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# Inclusive Special Education

Research to Practice

*Edited by Monique Somma and Margo Horne*





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# Inclusive Special Education - Research to Practice

*Edited by Monique Somma  
and Margo Horne*

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Edited by Monique Somma and Margo Horne

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# Education and Human Development

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## Aims and Scope of the Series

Education and Human Development is an interdisciplinary research area that aims to shed light on topics related to both learning and development. This Series is intended for researchers, practitioners, and students who are interested in understanding more about these fields and their applications.



# Meet the Series Editor



Katherine Meltzoff received her BA in Psychology from Trinity College, in Connecticut, USA and her Ph.D. in Experimental Psychology from the University of California, San Diego. She completed her postdoctoral work at the Yale Child Study Center with Dr. James McPartland. Dr. Meltzoff's doctoral dissertation explored neural correlates of reward anticipation to social versus nonsocial stimuli in children with and without autism spectrum disorders (ASD). She has been a faculty member at the University of California, Riverside in the School of Education since 2016. Her research focuses on translational studies to explore the reward system in ASD, as well as how anxiety contributes to social challenges in ASD. She also investigates how behavioral interventions affect neural activity, behavior, and school performance in children with ASD. She is also involved in the diagnosis of children with ASD and is a licensed clinical psychologist in California. She is the Assistant Director of the SEARCH Center at UCR and is a faculty member in the Graduate Program in Neuroscience.



# Meet the Volume Editors



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Margo Horne is a highly accomplished individual with a range of experiences in the field of education. She is an Assistant Professor and Assistant Director of Programming at Brock University, as well as a Trustee and former Chair of the Board in an Ontario school board. Her teaching career began as a classroom teacher in both mainstream and self-contained settings. She has held teaching and leadership positions in educational institutions in Canada, the UK,

and Japan, including consultant, lecturer, vice principal, and head of department. Her research endeavours include projects in Canada, the US, the UK and St. Vincent and the Grenadines. These projects focus on educational and community inclusion, empowering both students and teachers to engage in opportunities for positive change.



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# Preface

Inclusive education for children with diverse learning styles and needs has been recognized by the United Nations for over four decades, beginning with the Salamanca Statement in 1994.

Even most recently, Sustainable Development Goal 4 aimed at achieving inclusive education for all children by 2030. A broadly accepted definition of Inclusive Education envisions a system where “each individual’s needs are taken into account and that all learners participate and achieve together” (UNESCO, 2023). Furthermore, inclusive education acknowledges that every child possesses unique learning characteristics, interests, and abilities, and is capable of learning alongside their peers. Considerable research has contributed to the evolution of practice and policy for educators, education systems, and policymakers. This work has led to advancements in inclusive education for children with diverse learning styles and needs; however, this has not been without challenges. This text will highlight current research and best practices in inclusive education for diverse learners, with a focus on current inclusion frameworks, including Universal Design for Learning, Differentiated Instruction, and Ramps to Inclusion. This book emphasizes the importance of equipping students with the necessary tools and support to remain in the classroom alongside their peers, and ensuring they have access to physical (P), academic (A), and social (S) inclusion. Through this PAS framework, this book offers insight into research that is translated into practical classroom applications, supporting students, teachers, and their families in understanding the value of inclusion, with a focus on keeping students and educators at the forefront.

The book is organized into four sections, with each chapter highlighting current research in inclusive education from various contexts and countries, offering practical applications. It begins with an introduction to the PAS model within an educational setting, which focuses on Physical, Academic and Social ramps to inclusion. This chapter serves as a guiding framework for the subsequent chapters. The next section comprises three chapters that highlight current research on the attitudes and identities of educators and their impact on inclusive work and efficacy. Chapter two highlights research on teachers’ attitudes and knowledge. Chapter three explores educators’ knowledge in relation to their use of UDL and DI. Finally, chapter four provides a discussion of special educators’ professional identity and their practice of UDL. The following section comprises four chapters that delve into research on general and specific practices for school and classroom inclusion, including specific applications to Mathematics, Science, and Music. Chapter five, with a focus on developing inclusive schools and classrooms, offers some overarching practices for inclusive schools. Chapter six examines primary school students’ confidence and motivation in supporting inclusion in mathematics. Chapter seven highlights research on using UDL to support inclusive music education in early childhood settings. The final chapter in this section, chapter eight, suggests a method for ensuring that inclusive learning spaces take into account the sensory needs of all learners. Finally, the book concludes with three chapters that focus on engaging various stakeholders, including both parents

and students, to foster inclusion in school settings. Chapter nine focuses on how to begin setting the stage for inclusion in early childhood settings and how parents and educators can collaborate to support this approach. Chapter ten takes the perspective of a family and how they support the school in managing behavioral and emotional difficulties. The final chapter of the collection, chapter eleven, suggests how students can serve as co-learners and co-agents for classroom inclusion.

This book is a collection of scholarship that comes together to inform practice for inclusive education. Each author has contributed to the overall message that children should learn together by providing research-based best practices for this work. Each chapter was selected to evoke curiosity and consideration of how research supports educators and schools to work towards inclusive access for all children. Without the contributions of the authors and the support of IntechOpen, this collection would not have been possible. When research and practice are combined in creative ways, such as this, there is an opportunity to learn together and from one another in a shared vision of what education can and should be for all children.

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Section 1

# Introduction

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## Chapter 1

# The All Access PAS: A Practical Framework for Inclusive Education (Physical, Academic and Social Ramps)

*Monique Somma, Margo Horne, John Freer and Sheila Bennett*

### Abstract

In recent years many schools and boards have heeded the call for inclusive education. While inclusion is often thought about as a philosophy, we find it helpful to conceptualize it practically in three dimensions: Physical, Academic, and Social (PAS). It is not uncommon for teachers to provide accommodations and modified curriculum, a safe physical environment and some opportunities for socialization with peers. We believe the PAS model will help educators to enrich these efforts. By examining inclusion frameworks including Universal Design for Learning and Differentiated Instruction, along with years of field work, this chapter proposes a framework to help educators consider inclusion proactively as a pre-determinant within planning versus proactively as an additional task to complete. In this chapter we present the PAS framework by using the metaphor of a ramp. Ramps are often seen as a symbol for accessibility and in our experience is often the most basic and concrete starting place for considering inclusion. Further this chapter will discuss the impact on new and experienced educator pedagogy, educators' consideration of the framework, educators' self efficacy, and the implications for educator and system capacity for inclusive education.

**Keywords:** inclusive education, universal design for learning, ramps, students with disabilities, teacher strategies for inclusion

### 1. Introduction

Inclusive education for students with disabilities has come to the forefront of educational reform across the world over the past few decades, especially in light of the United Nations Sustainable Development Goals (SDG). SDG4 aims to ensure by 2030, the “inclusive and equitable quality education and [the] promot[ion of] lifelong learning opportunities for all” [1]. All children, including those with disabilities should have access to quality education in their communities. Even with a strong

statement by UNESCO and global commitment, inclusive education for students with disabilities remains a practical challenge in terms of implementation.

As educators and educational researchers, throughout our work over the years, we contend that the main challenge to genuine inclusion in education is access. In working with various schools and educators in a variety of Canadian and international contexts, we have come to realize that there is not a singular version of inclusion. During our collaborative international work, in conversations with educators, classroom observations and collaborative self-reflection, we learned of the challenges educators have in implementing inclusion practically [2]. Although the underlying premise remains- that all children regardless of ability are educated together in their neighborhood schools with their same age peers- in many contexts we have experienced a wide range of willingness, readiness, and capacity for inclusive education. Most often schools are reasonably effective at providing some access to inclusion, whether it be modified or accommodated curriculum, a safe physical environment and/or opportunities for socialization with peers. However, in our various and vast experiences within multiple contexts, we rarely see students with disabilities having regular and ongoing access to each of these entry points which all schools should be accountable for offering to children. There are many factors that contribute to the limitations imposed on inclusion, namely attitudes and beliefs about disability, lack of training, support and resources including funding, supplies, personnel and equipment.

Although there are currently several available inclusion models, including Universal Design for Learning (UDL) and Differentiated Instruction (DI), they are often perceived as complex and difficult to understand which can make it challenging for educators in-the-moment to find a starting point given their very busy roles. Research clearly shows that effective inclusive practice supports all children to thrive in classrooms, schools and communities [3]. By examining and deconstructing inclusion frameworks including Universal Design for Learning and Differentiated Instruction, we propose a framework to help educators consider inclusion as a pre-determinant within planning versus an additional task to complete. Based on the premise that access can be provided to all children with the proper “ramps” in place; specifically, three ramps: physical, academic, and social. Each ramp must be accounted for in order for true inclusion to exist because they coexist and support each other.

This chapter will highlight this framework and set of guiding questions that educators, administrators and school districts can use to self-evaluate their practice and consider how to make their settings more inclusive for all children. First, we explore Universal Design for Learning and Differentiated Instruction followed by literature on educator beliefs and self-efficacy for inclusion. This background supports the rationale for a tool to support the vast understandings of inclusive education. By considering educators’ views, the framework probes in developing simple and effective methods to increase inclusion in their classroom/school. Implications of this work include how this framework can support educator and system capacity for inclusive education.

## **2. Theoretical framework**

Universal Design for Learning (UDL) and Differentiated Instruction (DI) have historically been the focus of frameworks, recommendations and strategies to increase,

support and promote effective inclusive practice within schools. These frameworks are fundamental to ensure inclusivity and accessibility within an educational setting and beyond and are foundational to our work as inclusive educators and educational researchers. The origins of Universal Design (UD) evolved from a focus on addressing physical barriers within architectural structures. This later expanded to recognizing that inclusion is more than physical -gradually expanding to encompass a broader vision of inclusion that recognizes social, emotional and educational facets. In the 1970s, Ronald Mace championed the idea of accessible design and accessible solutions in the general design of products, services and environments [4].

## **2.1 The theoretical foundations of universal design for learning (UDL)**

In today's diverse classroom, educators face the challenge of meeting the unique needs of all learners. The Universal Design for Learning (UDL) framework provides a research-based approach to designing inclusive learning environments and strategies that serve to remove barriers and support student success. UDL is built on three core principles—multiple means of representation, multiple means of engagement, and multiple means of action and expression—which emphasize the need for flexible teaching strategies that accommodate different learning styles, abilities, and backgrounds [5].

In 2008, CAST created the theory of UDL based on the core belief and premise that barriers to learning are centered on how the educational environment is designed rather than a deficit approach within the individual learner. UDL challenges educators to question the *whys*, the *whats* and the *hows* of learning: Why do students want to learn? What do we do to encourage this learning in a way that is accessible? How do we see this learning taking place? [5]. A foundational belief of UDL is an understanding of how educators and service providers in a societal context can create better learning experiences that empower all students to reach their full potential. Although UDL provides a strong theoretical foundation for inclusive education, it does not offer a straightforward practical approach within an academic setting; educators must still interpret and apply its key principles in ways that effectively support student access to the curriculum and broader learning experiences.

When we look at these three core principles we ensure that students are motivated to learn. Multiple means of engagement promotes giving learners the choice in assignments and activities that match their values, interests, and goals as well as the choice to ensure it is targeted at the right cognitive level, motivating them to work toward authentic and realistic learning goals. In providing multiple means of representation, we allow students to access learning materials using their preferred format- this may include texts, audio recordings and/or video representations. Finally, in providing students with multiple ways to express their learning, UDL allows learners to express their learning using the mode of communication that suits them best [6].

Dr. Jennifer Katz built upon the premise of UDL to strengthen the bridge between theory and practice through her 3 Block Model. It emphasizes four key pillars: Self-worth, Belonging, Cognitive Challenge, and Social Learning. This model is founded on the notion that self-worth and belonging are essential for mental health, student engagement, academic achievement, and attendance. It recognizes that through meeting students where they are cognitively and creating appropriate cognitive challenges we allow a student-centred approach giving students the autonomy to learn within their peer groups in a way that promotes success capitalizing on the different backgrounds and skills that students bring to the learning environment. Within the

Three-Block Model of UDL [7], educators are offered a structured approach to fostering inclusive learning environments. This model translates decades of research on inclusive education into a practical, classroom-focused framework, guiding teachers through a step-by-step process for implementing inclusive practices. It consists of three interconnected blocks, each addressing key goals: social inclusion, academic inclusion, and systemic change. Although practical and structured, it is still complex because it requires educators to integrate social, academic, and structural changes simultaneously rather than focusing on a single aspect of inclusion. The model assumes that simple accommodations are backed by a fundamental shift in pedagogy, assessment, and school culture which can be reliant on intense teacher training, administrative support, and a school-wide commitment to inclusion. Katz's model of UDL incorporates Differentiated Instruction as a key component for academic planning in schools.

## **2.2 The theoretical foundations of differentiated instruction (DI)**

Differentiated Instruction (DI) recognizes the diverse nature of classrooms today and promotes teacher practices that are responsive to ensure success in responding to the diverse learning needs that exist. Research on DI provides evidence supporting this claim. For instance, Valiandes [8] found that students in classrooms where teachers applied DI demonstrated higher performance compared to those in non-DI settings. Similarly, studies by Reis et al. [9] and Baumgartner et al. [10] reported positive impacts of DI on student achievement, particularly in reading fluency and comprehension.

DI aims to tailor instruction in terms of content, process, and product based on students' readiness, interests, and learning profiles [11]. Initially, DI was viewed as a set of teaching strategies or simply as the act of differentiation (e.g., [12]), but it has since evolved into a pedagogical model encompassing both philosophical and practical components [13]. This model is founded on the belief that diversity is inherent in every classroom, and teachers should adapt their instruction accordingly [14]. Seen as a proactive approach, Tomlinson [15] focuses on the value of teachers sharing learning goals, creating accountability with the student. The idea of choice or multiple pathways to success, encourage educators to anticipate variations in readiness, interest, and learning needs. From this perspective, differentiation is an educational process that holds students accountable for their abilities, talents, learning pace, and personal interests, while also ensuring educators proactively design varied activities to determine what students need to learn, how they will learn it, and how they will demonstrate their learning. This ensures that each student can maximize their learning potential as efficiently as possible [16].

Furthermore, DI addresses the needs of both advanced and struggling learners in heterogeneous classrooms. Bearne [17] and Tomlinson [14] define differentiation as a teaching approach in which educators systematically adapt curricula, instructional strategies, resources, learning activities, and student output. The focus of DI ensures that the diverse needs of individuals or small groups are met, providing every student with optimal learning opportunities. This relies mainly on the implementation on the part of the educator in the classroom. Therefore, regardless of where a student finds themselves on the learning continuum they are able to have the necessary supports or extensions to create valuable and meaningful learning opportunities.

Research that has looked at the frequency of implementation of DI strategies by teachers, however, has shown mixed evidence. Implementing DI in inclusive

classrooms is still seen by many educators to pose challenges (e.g., lack of training, lack of support and resources) that limit educators' use of the strategy [18]. Although teachers' beliefs and supportive comments surrounding the ideals of DI are high in interviews, DI implementation is still below a critical benchmark [19]. Although these theories are well understood and supported pedagogically by teachers, the practical implementation is still seen as complex to navigate due to the complexity of the models. Theoretically it can be explained and supported, however practically its implementation has become tied to teacher efficacy, and attitudes and beliefs. Our research in this area supports the notion that UDL and DI frameworks offer a comprehensive set of guidelines for creating more inclusive learning opportunities for all students, however, their complexity is often challenging to actualize in practice depending on the beliefs and self-efficacy of the educator.

### **2.3 Educator beliefs and self-efficacy for inclusive education**

Policy and incentives to effectively include students within school classrooms come from advocacy efforts of policy makers, politicians and administrators, however, it is the teachers/educators in the classroom that are tasked with implementing these practices, delivering curriculum, and ensuring the safety for all the students in their care. When classrooms are increasingly diverse and involve multiple learning levels, strengths and needs, attitudes and beliefs about inclusion along with one's self efficacy about inclusive education become crucial. An abundance of research suggests that favorable attitudes about disability and inclusion are key to the successful implementation of inclusive education [20–22]. Attitudes are integral to the discussion of inclusive education.

One's attitudes about a particular topic are multi-faceted and include affective, behavioral and cognitive dimensions [23]. Each of these dimensions informs the development of the attitude held, in this case, attitudes about inclusive education. The cognitive dimension focuses on educator knowledge and beliefs of inclusive education/disability. Understanding one's level of knowledge is key in supporting educators to implement successful inclusion and the dimension of attitude that can be most easily influenced by professional development Knowledge of disability and inclusive education is important to consider and often an excellent starting place, but attitudes can be more complex. The affective dimension involves the emotions and feelings educators have about inclusion and disability in general. This can be strongly influenced by past experiences, both positive and negative. The behavioral dimension also reflects the actions that educators engage with in their own classrooms, their school and the community to promote inclusion of students with disabilities [24]. This is the dimension that we ultimately want to influence when it comes to inclusive practices as attitudinal barriers are ranked as one of the most detrimental barriers toward inclusion. It has been found that there is a great variation in educator attitudes toward inclusive education, including positive, neutral, and negative attitudes [25]. Educators holding positive attitudes also demonstrate a higher level of receptivity, individualized instruction, self-efficacy, and closer teacher–student relationships. Educators who hold negative attitudes toward inclusion often identify feeling frustrated, have less classroom management, and less individual learning occurring, which presents a major barrier to effective implementation of inclusion [22, 25, 26]. When planning to support educators in their practice of inclusive education and implementing both UDL and DI, it is critical to understand where they are coming from in their beliefs about their ability to actualize inclusion.

Self-efficacy, or “...a belief in one’s personal capabilities...”, ([27], p. 4) is noted as a key to an educators ability to implement inclusion. When educators believe that they can do something such as creating a classroom environment that is conducive to inclusion, and they believe that all children should learn together, successful inclusion is the outcome [28]. Self- efficacy however is a complex process and involves four types of regulation (cognitive, motivational, affective and selective). Similar to attitudinal factors (previously described), self- efficacy has a cognitive aspect which involves the educator’s choices and aspirations to be inclusive. Motivational factors include the goals an educator sets and their level of perseverance when setbacks happen. Affective factors or mood involve levels of stress encountered as a result of their inclusive teaching, Finally, selective approaches are the final factor for self-efficacy where the approaches they use and decisions they make regarding inclusion in their classroom are considered [29].

Educators must explore how they feel about their own competence for actualizing inclusive education and what skills they possess to successfully enact a classroom environment where all children, despite their ability level, are educated together [30]. When educators have high self-efficacy for inclusion, the skills they possess include, the confidence and ability to differentiate instruction by adjusting and changing curriculum, and utilizing pedagogical methods to ensure the learning needs of all students are met. When educators report low self-efficacy, they identify feeling anxious about implementing inclusion and they express a lack of knowledge and skills to do so [31, 32].

Studies have found that there are links between teacher self-efficacy and attitudes and beliefs about inclusion [28, 33]. For example, secondary school teachers who held positive beliefs that inclusion is the best education for all students, also had higher levels of self efficacy on three subscales that were measured, including, classroom management, student engagement and instructional strategies [33]. These teachers were found to have a higher efficacy to support all students physically, behaviourally and academically [34]. An understanding of attitudes and self-efficacy for inclusion has provided a foundation for developing frameworks and best practices for supporting educators including the PAS framework.

### **3. The PAS framework**

As we look to ways to best support educators it is also important to consider the various contexts that inclusive education exists in schools and learning environments globally. Inclusive education is not a singular entity and is impacted by the context it lies within (resources, knowledge, attitudes, self-efficacy, society, etc.). This means that inclusion can look different from context to context and a “one-size-fits-all” approach to professional development (PD) may not be feasible or practical [35]. For this reason and in alignment with calls to action for inclusive education worldwide, we propose a framework for examining inclusive practice in school.

Through examining frameworks and models to best actualize inclusive education for students with disabilities, our own experiences as educators, conversations with educators and each other, classroom observations and facilitating educator professional development we conceptualized the PAS framework. Guided by the concepts of UDL and our knowledge and understanding of diverse experiences with inclusion across the world, Ramps to Inclusion (**Figure 1**) was established to support educators’ learning about and implementation of inclusion in their schools and classrooms. In

## PAS

Consider these three aspects when planning for your students:

- Spaces that meet the physical and emotional needs for all students.
- Opportunities to learn with same age peers for all students.
- Opportunities and support to develop sustainable peer relationships for all students.

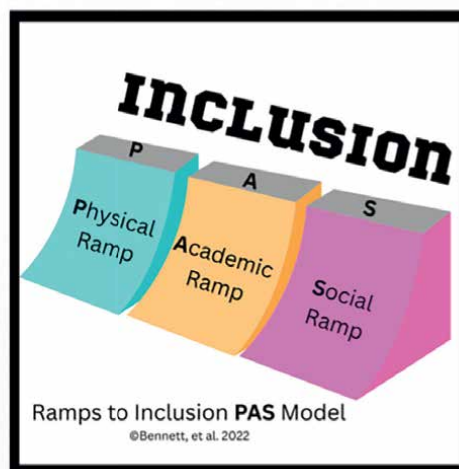


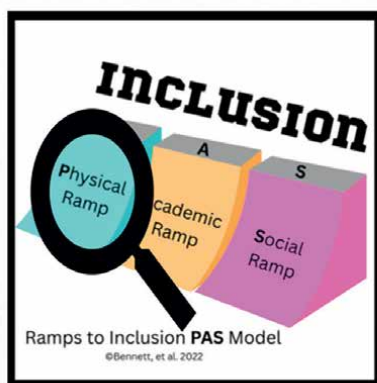
**Figure 1.**  
*Ramps to inclusion PAS model.*

order for inclusion to be actualized within a school context, three domains must be present: (1) physical access, (2) academic access and (3) social access. What follows is a description of each of these domains and a set of guiding questions for schools and educators to utilize when implementing concepts of UDL as a means for including students with disabilities.

### 3.1 Physical access: Opportunities to be together

When we take a closer look at the physical ramp (**Figure 2**), it is understood that physical access, although a prerequisite, does not simply mean being present in the school or classroom. In alignment with UDL, physical spaces need to be designed to

## What does PHYSICAL ACCESS look like?



1. Are learning spaces physically accessible for all students?
2. Do learning spaces meet the sensory needs of students?
3. Do learning spaces allow for time away/alone?
4. Are learning spaces safe?
5. Do learning spaces allow for choice and flexibility?

**Figure 2.**  
*Physical access: Ramps to inclusion.*

allow for access by people who have disabilities, including ramps, signage, electronic doors, etc. However, physical access also ensures that all physical needs are being met, including sensory needs. Inclusive physical spaces must not only allow for all students to access the space fully, they must also include flexibility and be adaptable to change, ensuring that students feel safe and supported in their learning environment. By using the questions outlined in **Figure 2**, educators can examine their current practices and discern what they are currently doing well to ensure physical access and what they need to improve on.

### 3.2 Academic access: Opportunities to learn together

Academic access consists of all methods and strategies in place to ensure students have opportunities to engage fully in curriculum-based learning tasks. This involves how the curriculum is used to create learning opportunities and how supports including materials and technology are readily available. Academic access is often outlined in a student's individual education plan and can sometimes be viewed as the most important domain to implement. In alignment with SDG 4, academic access is often viewed as the cornerstone of inclusive education. By examining the questions in **Figure 3**, educators can explore their current ideas and practices for academic access for students with disabilities.

### 3.3 Social access: Opportunities to play together

Research indicates that students who experience inclusive education have greater social outcomes due to their increased opportunity for social interaction [36]. The social ramp not only involves strategies and practices to ensure classrooms and schools promote meaningful and authentic social interaction among students but also to ensure required skills and opportunities for social interactions are embedded and available. The questions outlined in **Figure 4** support educators and schools to examine what practices are in place to promote social access and what practices are missing or ineffective.

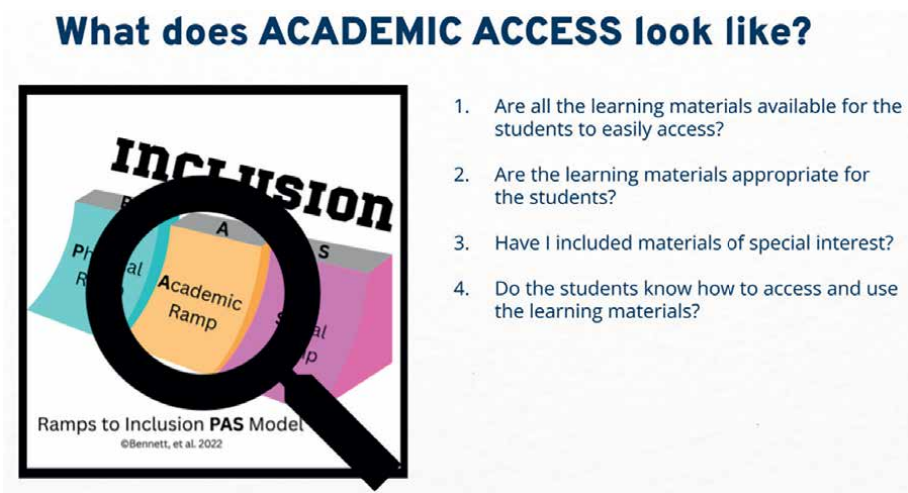


**Figure 3.**  
*Academic access: Ramps to inclusion.*



**Figure 4.**  
*Social access: Ramps to inclusion.*

### 3.4 Implications for practice

When we look at these ramps to inclusion defined by the physical, academic, and social domains to which they apply, educators are able to identify areas of strength and areas of need for improvement within their classrooms and schools.

Examples of how to implement physical access include:

- Creating flexible seating arrangements
- Having sensory tools to support students
- Ensuring equipment and manipulatives are accessible and readily at hand for students
- Allowing areas of the classroom to suit the varied needs of learners (quiet study areas, group learning tables and independent learning areas)
- Developing a classroom where there is room to move around and explore a variety of learning environments.

Examples of how to implement academic access include:

- Ensuring there are varying entry points to learning opportunities in class
- Creating materials to support learners and their varying needs (enlarged texts, physical manipulatives, varying formats for presentation, engagement and submission of work)

- Getting to know your learners and using this knowledge to create lessons that cater to preferences and interests of the students in your class
- Ensuring the learning environment is guided by predictable routines and patterns.

Examples of how to implement social access include:

- Creating opportunities for shared collaborative learning with roles to suit the needs and strengths of all learners
- Expliciting teaching students collaborative working skills
- Formulating classroom norms and routines to support the social engagement within the classroom
- Supporting learning opportunities where students are able to demonstrate their skills and abilities in mixed and similar ability group learning opportunities
- Creating social spaces and opportunities where all students are valued
- Challenging ableist assumptions that may be hindering friendship development.

