, including chatbots and virtual tutors, can test students' knowledge levels and offer personalised feedback (Koutsouris, Stentiford, & Norwich, 2022).

The incorporation of AI in inclusive education presents numerous advantages. It facilitates the early detection of learning and adaptation difficulties, and AI-driven programs can be modified to support extensive groups of students. Additionally, these technologies guarantee that every student has equal access to educational opportunities, no matter their individual requirements (Cotan et al., 2021).

AI tools hold great potential to tailor educational programs to meet the students' individual needs, particularly in inclusive settings. They facilitate personalised learning experiences, offer unbiased evaluations of adjustments, and encourage the inclusion of students with special educational needs (SEN) in general education. By identifying learning challenges early, accommodating large classes, and ensuring equitable access to education, AI is transforming the landscape of inclusive education.

## **8. Conclusion**

This article provides an in-depth analysis of the challenges associated with implementing inclusive education and integrating children with special educational needs (SEN) into mainstream schools. It emphasises that an inclusive educational environment involves various participants, including teachers, school administrators, parents, typically developing children, and those with SEN. Each of these groups faces psychological and pedagogical difficulties throughout the inclusive education process. These challenges reflect the real-life experiences of children and their families, as well as teachers and administrators, as they strive to incorporate children with SEN into mainstream schools. Therefore, there is an urgent need for inclusive resource centres.

Moreover, the article outlines the research foundation and profiles of the respondents involved in examining the adaptation of children with SEN to specialists, the educational environment, and the methods used. It analyses adaptation indicators at both the initial and final stages (after a ten-day study) and concludes with the effectiveness of inclusive resource centres.

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Svitlana Konopliasta described the adaptation process of children with SEN to the physical environment.

Iryna Matiushchenko investigated the adaptation of children with SEN to various educational methodologies and analysed the adaptive strategies employed for preschoolers within inclusive resource centres.

Alina Synytsia explored the cognitive processes that underpin adaptation and learning in inclusive settings.

Valeriia Mykhailenko addressed the cognitive development issues in children with SEN and proposed solutions based on neuroscience while also examining the potential of AI-driven tools in developing educational programs and assessing adaptation levels in inclusive environments.

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