### **3.5 Case example: Applying the PAS framework**

Mr. Fisher is a Grade 4 teacher at St. Paul Elementary. He teaches in an ‘inclusive’ classroom with a few students with IEPs. Three students have an IEP for learning disabilities and require some basic accommodations (e.g., additional time, preferred seating, etc.), but one student has more significant needs. Ron, a student with Down’s Syndrome. There is also a full time EA in the class, Ms. Foster. Routinely, Ron works with Ms. Foster at the back of the classroom in a special work station set up specifically for him. Ron works on the goals outlined in his IEP which consist mainly of modified curriculum expectations and some alternative programming. When the class is working on Grade 4 curriculum, Ron will often be engaged in something completely unrelated. Even during classwide tasks, Ron is excluded for one reason or another. Mr. Fisher and Ms. Foster have discussed how they can better include Ron in the grade four class.

Mr. Fisher and Ms. Foster are reconsidering how they can make the classroom environment more accessible for Ron focusing on the physical, academic, social ramps to inclusion outlined in the PAS model. This is what they did:

- *Physically:* They adjusted placement of the work station that was assigned to Ron and renamed it as a quiet work station for anyone in the class to use when they need a break or. Ron’s learning materials were organized in bins/drawers on wheels so they can be easily accessed and stored away when not needed. They moved Ron to sit alongside his peers and worked with support as required but also to give him space and independence when he was able to manage on his own. They established that it is ok for Ron to struggle at times and focused on allowing Ron time to figure things out on his own before immediately fixing the situation for him.

- *Academically*: Mr. Fisher re-examined his plans for all subject areas and looked for entry points for Ron based on his academic abilities. He structured collaborative learning opportunities where Ron can have valuable roles for participation in group work with some support as needed. For example, when reading a class text, Mr. Fisher used artificial intelligence to summarize the text at a level that Ron could understand and even read with support. These new learning goals were included in Ron's IEP.
- *Socially*: In moving Ron to sit with his peers in class the first steps in social acceptance was initiated. One of the most important precursors for establishing friendships is proximity by allowing the students to interact more freely, Ron was given increased social opportunities. Mr. Fisher and Ms. Foster also worked with Ron to support him in practicing communication and social interaction skills appropriate with his peers. They also taught the other students in the class strategies to interact with Ron including ways they can help support his learning, what language to use when speaking to Ron and how to include him in their learning and social activities.

This was just the beginning. Through working with both Ron and the rest of the class, Mr. Fisher and Ms. Foster supported an environment that created a sense of belonging within their class and through their efforts Ron became more independent in both academic and social opportunities.

#### **4. Conclusions**

The overarching goal of SDG 4 [1] is for all children to have access to high quality inclusive education. Many frameworks have supported the work of inclusive education over the past few decades, including Universal Design for Learning and Differentiated Instruction. These frameworks provide foundational theory for how to structure schools and school systems that are inclusive and most educators are familiar with these concepts. Yet despite these concepts being readily available, educators continue to struggle to actualize inclusive education due to their own beliefs and self-efficacy for inclusion [34] as well as the perceived complexity of the frameworks. How inclusion is actualized in classrooms and schools vary based on ones' interpretations of what inclusion means. Research indicates that in order for DI and UDL to be sustainable practices for inclusive education, educators and support staff need practical tools that are easy to use and implement [37].

The PAS framework presented in this chapter was designed to serve as a practical support for the implementation of DI and UDL in classrooms and school. The foundation for this book is to ensure that educators are equipped with the knowledge and understanding to use the many theories provided to them in a practical and applicable way within their classrooms and schools. The chapters that follow include research and practical implications for educators to enact inclusive education more effectively.

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## Section 2

# Educator Attitudes and Beliefs

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# Effective Teaching Practices and Inclusion of Students with Special Needs in Regular Classrooms: Examining Teachers' Attitudes and Knowledge toward Special Needs Minorities

*Awal Mohammed Alhassan*

## Abstract

This study examines how principals' expectations, teachers' attitudes, and knowledge of special education influence inclusive teaching practices and the integration of minority students with special needs in Norwegian classrooms. Using surveys and classroom observations, findings reveal that teacher attitudes, self-efficacy, and training significantly predict the adoption of inclusive practices, aligning with Allport's Intergroup Contact Theory and the Theory of Planned Behavior. Key strategies include differentiated instruction, culturally relevant pedagogy, and family involvement, fostering equity and engagement. While principals' expectations shape school culture, their direct impact on teachers' practices is limited. The study highlights the need for enhanced professional development and adaptive teaching to address resource and material gaps, ensuring equitable access to education. Limitations include a cross-sectional design and small sample size, which restrict causality and generalizability. Results underscore the importance of systematic, inclusive practices for meaningful integration.

**Keywords:** inclusive education, minority students, teacher attitudes, differentiated instruction, professional development

## 1. Introduction

Norway has established itself as a leader in inclusive education, promoting the principle that every student, including those with special educational needs (SEN), deserves equitable access to quality education. This commitment was institutionalized with the educational reforms of 1976, which introduced inclusive policies to both compulsory and upper-secondary education. Subsequent reforms in the 1980s and

1990s further emphasized equal participation and access for all students, setting the foundation for a more inclusive educational system [1].

The 1994 Salamanca Statement marked a pivotal moment in global education, urging nations to adopt inclusive education as a fundamental principle. Norway responded proactively, implementing policies designed to create inclusive classrooms and a learning environment where students of all abilities, backgrounds, and learning styles are welcomed, valued, and supported. The goal is to ensure that every student, including those with disabilities, diverse cultural backgrounds, or different learning needs, has equal access to education and opportunities to succeed. However, challenges remain in developing universally effective models that accommodate the diverse needs of SEN students. The European Agency for Special Needs and Inclusive Education underscores the importance of context-specific research to enhance the effectiveness of inclusive education practices in Norway.

In Norway, the terms “integration” and “inclusion” are often used interchangeably, reflecting a shared responsibility for fostering group belonging and equitable participation. Rooted in the educational reforms of the 1970s, these terms embody Norway’s dedication to creating “a school for all.” Achieving this ideal requires a confluence of supportive school leadership, positive teacher attitudes, and an in-depth understanding of diverse student needs [2]. Research indicates that positive teacher attitudes, coupled with robust training, significantly improve both the academic and social outcomes of SEN students including minorities [3, 4].

This study focuses on the inclusion of special needs minorities, exploring effective teaching practices and the interplay between teachers’ attitudes, knowledge, and inclusive practices. By examining these factors, the study seeks to provide insights for refining inclusion strategies, thereby advancing Norway’s commitment to high-quality education for all students.

## **2. Research on effective inclusive school practices**

Current research emphasizes the need for inclusive classroom climates that promote social integration and enhance the learning experiences of students with diverse abilities to foster inclusive classroom environments. Inclusive Mainstream Teaching (IMT) is central to this approach, advocating for the adaptation of general education classrooms to meet the needs of all learners, including those with disabilities. Merely offering special accommodations in isolation often falls short of achieving desired outcomes. Instead, flexible and differentiated instruction fosters an environment where all students thrive. This approach not only supports academic achievement but also nurtures peer acceptance, social cohesion, and mutual respect [5], often through Evidence-Based Practices (EBPs) [6].

According to Goddard et al. [6], the application of EBPs is another cornerstone of effective inclusive education. These structured methods are validated through research to support diverse learners, including those with disabilities. However, the confidence and preparedness of educators to implement EBPs remain inconsistent. Studies reveal that only one-third of teachers feel equipped to use inclusive practices effectively [6]. Ensuring that educators receive comprehensive training in EBPs is critical to improving the quality of instruction in inclusive classrooms. When applied effectively, EBPs create equitable environments that support the academic and social development of all students including special needs minorities, race and disabilities.

The intersectionality of race and disability presents unique challenges within inclusive education. Disability Critical Race Theory (DisCrit) highlights how racism and ableism intersect to create compounded barriers for students of color with disabilities. Research rooted in DisCrit emphasizes the inclusion of students' lived experiences in shaping inclusive practices. Community-based participatory research (CBPR), which involves families and communities, ensures that policies are both theoretically sound and practically applicable [7].

Despite these advancements, challenges persist in translating inclusive policies into effective practices. Teacher skepticism and a lack of confidence in managing diverse classrooms underscore the need for targeted professional development [8]. Effective inclusive teaching requires a supportive classroom climate, addressing individual learning needs while fostering collaboration and mutual respect.

### **3. Norway's context**

The Norwegian Directorate for Education and Training [9] identifies significant challenges in implementing inclusive education. Notably, nearly 48% of SEN students are taught in segregated settings, diverging from national policies and international guidelines such as the Salamanca Statement. Additionally, many schools rely on teacher assistants with limited training in special education, undermining the quality of inclusion efforts. Research highlights the need for evidence-based strategies, including Universal Design for Learning (UDL), differentiated instruction, collaborative teaching, and formative assessment [10, 11].

Effective schools consistently exceed socio-economic expectations, characterized by high expectations, strong leadership, continuous progress monitoring, and robust home-school relationships. Integrating these principles with inclusive strategies, such as UDL [12], collaborative teaching [13], and family involvement [14], can significantly enhance the inclusivity of educational practices.

### **4. Relationship between teachers' attitudes and knowledge**

Research underscores the critical relationship between teachers' attitudes toward SEN students and their knowledge of inclusive practices. Positive attitudes are often associated with greater proficiency in inclusive teaching methods, fostering supportive and accommodating classroom environments [15]. Conversely, limited knowledge can perpetuate resistance and exclusionary practices [16].

According to Hodkinson [16] teachers' attitudes and knowledge are mutually reinforcing, meaning that a teacher's *knowledge* and *attitude* are interconnected and continuously influence each other. When teachers improve their knowledge, their attitude toward teaching becomes more positive, and when they have a positive attitude, they are more open to learning and expanding their knowledge. This cycle ultimately leads to better teaching effectiveness and improved student outcomes. Professional development programs that focus on inclusive practices can significantly enhance both domains, leading to more effective implementation of inclusive education. Forlin et al. [17] highlight the importance of tailored training programs that address the specific needs of educators, enabling them to create more inclusive classrooms.

## **5. Theoretical framework**

This study integrates Ajzen's [18] Theory of Planned Behavior (TPB) and Allport's [19] Intergroup Contact Theory (ICT) to explore factors influencing inclusive education for special needs minority students. TPB asserts that an individual's behavior is shaped by their intentions, which are influenced by attitudes, subjective norms, and perceived behavioral control. Applied to inclusive education, the willingness of educators to implement inclusive practices hinges on their attitudes toward inclusion, perceived expectations from peers and leadership (subjective norms), and their confidence in executing these practices (perceived behavioral control). This underscores the necessity of supportive leadership and targeted professional development to empower educators in fostering inclusive classrooms.

ICT provides a complementary perspective by emphasizing the role of structured, meaningful interactions in reducing prejudice and promoting social cohesion. For students with special needs and minority backgrounds, purposeful and cooperative learning opportunities designed by educators can foster acceptance and understanding. However, ICT cautions that mere physical integration is insufficient; interactions must be intentional, equitable, and supportive to achieve genuine social inclusion.

By synthesizing TPB and ICT, this study investigates how educators' attitudes, knowledge, and external pressures influence their commitment and effectiveness in adopting inclusive practices for special needs minority students. This integrated approach highlights actionable strategies for promoting meaningful inclusion.

## **6. Research questions**

The study addresses the following research questions:

1. How do principals' expectations influence the implementation of effective teaching practices for students with special needs in inclusive classrooms?
2. What specific inclusive teaching practices are perceived as most effective by teachers and principals, and how do these practices align with current research on inclusion for special needs minorities?
3. What is the relationship between teachers' attitudes toward special needs students and their knowledge of inclusive teaching practices, and how does this relationship affect classroom inclusivity?

## **7. Methodology**

### **7.1 Research design**

This study utilized a cross-sectional survey design to collect quantitative data on attitudes, practices, and knowledge regarding inclusive education in Norwegian secondary schools. The approach allowed for a snapshot of current trends and relationships among variables at a single point in time.

## **7.2 Sample**

A total of 330 educators participated, comprising 10 principals and 320 teachers from 10 secondary schools in Oslo and Rogaland counties. The sample represented a diverse group, with 64% female and 36% male participants, aged 26–65 years. Of these, 43% reported formal training in special education, while 42% had prior experience working with students with special educational needs (SEN), including minority SEN populations.

## **7.3 Instruments, data collection and analysis**

Four validated instruments were employed in this study to assess various dimensions of inclusive education; Attitude Toward Inclusive Education Scale (ATIES) by Kuyini and Desai [20], Knowledge of Inclusive Education Scale (KIES) also developed by Kuyini and Desai [20], Principals' Expectations Scale (PES) and Effective Teaching Practices Checklist (ETPC). ATIES, this 16-item scale evaluates attitudes toward inclusion across academic, physical, social, and behavioral domains, demonstrating good reliability (Cronbach's Alpha = 0.87), and compares well with those from a study in Ghana which indicated an alpha figure of 0.861. KIES, a 16-item measure designed to assess knowledge of inclusive education principles, learner diversity, instructional planning, and teacher roles (Cronbach's Alpha = 0.82). PES, this 14-item scale captures principals' expectations regarding inclusive practices, showing strong reliability (Cronbach's Alpha = 0.83). ETPC, a comprehensive 30-item checklist evaluating evidence-based strategies for inclusive teaching was developed from the literature. These instruments have been instrumental in research exploring factors that influence the successful implementation of inclusive education practices.

Data were gathered through structured questionnaires and 48 classroom observations. Descriptive and inferential statistical analyses, including multiple regression, were performed to explore relationships among variables and predict attitudes and practices. Instrument reliability and validity were maintained through prior validation and observer training.

## **7.4 Ethical considerations**

Ethical approval was obtained from the Norwegian Educational Research Board. Informed consent was secured from all participants, ensuring compliance with ethical standards and confidentiality protocols.

## **8. Results**

The first research question examines how school leadership influences inclusive practices and impacts teachers' instructional strategies and classroom adaptations. To address this question, principals' scores on the Principals' Expectations of Schools (PES) measure were analyzed. The means and standard deviations of each PES item were computed, and the mean scores were rank-ordered from highest to lowest to provide a comprehensive view of principals' expectations regarding the implementation of inclusive practices.

Given the 4-point Likert-type scale of the PES, the ranked items were categorized into three expectation levels: high ( $\geq 3.0$ ), moderate (2.50–2.99), and low ( $\leq 2.49$ ). The rank ordering of mean scores (**Table 1**) revealed areas where principals held high expectations of their teachers. Specifically, principals emphasized Collaboration and Teamwork (item 11), the Use of Formal and Informal Assessments (item 3), Professional Development (item 9), Individual and Group Instruction (item 10), Co-teaching (item 14), Adapting Instructional Materials (item 4), and Assessing Diverse Information Sources (item 2).

In contrast, principals demonstrated moderate expectations for activities such as Organizing Support Services (item 1), Peer Tutoring and Cooperative Learning (item 7), Involving Students with SENs in All Activities (item 13), and Classroom Layout Modifications (item 6).

Notably, principals exhibited low expectations for tasks requiring greater individualization, including Multi-level Teaching (item 8), Setting Individual Performance Standards (item 5), and Preparing Individualized Educational Programs (IEPs) (item 12). This delineation underscores varying degrees of emphasis placed on inclusive practices by school leadership.

To address research question 2, teachers' scores on the Effective Teaching Practices Checklist (ETPC) were analyzed. Descriptive statistics, including means and standard deviations for each ETPC item, were computed to evaluate the frequency and consistency of specific teaching practices. The resulting mean scores were rank-ordered to identify trends in teacher performance across various effective teaching behaviors. Given the 3-point Likert-type scale utilized in the ETPC, the ranked items were systematically grouped into three categories of teaching behaviors based on their mean scores (refer to **Table 2**).

Items with mean scores ranging between 3.00 and 2.50 were classified as behaviors consistently demonstrated by teachers. According to the ETPC scoring

| Item                                           | Rank | Mean | SD   |
|------------------------------------------------|------|------|------|
| 11. Collaboration and Teamwork                 | 1    | 3.50 | .688 |
| 3. Policy and Legal Mandates                   | 2    | 3.50 | .688 |
| 9. Differentiated Instruction                  | 3    | 3.35 | .670 |
| 10. Individual and Group Instruction           | 4    | 3.15 | .812 |
| 14. Undertake Co-teaching                      | 5    | 3.00 | .725 |
| 4. Adapt Instr. & for special needs minorities | 6    | 3.00 | .725 |
| 2. Inclusive Pedagogy and Classroom Management | 7    | 3.00 | .725 |
| 1. Professional Development                    | 8    | 2.95 | .998 |
| 7. Use Peer tutoring/ Cooperative Learning     | 9    | 2.80 | .767 |
| 13. Involve all students in all Activities     | 10   | 2.75 | .550 |
| 6. Data-Driven Practices                       | 11   | 2.55 | 1.14 |
| 8. Use Multi-level Teaching                    | 12   | 2.10 | .552 |
| 5. Individual Performance Standards            | 13   | 1.85 | .812 |
| 12. Prepare IEPs                               | 14   | 1.50 | .512 |

**Table 1.**  
*Means and standard deviations of principals' responses on the PES.*

| Item                                              | Rank | Mean | SD   |
|---------------------------------------------------|------|------|------|
| 22. Collaborative teaching and family involvement | 1    | 3.00 | .000 |
| 2. Teacher Position                               | 2    | 2.94 | .229 |
| 7. Maintain Student Attention                     | 3    | 2.89 | .314 |
| 3. Peer Support and Cooperative Learning          | 4    | 2.85 | .308 |
| 17. Feedback                                      | 5    | 2.83 | .354 |
| 5. Use of Culturally Relevant Pedagogy            | 6    | 2.82 | .411 |
| 8. Differentiated instruction                     | 7    | 2.75 | .434 |
| 13. Presentation Clarity                          | 8    | 2.74 | .434 |
| 27. Involving Special Needs in Class Activities   | 9    | 2.71 | .449 |
| 11. Positive behavioral supports                  | 10   | 2.59 | .469 |
| 16. Independent Practice Activities               | 11   | 2.56 | .554 |
| 4. Class Rules and Procedures                     | 12   | 2.52 | .611 |
| 18. Lesson Mastery                                | 13   | 2.47 | .485 |
| 1. Instructional Environment                      | 14   | 2.47 | .725 |
| 14. Pace of Instruction                           | 15   | 2.44 | .770 |
| 6. Believe in students' potential                 | 16   | 2.43 | .488 |
| 9. Student Engagement Time                        | 17   | 2.41 | .478 |
| 15. Guided Practice                               | 18   | 2.22 | .534 |
| 19. Use of Questions                              | 19   | 2.20 | .594 |
| 12. Lesson Overview                               | 20   | 2.20 | .362 |
| 21. Forecast Upcoming Lesson                      | 21   | 1.98 | .606 |
| 20. Lesson Summary                                | 22   | 1.95 | .505 |
| 24. Individual and Group Instruction              | 23   | 1.71 | .702 |
| 28. Modify Evaluation Procedures                  | 24   | 1.59 | .675 |
| 25. Use of Assistive Technology                   | 25   | 1.37 | .491 |
| 23. Adapt Instr. and Curriculum Materials         | 26   | 1.27 | .596 |
| 26. Use Multi-level Teaching                      | 27   | 1.11 | .276 |
| 10. Use of IEPs                                   | 28   | 1.10 | .010 |
| 29. Supportive climate                            | 29   | 1.08 | .005 |
| 30. Scans and Circulates Classroom                | 30   | 1.06 | .000 |

**Table 2.**  
*Means and standard deviations of teachers' scores on the effective teaching practices checklist (ETPC).*

rubric, these scores correspond to the “Fully in Evidence” category. Teaching practices in this group included collaborative teaching (item 22), appropriate teacher positioning (item 2), maintaining student attention (item 7), gaining initial student attention (item 3), providing feedback (item 17), responding to rule non-compliance (item 5), reinforcement use (item 8), presentation clarity (item 13), involving students with disabilities in class activities (item 27), knowledge review (item 11), providing independent practice activities (item 16), and establishing class rules and procedures (item 4).

| Item                                  | Means for groups                           | t (p)         |
|---------------------------------------|--------------------------------------------|---------------|
| Adapts instructional Materials (23)   | No Training = 1.15<br>Some Training = 1.38 | -1.17 (.252)  |
| Individual and group instruction (24) | No Training = 1.71<br>Some Training = 1.73 | -.081 (.936)  |
| (Peer/coop. Learning) (25)            | No Training = 1.12<br>Some Training = 1.60 | -3.38 (.002)* |
| Differentiated Class activities (27)  | No Training = 2.56<br>Some Training = 2.85 | -2.05 (.048)* |
| Modifying Evaluation Procedures (28)  | No Training = 1.47<br>Some Training = 1.70 | -1.03 (.310)  |

\* $p < .05$ .

**Table 3.**

*Means and t-test: Training in special education/inclusion and ETPC items.*

Items with mean scores ranging from 2.49 to 2.00 were classified as behaviors less frequently demonstrated by teachers. These practices fell under the “Partially in Evidence” category of the ETPC. Specific behaviors in this category included ensuring lesson mastery (item 8), structuring the instructional environment (item 1), adjusting the pace of instruction (item 14), scanning and circulating the classroom (item 6), maximizing student engagement time (item 9), providing guided practice (item 15), effective use of questions (item 19), and providing clear lesson overviews (item 12). These practices were performed inconsistently or intermittently by teachers.

Items with mean scores ranging from 1.99 to 1.00 were categorized as behaviors rarely demonstrated in classrooms, aligning with the “Not in Evidence” category of the ETPC (see **Table 3**). These included forecasting upcoming lessons (item 21), lesson summaries (item 20), individual and group instruction (item 24), modifying evaluation procedures (item 28), additional instruction (e.g., peer tutoring or cooperative learning) (item 25), adapting instructional and curriculum materials for students with disabilities (item 23), multi-level teaching (item 26), and use of IEPs (item 11). Notably, most behaviors in this category pertained to the Adaptive Teaching Practices subscale, highlighting a gap in teacher implementation of adaptive inclusion strategies.

This analysis underscores a critical need for targeted professional development to enhance the adoption of adaptive teaching practices that align with evidence-based strategies for inclusive education.

In respect of the ETPC measure, teachers were using more teaching behaviors associated with class management and lesson presentation more consistently. However, the majority of teaching practices on the adaptive instruction subscale including peer tutoring and cooperative learning strategies were used less consistently.

## **9. Examining the relationship between teachers’ attitudes toward special needs students and their knowledge of inclusive teaching practices**

The third research question was addressed through a multiple regression analysis to examine the relationships between teachers’ attitudes (measured by ATIES),

teachers' knowledge (measured by KIES), and principals' expectations (measured by PES) as independent variables, and effective teaching practices (measured by ETPC) as the dependent variable. The analysis revealed no statistically significant correlation among the three independent variables and the dependent variable.

To further explore these findings, mean scores across the 30 items obtained from all participating teachers ( $N = 48$ ) during data collection were analyzed. The focus was on the variables of attitude (ATIES) and knowledge (KIES) in relation to two teacher background characteristics: (1) training in special education or inclusive education and (2) experience teaching students with special educational needs (SEN).

A comparative analysis was conducted to assess differences in mean scores between teachers with training in special education/inclusion and those without such training. This analysis identified statistically significant differences in the mean scores of these two groups on two items within the Adaptive Instruction subscale (see **Table 3**). These results suggest that specific training in special education or inclusion may influence certain aspects of adaptive instructional practices. Further research is recommended to explore these associations in depth.

Educators with training in special education or inclusion were observed to implement additional instructional strategies, including peer tutoring and cooperative learning techniques, at higher frequencies compared to those without such training (item 25). Moreover, these trained teachers demonstrated greater use of differentiated instruction and actively engaged students with disabilities in classroom activities (item 27). Statistical analysis revealed significant differences in the application of peer tutoring and cooperative learning strategies ( $t = -3.38$ ,  $df = 35$ ,  $p = .002$ ) and in the inclusion of students with disabilities in classroom activities ( $t = -2.05$ ,  $df = 35$ ,  $p = .048$ ). These findings underscore the impact of specialized training on enhancing inclusive teaching practices.

## **10. Experience with special needs minorities and effective teaching practices**

A comparison of mean scores across 30 items between teachers with and without experience working with minority students and those with special educational needs revealed a statistically significant difference on one item within the Adaptive Instruction subscale. This finding highlights a distinct variation in responses between the two groups (refer to **Table 4**). The results underscore the potential influence of prior experience on teachers' approaches to adaptive instructional practices.

Teachers with prior experience working with students with special educational needs (SENs) were observed to employ additional instructional strategies, including peer tutoring and cooperative learning techniques (item 25), more frequently than their counterparts without such experience. Statistical analysis revealed a significant difference in the use of these instructional strategies based on experience with SENs ( $t = -3.36$ ,  $df = 35$ ,  $p = .002$ ).

To further investigate the impact of background variables on teaching practices, a multiple regression analysis was conducted. This analysis examined the combined influence of four variables: years of training in inclusion/special education and experience working with SENs, using total scores across the domains of the Effective Teaching Practices Checklist (ETPC).

The stepwise regression analysis indicated no significant findings for the domains of classroom management and lesson planning/presentation. However, significant

| Item                                  | Means for groups                               | t. (p).       |
|---------------------------------------|------------------------------------------------|---------------|
| Adapts Instructional Materials (23)   | No Experience = 1.04<br>Have experience = 1.41 | –1.94 (.061)  |
| Individual and Group instruction (24) | No Experience = 1.57<br>Have experience = 1.80 | –.98 (.335)   |
| (Peer/coop. Learning) (25)            | No Experience = 1.07<br>Have experience =1.57  | –3.36 (.002)* |
| Differentiated Class Activities (27)  | No Experience =2.61<br>Have experience =2.78   | –1.6 (.255)   |
| Modifying Evaluation Procedures (28)  | No Experience =1.39<br>Have experience =1.72   | –1.44 (.159)  |

\* $p < .05$ .

**Table 4.**  
*Means and t-test: Experience with SENs and ETPC items.*

| Model | R    | R Square | Adj. R Square | df   | F     | Sig. |
|-------|------|----------|---------------|------|-------|------|
| 1     | .364 | .133     | .108          | 1/35 | 5.360 | .027 |

*a. Predictors: (Constant) Experience with SEN and minorities.*

**Table 5.**  
*Regression model summary: Background variables as predictors of effective teaching practices.*

correlations were identified within the adaptive instruction domain. Specifically, training in special education/inclusion ( $r = .292$ ,  $p = .040$ ) and experience with students with SENs ( $r = .364$ ,  $p = .013$ ) were positively associated with adaptive instructional practices. Further regression analysis demonstrated that experience working with SENs significantly predicted adaptive instructional practices, explaining 10.8% of the variance in this domain (adjusted  $R^2 = .108$ ,  $F = 5.36$ ,  $p = .027$ ).

These findings highlight the importance of experience with students with SENs in promoting adaptive teaching practices, emphasizing the need for exposure to inclusive educational environments as a critical component of teacher preparation programs (Refer to **Table 5** for detailed statistical data).

Teachers’ performance in effective teaching practices was significantly influenced by their training in special education/inclusion and their experience with students with special educational needs (SENs). Among these variables, experience working with SENs emerged as the most robust predictor, underscoring its critical role in fostering effective instructional strategies in inclusive education settings.

## 11. Discussion

This study aimed to investigate how principals’ expectations, teachers’ attitudes, and their knowledge about special education impact the effectiveness of teaching practices and the inclusion of minority students with special educational needs in regular classrooms. Specifically, this study seeks to understand how school leaders and educators perceive and approach the integration of students with special needs with special focus on minority students, and to identify which factors contribute

to successful inclusive education practices. The goal is to provide insights into how schools can create more supportive and equitable learning environments for students with special needs. A cross-sectional survey and classroom observations offered valuable insights into the practical implementation of IE with the findings echoing the theoretical underpinnings of both Allport's Intergroup Contact Theory [19] and Theory of Planned Behavior and their application in inclusion, suggesting the need for positive teacher attitudes, knowledge and engaging classroom environment as vital to the success of inclusion.

The study found high principal expectations of their teachers for inclusive practices and the methods Norwegian teachers employ are supported by research and policy studies. For example, Nes [21] and Haug [22] highlight that Norwegian principals are committed to implementing inclusive policies and promoting professional development in inclusive education. Additionally, Nordahl et al. [4] and Hauge [23] document specific strategies that teachers use to support inclusion, including differentiated instruction, cooperative learning, and the use of technology.

In contrast to this study, Kuyini and Desai [20], Vlachou and Tsirantonaki [24] and Kamran et al. [25] found that subjective norms, specifically principals' expectations, were not a significant factor in promoting effective teaching practices for the inclusion of students with special needs in regular classrooms. Research by Vlachou and Tsirantonaki [24], for example, highlights that principals' values and attitudes toward inclusivity might influence their support for inclusive policies but are not always sufficient to alter teachers' practices directly. Instead, factors such as teachers' personal beliefs, self-efficacy, and attitudes toward students with special needs play a more critical role in shaping inclusive behaviors, especially when resources and training are available. Kamran et al. [25] similarly found that while school leadership and values are important, teachers' self-efficacy and attitudes are stronger predictors of successful inclusive practices. Teachers with higher self-efficacy and positive attitudes toward inclusion tend to adopt inclusive practices more readily, independent of direct expectations from principals.

The biggest concern that has been raised in relation to instruction in inclusive classrooms is the issue of whether included students will benefit from such instruction. In this study, teachers were found to demonstrate teaching practices such as collaboration and family involvement, use of culturally relevant pedagogy and differentiated instruction to meet individual needs of minority students with disabilities. Moreover, it was found that teachers background variables of training and experience were correlated with effective teaching practices. This implied that teachers with training in special education/inclusion and those with experience working with students with special needs were found to be using more adaptive teaching practices. These findings are consistent with studies that have found a strong relationship between training in inclusion, experience working with students with disabilities on one hand, and instructional behaviors in inclusive classrooms on the other hand [20, 26–29].

On the other hand, the study also found that teachers were making minimal use of adaptive instruction and multi-level teaching. This aligns with Haug [22], who highlights that limited use of adapted instructional materials for Special Educational Needs (SEN) minority students can lead to unequal learning opportunities, as they help SEN students access curriculum content at appropriate difficulty levels. Conversely, multi-level teaching, which involves differentiated tasks and flexible grouping, supports inclusivity by accommodating diverse abilities within mainstream classrooms [30]. While Norway promotes inclusive education, inadequate adaptation

of materials limits SEN students' full participation. Implementing effective multi-level teaching strategies could bridge this gap and enhance equitable access to education for all students [4].

A vital finding of this study is the identification of inclusive practices crucial for integrating minority students with Special Educational Needs (SEN) into mainstream classrooms. Key practices include differentiated instruction, which tailors learning tasks to individual abilities, and multi-level teaching, allowing students to engage at varied difficulty levels. Family involvement fosters stronger support networks, enhancing students' academic and social inclusion. Peer support and cooperative learning promote interaction, increasing belonging and mutual understanding among students. Additionally, culturally relevant pedagogy aligns curriculum with students' backgrounds, fostering engagement and identity validation. These strategies collectively support inclusive, equitable learning environments for SEN minority students.

## **12. Conclusion**

The study demonstrates that both the Theory of Planned Behavior and Intergroup Contact Theory offer valuable frameworks for understanding the factors that influence effective teaching in inclusive classrooms. Effective teaching in inclusive classrooms in Norway is grounded in adaptive education practices, collaborative efforts, and a strong commitment to equity. Teachers are expected to implement inclusive teaching practices that cater to the needs of all students, from those with learning disabilities to those with giftedness or social challenges. Principals, as instructional leaders, are pivotal in supporting teachers through resource allocation, professional development, and fostering a culture of collaboration. Despite the challenges of time constraints and resource limitations, the Norwegian education system continues to prioritize inclusion as a cornerstone of its educational philosophy.

The findings suggest that teacher attitudes and knowledge are key predictors of effective teaching and that principals' expectations remain an important element in shaping school culture and policies. The results contribute to a growing body of research emphasizing the need for ongoing professional development and support for teachers in inclusive education.

## **Implications for policy and practice**

The findings of this study carry significant implications for policy and practice in inclusive education. First, they highlight the critical role of teacher attitudes and knowledge in the successful implementation of inclusive practices. Professional development programs that focus on improving teachers' attitudes toward inclusion and expanding their knowledge of support mechanisms are essential for fostering effective teaching in inclusive settings. This could involve targeted training that addresses the specific needs of various disability groups and equips teachers with practical strategies for adapting instruction to meet diverse learners' needs. It is suggested in the study that both teachers and principals have the cultural competence, sensitivity, and knowledge of the use of culturally relevant pedagogy, as cultural backgrounds can influence students' learning experiences and needs.

To translate these findings into action, schools should implement differentiated instruction, culturally relevant pedagogy, and family engagement. Teachers need professional development to enhance self-efficacy and inclusive strategies. Schools must

ensure accessible resources, adaptive materials, and supportive peer interactions. Principals should foster an inclusive culture, prioritizing equity in physical, academic, and social access to education.

Despite the valuable insights gained, a major limitation of this study is its reliance on a cross-sectional design, which captures data at a single point in time and, therefore, limits the ability to establish causality between teachers' attitudes, knowledge, and the effectiveness of teaching practices in inclusive classrooms. Additionally, the relatively small sample size may not provide a comprehensive representation of teaching practices and attitudes across Norwegian secondary schools, potentially limiting the generalizability of the findings. In spite of its limitations, the findings from this study underscore the importance of systematic, effective inclusive practices aligned with core elements of inclusion, emphasizing that:

- The student is fully part of the group.
- The student shares in the benefits socially and academically of group membership.
- The student assumes shared responsibility for tasks and obligations within the group.

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# Educators' Knowledge of Exceptionalities and Its Relationship with Their Use of Universal Design for Learning and Differentiated Instruction

*Allison Horsley and Deanna C. Friesen*

## Abstract

Ontario teachers work with students of varying strengths and needs profiles. Consequently, they must develop the competencies to support students with different exceptionalities. The current study examined elementary and secondary in-service teachers' (N = 95) knowledge and confidence in teaching students with different exceptionalities and how this confidence was related to their use of Universal Design for Learning and Differentiated Instruction. Findings revealed that teachers felt less confident in teaching students with low prevalence exceptionalities (i.e., deaf/hard of hearing and blind/low vision) and more confident working with students with high prevalence conditions (i.e., learning disabilities and behavioural exceptionalities). Teachers also reported feeling more confident in supporting writing, organisation, and time management skills but less so in memory, executive functioning, and fine motor skills. Weak but positive correlations were observed between their use of UDL and DI and their confidence in their ability to teach students with different exceptionalities. The study underscores key challenges and opportunities for improving teacher training and professional development and enhancing educational outcomes for all students.

**Keywords:** inclusion, exceptionalities, teachers' knowledge, self-efficacy, teachers' experience, universal design for learning, differentiated instruction

## 1. Introduction

Over the past several decades, there has been an increased emphasis on the importance of including all students in the same classroom [1]. As a result, teachers work with students who have diverse learner profiles or who have an identified exceptionality. Specht and Hutchinson [2] defined the term student with an exceptionality as learners who are gifted as well as students with disabilities. The term can be used interchangeably with students with special needs to describe students that are in need of special education programs. It is the preferred term in Ontario, Canada. In the 2020–2021

school year, 164,899 students were identified as ‘exceptional’ by an Identification, Placement, and Review Committee, constituting 8.1% of the students in Ontario [3]. Additionally, 17% of students in Ontario received special education services. Of these students, 88% spent more than half the day in a regular education classroom [3].

To effectively teach all students, educators need both an understanding of the students in their classrooms and inclusive teaching strategies. Specifically, they require knowledge of different exceptionalities and knowledge of inclusive practices like Universal Design for Learning (UDL) and Differentiated Instruction (DI). The current study examined teachers’ confidence in teaching students who have an identified exceptionality and how this confidence related to their use of UDL and DI strategies. Understanding teachers’ knowledge of educating students with different exceptionalities is crucial for addressing gaps in professional development. This chapter briefly describes inclusive education and the role of UDL and DI, before introducing a novel study on the relationship between teachers’ knowledge of different exceptionalities and their use of UDL and DI practices. It closes by providing insights into how teachers’ confidence or lack of confidence in their knowledge of exceptionalities can inform professional development.

## **1.1 Inclusive education**

Inclusive Education is the framework used across Canadian provinces [4]. Inclusion refers to fostering a sense of belonging and requires both teachers and students to embrace individual differences. It aims to allow all students to participate by seeing them as valuable and integral members of the school community [5]. While inclusive education provides the framework across Canada, inclusion is the lived experience that creates an accepting and supportive learning environment for students. Having everyone in the same classroom provides better opportunities for learning, and all children can develop a sense of belonging [6, 7]. Further, students without exceptionalities have been found to have a reduced fear of differences, an increase in self-esteem, and a sense of belonging when they are educated alongside students with exceptionalities [8, 9]. Inclusive classrooms do not ‘hurt’ students without exceptionalities academically; instead segregated spaces can cause harm by ostracizing students with exceptionalities [7].

UDL is an inclusive educational framework that optimises teaching methods and curriculum design to support the needs of all learners. UDL emphasises providing multiple means of representation, engagement, and expression to ensure that students with diverse learning needs and abilities can access and benefit from inclusion [10]. For example, representation can include using visual aids and written materials to present information in various formats. Expression can involve allowing students to demonstrate their understanding through written work or oral presentations. Engagement could include offering choice in activities or connecting lessons to students’ interests. This approach to learning helps remove barriers to learning by integrating flexible options that anticipate and address variability among students. Inclusive classrooms incorporate teaching methods that foster academic success for all students [9].

DI is a complementary approach to UDL and refers to providing different instructional options to meet students’ needs. In this approach, educators vary content, process, and product based on students’ readiness, interests, and learning needs [11]. Unlike UDL’s broad curriculum design focus, DI starts with the student, allowing educators to design their approaches for students’ specific academic and social-emotional

needs [12]. When used together, UDL and DI create a framework for inclusive education that acknowledges everyone's unique learning needs. Nonetheless, little is known about how educators' use of these practices relates to their self-efficacy for supporting students with different exceptionalities.

## **1.2 Teachers' beliefs about inclusion and their self-efficacy**

A key factor that determines whether teachers engage in inclusive practices is their beliefs. The nature of these beliefs can be shaped by several different experiences and individual characteristics [13]. Sharma et al. [14] found that pre-service teachers in Australia, Canada, Hong Kong, and Singapore had more positive beliefs towards inclusion when they received additional training and had more extensive experiences with people with disabilities. Specht et al. [15] also found that females tended to report more inclusive beliefs. Previous exposure to diverse student populations also influenced teachers' beliefs and self-efficacy, with those having more direct experience feeling more confident in inclusive practices. According to Clipa et al. [13], previous experience and seniority, level of training, gender, time, access to educational resources, and the type of exceptionality all impact inclusive beliefs for in-service teachers. They found that teachers who had more professional training, more time to implement inclusion, and more resources had more positive attitudes towards inclusive education. On the other hand, teachers who had low self-efficacy and had a large class were more likely to have negative beliefs towards being able to implement inclusive education effectively.

Teachers' beliefs affect their behaviours, which influence the classroom environment and students' opportunities for success [16]. Unfortunately, teaching experience can negatively impact teachers' beliefs towards inclusive education over time [17, 18]. This shift may be due to challenges in managing diverse needs, inadequate support, and insufficient training related to inclusion. The decline in teachers' beliefs over time indicates a need for teacher training and professional development opportunities. Schmidt and Vrhovnik [19] identified teacher training as a major challenge in implementing inclusive education. Effective training plays a crucial role in equipping teachers to support students with exceptionalities and improve their readiness for inclusive practices [19]. Nonetheless, it is unclear where the gaps are in teachers' knowledge and if there are certain exceptionalities, or learning needs that teachers feel less prepared to support.

According to Alnasser [20], a lack of knowledge about exceptionalities from teachers can promote negative beliefs, which stigmatises students with disabilities. Therefore, some teachers may need more information about disabilities to build a positive attitude towards teaching exceptional students [13]. Solis et al. [21] argue that beliefs are related to knowledge and involve an emotional charge, condition the individual, and determine behaviour based on the ideas, beliefs, opinions or perceptions, and emotions that are produced. Teachers' beliefs impact the quality of instruction that students receive. Although beliefs can be modified, adequate training is crucial for this change [21]. Continuous training, especially in the field of responding to diversity, favors not only the improvement of the educational response given to students but also the expectations about student abilities [21].

Teacher training can positively impact teachers' sense of self-efficacy for inclusive practice [22]. Self-efficacy is defined as the judgment of one's own capabilities to perform or achieve a task [23]. Individuals with greater beliefs about their self-efficacy are more inclined to try more difficult tasks, whereas those who have low self-efficacy beliefs tend to avoid difficult tasks. Teacher self-efficacy is the judgment of a teacher

about their ability to perform or achieve a task [1]. Teachers with high self-efficacy believe that they can foster all students' learning [24]. Bas [1] noted that teachers who are highly efficacious are more open to new ideas and are willing to try new methods to better meet the needs of their students. Teachers with low self-efficacy beliefs are more likely to blame low achievement on lack of intelligence, poor home environments, uncooperative administrators, or other external causes [25]. These teachers have low expectations, give up on struggling students, and are more critical when students fail. Students taught by high-efficacy teachers are more motivated and academically successful than students taught by low-efficacy teachers [1]. When engagement decreases in the classroom due to the lack of teachers' self-efficacy, many students feel less engaged and productive and find themselves unable to complete classroom tasks [26].

Teaching self-efficacy is a context-specific construct [16]. For example, a teacher who has high math self-efficacy may have low English self-efficacy. Thus, teaching self-efficacy should be measured in relation to specific teaching tasks in classroom settings [27]. The same is true for students with different learner profiles. Research has shown that teachers tend to feel more comfortable supporting students with some exceptionalities relative to others. For example, MacFarlane and Woolfson [28] found that teachers' self-efficacy varied depending on the exceptionality, with teachers feeling more confident supporting students with academic difficulties than those with behavioural difficulties. They also found more supportive beliefs about teaching children with sensory or physical disabilities versus those children with emotional, social, or behavioural disorders. Further, Smith [29] found that teachers with high self-efficacy for teaching children with mild learning needs had low self-efficacy for teaching children with severe disabilities. Hastings and Oakford [30] also reported more negative beliefs towards children with emotional and behavioural challenges than those towards children with intellectual disabilities in pre-service teachers. Despite these studies, very little work has examined how confident teachers are in working with students who have different types of exceptionalities. Therefore, it is imperative to understand which exceptionalities teachers feel confident teaching and which they find more challenging. Identifying these areas will help provide better support for educators, which ultimately supports the needs of all students.

## **2. The present study**

The present study examined current educators' experience and knowledge of teaching students with various exceptionalities. Teachers completed a series of questionnaires examining their knowledge and confidence levels regarding teaching students with exceptionalities, as well as their beliefs about using UDL and DI. This study posed the following research questions: (1) *What is teachers' knowledge, confidence in their ability to teach, and their experience working with students with exceptionalities in Ontario?* (2) *How confident are teachers in supporting students' different needs?* (3) *How is their knowledge, confidence in their ability to teach, and their experience working with students with exceptionalities correlated with their use of UDL and DI?* The findings from this study can help identify gaps in teachers' knowledge and confidence in supporting students with exceptionalities. Understanding these gaps can inform targeted professional development initiatives and policy improvements. The ultimate goal is to enhance teachers' ability to implement inclusive practices like UDL and DI and create more supportive learning environments for all students.

### 3. Methods

#### 3.1 Participants

To achieve an acceptable margin of error (10 with 90% confidence intervals) based on a population size of Ontario teachers who teach full time in elementary and secondary grades (in 2022–2023, it was 126,930), 95 current Ontario teachers participated in the study, leading to an 8% margin of error. Nonetheless, it should be noted that there was a gender imbalance (74 females and 21 males), and more elementary school teachers participated than secondary school teachers (68 elementary school teachers, 19 secondary school teachers, 3 itinerant teachers, 1 board consultant, 4 alternative settings). Participants' average age was 36.4 years, (SD = 11.9, range: 23–63). On average, the teachers had been teaching for 11.3 years (SD = 10.2). Seventy-five teachers reported that their highest degree was a Bachelor of Education degree; 17 had a Master's degree, and three had a Doctoral degree.

#### 3.2 Materials

*Exceptionalities Questionnaire:* The Exceptionalities Questionnaire was developed for use in this study. The questionnaire included three sections: (1) demographic information, (2) UDL and DI experience, (3) exceptionalities experience. Demographic items included: age, gender, education level, and years and type of teaching experience. Items on UDL and DI included the following: (1) "During my Bachelor of Education degree, I learned about UDL/DI," (2) "I use UDL/DI principles in my class," (3) "UDL/DI positively affect the learning outcomes of students in my class," (4) "UDL/DI positively affect the social outcomes of students in my class." Teachers were also asked the following general questions: "In general, I am confident in my *knowledge* about exceptionalities." "In general, I am confident in my *ability to teach* students with exceptionalities." "In general, I have *experience* working with students with exceptionalities." Participants responded on a 6-point Likert scale with 1 as strongly disagree and 6 as strongly agree.

Further, items on exceptionalities asked about each of the 12 specific exceptionalities listed in Ontario policy. However, the term 'Learning Disability' also included the categories reading, writing, and math disabilities as efficacy to work with students with learning disabilities might be subject-specific (15 exceptionalities total). Participants indicated on a 6-point scale whether they agreed with the following statements "I am confident in my *knowledge* about each of the following exceptionalities." "I am confident in my *ability to teach* students with each of the following exceptionalities." "I have *experience* working with students who have been identified with each of the following exceptionalities." The questionnaire also had items on different areas of needs associated with exceptionalities (e.g., transition skills, social skills, math, etc.). Participants indicated on a 6-point scale whether they agreed with the following statements: "I am confident in my ability to teach students who have the following identified *needs* (i.e., difficulties)." "Right now, I can easily think of *three strategies* to help a student with the following needs learn." The first domain was classified as the global ability to teach students with the identified need, and the second domain was considered local strategies to support students who present with the specified need. Strongly disagree was assigned the value of 1, whereas 6 was strongly agree.

### 3.3 Procedure

This study received approval from the Non-Medical Research Ethics Board at Western University. Participants for the study were recruited through online advertisements that were posted to social media sites, such as Facebook and Twitter (X). The questionnaire was completed online using the Qualtrics platform. The study was part of a larger study that also included additional questionnaires that are not reported here. Participants received a \$20 electronic gift card as compensation.

## 4. Results

### 4.1 Exceptionalities

A 3 by 15 repeated measures analysis of variance (ANOVA) was run on participants' ratings for three different domains relevant to working with students with exceptionalities (domains: their *knowledge*, their *experience*, and their *ability to teach*) as a function of 15 different exceptionalities. Greenhouse-Geiser correction was applied when sphericity was violated, and Bonferroni corrections were made for multiple comparisons. See **Figure 1** for educators' rating of their *knowledge*, *ability to teach*, and their *experience* working with students based on their exceptionality type.

There was no significant main effect of domain,  $F(1.5, 140.36) = 2.74, p = .08, \eta^2 = .03$ . There was a significant main effect of exceptionality type,  $F(7.3, 680.47) = 31.43, p < .001, \eta^2 = .25$ . It was qualified by a significant interaction effect of domain and the exceptionality type,  $F(14.05, 1306.69) = 8.60, p < .001, \eta^2 = .09$ . For the main effect of exceptionality type, pairwise comparisons with Bonferroni correction revealed three main groupings: lowest agreement (blind/low vision and deaf/hard of hearing), middle agreement (speech, multiple, language, physical, math, gifted, developmental disabilities (DD)), and highest agreement (writing, mild intellectual disability (MID), reading, autism, behaviour, and learning disability). The exceptionalities in the lowest tier differed significantly from all other exceptionalities, all  $ps < .05$ . In the highest echelon, learning disabilities, behaviour, autism, mild intellectual disability,

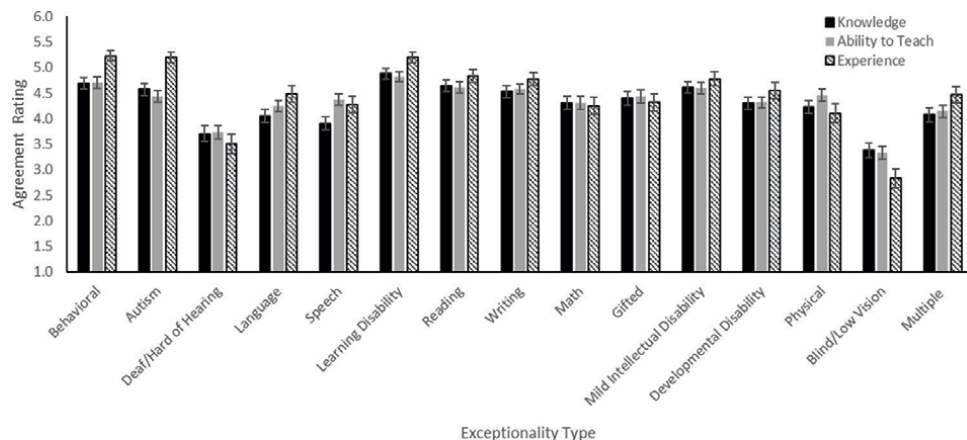


**Figure 1.** Teachers' ratings (Means and Standard Errors) of knowledge, ability to teach, and experience as a function of exceptionality type.

and reading disabilities did not differ significantly from each other, but learning disabilities were rated significantly higher than all other exceptionalities,  $ps < .05$ .

Simple main effects analyses were conducted to examine responses within each exceptionality across the different domains. Notably, for four exceptionalities (behavioural, autism, learning disabilities, and multiple), educators provided higher agreement of their *experience* than both their *knowledge* and *ability to teach*, all  $ps < .001$ . When rating physical disabilities, teachers rated their *ability to teach* as higher than their *experience*,  $p < .05$ . Further, for both speech impairment and language impairments, *ability to teach* and *experience* were rated higher than their *knowledge*,  $ps < .05$ . For blind/low vision, teachers rated their *knowledge* and *ability to teach* as greater than their *experience*,  $p < .01$ . Finally, there were seven exceptionalities (deaf/hard of hearing, reading, writing, developmental, math, mild intellectual disability, and students who are gifted), where the ratings on each domain did not significantly differ from each other, all  $ps > .15$ .

#### 4.2 Needs and strategies

A 2 by 15 repeated measures ANOVA was conducted on participants' agreement ratings for teacher ability type (ability to teach a student with that need and ability to generate three strategies to address that need) as a function of 15 different needs. **Figure 2** provides the means and standard deviations as a function of teacher ability type and type of needs. Greenhouse-Geiser correction was applied when sphericity was violated, and Bonferroni corrections were made for multiple comparisons.

There was no significant main effect of teacher ability,  $F < 1$ . There was a significant main effect of type of needs,  $F(8.32, 765.76) = 5.89$ ,  $p < .01$ ,  $np^2 = .06$ . However, it was qualified by a significant interaction,  $F(9.53, 876.80) = 2.68$ ,  $p < .01$ ,  $np^2 = .03$ . For the main effect of needs, teachers' ratings of their ability to support writing, organisation, and time management were most strongly endorsed relative to their abilities to support memory, problem solving, executive control, fine motor, anger/frustration management, and listening comprehension skills. Simple main effects analyses were conducted to examine teaching ability within each specific need. Ratings on both abilities were not significantly different for most needs. For memory and anger/frustration management only, teachers provided a higher rating of being able to implement strategies than their actual ability to teach students with these needs,  $ps < .05$ .

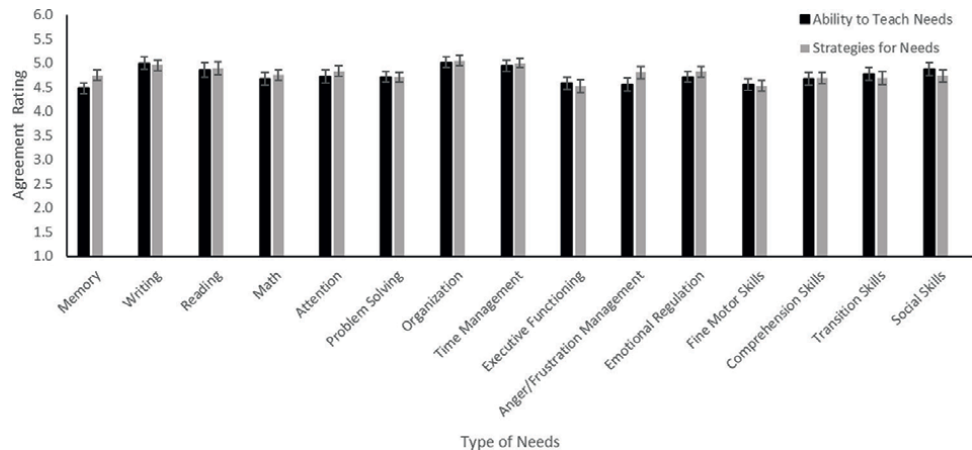


**Figure 2.**  
Educators' ratings of their confidence in their ability to teach and implement strategies for specific needs.

### 4.3 Relationship between UDL/DI and exceptionalities

**Table 1** provides the ratings (means and standard deviations) for teachers' overall ratings of their *knowledge*, *experience*, and *ability to teach* students with exceptionalities and their ratings on the UDL and DI statements. To understand the relationships between the overall ratings, UDL and DI ratings and responses to specific exceptionalities and needs, correlational analyses were conducted. First, to obtain composite scores for both UDL and DI, a principal components factor analysis was conducted on the eight UDL/DI items (minus the B.Ed experience question). The KMO test value was 0.82, indicating meritorious sampling adequacy for the factor analysis. All communalities were greater than .75, and two factors were generated based on eigenvalues greater than 1. With a varimax rotation, only UDL items loaded on to the first factor (loadings > .86), and only DI items loaded onto the second factor (loadings > .77). Regression scores for each factor for each participant were generated; they were called UDL score and DI score, respectively.

**Table 2** provides the Pearson correlations between UDL score, DI score, and overall ratings with the *experience*, *knowledge*, and *ability to teach* ratings for each of the 15 exceptionalities. An examination of the correlations revealed a series of significant but weak positive correlations between UDL score and DI score with *knowledge* and *ability to teach* for many of the specific exceptionalities. Fewer significant correlations were observed between UDL score and DI score with *experience* with each of the exceptionalities. Moderate positive correlations were observed between overall *knowledge*, overall *teaching ability*, and overall *experience* with each of the specific exceptionalities on these variables. The weakest and often non-significant correlations were on the deaf, blind, physical, and gifted exceptionalities, suggesting that these exceptionalities do not factor into consideration when teachers are asked to consider their overall ratings of exceptionalities.

**Table 3** provides the Pearson correlations between UDL score, DI score, and overall ratings scores with the ratings on ability to support students' needs. Positive weak correlations were observed between UDL score and the following: memory, writing,

|                                                                                          | Mean | SD  |
|------------------------------------------------------------------------------------------|------|-----|
| In general, I am confident in my knowledge about exceptionalities.                       | 4.72 | 1.1 |
| In general, I am confident in my ability to teach students with exceptionalities.        | 4.65 | 1.1 |
| In general, I have experience working with students with exceptionalities.               | 5.22 | .91 |
| I feel confident identifying students' strengths and using them to leverage their needs. | 5.18 | .95 |
| During my Bachelor of Education degree, I learned about UDL                              | 4.29 | 1.6 |
| I use UDL principles in my classroom                                                     | 4.71 | 1.4 |
| I feel comfortable using UDL in my classroom                                             | 4.64 | 1.3 |
| UDL positively affects the learning outcomes of my students in my classroom              | 4.89 | 1.3 |
| UDL positively affects the social outcomes of my students in my classroom                | 4.79 | 1.2 |
| During my Bachelor of Education degree, I learned about DI.                              | 5.02 | 1.4 |
| I use DI principles in my classroom                                                      | 5.44 | .83 |
| I feel comfortable using DI in my classroom                                              | 5.27 | .87 |
| DI positively affects the learning outcomes of my students in my classroom               | 5.45 | .81 |
| DI positively affects the social outcomes of my students in my classroom                 | 5.12 | 1.1 |

**Table 1.**  
Descriptive statistics (Means and Standard Deviations) for teachers' overall ratings of their knowledge, experience and ability to teach students with exceptionalities and their ratings on UDL and DI statements.

math, attention, problem solving, emotion regulation, and transition skills. Positive weak correlations were observed between DI scores and the following: memory, writing, reading, math, executive functioning, emotion regulation, listening comprehension skills, transition skills, and social skills. Generally stronger correlations were observed between the needs and the overall ratings of *knowledge* and *ability to teach*.

|                  | Exceptionality | UDL    | DI     | Overall Knowledge | Overall Teaching Ability | Overall Experience | Leveraging Strengths |
|------------------|----------------|--------|--------|-------------------|--------------------------|--------------------|----------------------|
| Knowledge        | Behaviour      | .30**  | .29**  | .65***            | .64***                   | .48***             | .40***               |
|                  | Autism         | .35*** | .38*** | .61***            | .53***                   | .41***             | .44***               |
|                  | Deaf           | .17    | .02    | .31**             | .28**                    | .18                | .22*                 |
|                  | Language       | .31**  | .31**  | .54***            | .57***                   | .33**              | .51***               |
|                  | Speech         | .26**  | .24*   | .50***            | .53***                   | .31**              | .50***               |
|                  | LD             | .35*** | .28**  | .55***            | .64***                   | .41***             | .46***               |
|                  | Reading        | .26*   | .29**  | .67***            | .66***                   | .40***             | .50***               |
|                  | Writing        | .24*   | .23*   | .66***            | .70***                   | .49***             | .47***               |
|                  | Math           | .24*   | .34**  | .56***            | .64***                   | .34**              | .39***               |
|                  | Gifted         | .22*   | .23*   | .26*              | .32**                    | .14                | .24*                 |
|                  | MID            | .27**  | .21*   | .52***            | .62***                   | .45***             | .40***               |
|                  | DD             | .37*** | .24*   | .57***            | .62***                   | .38***             | .46***               |
|                  | Physical       | .27**  | -.01   | .33**             | .41***                   | .14                | .20                  |
|                  | Blind          | .29**  | -.10   | .21*              | .28*                     | .06                | .16                  |
|                  | Multiple       | .29**  | .22*   | .52***            | .52***                   | .34**              | .34**                |
| Teaching Ability | Behaviour      | .21*   | .28**  | .58***            | .58***                   | .41***             | .43***               |
|                  | Autism         | .38*** | .26*   | .60***            | .60***                   | .32**              | .41***               |
|                  | Deaf           | .15    | -.06   | .15               | .17                      | .11                | .17                  |
|                  | Language       | .28**  | .29**  | .50***            | .50***                   | .35**              | .46***               |
|                  | Speech         | .37*** | .16    | .48***            | .48***                   | .33**              | .39***               |
|                  | LD             | .41*** | .20    | .60***            | .67***                   | .47***             | .42***               |
|                  | Reading        | .32**  | .20    | .55***            | .57***                   | .40***             | .46***               |
|                  | Writing        | .33**  | .17    | .56***            | .57***                   | .42***             | .37***               |
|                  | Math           | .35**  | .27**  | .53***            | .53***                   | .30**              | .34**                |
|                  | Gifted         | .18    | .04    | .13               | .20                      | .17                | .01                  |
|                  | MID            | .28**  | .17    | .53***            | .60***                   | .51***             | .32**                |
|                  | DD             | .40*** | .25*   | .61***            | .68***                   | .45***             | .50***               |
|                  | Physical       | .31**  | .04    | .30**             | .38***                   | .14                | .20                  |
|                  | Blind          | .20*   | -.11   | .13               | .16**                    | .05                | .07                  |
|                  | Multiple       | .29**  | .25*   | .53***            | .55***                   | .39***             | .39***               |
| Experience       | Behaviour      | .03    | .30**  | .58***            | .49***                   | .53***             | .39***               |
|                  | Autism         | .07    | .19    | .42***            | .30**                    | .53***             | .23*                 |
|                  | Deaf           | .11    | -.01   | .18               | .17                      | .18                | .11                  |
|                  | Language       | .19    | .23*   | .41***            | .41***                   | .43***             | .40***               |
|                  | Speech         | .26*   | .14    | .33**             | .32**                    | .31**              | .34**                |

| Exceptionality | UDL | DI                 | Overall Knowledge  | Overall Teaching Ability | Overall Experience | Leveraging Strengths |
|----------------|-----|--------------------|--------------------|--------------------------|--------------------|----------------------|
| LD             | .04 | .24 <sup>*</sup>   | .33 <sup>**</sup>  | .33 <sup>**</sup>        | .46 <sup>***</sup> | .25 <sup>*</sup>     |
| Reading        | .11 | .26 <sup>*</sup>   | .36 <sup>***</sup> | .32 <sup>**</sup>        | .28 <sup>**</sup>  | .28 <sup>**</sup>    |
| Writing        | .11 | .19                | .38 <sup>***</sup> | .34 <sup>**</sup>        | .33 <sup>**</sup>  | .31 <sup>**</sup>    |
| Math           | .02 | .36 <sup>***</sup> | .38 <sup>***</sup> | .42 <sup>***</sup>       | .25 <sup>*</sup>   | .29 <sup>**</sup>    |
| Gifted         | .06 | .05                | .04                | .04                      | .21 <sup>*</sup>   | -.08                 |
| MID            | .09 | .05                | .25 <sup>*</sup>   | .29 <sup>**</sup>        | .48 <sup>***</sup> | .19                  |
| DD             | .02 | .15                | .25 <sup>*</sup>   | .28 <sup>**</sup>        | .32 <sup>**</sup>  | .18                  |
| Physical       | .13 | -.02               | .31 <sup>**</sup>  | .28 <sup>**</sup>        | .22 <sup>*</sup>   | .13                  |
| Blind          | .10 | .09                | .26 <sup>*</sup>   | .33 <sup>**</sup>        | .22 <sup>*</sup>   | .28 <sup>**</sup>    |
| Multiple       | .01 | .14                | .35 <sup>***</sup> | .39 <sup>***</sup>       | .41 <sup>***</sup> | .23 <sup>*</sup>     |

<sup>\*</sup>  $p < .05$ ; <sup>\*\*</sup>  $p < .01$ ; <sup>\*\*\*</sup>  $p < .001$ .

**Table 2.**

*Pearson correlations of UDL score, DI score, and overall ratings with the experience, knowledge, and ability to teach ratings from the 15 exceptionalities.*

| Skill                   | UDL Score         | DI Score          | Overall Knowledge  | Overall Teaching Ability | Overall Experience | Leveraging Strengths |
|-------------------------|-------------------|-------------------|--------------------|--------------------------|--------------------|----------------------|
| Memory                  | .26 <sup>*</sup>  | .24 <sup>*</sup>  | .43 <sup>***</sup> | .49 <sup>***</sup>       | .31 <sup>**</sup>  | .35 <sup>**</sup>    |
| Writing                 | .33 <sup>**</sup> | .21 <sup>*</sup>  | .31 <sup>**</sup>  | .37 <sup>***</sup>       | .27 <sup>**</sup>  | .28 <sup>**</sup>    |
| Reading                 | .18               | .26 <sup>**</sup> | .38 <sup>***</sup> | .46 <sup>***</sup>       | .39 <sup>***</sup> | .51 <sup>***</sup>   |
| Math                    | .23 <sup>*</sup>  | .30 <sup>**</sup> | .37 <sup>***</sup> | .45 <sup>***</sup>       | .28 <sup>**</sup>  | .31 <sup>**</sup>    |
| Attention               | .21 <sup>*</sup>  | .15               | .46 <sup>***</sup> | .51 <sup>***</sup>       | .30 <sup>**</sup>  | .26 <sup>**</sup>    |
| Problem Solving         | .24 <sup>*</sup>  | .11               | .42 <sup>***</sup> | .48 <sup>***</sup>       | .24 <sup>*</sup>   | .24 <sup>*</sup>     |
| Organisation            | .14               | .15               | .25 <sup>*</sup>   | .30 <sup>**</sup>        | .22 <sup>*</sup>   | .13                  |
| Time Management         | .05               | .18               | .24 <sup>*</sup>   | .24 <sup>*</sup>         | .37 <sup>***</sup> | .15                  |
| Executive Functioning   | .11               | .27 <sup>**</sup> | .45 <sup>***</sup> | .57 <sup>***</sup>       | .24 <sup>*</sup>   | .33 <sup>**</sup>    |
| Frustration Management  | .19               | .14               | .31 <sup>**</sup>  | .37 <sup>***</sup>       | .30 <sup>**</sup>  | .29 <sup>**</sup>    |
| Emotion Regulation      | .22 <sup>*</sup>  | .25 <sup>*</sup>  | .33 <sup>**</sup>  | .39 <sup>***</sup>       | .25 <sup>*</sup>   | .34 <sup>**</sup>    |
| Fine Motor Skills       | .18               | .14               | .38 <sup>***</sup> | .40 <sup>***</sup>       | .41 <sup>***</sup> | .31 <sup>**</sup>    |
| Listening Comprehension | .12               | .21 <sup>*</sup>  | .32 <sup>**</sup>  | .38 <sup>***</sup>       | .39 <sup>***</sup> | .30 <sup>**</sup>    |
| Transition Skills       | .28 <sup>**</sup> | .27 <sup>**</sup> | .40 <sup>***</sup> | .46 <sup>***</sup>       | .39 <sup>***</sup> | .33 <sup>**</sup>    |
| Social Skills           | .13               | .21 <sup>*</sup>  | .26 <sup>*</sup>   | .32 <sup>**</sup>        | .31 <sup>**</sup>  | .23 <sup>*</sup>     |

<sup>\*</sup>  $p < .05$ ; <sup>\*\*</sup>  $p < .01$ ; <sup>\*\*\*</sup>  $p < .001$ .

**Table 3.**

*Pearson correlations of UDL score, DI score, and overall ratings with the ability to support specific student needs ratings.*

## 5. Discussion

This study examined educators' *knowledge, ability to teach, and experience* working with students with specific exceptionalities and how they are related to their reported use of UDL and DI. Teachers most strongly endorsed statements related to learning disabilities, autism, and behavioural exceptionalities. However, they felt less equipped to teach students with low-prevalence exceptionalities (deaf/hard of hearing or blind/low vision). They also more strongly endorsed statements about confidence supporting writing, organisation, and time management needs relative to memory, problem solving, executive control, fine motor skills, anger/frustration management, and listening comprehension needs. Finally, positive but weak correlations between UDL and DI scores and teachers' ability to teach students with specific exceptionalities and needs were observed. These findings suggest that these frameworks can explain a small proportion of teachers' beliefs about their ability to work with students with specific exceptionalities.

### 5.1 Knowledge, ability to teach, and experience working with students with exceptionalities

Teachers provided average ratings that ranged from "somewhat disagree" to "agree" with statements concerning specific exceptionalities. The highest ratings were associated with learning disabilities and behavioural exceptionalities. Specifically, teachers reported having the most experience with students with autism, learning disabilities, and behavioural exceptionalities and relatively high scores on knowledge and ability to teach. Interestingly, the generally higher ratings for behavioural exceptionalities differ somewhat from previous research, which found that behavioural exceptionalities were viewed less favorably than other exceptionalities [28, 30]. Yet, despite relatively high scores on knowledge and ability to teach, teachers reported that their experience outpaced these features. This discrepancy suggests a gap between the realities of the classroom that includes high incidences of these exceptionalities and the amount of knowledge teachers possess and their confidence in their teaching ability to support these students. Teachers may benefit from specialised training that is focused on the specific needs and best teaching strategies for teaching students with behavioural exceptionalities, autism, and learning disabilities. Practical workshops on behaviour management techniques, structured literacy approaches for learning disabilities, and strategies for social skills and communication could help to bridge the gap between experience and confidence. Additionally, extended mentorship programs that pair less experienced teachers with those with more experience could also provide ongoing support in applying these strategies effectively.

Although statements pertaining to learning disabilities were rated highly, it is important to note that teachers endorsed statements about disabilities that were specific to language or academic domains significantly lower. These results suggest there may be a disconnect between how the teachers were considering learning disabilities relative to its subtypes or related conditions. Specifically, they may feel less equipped to address difficulties related to language, speech, math, and writing impairments compared to their perceptions of learning disabilities as an umbrella category. It may also be that when teachers think about a learning disability, they think about how to accommodate the student, but when the skill is emphasised (such as a math disability), teachers start to think more about implementing modifications or interventions that may be perceived as more challenging. These possibilities are speculative, and

further research would be necessary to understand the relationship between teachers' perceptions of learning disabilities as a broad category relative to their self-efficacy for specific types of learning disabilities. Of note, how researchers frame their questions about self-efficacy for supporting students with learning disabilities might yield different results depending on how the question is posed.

Sensory conditions (blind/low vision and deaf/hard of hearing) received the lowest agreement of all the exceptionalities on *knowledge*, *experience*, and *ability to teach*. Similarly, Aguja et al. [31] found that teachers perceived their knowledge for students with sensory conditions as not sufficient. There are several possible reasons for these low ratings. First, the lower prevalence of these students in the general population means that teachers, especially in mainstream settings, have less exposure compared to more common exceptionalities [32]. Secondly, supporting students with sensory conditions may require specialised knowledge (e.g., sign languages, braille), yet many teacher education programs offer limited coursework focused on visual or hearing impairments [33]. Finally, specialised roles such as Teachers of the Deaf/Hard of Hearing (TOD/HH) often take primary responsibility for these students. Students in Ontario have the option of attending schools specifically for students who are blind or who are deaf, which may reduce general education teachers' direct experience and, consequently, confidence working with these students [33]. Of note, the ratings on students who are deaf, blind, or gifted were not significantly correlated with teachers' overall ratings of their experience, knowledge, or ability to teach. Such findings suggest that these exceptionalities are not factored into their overall estimates of their ability to work with students with exceptionalities.

## **5.2 Student needs**

In addition to asking teachers to rate their confidence to work with students with different exceptionalities, the current study also collected ratings on their comfort level to support diverse needs. The logic was that students within an exceptionality category can present with diverse needs, and thus, when teachers are asked to provide ratings, they may be thinking of one student from their career or imagining a prototypical student. This response may not generalise to all the needs that a student could present within a particular category. Consequently, localizing the questions to arrays of needs a student might present with can provide additional insight into where teachers may feel confident.

It was found that the most strongly endorsed needs that teachers could support were writing, reading, organisation, and time management. In contrast, teachers felt the least confident in supporting memory, executive functioning, and fine motor skills. The rest of the needs (math, attention, problem solving, emotional regulation, comprehension skills, transition skills, and social skills) were in the middle of teachers' confidence levels. Teachers' lower confidence in supporting memory and executive functioning may reflect the complexity of these needs and the lack of direct training on these topics. There is a need for targeted professional development that addresses these lower-confidence areas. Workshops or training modules that focus on memory strategies or executive functioning support could equip teachers with practical tools and strategies. Additionally, the lower confidence in fine motor skills suggests that teachers could benefit from training on classroom-based strategies, such as adaptive writing tools, and fine motor exercises within instruction.

Keenan et al. [34] explain that executive functioning skills are critical for students to be able to meet the academic and social demands at school. In a classroom setting, the teacher plays a crucial role in providing support to promote these skills. However, issues with resource limitations may restrict effective implementation of supports and classroom-based interventions. Further, Long et al. [35] explain that since teachers are often responsible for the implementation of interventions in the classroom setting, developing a better understanding of teachers' awareness and ability to support students' executive functioning skills is needed.

Teachers' concerns about executive functioning (EF) and memory are particularly relevant for students with Attention Deficit Hyperactivity Disorder (ADHD), as these cognitive processes are often impaired. EF includes skills such as working memory, flexible thinking, and self-control, which are crucial for academic success and daily functioning [36]. Students with ADHD often struggle with EF and memory, which can affect their ability to plan, organise, focus, and remember instructions. Teachers' awareness of these issues underscores the need for specific strategies to support these cognitive challenges. Therefore, teacher training programs and professional development opportunities, such as self-regulated strategy development instruction, should be incorporated to help students find ways of circumventing memory and EF challenges.

Generally, teachers did not differ in their ratings of their ability to teach a student with a specific need and their ability to generate three strategies to support that need. The only exceptions were for memory and anger/frustration management. Here, teachers rated their ability to generate strategies higher than their confidence in their ability to teach students with those needs. This distinction suggests that while teachers may be aware of potential strategies, they may not feel as confident in either their ability to apply these strategies or they may be doubtful of whether these students would be responsive to the strategies. The gap between knowing strategies and feeling confident in implementing them is echoed by Mathews et al. [37] who explain that teachers' self-efficacy often increases with practical experience but can remain insufficient without tailored support.

### 5.3 UDL and DI

The study revealed several positive correlations between UDL and DI scores and educators' knowledge of teaching students with specific exceptionalities and needs. However, these significant correlations were somewhat weak, ranging from .21 to .41. The number of significant correlations of UDL and DI was greater with the *knowledge* and *ability to teach* variables than for the *experience* variable. The latter is potentially concerning as the more experience gained with diversity in the classroom, ideally the more benefit teachers should perceive in utilizing UDL and DI. For *knowledge*, most correlations were significant for both UDL and DI. Where there were interesting differences was in the *ability to teach* variable. Here, all correlations with UDL were significant except for deafness and giftedness. For DI, only behaviour, autism, language, math, developmental disabilities, and multiple disabilities correlations were significant. In contrast, when expressed as needs rather than exceptionalities, there were more significant correlations for DI than UDL. These findings suggest that when framed as working with an individual, UDL may be more prevalent, but when expressed as a need, the ability to differentiate based on readiness may be more evident. Interestingly, for reading and writing, the correlation with DI only reached

significance when expressed as a need. Positive correlations between UDL and DI scores in areas like writing and math suggest that these frameworks are more easily applied to well-established academic domains. Teachers may find it more intuitive to adapt UDL and DI principles in these areas due to their alignment with existing instructional practices.

Despite the presence of these correlations, they were not very strong. There are a couple possible reasons. The first is that teachers gave generally strong ratings to their UDL and DI abilities, which may have limited the variability in the UDL and DI scores, thus making strong relationships more difficult to observe. The second possibility is that while teachers recognise the importance of these frameworks, their confidence and perceived ability to support certain exceptionalities are not influenced by UDL or DI alone. These frameworks provide strategies for inclusion but may need more specialised guidance for addressing unique challenges, such as sensory or behavioural exceptionalities. Fornauf et al. [38] noted that there are limited descriptions in the literature of how teachers practically engage with UDL in their classrooms. To maximise the impact of UDL and DI, they should be paired with targeted, hands-on training and practical experiences that allow teachers to apply these frameworks in real-world contexts. Overall, these findings emphasise the importance of equipping teachers with both theoretical knowledge of inclusive practices and the practical tools, as well as ongoing support needed to address the diverse needs of students with exceptionalities effectively.

## **5.4 Implications**

The findings from this study highlight important implications for teacher education, professional development, and inclusive education. Specifically, by providing a profile of educators' reported areas of strengths and needs with respect to their understanding of each exceptionality and area of skill development, we provide a potential road map for professional development. Initial teacher training, continuous professional development, and ongoing support, such as coaching or mentoring, could help teachers build their confidence and knowledge over time in areas of need as outlined above. Additionally, increasing opportunities for practical, hands-on experience with students with exceptionalities during teacher training programs could help to close the gap between theoretical knowledge and practical application [39]. Bassi et al. [40] emphasised the role of experience in fostering self-efficacy such that greater involvement and experience within the school environment correlated with higher levels of self-efficacy. These implications highlight the need for an intentional, structured approach to teacher preparation, which ensures that teachers are adequately equipped to meet the diverse needs of students in inclusive classrooms.

## **5.5 Limitations**

The present study has some limitations to consider. Firstly, it should be noted that this study is not representative of the entire population. It solely focused on Ontario certified teachers in Canada, and therefore, the study's results are limited in their generalisability. There was also not an equal number of participants from the elementary and secondary school settings. Future research should incorporate more teachers from secondary schools to determine if there are differences based on the grade level taught. Future research could also examine if there are significant differences among teachers' preparedness from regions of the country to obtain more generalisable

results. Finally, the Exceptionalities Questionnaire was written for this study, and although it was piloted on teachers to ensure understanding of the questions, it is not yet a validated measure.

## **6. Conclusion**

This study examined teachers' knowledge, confidence in their ability to teach, and their experience in teaching students with exceptionalities and how these factors relate to their use of UDL and DI. The findings reveal critical gaps in teachers' preparedness to support students with exceptionalities, particularly those with sensory and physical needs, while also highlighting areas of strength, such as supporting students with learning disabilities and behavioural exceptionalities.

These results highlight a need for targeted professional development that focuses on building teachers' skills and confidence in these less familiar areas. The study also found weak correlations between UDL and DI scores and teachers' ability to teach students with specific exceptionalities and needs, suggesting that these frameworks alone are insufficient for explaining the full range of teachers' confidence in supporting student diversity. While UDL and DI are valuable in fostering inclusivity, their effectiveness depends on integrating practical, hands-on experiences and potentially including specialised training tailored to individual exceptionalities or needs.

The findings emphasise the importance of a multifaceted approach to teacher training that combines theoretical knowledge, practical strategies, and sustained support. By addressing gaps in training and ensuring teachers have meaningful exposure to diverse learner profiles, educational systems can better equip educators to foster an inclusive teaching environment in the classroom. Strengthening teachers' confidence not only benefits students with exceptionalities but also enriches the learning environment for all students.

Overall, teacher preparation programs, school boards, and policymakers must prioritise ongoing professional development that explicitly addresses areas of lower confidence, particularly for sensory and physical exceptionalities. Investing in specialised training, mentorship opportunities, and hands-on learning experiences will allow teachers to create inclusive classrooms. By equipping educators with the necessary skills and knowledge, all students can receive the support they need to succeed.

## **Conflict of interest**

The authors declare no conflict of interest.

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# Landscapes in the Professional Identity of Special Education Teachers: Perceptions and Practices Related to Universal Design for Learning (UDL)

*Nurit Chamo and Talia Yarom-Cohen*

## Abstract

One of the contemporary focal points in the discourse surrounding inclusion and accessibility is Universal Design for Learning (UDL). UDL is an educational framework designed to provide equitable and just solutions for diverse learner populations within mainstream education. In line with this approach, special education has become integral to the professional development of both pre-service and in-service teachers. However, this shift has raised concerns about teachers' self-efficacy in implementing UDL and has brought into question the construction of inclusive education within their broader professional identities. This study aims to explore the needs of a group of teachers (N = 31) working in elementary and secondary education, who are engaged in learning and deepening their expertise in designing universal learning environments. Utilizing a qualitative interpretative methodology, the study reveals both humanistic and instrumental perceptions among teachers, highlighting needs in pedagogical practices, and a demand for sustained and targeted professional and emotional support to enhance their sense of efficacy in fostering inclusion and accessibility.

**Keywords:** universal accessibility, inclusion, professional identity, professional development, students with special needs

## 1. Introduction

### 1.1 Universal design for learning: Framework and principles

Inclusive education has been identified as a key priority by global education policymakers, including UNESCO [1, 2] and the OECD. The concept of Universal Design originally stems from architecture and product development, with its goal being the

creation of barrier-free environments accessible to all. Coined more than two decades ago by American architect Ronald Mace, who was disabled due to childhood polio, the idea focuses on designing for people of all abilities and ages [3]. The UDL framework is founded on three core principles: multiple means of engagement, representation, and action/expression. These principles correspond to the brain's learning networks and emphasize designing lessons that reduce barriers to instruction while accommodating individual learning preferences [4]. By offering flexibility in how students access materials, engage with content, and demonstrate knowledge, UDL fosters an inclusive learning environment. Recent research underscores the significance of this approach in enhancing accessibility and student engagement.

Studies reveal that integrating UDL with educational technologies significantly improves students' sense of belonging and engagement in the classroom [5]. The flexibility inherent in UDL enables students to choose how they interact with content, fostering a deeper connection to the learning process. For instance, UDL provides diverse learning channels—visual, auditory, kinesthetic, and technological—without compromising academic expectations or differentiating students with disabilities from their peers [6].

In recent years, the concepts of “integration” and “inclusion” have become more distinct in educational discourse. Integration involves addressing the needs of students with special needs in regular classrooms through tailored supports, whereas inclusion emphasizes the educational institution's capacity to meet the needs of all students within a shared classroom setting [5–7]. Inclusion aligns closely with UDL principles by promoting equity in learning and ensuring all students have equal opportunities to engage with peers.

Despite its potential benefits, implementing UDL in educational settings presents several challenges. A significant barrier is the lack of adequate training for educators in UDL principles, which often results in inconsistent application [8]. Additionally, resource constraints, such as limited access to necessary materials and technology, hinder the effective adoption of UDL strategies [9, 10]. Another critical obstacle is institutional resistance, as traditional teaching methods and an aversion to change within educational organizations frequently impede the integration of UDL frameworks [10]. When effectively implemented, UDL promotes inclusivity, equity, and enhanced student engagement. By providing diverse teaching methods, UDL creates equitable learning opportunities, improving outcomes for all students, including those with disabilities [8]. Furthermore, UDL reduces or eliminates barriers—physical, academic, and social—allowing students with disabilities to access the same range of educational opportunities as their peers.

Teaching within the UDL framework involves designing curricula that are accessible to all students from the outset. This approach allows general education teachers to teach heterogeneous classes, including students with special needs, without requiring specialization in “special education” [11, 12]. Instead, UDL promotes awareness of student diversity while addressing the holistic needs of all learners. Teachers prepare flexible learning environments with adaptable methods, materials, and strategies, ensuring lessons align with academic standards and are accessible to diverse learners [12].

## **1.2 Professional identity and development in the field of universal accessibility**

The pivotal role of teachers in shaping the educational process is widely acknowledged within the field of education. This recognition has led to increased attention to

the concept of professional identity and a growing body of research on the subject, as highlighted in OECD reports [13] and academic studies [14]. The exploration of professional identity underscores the need for professional development that delves into educators' underlying perceptions and values, rather than focusing solely on instrumental approaches that prioritize skill acquisition. Specifically, perceptions of accessibility in teaching and learning are essential in fostering a comprehensive understanding of students with special needs, emphasizing their abilities and strengths.

Effective implementation of UDL necessitates a robust professional identity among educators, enabling them to navigate the challenges associated with this inclusive model [15]. CAST [16] a leading organization dedicated to UDL, outlines three core principles aligned with the brain's learning networks: "what," "how," and "why." These principles emphasize diverse forms of representation, varied modes of expression and communication, and fostering students' motivation for learning, respectively [17]. To ensure successful application of these principles, targeted professional development initiatives are essential for equipping educators with the necessary competence and confidence.

Several studies highlight the impact of professional development on educators' perceptions and practices related to UDL. Kumar and Lwideman [18] investigated teachers' attitudes following a course introducing a variety of teaching methods, expression techniques, and engagement strategies. Their findings revealed positive attitudes toward UDL-based teaching and learning accessibility, both during and after the course, and a reduced need for special accommodations within the educational framework. Similarly, Canter et al. [19] explored the use of digital and physical resources, including blogs, apps, and graphics, to support UDL implementation. Teachers, in this study, perceived UDL as an innovative and accessible teaching approach that enabled them to address the needs of diverse learners and heightened their awareness of the importance of inclusion.

Research by Craig et al. [20], demonstrated that teachers who adopted the UDL framework were rated as more effective in their teaching compared to those who did not. Additionally, Zerbato and Mendes [21] examined the impact of UDL training on pre-service teachers preparing to work with students with special needs. This training incorporated the development of teaching units, reflective journals, teaching simulations, and tools adapted for accessibility. Despite being brief and introductory, the training facilitated optimal responses to classroom diversity. Moreover, a literature review by Ok et al. [22] synthesized findings from 13 studies on UDL-based interventions aimed at enhancing curriculum accessibility from kindergarten to secondary education. The review concluded that UDL approaches supported the achievement of students with special needs and provided teachers with effective strategies to address the diverse needs of their learners. In a study on teacher leadership, including special education teachers, it was found that reflective processes regarding their professional identity were part of their empowerment process and their way of coping with difficulties and challenges [23].

Given the critical role of teacher training and professional development in advancing UDL as a means of fostering inclusion and accessibility, it is imperative to examine educators' perceptions of accessibility within the Universal Design framework. This includes identifying the practices they employ and mapping the professional development needs related to universal accessibility. Such efforts are essential for ensuring that all students, regardless of their abilities, can thrive in inclusive educational environments.

### **1.3 Research questions**

1. What guiding perceptions within the UDL framework does the research group express?
2. What characterizes the research group pedagogical practices for implementing the UDL model?
3. What needs does the research group express addressing the training processes and ongoing professional development?

### **1.4 Methodology**

This study employed a qualitative, interpretative methodology grounded in phenomenological principles to explore the lived experiences of participants. The study sample consisted of 31 participants selected through convenience sampling. The cohort included 29 women and 2 men, aged 25–51, reflecting a diverse range of life experiences and perspectives. In terms of professional background, 20 participants were elementary school educators, and 11 were high school educators. Educationally, 24 participants held a Bachelor of Education (B.Ed.), while 7 had earned a Master of Education (M.Ed.). The participants' average professional tenure was 11 years, representing a blend of seasoned professionals and those newer to the field.

Data collection utilized open-ended, flexible tools—specifically semi-structured interviews and reflective journals—to elicit rich, contextualized insights. The semi-structured interview included open-ended questions, primarily focusing on:

- Tell me about your overall experience in the field of Universal Design for Learning (UDL).
- What does this approach mean to you? Why?
- What resources are available at your school to support inclusion and accessibility?
- What challenges do you face in implementation?
- What could help you achieve optimal implementation?

These instruments facilitated the generation of a comprehensive dataset, enabling the identification of thematic patterns. An iterative process of coding and thematic analysis was employed to ensure analytical depth and coherence, resulting in the development of a robust thematic framework. The study employed thematic analysis approach, as outlined by Braun and Clarke [24], with a systematic process following the six phases of inductive thematic analysis proposed by Nowell et al. [25]. The analysis began with familiarization with the dataset, followed by systematic coding of all data. Emerging themes were identified, reviewed, and refined to ensure they accurately reflected the data collected through all research tools. The identified themes were interpreted in light of relevant research literature, integrating etic categories to contextualize findings within the broader academic discourse. The final phase involved synthesizing and presenting the findings in a coherent and meaningful

manner, providing insights into the interplay between teacher leaders' visibility and their professional identity formation.

*Limitations and reflexivity* - While qualitative research prioritizes depth over generalizability, the use of convenience sampling limits the extent to which findings can be generalized beyond the specific study context. Additionally, the phenomenological approach introduces the potential for researcher bias, particularly when the researcher is an outsider to the community under study. To mitigate this, reflexivity and peer reviews were incorporated into the research process. Triangulation—employing multiple data sources, methods, and perspectives—was also utilized to enhance the credibility and trustworthiness of the findings.

*Ethical considerations* - The study adhered to the principles of the Helsinki Declaration and was approved by the Ethics Committee of the sampled college. Participants actively embraced an ethical stance rooted in collaboration, viewing themselves as integral contributors to the research process. This alliance fostered a reciprocal ethos, emphasizing mutual benefits for both participants and the researcher. Finally, participants expressed a keen interest in engaging with the broader study, which explored aspects of the UDL approach, further demonstrating their investment in the research process.

## 2. Findings

The thematic analysis revealed five central themes, each shedding light on different aspects of participants' perceptions regarding the UDL model, pedagogical practices, and professional needs in fostering and strengthening their professional identity.

### 2.1 Main themes

#### 2.1.1 *The first theme is: Commitment and responsibility toward students*

The theme explores commitment and responsibility toward students from both humanistic and social perspectives. The humanistic approach emphasizes the fundamental rights of every child, particularly the right to equality, and highlights the importance of fostering student well-being. In parallel, the social perspective underscores teachers' responsibility to support students' optimal social integration by equipping them with essential twenty-first-century skills. Together, these perspectives stress the critical role of educators in ensuring both the personal and social development of their students.

*D: "I had a student in class who exhibited unusual and unpredictable behavior—gazing around, or suddenly talking about unicorns. Even her answers in class were sometimes unrelated to the topic, but she had confidence and would raise her hand to participate. I always tried to find a connection in her responses to give her space, so that through mirroring, the other students would also learn how to interact with her, give her room, and avoid making her feel uncomfortable or laughing at her."*

*N: "Accessibility is not about creating equality in life; people will never be entirely equal. It's about creating equity, ensuring that people can approach a task or challenge from their own circumstances and conditions to achieve success. I mean the difference between equity and equality. My perspective is that every child is naturally curious,*

*every child wants to succeed and receive validation, especially children with learning disabilities. Teachers and educators have a responsibility to learn how to teach, to research the disability, and to acquire the tools needed to address and overcome it. Students with learning disabilities need accommodations.”*

These quotes illustrate teachers’ commitment to inclusivity and equity in education. The first highlights a humanistic approach, where the teacher fosters a supportive classroom environment, ensuring all students feel valued and accepted. The second emphasizes equity, stressing the educator’s responsibility to provide tailored support for students with learning disabilities. Together, they reflect the ethical duty to promote both social integration and academic success for all learners. This theme reflects teachers’ dedication to ensuring every student’s basic rights. It also emphasizes their role in fostering social integration by equipping students with skills essential for success in the twenty-first century.

### *2.1.2 The second theme: Reflective thinking about teachers’ professional identity*

Teachers engage in reflective thinking about their professional identity by looking both retrospectively and prospectively at their development. They reflect on their initial commitment to educating all students and assess their ability to address diverse learning needs. At the same time, they consider how to integrate inclusive perspectives and professional skills into their evolving identity to ensure accessibility for all learners.

*R: My teaching experience so far, alongside my life experiences, has taught me that as a teacher in the classroom, you need to incorporate not only teaching skills but also skills of a babysitter, a disciplinarian enforcing rules and order, a stand-up comedian, a humorist, a uniquely creative individual, and a specialized artist. And I am not all these things at once. [...] The more you learn, experiment, and integrate a universal design model, [...] I see how demanding it is, and I am learning to apply specific skills in advance, rather than all at once. Not everything is spontaneous. You can prepare in advance and think about integrating variety. In other words, what the experience with universal design has done for me is to make me reflect on my teaching skills and how to implement them in a planned and effective way.*

*A notes: “The process of constructing the teaching unit was perceived by me as an exceptional opportunity to develop my professional identity as a teacher.”*

The quotes illustrate how this reflective process shapes teachers’ approaches to their profession. One teacher emphasizes the multifaceted nature of the role, highlighting the importance of preparation and intentional skill development rather than relying solely on spontaneity. Another teacher describes how designing a teaching unit became a valuable opportunity for professional growth. Through reflection, teachers reassess their educational values and responsibilities, examining how their professional identity has evolved while also exploring ways to integrate inclusivity and accessibility into their future teaching practices.

### *2.1.3 The third theme: Learning environments and their characteristics*

Teachers critically reflect on the concept of learning environments, redefining and evaluating their characteristics to enhance inclusivity and accessibility. They consider

both the physical and pedagogical aspects of learning spaces, emphasizing the role of dialog, teaching methods, and technological integration in shaping meaningful educational experiences:

*L: For me, a learning environment is everything. It encompasses the physical environment—how it is organized, what it includes, and what it facilitates—but a learning environment is also what emerges through our teaching methods, the type of dialogue, and the richness it offers. Above all, it's the dialogue between teacher and student.*

*G: "I observe my colleagues to learn. When planning lessons, you need to think about the fine details, especially in the visual aspects. While we often rely on verbal explanations, there's a need to include more images and visual aids. You have to think about diverse modes of representation in the learning environment. I can say that an accessible environment for students exists when there's flexibility to move between different learning spaces, both physical and technological, and to navigate them freely—but, of course, under supervision. My goal is to guide them, be there for them, and help them find their path. Their choices need to be well-informed."*

The quotes illustrate teachers' perspectives on learning environments and how they approach their design. One teacher emphasizes the significance of both physical organization and the interactive dynamics between educators and students, while another highlights the need for diverse modes of representation, such as visual aids and flexible learning spaces. Together, these perspectives underscore the importance of intentional design, adaptability, and a commitment to student engagement in fostering inclusivity. This theme explores the critical evaluation and redefinition of learning environments, emphasizing their role in supporting diverse learners. Additionally, technology emerges as a key tool in creating accessible and inclusive educational spaces.

#### *2.1.4 The fourth theme: The pedagogical repertoire within professional identity*

Teachers reflected on the development of their pedagogical repertoire as an essential aspect of their professional identity, emphasizing the need to align their teaching practices with UDL principles. They recognized the importance of incorporating diverse modes of representation and expression to accommodate different learning preferences while fostering motivation and participation among all students. The following quotes illustrate how teachers implement these strategies in practice:

*.D: "As much as kids are tech-savvy, they're not completely tech-savvy, and that's what makes it challenging. You end up having to teach 34 students how to operate the technology—explaining what to do, where to click—which makes things even harder. Another challenge is that their knowledge of technology is incomplete, and there are also technical issues, like internet connectivity. For instance, we recently did an activity using phones, but there was no internet in the space, and it ruined the entire lesson. I chose this practice because I consider the needs of all students and think about how each one can learn comfortably. I present material in various ways, such as slideshows, games, diagrams, songs, or digital readings. I know each student prefers a different mode of learning, so I always offer a variety of methods to make the material accessible. This way, each student connects with what suits them and also learns to engage with other approaches along the way. For student participation, I allow them to express themselves in different ways—creating games, building models,*

*typing on a computer, moving, or taking photos. As for participation styles, students can choose whether to work in pairs, in groups, or individually. They build their knowledge based on what they want to explore, reflecting the principles of universal design through various methods: researching using interactive information sources, watching videos, reading texts, or listening to external speakers who visit the school to give lectures.”*

*H: “I guided them in completing an interesting group task where each student worked on their strengths. The final product was a presentation that included a slideshow, spoken content, a game, a performance, or a comic strip—each student had a personal role. The students enjoyed this task a lot, and even those with special needs had opportunities for self-expression. For example, one group decided to create a slideshow and teach it to the class. In this group, there was a student with selective mutism, and I knew she would avoid presenting. In the end, we decided that each student would record themselves and include the recordings in the slideshow, allowing everyone to participate.”*

One teacher describes the challenges of integrating technology in the classroom while ensuring that all students can engage with the material through multiple formats, such as slideshows, games, and digital readings. Another teacher highlights a group project where students contributed based on their strengths, ensuring meaningful participation for all, including students with special needs. These examples demonstrate that an inclusive pedagogical repertoire requires flexibility, creativity, and intentional planning to support diverse learners effectively.

#### *2.1.5 The fifth theme: Support systems for teachers implementing universal accessibility*

Teachers emphasized the need for systemic support in implementing inclusive practices, highlighting the importance of professional training, school-wide collaboration, and emotional encouragement. They stressed that equipping educators with the necessary technological skills and fostering a collective commitment to accessibility are crucial for meaningful change. Additionally, emotional support plays a vital role in helping teachers navigate the challenges of universal accessibility. The following quotes illustrate these key points:

*A: The support of the entire school staff is important. It is advisable to create a learning community around the field of Universal Design for Learning (UDL), bringing examples from real-life work, including challenges and difficulties. This can raise awareness of the topic's importance and develop teaching skills for dealing with these challenges. It's not something that was part of the foundational training of all teachers. The support of the school principal is also very important. If the principal is interested in learning environments and technology and understands that this is part of the continuous professional development of her teaching staff, it can make a difference. However, if she doesn't prioritize it, it won't work.*

*B: Many colleagues report that this is really challenging. In the past, I wasn't given the professional tools for this. When such a task suddenly falls on you, and you're expected to make all the adaptations for every student, it creates frustration, and the result is often not great. Teachers may adopt practices without truly understanding if they're*

*suitable for the child. It's important to acknowledge these difficulties, give them space, and show empathy. In the race of teaching and learning, the teacher often ends up neglected. We need to think about how to empower them in terms of resilience and strength while also embedding the expectation that this becomes part of their professional identity.*

One teacher advocates for creating a professional learning community around UDL, where educators can share real-life experiences and challenges to enhance their skills. Another teacher reflects on the frustration of being expected to implement inclusive practices without adequate training, emphasizing the need for empathy and resilience-building. These perspectives demonstrate that successful inclusion requires not only individual effort but also institutional commitment and a supportive professional environment.

### 3. Discussion

The discussion of the five central themes emerging from the data analysis highlights two key focal points in the landscape of teachers' professional identity. The first focal point emphasizes children and the ways in which they learn, while the second centers on teachers, their instructional practices, and their professional needs. The former adopts an outward perspective, focusing on the child, society, and the values integral to educational practice. In contrast, the latter offers an inward perspective, examining teachers' professional identity, beliefs, and skills.

This study employed a qualitative phenomenological methodology to amplify the voices of 31 participants, all of whom had experience with UDL and were actively teaching in primary and secondary education settings. This methodological approach enabled an in-depth exploration of participants' perceptions, practices, and needs regarding UDL, which formed the foundation of their discussions and guided the study's research questions. Participants expressed overwhelmingly positive attitudes toward UDL, supporting their perspectives with a coherent framework of justifications. These justifications emphasized the importance of adopting a universal accessibility model in educational settings.

Aligned with the recommendations of international bodies such as UNESCO and the OECD [1, 2], which advocate for promoting equity in education and ensuring that all students have equal opportunities to engage with their peers, the study's first theme centers on participants' perceptions of accountability and care. Teachers reported a strong sense of mission and justice toward their students, viewing their work as a means to foster equity and opportunity. They also highlighted the importance of cultivating a communal mindset and integrating children into a healthy and thriving society. These findings resonate with previous research, such as Fleming [5], which demonstrates that integrating UDL with educational technologies significantly enhances students' sense of belonging and engagement in the classroom. For these educators, unlocking each child's full potential is seen as fundamental to achieving these goals [8, 9].

The second focal point contributes to the broader understanding that the effective implementation of UDL requires a strong professional identity among educators. This identity enables teachers to navigate the challenges inherent in adopting this inclusive model [15] and underscores the critical connection between UDL and the professional development of teachers. Participants described the evolution of their

professional identities as a dual process, encompassing both reflective and practical dimensions. Teachers highlighted the significance of introspection, emphasizing the need to pause and examine the meaning of their roles and the factors that sustain their commitment to teaching. These reflective processes were identified in the research literature (e.g. [23]) as integral to developing a strong professional identity with distinct leadership qualities. Through this reflective practice, they were able to confront their professional limitations and identify areas requiring growth. In this context, UDL training emerged as a key resource, providing targeted support and actionable solutions to address these gaps. In the practical process, participants identified two primary benefits of UDL training in their professional practice. First, it expanded their pedagogical repertoire, equipping them with a diverse range of tools and strategies to enhance their instruction. Second, it improved their curriculum planning capabilities, particularly in designing professional, evidence-based adaptations. Teachers emphasized that such adaptations cannot rely solely on spontaneous or reactive solutions within a flexible, evolving curriculum. Instead, effective implementation of UDL demands deliberate, thoughtful, and extensive pre-planning to ensure that instructional approaches meet the needs of all learners.

Participants also articulated a series of needs related to their professional development, which reflect broader issues often discussed in educational research [14, 15, 21]. Unlike the instrumentalist perspectives that sometimes dominate teacher discourse, the participants demonstrated a mature, holistic view of professional development. They stressed that any effective process must begin with addressing the fundamental question of *why*—the underlying purpose of their work. Only after answering this question can educators move on to explore the *what* and *how* of their practice. The need for systemic change also emerged as a recurring theme. Participants called for collaborative efforts involving all teachers within the school community, with strong leadership and support from school principals. This collective approach was seen as critical for embedding UDL principles into school culture and practice. A final yet equally important theme related to the social and emotional dimensions of teaching. Participants described teaching as a demanding, multifaceted profession fraught with challenges. They expressed a clear need for acknowledgment—both of the difficulties they face and the significant effort they invest in their roles. Addressing these social-emotional aspects is essential for sustaining teacher motivation and well-being [23], as well as fostering long-term professional engagement.

*In conclusion*, this study sheds light on the complex and dynamic *landscapes in the professional identity of special education teachers*, focusing on their *perceptions and practices related to Universal Design for Learning (UDL)*. Through a qualitative phenomenological methodology, the research highlighted the multifaceted ways in which UDL contributes to both equity-driven teaching practices and the reflective development of professional identity. Participants expressed a deep sense of responsibility and *caring*, driven by a commitment to fostering inclusive and thriving educational environments that prioritize the realization of every child's potential. The findings also underscore the transformative impact of UDL on teachers' professional growth, highlighting a dual process of reflective introspection and practical skill-building. This process enables educators to address foundational “why” questions about their roles, while simultaneously equipping them to plan and implement pedagogical adaptations with intentionality and professionalism. Moreover, the study emphasizes the importance of addressing teachers' social-emotional needs and fostering systemic collaboration, guided by supportive leadership, to successfully integrate UDL principles into educational frameworks. The study contributes to the field in two ways:

**Theoretical Contribution:** It reinforces and substantiates arguments tied to humanistic and child-centered pedagogical perspectives. **Practical Contribution:** It enriches the understanding of how UDL experiences shape teachers' professional identities, offering insights into the transformative potential of this model on their teaching philosophies and practices. By exploring these *landscapes in the professional identity of special education teachers*, the study provides valuable insights into how UDL not only enhances inclusive practices but also strengthens educators' sense of purpose, resilience, and professional fulfillment.

### **3.1 Implications for practice: Supporting teachers in creating inclusive learning environments**

The findings emphasize the need for a comprehensive professional development approach that merges humanistic values—such as empathy, collaboration, and teacher well-being—with practical tools for implementing inclusive education. To move forward, schools and educational institutions must provide ongoing training in UDL, ensuring that teachers receive continuous support in developing diverse instructional strategies, integrating assistive technologies, and applying inclusive pedagogical methods. These training sessions should be interactive and based on real-world classroom experiences, helping teachers refine their approaches through practice and reflection.

Creating professional learning communities (PLCs) focused on inclusion and accessibility can further enhance teacher support by fostering a space for collaboration. Within these communities, educators can share best practices, discuss challenges, and co-develop solutions, ultimately, promoting a systemic and school-wide commitment to inclusion. Bringing together teachers across different disciplines and grade levels ensures a more holistic approach, where accessibility is not just an isolated effort but an integral part of the school's educational philosophy.

Since technology plays a crucial role in accessibility, it is essential that training extends beyond technical skills to include strategies for effective integration into diverse classrooms. Schools should offer hands-on workshops and mentorship programs that help teachers feel confident in using digital tools to enhance learning for all students. However, technological integration must be accompanied by strong leadership support. Administrators play a key role in fostering an inclusive school culture by prioritizing accessibility in professional development, embedding inclusive practices into school policies, and ensuring that teachers have the time and resources to implement these strategies effectively. Without institutional commitment, efforts toward inclusion may remain fragmented and unsustainable.

At the same time, it is essential to acknowledge the emotional and professional challenges teachers face in adapting to diverse learning needs. Implementing inclusive practices can be demanding, and without adequate emotional support, teachers risk burnout. Schools should actively promote resilience-building strategies, mentorship programs, and peer support networks to help teachers navigate these challenges. Recognizing the pressures educators face and addressing their well-being is critical in sustaining long-term engagement in inclusive education.

Beyond individual classrooms, a whole-school approach to inclusion is necessary to create meaningful and lasting change. Schools should encourage co-teaching models, interdisciplinary collaboration, and school-wide initiatives that promote accessibility as a shared responsibility. When inclusion becomes an embedded part of the school's identity, rather than an additional burden placed on individual teachers,

it fosters a more equitable and sustainable educational system. By integrating these strategies, schools can ensure that teachers receive both the practical tools and emotional support they need, ultimately, creating learning environments where all students can thrive.

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## Section 3

# Applications in School and Classroom Settings

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## Chapter 5

# Developing Inclusive Schools and Classroom

*Rolf B. Fasting*

### Abstract

It is widely acknowledged that inclusive education should be accelerated for the sake of the large number of children and young people who are excluded from, or do not succeed in, school. This chapter dives into the processes of developing inclusive schools and classrooms. The first part of the chapter focuses on inclusive education as a framework for developing inclusive learning environments. The second part focuses on the change process when schools aim towards inclusive education. To face these challenges, a significant element is the co-construction of a shared understanding through collaboration and reflection on the core elements of inclusive education. A model for moving practice forward, aiming at providing students with experiences of being significant parts of school and society, is suggested.

**Keywords:** organisation development, inclusive schools, inclusive classrooms, cooperative schools, school leadership, professional learning communities

### 1. Introduction

The Salamanca Statement and the Framework for Action on Special Needs Education [1, 2] recognise policies and practices that include all students in the common school, value diversity, address individual needs, and foster learning. The framework is highly supported [3] and justified along political, educational, social, and economic fronts [4]. However, despite the celebration of Inclusive Education (IE) at the political level, the implementation of IE varies significantly across contexts [5, 6]. The literature on IE is largely situated at a meta-level, expressed in general terms, and not easily accessible or directly applicable. The challenge is not a scarcity of knowledge or agreement on the need to accommodate IE for the diversity of children, but how to translate the ideologies and knowledge into schools and classrooms. As a result, the distance between theory and values, and how to design IE in schools, often leads school leaders and educators to resort to their notions of what they consider expected.

The varying understandings of IE have generated discussions at the policy level as well as in schools [7]. Even within Scandinavian schools, which are considered built on an IE policy, the understanding of what an inclusive classroom is varies

considerably [8]. Some educators and scholars posit that the core of IE primarily refers to specific groups and categories of children, while others highlight its universal applicability [9]. These contrasting perspectives and understandings signify the evolution of IE through various political, economic, and cultural processes, highlighting its complexity, ambiguity, and contested nature [3, 10–12]. The varying understandings generate tensions [13] and emphasise the need for a clearly defined operative meaning of what IE entails ([6], p. 255). An operationalisation must encompass the involved organisational levels [14, 15] and set the premises for future educational policy and classroom practices.

To set the stage for the chapter, contrasting approaches to “education for all” are introduced. On this background, a multi-dimensional deconstruction of IE is suggested as objectives that schools and teachers should strive to achieve. The following section explores critical elements for moving practice in an IE direction. Significant elements include the co-construction of shared understanding and the development of Professional Learning Communities. Subsequently, Lesson Study is introduced as an approach on the path towards more inclusive practices. The final parts of the chapter recapitulate the main ideas and conclude with the implications of these perspectives.

## **1.1 Education for all**

One challenging aspect of education is that its objectives are anchored in varying expectations, understandings, and contexts, both locally and globally [10]. The underlying processes are influenced by the diverse interests and views of policymakers and scholars. Additionally, the blurring and fluid relationship between “education for all”, inclusive education (IE), and special education affects interpretations [16, 17]. These varying understandings not only reflect differences in students and the contexts in which education is implemented but also highlight the contested nature of these concepts, partly due to their close connection to special education. Such conflicting understandings challenge the development of inclusive schools and classrooms, which aim to ensure participation and outcomes for all students, including those with diverse needs [10].

Education for All encompasses educational strategies and programmes focusing on reducing disparities in school and society by addressing barriers to learning and participation [18]. The intention behind these programmes is to boost participation and individuals’ ability to absorb academic, social, and practical knowledge. To address the situation at hand, especially regarding students with special education needs, schools require specific expertise to enhance their capabilities. This includes calls for specialists in autism spectrum conditions, dyslexia, dyscalculia, general learning difficulties, or speech therapy. The process often involves labelling diagnoses and categorising groups of students, which can lead to stigmatisation and exclusion [19, 20]. Support is often provided alongside ordinary education, in resource classes or special settings, often separated from their peers’ everyday classroom activities. This approach stems from the functionalist tradition [21], which views a student’s learning success or failure as a result of their individual predispositions and biology. Furthermore, research indicates that individual-oriented programmes are not necessarily effective [22].

An alternative approach to Education for All and IE stems from a social-constructionist perspective and system-theoretical thinking [23–25]. This perspective aims to break the presupposed links between individual predispositions, diagnoses, and learning disabilities on which the individual model is built [26]. The alternative

approach emphasises that learning failure is contextually based and contingent on individual, environmental, social, and cultural factors, creating limitations for social interaction and learning. Hence, participation, teaching, and learning are the result of teacher-child-peer interaction and the arrangement of an adapted learning environment. This system-theoretical understanding has, since the 1990s, grown into a significant perspective in developing schools to respond to the variety of learner characteristics and needs. The shift is labelled the “organisational paradigm” [27].

To bring about such a shift, it is crucial to direct attention to the core elements of education. Booth and Ainscow [14] highlight significant elements in designing schools that respond to the diversity of individuals. These are:

- Creating inclusive cultures: Building community and establishing inclusive values
- Producing inclusive policies: Developing the school for all and organising support for diversity
- Evolving inclusive practices: Constructing curricula for all and orchestrating learning

Accordingly, developing inclusive schools and classrooms concerns the school system as a whole, from the Ministry of Education to the individual teacher. Consequently, it also involves the children’s parents.

Responding to the diversity of students and the variability of needs requires a range of educational strategies and approaches. Therefore, in an inclusive school, competence in special needs education is an important part of the school’s professionalism. Inclusive special education implies that schools provide students in need of support with adapted education that is closely connected to the ordinary educational programme. Consequently, developing inclusive schools must be regarded as an ongoing process requiring proactive strategies at administrative levels as well as in local schools ([28], p. 51). Despite the significance of contextual factors, individual schools and teachers can contribute significantly to counteracting marginalisation and exclusion. Such initiatives have a profound effect on students’ experiences of being part of the class learning community.

## **1.2 Deconstruction of inclusive education**

There is no universally accepted definition or operationalisation of Inclusive Education (IE). However, the conferences and scholarly work that have followed the World Conference on Special Needs Education in Salamanca, 1994 [1] have led to an emerging consensus about what IE entails. Such a consensus is of vital importance when encouraging schools to develop more inclusive practices.

A deconstruction of IE involves breaking it down into its fundamental components. Based on Booth and Ainscow’s [14] significant elements, along with additional insights from the Norwegian scholar Haug [8], a framework based on *vertical* and *horizontal dimensions* might provide a clear basis for schools moving towards IE. The vertical axis represents the policy-practice level, ranging from national politically-driven ideologies and values down to the school organisation and teachers’ classroom practices. On the horizontal axis, the core of IE is included, focusing on increasing *fellowship, participation, involvement, and outcomes*.

*The vertical axis* represents the policy level and includes education authorities, curricula, and school management documents. It focuses on the responsibilities and influence of the state, regional (municipal) policymakers, school leaders, and teachers in facilitating inclusive practices. To achieve the transition from policy to practice, there is a need for a clear and common understanding of the core elements of IE, the objectives in focus, based on supportive stakeholders with the power to act. Such a collaborative management chain will support school leaders in managing school change initiatives and fostering inclusive schools and classrooms.

*Horizontally*, the core elements of Inclusive Education (IE) are operationalised into four elements or aspirations that all actors in the management chain should strive for on a daily basis. These elements have emerged through the analysis of international policy documents [8, 14]. The core elements and aspirations are summarised as follows:

*Increase fellowship.* All students should have the opportunity to be genuine members of a school and a class and participate in common learning activities academically, socially, and culturally. Accordingly, fellowship in education impacts the entire school, not just some teachers or specific students.

*Increase participation.* All students should be allowed to engage in meaningful learning activities and contribute to the best of their ability and capability, rather than being mere “bystanders.” Accordingly, IE presupposes opportunities for participation in meaningful activities.

*Increase involvement.* All students should be heard and have influence on matters that apply to them and their educational interests as part of teaching school democracy. Accordingly, IE implies opportunities to address and express personal needs, interests, and viewpoints.

*Increase outcomes.* All students should benefit from the education, socially, academically, and in terms of knowledge for life. The benefit of education is the sum of fellowship, participation, and involvement. Accordingly, IE is concerned with providing all students with future-oriented skills and competencies (c.f. [8, 29]).

Implementing policies in the education sector is a complex process involving a series of stakeholders. It is a significant step from passing a policy statement to turning it into daily practices in schools and classrooms [30]. From a social-constructionist perspective and system-theoretical thinking, implementation depends on support for the ideas at all levels. This means that national ambitions and aspirations need support and follow-ups in regions, municipalities, schools, and classrooms. When it comes to inclusive education, there is often a gap between the consensus that IE is important and the priority IE is given at different levels. Adding to this, the varying understandings of IE represent additional challenges. For example, understanding IE solely as placing pupils with special educational needs in regular classrooms [6] is an effective means, but it does not necessarily support the elements of participation, involvement, and outcomes. Such varying acceptance and understandings of what IE entails are a challenge in developing inclusive schools that are supportive and provide an accommodating environment for all students, regardless of their backgrounds and abilities.

### **1.3 Critical aspects regarding the deconstruction**

In the following section, I will discuss some critical aspects of the deconstruction of Inclusive Education (IE), focusing on *fellowship*, *participation*, *involvement*, and *outcomes* when these concepts are applied in practice.

*Fellowship* is about the extent to which all students are seen as genuine parts of the school's and class's learning community [8, 29]. Aiming for IE, a critical element is the use of organisational differentiation, especially when the differentiation is based on social class or educational performance. Organisational differentiation based on categories such as cognitive, sensory-, or language deficits could sideline the ambitions for inclusive education. This kind of practice is often justified by arguments that the students are not "prepared" for classroom teaching. The argument is often followed by assigning students to out-of-class settings, special groups, or special schools. From an IE perspective, such practices counteract inclusion and reduce students' opportunities for interaction with peers and participation in a common learning community. A significant challenge in developing inclusive schools is to ensure quality education for all while counteracting strategies that facilitate segregation.

*Participation* is about taking an active part in the school community and classroom activities [8, 29]. While participation does not guarantee learning, it is a prerequisite for it. In this perspective, school leaders' and teachers' attitudes towards diversity are important. A large body of research indicates that the teacher is the most important factor in students' learning [31, 32]. However, teachers' actions are regulated by factors that define their scope of action. For example, curriculum, class size, availability of supportive devices and teaching aids, local regulations, and expectations significantly impact teachers' everyday work. An adjacent challenge is contradictory governing signals on how IE is to be realised, creating uncertainties both at the school level and for teachers.

Private schools' enrolment criteria is another matter that might challenge the principle of participation. The issue arises when the criteria lead to the homogenisation of students, for example, by systematically admitting students based on social strata, ethnicity, and capabilities. In the global north, for instance, some private schools exclusively cater to specific strata in the population, favouring students from affluent backgrounds or students fitting a particular social or cultural profile. As a result, students with other backgrounds, different ethnicities, or varying capabilities and educational needs may find themselves excluded from these educational opportunities. This kind of practice undermines a diverse classroom, which is essential for developing a rich set of educational experiences in an equitable learning environment.

Furthermore, a trend in recent decades is the use of individual teaching strategies through an uncritical approach to Dewey's [33] ideas of "learning by doing." Research shows that high-achieving students benefit more from individualised teaching strategies than low-achieving students. Low-achieving students tend to be less active and interact with fewer peers than high-achieving students. Participation, interaction, and activity are not the same as learning outcomes; however, learning outcomes require activity.

*Involvement* in education entails opportunities to influence matters related to one's education and interests. Students' involvement is rooted in the schools' governing practices and the daily interactions between the teachers and the students. One main issue regarding students' involvement is the opportunities to raise their voices and express their thoughts and needs as part of building relationships and teaching democracy.

An additional factor is parental involvement in their children's schooling. Parents often know little about what is going on at school. Some schools and teachers try to bridge this gap by sending home short messages about the day-to-day school programme, children's behaviour and performance, school attendance, and accepted/missing assignments. Furthermore, parents often do not know how to support their

children. This issue can be addressed by providing parents with simple tutoring tips or home follow-up activities *via* notes, text messages, or other communication platforms. Such kind of information has proven positive for parents' involvement in their children's schoolwork.

A final comment regarding involvement is the extent to which individual students and parents should expect their suggestions to be heard. Collaboration and co-determination are not about everyone getting what they want. It is about allowing views to come forward, being listened to, and being taken into account in line with everyone else's views and interests. The challenge is to balance individuals' opinions and perspectives with the common interests of the class as a learning community [34].

*Outcomes* of education have received significant attention the last decades closely connected to the ideas of accountability and globalisation. Accordingly, a common template for measuring the quality of education is academic performance indicators, especially in major subjects such as mother tongue, second languages, science, and mathematics. Specific educational strategies or assessment methods cannot guarantee quality outcomes. Therefore, it is important to emphasise that education and schooling have a much wider role than just providing academic knowledge [35].

Education aims at providing young people with skills and competencies for collaboration and participation in society. Several studies have focused on significant factors influencing the outcomes of schooling. One of the most well-known and discussed studies is John Hattie's review of 800 meta-studies [32]. Less known is David Mitchell's review of what works in special and inclusive education [15]. Such studies provide a large body of information on what counts in advancing school education. Approaching this information with an open mind and using the knowledge as a framework for local analyses, reflection, and professional discussions might inspire change and development—however, not as recipes to follow slavishly.

Finally, it should be noted that it is easier to have ambitions for creating inclusive schools and classrooms than to implement IE in practice. This is a challenge even in education systems that identify themselves as inclusive. It is, therefore, crucial that ongoing practices receive attention, are discussed, and are continually followed up on. Claiming that one specific kind of education policy, programme, or school is inclusive by referring to the education programme's orientation or some classroom practices does not provide a contextually valid picture of the current state. A review on education policy implementation by Viennet and Pont [30] summarises the complexity of bringing policy into practice and suggests four recommendations for a fruitful transition. These are:

*Smart policy design* offers logical and feasible solutions, indicating how it can be implemented and to what extent. The suggested deconstruction of IE, focusing on increasing *fellowship*, *participation*, *involvement*, and *outcomes* is an attempt to develop a flexible policy design that aspires to these goals.

*Inclusive stakeholder engagement* by recognising and including key parties in the process. The suggested model's vertical axis focuses on stakeholders' influence at different administrative levels: the state, regional (municipal), school, and classroom (teacher), aiming to enhance the stakeholders' engagement.

*A conducive institutional, policy, and societal context* recognises the influence of the context and existing policy environment. Implementation is more likely to take effect when the context is acknowledged.

*A coherent implementation strategy to reach schools* bringing all the elements together in a coherent manner to make the policy operational at the school level ([30], pp. 42–43).

## 2. Moving practice forward

The second part of the chapter delves into the processes of transforming schools and classrooms into inclusive learning communities. Significant change is unlikely to occur without a sense of urgency regarding important matters [36]. Additionally, there should be a clear understanding of what the change should entail. Finally, impending changes must be contextually adapted and accepted by school leaders and the involved teachers [37]. Research shows that without attention to critical matters in a change process, attempts to change practices might instead reinforce the status quo or go in unforeseen directions. At the heart of the process is a common language for discussing and reflecting on the processes involved and the actions needed for change and development [29, 38]. Without a language for reflection, co-construction, and revising ongoing practices, it is very difficult to create urgency to implement changes in an organisation.

### 2.1 Cooperation for inclusion

Cooperative schools do better than individual schools argue Hargreaves and Fullan in their book, *Professional Capital* [39]. Based on research and their experiences in school development, they contend that the quality of schooling is heavily influenced by the school leader's facilitation of collaboration among staff to build a community that enhances learning and development. Research shows that about 30% of the value-added effect regarding learning and well-being is attributed to the teacher [32]. Initiating change and development implies that the school leader must actively take the driver's seat and support the process, especially when it comes to developing inclusive schools and classrooms. A model that can be used to illustrate the processes involved is a modification of Kolb's learning circle [40]. In the following part, I will briefly elaborate on some of the elements of Kolb's learning circle (cf. **Figure 1**).

Kolb [41] argues that learning is a spiral process that includes four stages: *concrete experiences*, *reflections*, *abstract conceptualisation*, and *experimentation* (actions). To initiate change, the abstract conceptions based on the challenges at hand and the potential new practices must be transformed into actions. From a system-theoretical perspective, a significant element is the transition of ideas into practice. The transformation is supported by reflections and discussions on concrete experiences to frame and conceptualise the challenges, aiming to develop an urgency to act [36]. This co-constructed understanding creates a common basis for what is achievable in the short term and supports long-term collaboration.

Common reflections and conceptualisation aim to develop a shared understanding of the current challenges and the urgency to act. The next step involves planning and reaching a common agreement on how to act for a given period. These internal and external processes (cf. Kolb's learning circle) are mutually related, indicating the transition from general ideas and visions into actions and new practices. The process is framed by contextual and local regulations and expectations such as the curriculum framework, school architecture, resources, and class size.

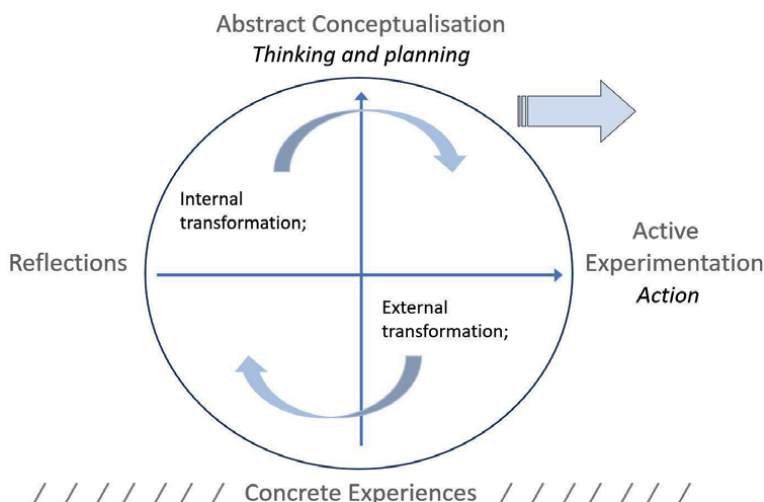


**Figure 1.**  
*Kolb's [41] learning circle.*

A revised inclusive practice grows out of the staff's collaborative efforts and actions to facilitate fellowship, participation, involvement, and outcomes for all students. The process relies on the school management's involvement and teachers' collective examination of ongoing practices. Additionally, Robertson [42] argues that it makes a significant difference whether school leaders acknowledge that they are a part of the change process or if they "think" that change processes are solely the responsibility of the staff.

Organisational learning in schools occurs when significant problems related to teachers' daily work are collectively addressed and discussed and transformed into refined actions, behaviours, and practices. Such collaborative initiatives can serve as points of departure for partnerships and networks within and between schools, as well as between schools and universities.

## 2.2 Lesson study

In the previous section, a model for cooperation in developing inclusive schools was introduced. To test these ideas at the school and classroom levels (Active Experimentation, see **Figure 1**), a promising approach is the use of “Lesson Study” [43, 44]. Lesson Study is an approach used to gain experiences for further developing practices. A Lesson Study is a “research lesson” where teachers jointly design and plan a lesson, which they then implement in their classes. The idea is to create a common platform to reflect on the teaching and learning activities and examine the students’ responsiveness to the activities. After the research lesson, a follow-up post-lesson meeting and discussion are arranged for sharing and reflecting on the experiences from the lesson. Lesson Study may include a subgroup of teachers observing and evaluating the process.

Lesson Study designs facilitate the sharing of knowledge through observations, reflections, and discussions, aiming to develop awareness of students' responsiveness to classroom practices (cf. [41]). This approach can be applied at all grade levels and in all subjects, focusing on various aspects of the teaching and learning process. Furthermore, lesson studies can be scaled up as part of a broader municipal in-service

training programme, promoting networking that links schools together and builds common professional capital. Including students' voices and perceptions in the discussions [45, 46] adds a critical edge to the process. Building collective capacity for improving the quality of education encourages the development of professional learning communities as a driving force for school development [39].

### 2.3 Professional learning communities

Collaboration, co-construction, and joint understandings of knowledge are basic elements in a system-theoretical approach for developing inclusive schools and classrooms. Additionally, the theory of Professional Learning Community (PLC) adds fruitful perspectives to the process. Hord and Sommers [47] summarise three significant elements defining PLC: *professionals coming together, the creation of a joint fellowship, and mutual learning*. In educational settings, a PLC can be defined as a group of educators who regularly meet, share expertise, and collaborate to improve their teaching strategies and methods, as well as enhance students' well-being and learning. In school settings, the PLC model aims to extend individual teachers' classroom practices to the community of teachers by discussing strategies and teaching practices.

PLC is based on the idea of a learning organisation [48] and reflective practices espoused by Schön [38]. Hargreaves [49] argues that teacher collaboration must focus on the school's contribution to the students' overall learning and well-being. Secondly, the collaboration has to be trustfully-based, and not forced. The processes aim to serve at least two purposes. Firstly, PLC extends the skills and knowledge of school leaders and teachers through reciprocal, collaborative dialogues and the exchange of ideas, understandings, and expertise. Secondly, PLC aims to improve students' achievement and well-being through better teaching practices and coherent classroom leadership. The processes involved in the theory of Professional Learning Community are similar to those described in the two previous sections, Cooperation for Inclusion and Lesson Study. All three designs aim to build schools' overall capacity and professionalism, providing valuable methods for the implementation of inclusive education.

## 3. Final discussion—Implications for practice

Developing inclusive schools and classrooms is argued as demanding and challenging. Delving into these challenges, a key theme has been the connection between a multi-dimensional view on Inclusive Education [8, 14, 29] and designs for how schools and teachers can move practices in an inclusive direction. In the continuation of the discussion, one question is how to respond to students in need of specific strategies for teaching and learning. Based on the previous discussions, an initial assumption is that special needs education strategies and measures have no place in an inclusive school and classroom. This is a hasty conclusion. The question is, rather, how to include specific teaching and learning strategies in the activities of the classroom. For example, sign language teaching for deaf students is different from spoken teaching strategies, but crucial for deaf students' learning. In this context, studies indicate that the use of sign language can benefit all students' learning, including those without impairments (cf. [50]). A socio-cultural perspective on learning supports the finding by emphasising the importance of a variety of linguistic mediating tools, as language is the main source for human learning and development [51, 52].

The example indicates that a specific learning strategy, such as sign language, opens possibilities for expanding the range of teaching and learning activities in the classroom without promoting exclusion. From an Inclusive Education perspective, the questions we need to raise are: What is the diversity of the classroom, how do we address this diversity, and what consequences do the strategies we implement entail?

In developing inclusive schools and classrooms, at least two challenges must be acknowledged. The first is to develop a shared, context-based understanding of what IE entails and to agree on the core elements to implement into practice. Furthermore, the co-constructed and shared understanding must be transformed into actions for adjusting current practices. An OECD report on the matter concludes that:

*... developing inclusive education must be seen as a reform process. For it to work, many new attitudes need to be formed and practices developed, not only among education professionals but also across communities and societies as a whole ([28], p. 51).*

The implication of this perspective is that teachers must open-mindedly balance individuals' needs and resources with the subject content, the teaching and tutoring methods in use, and the environmental variables representing the community of peers and available supportive aids and resources [48].

A second challenge is to recognise that developing inclusive schools and classrooms is a continuous ongoing process where schools and educational programmes are constantly evolving. Creating a viable process requires an understanding of Inclusive Education as something “unfinished” [53], making established understandings and practices open for change. Within this frame of complexity and uncertainty, school leadership and teachers have a profound impact on the individual student's perception of being a significant part of the school and society. Accordingly, the implication for practice is that schools must address the challenges at hand, especially the challenges of vulnerable students, in terms of barriers to access, participation, and outcomes, and critically discuss whether current practices are exclusionary.

When summarising the implications, the main message is that the process of developing inclusive schools and classrooms is an ongoing, constructive process that constantly brings up new challenges that need to be addressed.

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# Multisensory Mathematics Instruction for Differentiation in the Elementary Mathematics Classroom

*Cliff Chestnutt*

## Abstract

This paper explores multisensory mathematics instruction's theoretical foundations and practical applications as a differentiation strategy in elementary classrooms. Drawing on constructivist theory, cognitive load theory, multiple intelligences theory, and other relevant frameworks, we examine how engaging numerous senses in mathematics learning can enhance conceptual understanding, retention, and engagement for diverse learners. The study discusses key components of multisensory mathematics instruction, including the Concrete-Representational-Abstract (CRA) sequence, manipulatives, visual representations, movement-based learning, and technology integration. We present strategies for differentiating content, process, and product using multisensory approaches and provide implementation guidelines for educators. By synthesizing current research and best practices, this paper aims to demonstrate how multisensory mathematics instruction can create more inclusive, effective, and engaging learning environments that cater to the diverse needs of all students in elementary mathematics education.

**Keywords:** multisensory mathematics, mathematics education, differentiation, mathematics, elementary mathematics

## 1. Introduction

Mathematics instruction in elementary classrooms has traditionally relied heavily on abstract concepts, rote memorization, and paper-and-pencil exercises. While efficient in some respects, this conventional approach has often left many students struggling to grasp the fundamental ideas underpinning mathematical thinking. Research has consistently shown that many students face challenges when mathematical concepts are presented solely in symbolic or abstract form [1]. This disconnect between abstract representation and conceptual understanding has led educators and researchers to seek more effective, inclusive methods of mathematics instruction.

A paradigm shift has occurred in mathematics education in response to these challenges. At the forefront of this shift is the multisensory approach to mathematics

instruction. This innovative methodology engages multiple senses and learning modalities, allowing students to construct deeper conceptual understanding through hands-on exploration and concrete representations. By bridging the gap between tangible experiences and abstract concepts, multisensory mathematics instruction offers a promising path to enhanced mathematical comprehension and proficiency.

### **1.1 The need for multisensory approaches**

The traditional emphasis on abstract thinking in mathematics education often overlooks the diverse learning needs of students in elementary classrooms. Young learners, in particular, benefit from concrete experiences that help them make sense of abstract mathematical ideas. Moreover, students with learning differences, such as dyscalculia or visual-spatial processing difficulties, may find traditional instructional methods particularly challenging. The multisensory approach addresses these issues by providing multiple entry points to mathematical concepts, catering to various learning styles and abilities.

### **1.2 Differentiation through multisensory instruction**

One of the most compelling aspects of multisensory mathematics instruction is its potential as a differentiation strategy. In today's diverse classrooms, teachers are meeting the needs of students with varying abilities, backgrounds, and learning preferences. Multisensory approaches offer a flexible framework adapted to support struggling learners, challenge high-achieving students, and engage all students. By incorporating visual, auditory, tactile, and kinesthetic elements into mathematics lessons, educators can create a more inclusive learning environment that addresses the unique needs of each student.

### **1.3 Neuroscience and multisensory learning**

Recent advances in neuroscience have provided strong support for multisensory approaches to learning. Research has shown that simultaneously processing information through multiple sensory channels leads to stronger neural connections and improved retention [2]. This finding has significant implications for mathematics education, suggesting that multisensory instruction can enhance immediate understanding and long-term mathematical proficiency.

### **1.4 Scope of this chapter**

This chapter explores the theoretical foundations, practical applications, and potential benefits of multisensory mathematics instruction in elementary classrooms. We will examine:

1. The principles underlying multisensory approaches to mathematics
2. Specific strategies and tools for implementing multisensory instruction
3. Case studies and research findings demonstrating the effectiveness of these methods

#### 4. Challenges and considerations in adopting multisensory approaches

#### 5. Future directions for research and practice in multisensory mathematics education

By the end of this chapter, readers will have a comprehensive understanding of how multisensory mathematics instruction can be leveraged as an effective differentiation strategy to meet the diverse needs of all learners in elementary classrooms. This knowledge will empower educators to create more engaging, accessible, and effective mathematics learning experiences that foster deep conceptual understanding and mathematical proficiency among all students.

As we delve into the world of multisensory mathematics instruction, we invite readers to reimagine the possibilities of mathematics education. In this vision, every student, regardless of their learning style or ability, can develop a strong foundation in mathematical thinking and problem-solving skills that will serve them throughout their academic careers and beyond.

Mathematics instruction in elementary classrooms has traditionally relied heavily on abstract concepts, rote memorization, and paper-and-pencil exercises. However, research has shown that many students struggle to grasp mathematical ideas when presented only in symbolic or abstract form [1]. A multisensory approach to mathematics education engages multiple senses and learning modalities, allowing students to construct deeper conceptual understanding through hands-on exploration and concrete representations. This chapter explores how multisensory mathematics instruction can be leveraged as an effective differentiation strategy to meet the diverse needs of all learners in elementary classrooms.

## 2. Theoretical framework for multisensory instruction in mathematics education

Multisensory instruction in mathematics draws on several influential educational theories that emphasize the interaction between sensory experiences and cognitive development. These theories collectively provide a strong foundation for understanding how multisensory approaches can enhance learning, particularly for diverse learners. By integrating visual, auditory, and kinesthetic learning modes, multisensory instruction aligns with cognitive, developmental, and constructivist theories, offering a robust rationale for its effectiveness in mathematics education.

At the heart of multisensory instruction is *constructivism*, a theory advanced by Jean Piaget and Lev Vygotsky, which asserts that learners actively construct knowledge through engagement with their environment [3, 4]. According to constructivist principles, learning is not passive; learners build understanding through hands-on experiences and social interactions. Multisensory approaches facilitate this process in mathematics by providing concrete tools and experiences that help students internalize abstract concepts. For instance, manipulatives such as geometric shapes or fraction bars allow students to manipulate mathematical objects physically, deepening their understanding of spatial relationships and mathematical operations. This hands-on exploration, which connects abstract symbols with physical forms, embodies Piaget's concept of "active construction" [3].

Additionally, Vygotsky's [4] emphasis on social interaction and the zone of proximal development highlights the importance of collaborative learning. Multisensory instruction fosters this collaborative engagement by incorporating peer discussions and group problem-solving. Students are encouraged to share their tactile, visual, and verbal insights, supporting deeper cognitive processing and reinforcing the learning experience.

Building on this, *Cognitive Load Theory* (CLT), developed by John Sweller [5, 6], offers a compelling explanation for how multisensory instruction optimizes learning. CLT posits that working memory has limited capacity, and learning can become less effective when the cognitive load exceeds this capacity [5]. Multisensory approaches help mitigate this by distributing cognitive load across multiple sensory channels, preventing overload on any channel and improving overall processing efficiency. For example, when mathematical concepts are taught using verbal explanations and visual aids—such as diagrams, graphs, or charts—cognitive load is shared between the auditory and visual systems, enhancing comprehension and retention [7]. Research has consistently shown that combining verbal and visual stimuli facilitates better understanding by engaging dual cognitive pathways [5]. This aligns with Sweller's "worked example effect," demonstrating how structured instructional techniques can optimize cognitive load and improve learning outcomes. Multisensory instruction enables students to manage cognitive load more effectively by engaging multiple senses, making complex mathematical concepts more accessible.

Another important perspective comes from the *Multiple Intelligences Theory*, proposed by Howard Gardner [8]. Gardner's theory recognizes that students possess various intellectual strengths beyond the traditional linguistic and logical-mathematical intelligences. His model identifies eight intelligences—linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalistic—each representing a different way of processing and interacting with information. Multisensory instruction is compelling in addressing this diversity by offering a variety of learning experiences that cater to different intelligences. For example, students with strong spatial intelligence might benefit from hands-on activities like building geometric shapes.

In contrast, those with bodily-kinesthetic intelligence could engage in movement-based learning, such as acting out mathematical concepts like symmetry or angles. By using visual, auditory, tactile, and kinesthetic modalities, educators can tap into students' diverse strengths, ensuring that learners with varying intellectual profiles are engaged and supported. This inclusive approach fosters a classroom environment where all students can thrive, promoting a more holistic form of learning [8].

In conjunction with Gardner's theory, the *Dual Coding Theory*, proposed by Allan Paivio [7], further supports the efficacy of multisensory instruction by emphasizing the brain's ability to process verbal and visual information through separate channels. Paivio argued that when information is presented through verbal and visual modalities, it is more likely to be retained and understood. This idea is particularly relevant to mathematics education, where abstract symbols can be paired with concrete visual representations. For instance, when teaching algebraic equations, combining verbal explanations with graphical representations helps students connect abstract symbols to visual forms, thus enhancing comprehension [7]. By presenting information through multiple pathways, dual coding reinforces learning through repetition in different formats, allowing students to encode and retrieve mathematical concepts more effectively.

Furthermore, the theory of *embodied cognition* provides a valuable perspective on how multisensory instruction can facilitate deeper learning. Embodied cognition

posits that cognitive processes are rooted in the body's interactions with the world, emphasizing the role of physical movement and sensory experiences in shaping understanding [9]. This theory is particularly relevant to multisensory mathematics instruction, often incorporating physical movement and tactile exploration. For example, students might use their hands to manipulate objects or trace shapes in the air better to understand geometric concepts such as angles or symmetry. These physical experiences directly link the abstract world of mathematics to the sensory experiences of the body, making concepts more tangible and accessible. By integrating movement, gesture, and tactile exploration, multisensory instruction capitalizes on the embodied nature of learning, which can be especially beneficial for kinesthetic learners who excel through physical interaction with the environment [10].

Finally, *Dienes' Theory of Mathematics Learning* (1960) provides a framework for structuring multisensory instruction in mathematics. Dienes proposed four key principles for effective mathematics learning: the *Dynamic Principle* (learning through experience), the *Perceptual Variability Principle* (exposure to multiple representations), the *Mathematical Variability Principle* (emphasizing different mathematical methods), and the *Constructivity Principle* (learning through self-discovery). Multisensory instruction effectively embodies these principles by providing students with varied, hands-on experiences that allow them to explore mathematical concepts from different perspectives. For instance, students might learn multiplication through physical manipulatives (dynamic experience), visual representations (perceptual variability), multiple strategies such as skip counting or grouping (mathematical variability), and collaborative problem-solving (constructivity). This dynamic, varied approach helps students build a deeper, more flexible understanding of mathematics, moving beyond rote memorization to meaningful learning [11].

In summary, integrating these diverse educational theories provides a comprehensive framework for understanding the effectiveness of multisensory instruction in mathematics education. By combining insights from constructivism, cognitive load theory, multiple intelligences, dual coding, embodied cognition, and Dienes' principles, multisensory approaches offer a rich, multidimensional pathway for learning. These theories collectively emphasize the importance of engaging diverse cognitive and sensory channels, which enhances learning and makes mathematical concepts more accessible. By incorporating multisensory techniques, educators can create inclusive, cognitively efficient, and engaging learning environments that support the development of mathematical understanding across a diverse range of learners.

### 3. Understanding multisensory mathematics

Multisensory mathematics instruction is an approach that incorporates multiple sensory inputs and learning modalities to teach mathematical concepts. This method aims to engage sensory pathways—visual, auditory, tactile, and kinesthetic—to strengthen neural pathways, enhance memory retention, and support long-term learning outcomes. Research suggests that using diverse forms of sensory engagement, multisensory approaches foster deeper conceptual understanding and facilitate the retrieval and application of mathematical knowledge [12]. These techniques have proven beneficial for students with different learning styles, allowing for a more personalized learning experience.

One of the key components of multisensory mathematics is the use of manipulative objects. Manipulatives—such as base-ten blocks, pattern blocks, and counting

beads—serve as physical representations of abstract mathematical concepts, helping students build understanding through hands-on interaction. By physically manipulating these objects, students can concretely explore foundational concepts like place value, addition, and spatial relationships. This hands-on approach promotes active learning, encouraging students to develop a deeper understanding of mathematical ideas by “constructing” them through tactile experiences. For instance, when students use base-ten blocks to understand place value, they move beyond mere memorization of rules and gain a more concrete, intuitive sense of number relationships [13].

In addition to manipulatives, multisensory math instruction involves incorporating visual, tactile, and kinesthetic learning experiences. Visual aids such as charts, diagrams, and number lines play a crucial role in helping students organize and conceptualize mathematical ideas. For example, graphic organizers can clarify problem-solving strategies, while visual representations of word problems can support students in deciphering complex language and applying appropriate mathematical operations [13, 14]. By engaging students’ visual and tactile senses, these tools facilitate the process of abstraction, which can otherwise be difficult for learners who struggle to connect theoretical concepts with concrete experiences.

A hallmark of multisensory mathematics is using the *Concrete-Representational-Abstract* (CRA) instructional sequence. This approach systematically scaffolds learning by guiding students through three stages of understanding mathematical concepts. In the *concrete* phase, students manipulate physical objects to explore mathematical ideas hands-on. For instance, they might use counting beads to understand addition or fraction strips to explore equivalency. In the *representational* phase, students move from concrete manipulatives to visual representations such as drawings, diagrams, or pictures, which allow them to express their understanding symbolically. Finally, in the *abstract* phase, students transition to working with symbols, numerals, and equations, representing the complete abstraction of the explored concepts. This sequence ensures that students develop a solid conceptual understanding before progressing to more abstract forms of mathematical expression [14]. The CRA approach is efficient because it allows students to gradually internalize mathematical concepts, reducing cognitive overload and supporting deeper learning.

Physical movement is another essential aspect of multisensory mathematics, which can enhance learning by providing kinesthetic experiences. Activities that involve movement, such as using an extensive number line on the floor or creating human shapes to represent geometric concepts, can help students internalize mathematical principles. For example, students might physically move along a number line to understand addition and subtraction or work together to form shapes with their bodies to explore concepts such as symmetry or geometry. These kinesthetic activities provide a tangible link between abstract mathematical concepts and the student’s physical experience, reinforcing learning in a way that engages the body and mind together [13].

The benefits of multisensory mathematics instruction are well-documented in research. One key advantage is improved conceptual understanding. By providing students with opportunities to explore mathematical concepts through physical and visual means, multisensory instruction helps students build a deeper, more intuitive understanding of abstract ideas. For instance, students who engage with manipulatives can see, touch, and move objects in ways that clarify the meaning of complex concepts like fractions, multiplication, or geometry, which are often difficult to grasp through verbal explanation alone [13]. Moreover, engaging multiple senses helps to solidify the neural pathways associated with mathematical knowledge, leading to improved long-term retention [12].

In addition to enhancing conceptual understanding, multisensory instruction also supports increased student engagement. Multisensory activities, such as working with manipulatives or moving through the classroom for kinesthetic exercises, tend to be more engaging than traditional paper-and-pencil tasks. These interactive activities capture students' attention and promote active participation, which is essential for deep learning. Engaged students are more likely to persist in problem-solving tasks and develop a positive attitude toward mathematics, particularly those who might otherwise struggle with more traditional, passive forms of learning [14].

Multisensory math instruction also offers significant benefits for diverse learners. By incorporating visual, tactile, and kinesthetic elements into lessons, teachers can cater to various learning styles and needs. For example, students who struggle with verbal processing might find visual aids or manipulatives particularly helpful. At the same time, those who benefit from hands-on, kinesthetic activities will thrive in an environment where movement and physical engagement are integral. This inclusivity makes multisensory approaches particularly effective for students with learning differences or those who have difficulty with more conventional, one-size-fits-all methods [14]. Moreover, multisensory instruction can reduce math anxiety, as concrete representations of abstract concepts can help demystify challenging material, making it more accessible and less intimidating for struggling learners.

Finally, multisensory math instruction fosters the development of number sense. Hands-on activities with manipulatives allow students to build a strong foundation in numeracy, which is critical for success in more advanced mathematical concepts. By working with physical objects and engaging in visual and kinesthetic activities, students develop a more intuitive sense of numbers and operations, which supports their ability to solve problems and make connections between different areas of mathematics [13].

Multisensory mathematics instruction offers a comprehensive, engaging, and inclusive approach to teaching mathematical concepts. Incorporating manipulatives, visual supports, kinesthetic activities, and the CRA sequence helps students build a deep, flexible understanding of mathematics. It also supports retention, reduces anxiety, and fosters engagement, making mathematics more accessible to all learners, regardless of their learning style or ability level.

## **4. Visual and tactile learning in multisensory mathematics instruction**

Visual and tactile learning is integral to multisensory mathematics instruction, offering students diverse ways to engage with mathematical concepts. Visual learning utilizes visual aids such as diagrams, charts, and graphs to represent abstract mathematical ideas. In contrast, tactile learning involves physical manipulation of objects to deepen understanding and make abstract concepts more concrete. Together, these modalities provide rich, multisensory experiences that enhance student engagement, support memory retention, and foster inclusivity, particularly for learners with diverse learning needs [15, 16].

### **4.1 Visual learning in mathematics**

Visual learning is critical in helping students organize and internalize mathematical information. Visual aids such as number lines, flowcharts, and graphs provide external representations of abstract concepts, helping students “see” mathematical

operations and relationships. For example, number lines offer a visual depiction of the process of addition and subtraction, making it easier for students to conceptualize how numbers increase or decrease [17]. Visual representations of fractions, ratios, and algebraic expressions also enable students to connect mathematical symbols and real-world contexts, facilitating deeper understanding [18].

The effectiveness of visual learning in mathematics is supported by *the Dual Coding Theory* [7], which posits that presenting information through visual and verbal channels enhances learning by allowing students to encode and retrieve information via two distinct cognitive pathways. For instance, when introducing multiplication, students can visualize arrays or grid models while listening to verbal explanations of the process. This dual input helps to reinforce the concept by engaging visual and auditory processing systems, leading to better retention and understanding [19].

Furthermore, visual supports are essential for making abstract mathematical concepts more accessible, especially for students who find working with purely symbolic representations challenging. For example, when learning algebraic equations, students might use visual diagrams or color-coded charts to see how variables interact within an equation [20]. Research suggests that students who use visual aids frequently outperform those who rely on traditional methods, as the visual components help make abstract ideas more tangible and understandable [21].

## **4.2 Tactile learning in mathematics**

Tactile learning, which involves using manipulatives, engages students by allowing them to interact with mathematical objects physically. This hands-on approach deepens students' conceptual understanding and promotes long-term retention by providing a sensory connection to abstract mathematical ideas. Manipulatives, such as base-ten blocks, fraction bars, and pattern blocks, are key tools in tactile learning, enabling students to explore mathematical concepts in a concrete and tangible manner [22].

For example, using base-ten blocks to represent place value allows students to construct and deconstruct numbers physically, strengthening their understanding of how numbers are structured. Similarly, pattern blocks can be used to explore geometric shapes and spatial relationships, helping students develop critical skills in geometry [23]. By manipulating these tools, students engage their sense of touch and reinforce key mathematical operations, such as addition, subtraction, multiplication, and division.

Tactile learning is particularly effective for kinesthetic learners who learn best through physical movement and hands-on activities. Using manipulatives provides an active, engaged learning experience that taps into the body's natural way of processing information [24]. When students manipulate objects like fraction strips or counting cubes, they actively explore and internalize mathematical concepts, helping them build a more flexible understanding of mathematics beyond rote memorization [16].

## **4.3 Integration of visual and tactile learning in multisensory instruction**

Integrating visual and tactile strategies creates a robust framework for multisensory mathematics instruction, where students engage in multiple sensory pathways to deepen their understanding. When these two modalities are combined, they provide

students with multiple representations of the same mathematical concepts, helping to reinforce learning. For example, in teaching geometry, students might use tactile manipulatives such as pattern blocks to form shapes while referencing visual diagrams to understand the properties of these shapes [18]. This combined approach allows students to connect concrete, hands-on experiences with visual representations, which fosters a more holistic understanding of mathematical concepts.

The synergy between visual and tactile strategies aligns well with the *Concrete-Representational-Abstract (CRA) Sequence* discussed earlier [14]. During the concrete phase, students physically manipulate objects, which allows them to experience mathematical concepts firsthand. The representational phase uses visual tools such as diagrams or drawings to represent abstract concepts, while the abstract phase focuses on working with symbols and formulas. This progression from concrete to representational and finally to abstract representations ensures that students build a solid mathematical foundation before advancing to more complex, symbolic work [13].

Additionally, combining visual and tactile approaches supports cognitive load management, an important principle in *Cognitive Load Theory* [5]. Students can distribute cognitive load across different pathways by engaging multiple sensory channels simultaneously, which helps prevent overload and enhances learning efficiency. For example, when learning to solve algebraic equations, students can use visual aids like graphs and tactile manipulatives to explore the relationships between variables, allowing them to focus on the conceptual underpinnings of the problem without being overwhelmed by the cognitive demands of abstract symbols alone [5, 7].

In conclusion, integrating visual and tactile learning strategies within multisensory mathematics instruction enhances students' engagement, understanding, and retention by providing concrete, sensory-rich experiences. Visual tools like charts, number lines, and graphs help students conceptualize abstract mathematical ideas, while tactile manipulatives allow physical interaction with mathematical concepts. Together, these approaches create multiple pathways for students to process and retain mathematical information, making abstract ideas more accessible and reinforcing key mathematical principles. This dual engagement supports diverse learners and ensures that mathematical instruction is effective, inclusive, and deeply engaging.

## **5. Movement and kinesthetic learning in mathematics**

Incorporating movement into mathematics instruction is a powerful strategy that activates students' physical and cognitive faculties, enhancing their engagement, retention, and understanding of mathematical concepts. Kinesthetic learning, which involves physical movement and hands-on activities, is especially beneficial for students who learn best through direct interaction with their environment. This approach not only supports the development of motor skills but also strengthens the connection between physical actions and abstract mathematical ideas. Research has shown that movement can positively impact student motivation, engagement, and conceptual understanding by creating more robust neural connections between the body and the mind [25]. When students physically engage with mathematical concepts, they often develop a deeper, more lasting understanding, as movement reinforces the learning process by adding a tactile dimension to otherwise abstract ideas.

For example, using body movements to illustrate mathematical operations or concepts helps bridge the gap between abstract symbols and real-world experiences.

One everyday kinesthetic activity in mathematics is using arm motions to represent greater than/less than inequalities. In this activity, students physically move their arms apart or together to symbolize the relational direction of mathematical symbols (i.e.,  $>$  or  $<$ ). This movement creates a concrete connection to the abstract concept of inequality and allows students to internalize the idea in a way that is both visual and physical. Research by Witzel [26] highlights the efficacy of incorporating physical gestures, such as these arm motions, in helping students better grasp mathematical relationships.

Another example of kinesthetic learning in mathematics is “walking a number line.” In this activity, a number line is taped onto the floor, and students walk along it to physically experience addition and subtraction. By linearly moving their bodies, students can literally “feel” the increments of numbers, which enhances their understanding of how numbers relate to each other. For example, walking from one number to the next while adding or subtracting allows students to visualize moving forward or backward along a number line, thus deepening their comprehension of basic arithmetic operations [25]. This physical representation of numbers makes abstract concepts more concrete and accessible, particularly for young learners or students who struggle with traditional, abstract forms of instruction.

Kinesthetic learning also plays a significant role in spatial reasoning, particularly geometry. One kinesthetic activity that aids in spatial awareness is having students physically form geometric shapes with their bodies. For example, students can use their arms and legs to form triangles, squares, or other polygons. This activity helps students visualize geometric shapes’ properties and reinforces their understanding of key concepts such as angles, symmetry, and congruency. According to research by Randler and Klenk [27], students who physically manipulate geometric shapes tend to show improved spatial reasoning skills and a firmer grasp of geometric principles. The tactile experience of forming shapes strengthens students’ understanding of their properties, making abstract geometric concepts more tangible.

Role-playing and acting out word problems is another effective way to incorporate movement into mathematics lessons. By physically acting out scenarios presented in word problems, students can better understand the context and relationships within the problem. For example, students might simulate the steps of a word problem involving addition or subtraction by using their bodies to represent different quantities and actions. This type of activity encourages students to visualize the mathematical problem in a real-world context, which helps them develop critical thinking skills. Furthermore, the physical engagement required for role-playing word problems makes the learning experience more enjoyable and memorable [25]. By creating physical representations of word problems, students are likelier to retain the concepts involved and approach similar problems more confidently.

Another innovative approach to kinesthetic learning in mathematics is using sign language to reinforce number concepts and mathematical operations. Witzel [26] highlights the effectiveness of integrating sign language into math instruction, combining visual and kinesthetic modalities. For example, students can use hand signs to represent numbers or mathematical operations such as addition, subtraction, multiplication, and division. This approach not only reinforces the understanding of mathematical symbols but also helps students connect the physical movements of their hands with the concepts they represent. By incorporating sign language, educators can provide a multisensory experience that supports students’ comprehension while fostering inclusivity for students with hearing impairments or those learning sign language as a second language.

The benefits of kinesthetic learning extend beyond the immediate classroom setting. When students engage in movement-based activities, they improve their understanding of mathematical concepts and develop important skills in areas such as spatial awareness, fine motor coordination, and teamwork. Moreover, these activities can contribute to a positive emotional experience of learning. Movement-based learning often reduces anxiety and increases motivation, particularly for students who may feel overwhelmed or disengaged in traditional, sedentary classroom settings [25]. As students engage in physical movement, their motivation to participate in lessons increases and their sense of competence and confidence in their mathematical abilities improves.

Incorporating kinesthetic learning into mathematics instruction is particularly valuable for students who are kinesthetic learners or those who struggle with traditional verbal or written instruction. By providing a hands-on, interactive learning environment, educators can cater to diverse learning styles and offer students a more engaging and effective way to grasp mathematical concepts. As research has shown, physical engagement enhances cognitive processing, making it easier for students to connect abstract ideas to real-world experiences and retain mathematical knowledge for the long term [25].

## **6. Technology integration in multisensory mathematics instruction**

Technology integration in mathematics education plays a transformative role in enhancing multisensory learning experiences. By incorporating digital tools, educators can provide students with varied modes of representation, interaction, and practice that engage multiple senses, making abstract mathematical concepts more tangible and accessible. Technology supports active learning and caters to diverse learning preferences, offering opportunities for personalized learning, independent practice, and interactive feedback [28, 29]. With technology, students can simultaneously engage in visual, auditory, and tactile experiences, fostering deeper understanding and better retention of mathematical concepts.

### **6.1 Virtual manipulatives and digital tools**

One of the most effective applications of technology in mathematics instruction is the use of virtual manipulatives. These digital tools replicate traditional hands-on manipulatives such as base-ten blocks, fraction strips, and number lines, allowing students to engage in tactile learning without needing physical materials. Virtual manipulatives provide interactive, flexible learning experiences that help students explore mathematical concepts dynamically and engagingly. For example, virtual base-ten blocks allow students to model place value, perform addition and subtraction, and even explore multiplication and division, just as they would with physical blocks [30]. These virtual tools provide a concrete representation of abstract concepts and can be easily manipulated to suit various learning styles.

Research has shown that using virtual manipulatives increases student engagement and helps improve conceptual understanding. By enabling students to visualize mathematical operations and relationships in real time, these tools allow instant feedback and provide opportunities for immediate correction of misconceptions [31]. Furthermore, virtual manipulatives can create individualized learning experiences that cater to students' specific needs, promoting a deeper understanding of core mathematical concepts.

## **6.2 Interactive whiteboards and dynamic learning**

Interactive whiteboards (IWBs) are another powerful tool for integrating technology into the classroom. IWBs allow teachers and students to manipulate numbers, shapes, graphs, and diagrams directly on the board, facilitating visual and tactile engagement. For instance, students can drag geometric shapes, adjust number lines, or modify equations, enhancing their ability to visualize mathematical relationships and operations. This hands-on, interactive approach to learning supports the *Concrete-Representational-Abstract* (CRA) instructional sequence, as students first manipulate physical or digital objects (concrete), then represent these objects through drawings or diagrams (representational), and finally move to abstract symbols and equations [14].

IWBs also support collaborative learning, enabling students to work together on mathematical problems while interacting with digital content. This collaborative aspect of technology use aligns with Vygotsky's [4] theory of social constructivism, which emphasizes the role of social interaction in cognitive development. Through collaborative tasks on IWBs, students can engage in peer-to-peer learning, reinforcing their understanding and problem-solving skills in real-time.

## **6.3 Math apps and game-based learning**

Another emerging trend in technology integration is using math apps and games, which combine gamification principles with mathematics learning. Apps such as *DragonBox* and *Prodigy* have revolutionized how students learn mathematical concepts by incorporating game-based elements. These apps offer engaging, interactive environments where students solve math problems as part of a game, earning rewards and progressing through levels as they master different concepts. Research suggests that gamified learning experiences, particularly those that integrate game mechanics with educational content, can enhance motivation, promote problem-solving skills, and foster deeper engagement with mathematical concepts [32].

Math apps allow students to practice key skills independently, providing instant feedback and adaptive learning pathways. These personalized learning environments are particularly beneficial for students who need extra support or those who excel and require more challenging content. These apps' combination of visual, auditory, and kinesthetic elements provides a multisensory experience that caters to different learning preferences, thus ensuring that students stay motivated and involved in the learning process.

## **6.4 Video creation and digital storytelling**

In addition to using traditional educational technology, creating math-related videos and digital stories is another innovative way to enhance multisensory learning. Students can use video creation tools like stop-motion animation apps or simple video-editing software to demonstrate their understanding of mathematical concepts. For instance, a student might create a stop-motion animation to show the process of solving a fraction problem, using visual cues to represent the operations involved [33]. This process engages students in mathematical problem-solving, creative thinking, and communication, making it an effective tool for deeper learning.

Video creation also provides a powerful form of formative assessment, allowing teachers to observe students' understanding. By reviewing the videos, teachers can

assess whether students can accurately represent mathematical processes, helping to identify areas of confusion or misunderstanding that may need further clarification [33]. Furthermore, video creation fosters the development of digital literacy skills, which are increasingly important in the modern educational landscape.

### **6.5 3D printing in mathematics instruction**

Finally, 3D printing has emerged as an exciting technology that can complement multisensory math instruction. Through 3D printing, students can create physical models of geometric shapes, fractions, and other mathematical objects, allowing them to explore abstract concepts in a tangible, hands-on way. For example, students can print models of geometric solids to examine their properties, such as surface area, volume, and symmetry, which can deepen their understanding of spatial reasoning [33]. By manipulating these physical objects, students gain a concrete understanding of geometric relationships that would be difficult to grasp through traditional methods alone.

3D printing also allows for personalized learning, as students can design and print their own models to explore mathematical ideas at their own pace. This creative, hands-on process encourages problem-solving and critical thinking, which are essential skills for mastering mathematical concepts. Additionally, 3D printing can create visual representations of word problems, making abstract mathematical scenarios more relatable and straightforward to comprehend [33].

Integrating technology in multisensory mathematics instruction provides students with dynamic, engaging, and personalized learning experiences that enhance their understanding of mathematical concepts. Virtual manipulatives, interactive whiteboards, math apps, video creation, and 3D printing offer valuable opportunities for students to interact with mathematical ideas in diverse ways. By combining digital tools with traditional hands-on approaches, educators can create a rich, multisensory learning environment that supports the needs of all learners. These technologies provide new avenues for representation, practice, and feedback and foster student engagement, motivation, and mastery of mathematical concepts.

## **7. Implementing multisensory instruction in the classroom**

To successfully implement multisensory math strategies in the classroom, educators should design learning experiences that actively engage multiple senses, allowing students to see, hear, and touch mathematical concepts. Research indicates that combining sensory modalities enhances memory retention and conceptual understanding, particularly for students with diverse learning needs [34, 35]. One of the foundational strategies is to begin with concrete experiences, where students use manipulatives and tactile objects to explore new concepts. Bruner [36] emphasizes that concrete experiences provide a crucial scaffold for abstract reasoning, allowing students to build mental representations based on hands-on exploration. For example, using base-ten blocks to teach place value or fraction strips to illustrate part-whole relationships gives learners a tangible understanding before introducing abstract symbols.

After establishing a concrete understanding, teachers must explicitly connect physical models to visual and symbolic representations. Making these connections visible bridges the gap between different forms of mathematical reasoning [36].

Visual aids such as number lines, diagrams, and area models can help students transition from manipulative-based learning to visualizing mathematical relationships internally. Moreover, symbolic representations, including equations and formulas, become more meaningful when students understand their concrete origins.

Creating a classroom culture that encourages mathematical discourse is another key component of multisensory learning. Hufferd-Ackles [37] notes that when students articulate their mathematical thinking, share problem-solving strategies, and engage in collaborative reasoning, they develop deeper conceptual understanding and critical thinking skills. Providing structured opportunities for dialog, such as math talks or partner problem-solving, allows students to verbalize their ideas, reinforcing their learning through language. Teachers should foster an environment where questions, explanations, and justifications are welcomed, helping students to refine and expand their understanding.

Ample practice with manipulatives and visual models is crucial for students to develop fluency and long-term retention of mathematical concepts. Papaleontiou-Louca [25] highlights that frequent, sustained engagement with concrete and visual tools helps learners internalize patterns and relationships before transitioning to more abstract representations. For instance, consistent practice with geometric shapes to explore area and perimeter builds a foundational understanding that students can later apply to algebraic expressions involving variables.

Incorporating purposeful questioning further deepens students' comprehension. Thought-provoking, open-ended questions guide learners to explore patterns, make connections, and justify reasoning, promoting a deeper engagement with mathematical content [38]. Examples of practical questions include, "What patterns do you notice in these numbers?" or "How can you prove your answer using a different strategy?" Such questions challenge students to think critically, reflect on their processes, and strengthen their problem-solving abilities.

Teachers can also model metacognition by thinking aloud during problem-solving, demonstrating how to connect concrete experiences to abstract symbols, and reflecting on reasoning. Papaleontiou-Louca [25] suggests that modeling reflective thinking helps students become more aware of their cognitive processes and equips them with strategies for independent learning. For instance, a teacher might walk through a word problem aloud, explaining how they visualize it, choose a strategy, and verify the solution. This approach fosters self-regulation and critical thinking.

Finally, a math-rich environment filled with diverse representations of mathematical ideas enhances students' exposure to and engagement with concepts. Boaler [34] advocates for creating classrooms where manipulatives, real-world connections, and visual models are readily accessible. Wall displays of number charts, geometric shapes, and problem-solving strategies remind students continuously of key concepts. Additionally, incorporating everyday math applications—such as measuring ingredients in a recipe or analyzing data in sports—helps students see the relevance of mathematics in real life, further motivating them to engage with the subject.

In conclusion, integrating multisensory strategies into math instruction involves a thoughtful blend of concrete experiences, explicit connections between representations, purposeful questioning, and continuous engagement with visual and real-world contexts. This approach enhances students' conceptual understanding and cultivates a deep appreciation for mathematical thinking.

## **8. Differentiating instruction with multisensory approaches in mathematics**

Multisensory mathematics instruction is inherently aligned with the principles of differentiated instruction, offering a flexible framework that allows educators to meet the diverse needs of their students. As Tomlinson [39] emphasizes, effective differentiation involves adjusting content, process, and product according to students' readiness levels, interests, and learning profiles. This is particularly important in mathematics, where students often encounter varying levels of conceptual understanding, comfort with abstract reasoning, and different learning preferences. By incorporating multisensory strategies, educators can provide differentiated learning experiences that support all students, ensuring equitable access to mathematical concepts.

### **8.1 Differentiating content**

Differentiating content is a key aspect of effective multisensory instruction. In mathematics, one decisive way to differentiate content is through manipulatives, which can vary in their level of abstraction. For example, younger students may begin with physical manipulatives, such as base-10 blocks, to build a concrete understanding of place value and other foundational math concepts. As students progress, educators can introduce more abstract tools, like place value disks or digital manipulatives, which offer a more symbolic representation of mathematical ideas [39]. This gradual shift from concrete to abstract representations aligns with the *Concrete-Representational-Abstract* (CRA) instructional sequence, ensuring students develop a deep understanding before moving to abstract symbols and notations.

Another effective strategy for differentiating content involves providing students with multiple forms of representation. Bruner [36] argued that presenting mathematical ideas through various modes—concrete, pictorial, and symbolic representations—enables students to connect different mathematical models. For example, when learning about fractions, students may first use physical fraction strips (concrete), then draw representations of fractions (pictorial), and finally work with symbolic equations (abstract). This progression allows students to understand the relationship between different forms of representation and reinforces the flexibility of mathematical concepts.

Incorporating real-world contexts is another crucial strategy for differentiating content. By embedding mathematical concepts within real-life scenarios, educators can help students see the relevance of math in their everyday lives. For instance, students might explore measurements, budgeting, or data analysis through practical examples that resonate with their interests and experiences [34]. This approach makes math more engaging and helps students understand its practical applications, fostering a more profound sense of purpose and motivation.

### **8.2 Differentiating process**

The process through which students learn mathematical concepts can also be differentiated to meet individual needs. One practical approach is to allow students to choose the manipulatives or tools they use to explore mathematical ideas. Students can select the resources that align best with their learning preferences by offering a selection of materials—ranging from physical manipulatives to digital tools [39]. This autonomy in choosing their learning tools fosters engagement and supports diverse

learning styles, whether students benefit from tactile, visual, or digital interactions with mathematical concepts.

Teachers can also vary the complexity of tasks to accommodate different readiness levels. For instance, all students might begin using the same set of manipulatives, but the complexity of the given tasks can differ. Some students may work on foundational skills, such as essential addition and subtraction, while others might engage in more advanced tasks, such as multi-step word problems or solving equations [39]. This differentiation ensures students are appropriately challenged and supported to advance their learning.

Adjusting the pace of instruction is another key way to differentiate the learning process. Some students may need additional time or support to master a particular concept, while others may be ready to move on to more advanced topics. By offering additional practice opportunities or scaffolded support for those who need it while providing accelerated tasks for students who are ready to progress, educators can ensure that all students are working within their zone of proximal development [4]. This pacing adjustment ensures students receive the appropriate challenge level, promoting mastery and confidence.

### **8.3 Differentiating product**

Finally, differentiating the product—or how students demonstrate their learning—ensures that all students can showcase their understanding in ways that align with their strengths. Multisensory instruction allows multiple ways to demonstrate understanding, from building physical models to creating visual diagrams or offering oral explanations. For example, a student might use manipulatives to physically represent a math problem, while another might draw a diagram or verbally explain their reasoning [40]. This flexibility in assessment allows students to demonstrate their understanding in the most comfortable and effective way [39].

Tiered assignments provide another valuable strategy for differentiating products. These assignments are designed to match students' readiness levels, ensuring that all students are appropriately challenged. For example, a tiered assignment might involve solving problems with varying degrees of complexity, where students are tasked with different levels of difficulty based on their current understanding. These assignments allow teachers to meet students where they are in their learning journey, providing targeted challenges that help each student grow [41].

Differentiating instruction through multisensory approaches enables educators to tailor learning experiences to the unique needs of each student, ensuring that all learners have access to meaningful and engaging mathematical content. By varying the content, process, and product, teachers can provide students with the support they need to succeed through manipulatives, real-world connections, or opportunities for choice and autonomy. These strategies help create an inclusive classroom environment where all students can engage with and master mathematical concepts in ways that align with their learning profiles. By embracing differentiation within multisensory math instruction, educators can foster a deeper, more personalized understanding of mathematics, empowering all students to reach their full potential.

## **9. Assessing understanding in multisensory math**

Assessing students' understanding in a multisensory math classroom requires a flexible and diverse approach, aligning assessment methods with instructional

practices to provide a comprehensive view of student learning. This approach supports the principles of Universal Design for Learning [42], which emphasizes the importance of offering multiple means of engagement, representation, and expression. By using varied assessment strategies, teachers can ensure that all students have opportunities to demonstrate their knowledge and skills in ways that align with their strengths and learning preferences.

One effective strategy for assessing understanding is observing students' interactions with manipulatives and problem-solving processes. Observational assessments allow teachers to gather real-time data on how students manipulate physical tools, approach problem-solving, and apply mathematical concepts [39]. For example, a teacher observing a student using fraction tiles to compare values can note the strategies employed and the student's grasp of equivalency and proportional reasoning.

Another valuable assessment form encourages students to explain their thinking using physical or visual models. When students articulate their reasoning verbally or in written form, they provide insight into their conceptual understanding and ability to connect concrete, visual, and abstract representations [37]. Teachers can ask students to demonstrate how they solved a problem using base-ten blocks or create a number line to explain their approach to addition or subtraction.

Incorporating visual representations into assessment allows students to demonstrate their knowledge through diagrams, charts, and drawings. Boaler [34] highlights that visualizing mathematical ideas helps students deepen their comprehension, making it an effective method for assessment. For example, students can draw area models to represent multiplication problems or create bar graphs to interpret data. These visual products reveal students' understanding of mathematical relationships and their ability to use representational tools.

Performance tasks provide another dynamic way to assess learning, involving real-world problem-solving scenarios requiring hands-on engagement. Performance-based assessments ask students to apply the same strategies and manipulatives they have used in class to tackle practical challenges. According to Papaleontiou-Louca [25], such tasks enhance authenticity in assessment, allowing students to demonstrate their abilities in meaningful contexts. For instance, students might measure objects to calculate perimeter and area or use geometric shapes to design a simple structure, integrating multiple mathematical concepts.

Finally, self-reflection is an essential component of multisensory math assessment. Encouraging students to think about their learning processes and identify the best strategies for them fosters metacognitive awareness [41]. Reflection activities can include journaling, completing learning logs, or discussing successes and challenges during problem-solving. These practices promote self-awareness and empower students to take ownership of their mathematical growth.

In conclusion, practical assessment in a multisensory math classroom involves a blend of observational techniques, student explanations, visual representations, performance tasks, and reflective practices. By embracing diverse and flexible assessment methods, teachers create inclusive environments that honor the varied ways students express their understanding, ultimately fostering deeper learning and engagement.

## 10. Conclusion

In conclusion, multisensory instruction represents a powerful, research-grounded approach to mathematics education that bridges theoretical foundations with

practical applications [43]. Drawing from constructivist theories of learning [36] and the principles of Universal Design for Learning [42], multisensory teaching emphasizes engaging multiple senses to enhance student understanding and retention. This approach addresses diverse cognitive processes and creates meaningful learning experiences by integrating tactile, visual, and auditory methods that scaffold students' transition from concrete to abstract reasoning [25].

One of the most compelling benefits of multisensory instruction is its inherent flexibility, which promotes differentiation and accessibility. This approach provides students with multiple entry points to mathematical concepts in inclusive and special education settings, accommodating various learning styles and cognitive profiles [34]. For example, students with dyscalculia, a learning disability that affects numerical processing, often struggle with abstract symbols but benefit significantly from using physical manipulatives, such as base-ten blocks or fraction tiles, to visualize mathematical relationships [44]. Visual-spatial learners gain more profound insights using diagrams and models alongside equations [35]. These practices align with the National Council of Teachers of Mathematics (NCTM) recommendations, which advocate differentiated instruction and the integration of multiple representations to support diverse learners [45]. Moreover, students with limited verbal communication skills find opportunities to demonstrate their understanding through physical and visual models, aligning with the multimodal pathways emphasized by Papaleontiou-Louca [25]. This adaptability makes multisensory instruction critical for fostering inclusive, equitable learning environments.

The real-world relevance of multisensory strategies is equally compelling. Everyday problem-solving requires translating abstract concepts into tangible actions, whether measuring ingredients for a recipe, calculating the cost of purchases, or interpreting spatial layouts on a map. Classroom activities that engage students in similar tactile and visual problem-solving mirror these authentic applications. For example, when students use pattern blocks to explore geometric relationships, they mimic architects' and engineers' skills when designing structures from blueprints [34]. Similarly, financial literacy exercises that involve manipulating play money or creating budgets help students build practical numeracy skills to manage personal finances. This grounding in authentic, hands-on experiences cultivates a deeper understanding and appreciation of mathematics as a dynamic and applicable discipline.

Ultimately, multisensory instruction has the potential to revolutionize how students interact with mathematics, emphasizing understanding over memorization and fostering lifelong skills. Integrating concrete experiences, dynamic questioning, and reflective thinking support a mindset of exploration and discovery [38]. It empowers learners to make connections between representations, articulate their reasoning, and develop fluency with abstract concepts. Research demonstrates that students who engage in multisensory learning exhibit improved retention, problem-solving abilities, and motivation [35, 39].

As educators increasingly prioritize differentiation and accessibility, multisensory instruction provides a powerful model that embodies the principles of equity and inclusion. Its impact on mathematics education is profound, particularly for students with learning differences. By harnessing sensory experiences, teachers inspire confidence, curiosity, and a deeper engagement with mathematical thinking. This approach prepares students for academic success and real-world problem-solving, underscoring its transformative potential to make mathematics accessible, meaningful, and engaging for all learners.

## **Conflict of interest**

The authors declare no conflict of interest.

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# Fostering a Pedagogy of Care through a Universal Design Framework for Music Learning in Singapore's Early Childhood Education

*Alicia Z. Q. Toh and Rebecca Y. P. Kan*

## Abstract

In Singapore's early childhood sector, many preschools integrate children with special needs into their general curriculum. However, a significant gap remains in equipping preschool educators with inclusive pedagogical approaches that effectively support the diverse learning needs of both neurotypical and special needs children in music lessons. As the number of children requiring special education support continues to rise, there is an urgent need to better prepare music teachers to handle the varied requirements of children with special needs. This study explores how music, a common arts subject in preschools, can be designed with lessons that adapt to the needs of special needs children while keeping neurotypical children engaged and appropriately challenged. Using practice case exemplars, this chapter proposes a framework for early childhood curriculum design based on principles of universal design for music learning, and Noddings' pedagogy of care. By modeling care and connection, encouraging open dialog, inviting active student engagement, and cultivating care among peers, this framework aims to establish a signature pedagogy of care.

**Keywords:** Universal Design for Learning, signature pedagogies, pedagogy of care, early childhood education, music, special needs, inclusive education, Singapore

## 1. Introduction

In Singapore, where enrolment in mainstream or special education (SPED) schools is mandatory for children aged 7 to 15, the growing number of special needs students in mainstream schools—now at 27,000 (6.9%)—is creating a crunch in our capacity to provide adequate care and education [1, 2]. This figure does not include those who have not been formally diagnosed [3]. With public hospitals reporting around 5000 new diagnoses of developmental delay among preschoolers in 2020, the number of children with special needs is expected to rise exponentially [3, 4]. In response, Singapore has prioritized the inclusion of children with special needs in mainstream

schools, as seen in efforts to integrate special education into the broader education system and the Advisory Council for the Disabled stance that placements in special schools should only be considered when mainstream education cannot provide quality support [5]. Moving forward, the nation has developed Enabling Masterplans to build a comprehensive support ecosystem, placing emphasis on early detection, access to quality education, and fostering an inclusive society with changing mindsets [6].

While there remains the strategic agenda to enroll as many children with special education needs as possible into mainstream schools, the majority of preschool teachers remain untrained and unprepared to manage inclusive classrooms [5]. The number of teachers from each preschool in Singapore selected to undergo training on identifying children with special needs and accessing early intervention resources is less than adequate. Therefore, educators generally may have concerns about not being equipped with the necessary skills, not knowing how to manage the safety of a special needs child in the classroom among other children, or being uncertain if the child will be able to access and benefit from the curriculum [7]. Nonetheless, teachers generally harbor positive attitudes towards inclusion, with some suggestions for on-the-job training as every individual is different and a behavioral management strategy that works for one may not work for another. In reality, many teachers only gain knowledge and experiences *via* trial and error [5].

This chapter explores how music education, a core arts subject being taught in pre-schools, can be designed to meet the needs of children with special educational needs while keeping neurotypical children engaged and appropriately challenged. To address this, we examine the role of universal design for learning (UDL) principles to foster a pedagogy of care [8]. Pedagogical care enhances student engagement, which would directly impact student belonging, retention, and progression [9]. Therefore, embracing a pedagogy of care nurtures the development of students' personal identities and values through meaningful pedagogical interactions. In so doing, pedagogical signatures shape character, identity, and moral sensibilities, which enact the innate beliefs about attitudes, values, and dispositions that are reflected in signature pedagogies of professions in arts and design [10].

## **2. Literature review**

### **2.1 Universal Design for Learning (UDL)**

The UDL framework is built on three core principles—multiple means of representation that focuses on how content is delivered, multiple means of action and expression that focuses on how students demonstrate learning, and multiple means of engagement that focuses on how students are motivated to learn. First created in 2002 by Ron Mace, the universal design for learning (UDL) guidelines focused on creating environments that are accessible to all without any retrofitting or specialized adaptations [11, 12]. The guidelines have since gone through several revisions that continue drawing from insights in cognitive neuroscience, understanding how individuals process information differently across networks including sensory, cognitive, and affective. For instance, version 2.2 focuses on reducing barriers that are related to abilities and disabilities, by improving access to information through varied formats like audio and visual resources, with the goal of creating more inclusive and equitable learning environments [13]. The latest Version 3.0, released in July 2024 by CAST, intentionally draws from the experiences and perspective from practitioners and scholars to cultivate environments and experiences that better honor and value every learner and reduce barriers. These updates explicitly emphasize the inclusion of diverse voices

and experiences in learning materials and strategies. Some improvements include addressing systemic barriers like biases and exclusions stemming from discrimination, ensuring that the curriculum reflects diverse identities and perspectives [14].

Representation within the UDL framework focuses on offering diverse ways for students to access and understand information. The framework suggests that learners perceive and make meaning of information uniquely, diverse ways for students to access and comprehend information, recognizing that each learner perceives and constructs meaning uniquely [15]. This can be achieved through a combination of low-tech methods, such as demonstrations, agendas, models, posters and audiobooks, as well as high-tech tools like video clips, PowerPoint, Smartboards and overhead presentations [16]. By embedding multimedia elements, such as videos, audio texts and diagrams, within lesson plans, educators can facilitate learning that connects new material to previously mastered concepts [11]. Additionally, providing students with materials in multiple formats, such as written reports, posters and multimedia presentations, supports their ability to process information in diverse ways, thus offering opportunities to respond and navigate learning in multiple ways [17].

Action and expression in the UDL framework focus on providing students with diverse ways to demonstrate their knowledge and skills, recognizing the uniqueness of each learner [15]. Some examples of action and expression would include the adoption of augmentative devices, computers or graphic programs, and considering the multiple options in which children can express their learning. Educators may develop goals that allow students to demonstrate their learning in different formats, such as written, oral or multimedia narratives, aligning these expressions with academic standards while making necessary modifications [17]. Learners might also engage in peer feedback, social media-based reflection or the creation of mini-UDL lessons, which offer additional avenues for demonstrating knowledge and critical thinking [18].

Engagement within the UDL framework focuses on fostering motivation, interest and sustained effort among diverse learners, acknowledging that engagement is shaped by various factors, including spontaneity, novelty and learners' preferences for routine. Multiple options for engagement are the result of the absence of an optimal method [11]. Multiple ways of engagement include employing various strategies to enhance inclusivity, differentiated instruction, use of peer support and fostering a collaborative classroom atmosphere to engage students with different learning needs [19]. The framework recognizes that there is no one-size-fits-all approach to engagement; rather, multiple strategies must be employed to ensure all students are motivated to participate [11]. These strategies may include differentiated instruction, peer support and fostering a collaborative classroom environment where students can engage with content in ways that are personally meaningful [19]. Teachers can optimize student autonomy by providing choices, such as taking turns or working in pairs for discussions, while also fostering collaboration through cooperative learning tasks that require collective input and creation. Learners may engage with lessons through various means, such as small-group work, graphic organizers or digital tools like interactive Websites, virtual manipulatives or social networking media [16]. These options for engagement ensure that students have the flexibility to choose how they wish to express their learning in ways that best suit their needs and preferences [20], promoting a deeper and more sustained connection to the material.

## **2.2 Pedagogy of care**

Supporting neurodivergence and physical difference within the student cohort sheds light on the importance of rethinking traditional pedagogical practices [21].

Attending to learners in our care is an ethical responsibility and mandate of every educator [22]. A pedagogy of care involves the critically conscious effort to plan what and when students will need ahead of time, and how instructors can facilitate authentic dialog that attends to the student's preconceived assumptions to create space for respect and to enact compassion [23–25]. This requires an intentional practice in designing for care through curriculum lesson plans [22, 24, 26].

Noddings [22] identified four critical components underpinning this pedagogy: modeling, dialog, practice and confirmation. In thoughtful curriculum plans, modeling means that instructors alleviate confusion or anxiety by facilitating accessibility and flexibility, and creating a welcoming and supportive learning environment [26, 27]. Dialog involves consistent, transparent communication, fostering trust and giving students a safe space to purposefully share ideas or voice concerns, and feedback loops that remove barriers to participation [24]. Practice is where learners are empowered to enact care by engaging in collaborative tasks, reflective discussions or peer feedback that enables mutual support and deeper connections within the learning community [22, 28]. Genuine acts of confirmation in care centre on recognizing and nurturing each student's potential through personalized feedback, using holistic/authentic assessments, and relational encouragement that affirm progress and aspirations [26, 27, 29].

At the heart of Noddings' pedagogy of care is the principle of relational ethics, which emphasizes the educator's role to generate deep relationships and create an environment where students feel seen, valued and supported [30]. This approach moves beyond transactional teaching to cultivate authentic relationships that empower students to engage meaningfully with learning. Providing opportunities for as many students as possible to present their voice will increase representation and should be considered as "a strategy to promote equity and wider participation in higher education" [31]. While the importance of an "ethic of care" in literature is beginning to emerge in early childhood education research [26, 32], a pedagogy of care that enables us to work in diverse settings is largely missing from music education literature. This leads us to two research questions:

1. What are some practical ways to cultivate universal design for music learning (here UDmL) in (mainstream) early childhood education?
2. How can we foster a pedagogy of care through the lens of this UDmL framework?

### **3. Method**

The method and approach when designing the universal design for music learning (UDmL) lesson plans incorporates background information of students, national standards, lesson goals, variability of students, guided and independent practice, and materials [20]. To ensure alignment with best practices in inclusive education, specific UDL guidelines were integrated using Spooner's [33] rubrics, which provide a structured framework for evaluating lesson accessibility and effectiveness. Through practice case exemplars, we present three lesson plans tailored for different preschool levels—Playgroup (PG), Nursery 2 (N2) and Kindergarten 2 (K2)—to illustrate inclusive music teaching in action [34].

### **3.1 Background of students**

Assessing the overall readiness and needs of the students determines the appropriate scaffolds to keep students on track. To achieve this, the learning environment is to be considered [20]. Multiple strategies may be adopted to support learners' literacy and engagement needs by pairing visuals and words decoding and sight vocabulary development and adding gestures and facial expressions as scaffold. Teachers may pair emerging readers with proficient ones to foster peer learning and provide reserved learners with opportunities to respond. Students struggling with attention during group activities may be seated nearby so that teachers can maintain focus through concise communication to engage them. Teachers may also tailor themed activities when choosing a topic of interest for their students and age-appropriate interests are to be reflected when creating the wish lists, for example, namely technology, sports equipment, clothes and music.

### **3.2 Alignment with national standards**

When creating goals in the music classroom, national frameworks on early childhood education play an important role in aligning the musical goals to the classroom goals. As the lesson plans that are articulated in this study follow the guidelines of Singapore's Nurturing Early Years (NEL) framework, it is essential to align clear goals to this Singapore framework. With reference to the NEL framework on esthetics and creative expression, there are learning outcomes for the levels Nursery 2 (N2), Kindergarten 1 (K2) and Kindergarten 2 (K2), but presently no guidelines developed at the beginner levels of PG and N1 [35]. Hence, the Australian equivalent of the framework, *Belonging, Being, and Becoming: The Early Years Learning Framework for Australia* [36] has been used as a point of reference. This framework does not have learning outcomes for each level, but it focuses on the children feeling safe, secure and supported, development of their emerging autonomy, interdependence, resilience and agency, development of their knowledgeable, confident self-identities and a positive sense of self-worth, and learning to interact in relation to others with care, empathy and respect.

### **3.3 Lesson goals**

UDL provides students with flexible methods to achieve their goals [11]. When planning activities to work towards a certain goal, teachers can keep in mind the UDL principles to consider the ways of representing information, allowing students to express in flexible ways, and engaging students in a variety of ways. For example, UDL suggests that providing multiple representations of a concept not only enables deeper engagement with that concept but also enables access for a broader range of learners (McGuire et al., 2006 in [11]). Learners may use matrices in place of traditional music notation to help students visualize the pitch and rhythm of songs [37].

We asked these questions [17] to develop good learning goals:

- Based on the standard, what are the skills and concepts that we want students to master?
- How can students demonstrate achievement of the identified goals in varied ways?
- What supports and scaffolds can be used as part of instruction to help students acquire the content and demonstrate what they have learned?

- What resources, materials, and tools can be used to provide multiple means to represent and express information and concepts or to engage with content?

### **3.4 Variability of students**

Implementing the UDL framework requires learner variability, which includes a flexible tailoring of goals, methods, materials and assessments in lesson planning [18]. To enable variability in a classroom, lessons could be designed to allow students to select and enjoy background music, promote community and belonging, enable students to break up lyrics to understand its content, and encourage the addition of new verses in songs to encourage synthesis of content through creative expression [38].

Our lesson plans take into account Hess's [39] concept of predictable learning variability, which advocates for educators to design curricula that upholds high expectations for all students, instead of relying on stereotypes or limited representations based on students' disabilities. Hess emphasizes on diverse ways of presenting knowledge. In line with this, Rao and Meo [17] highlight that learner variability manifests in various ways, usually in relation to the ability and background of the students. This includes how each student processes information differently and at different speeds. Different family backgrounds and experiences may play a part in the students' approaches, interactions and communication.

## **4. Practice case exemplars**

Three lesson plans were designed with an inclusive preschool music class in mind for three different levels—the Playgroup (PG), the Nursery 2 (N2) and the Kindergarten 2 (K2). By providing clear instructions and outlining expected, plausible student responses, the lesson plans in Appendix A serve as concrete examples that mainstream teachers can easily implement and adapt in their own classrooms. This approach ensures that teachers, regardless of their experience with diverse learners, can foster an inclusive and supportive music learning environment.

### **4.1 Case 1: Playgroup lesson**

The goal of the 30-minute lesson expressed in the Appendix (**Table A1**) is to understand a melodic phrase of three notes using the song "Hot Cross Buns". The class comprises children as young as 18 months, with the oldest at 2 years of age. This means that the students are expected to reach different developmental milestones at the same time. In terms of instruments, they have been exposed to the castanets, egg shakers, mousebells, handbells, boomwhackers, xylophones and the African drums. They are also familiar with using animals and fruits to represent or play rhythms. They explore the sounds made by the different instruments and are aware that they can create sounds using different body parts too, for example, clapping and stomping. They also actively play the drone (notes C and G) on the xylophone and bells while being exposed to famous composers and their works, which they are articulating after the teacher at different paces.

### **4.2 Case 2: Nursery 2 lesson**

The goal of the lesson in the Appendix (**Table A2**) for this N2 class is to perform simple rhythms and differentiate rhythms from beats. This is a class of four-year-olds.

Students are learning to march to a steady beat to different songs and to play specific rhythms along with songs. They also participate in rhythm duets and need to better understand how to play a given rhythm when the other group plays a steady beat. The main challenge the students face is that their rhythm tends to follow the syllables of the beat and are struggling to recognize that the other group is giving the pulse and should be different from their rhythm. At this point, students can read stem notation of crotchet, quaver and semiquaver. They are exposed to simple percussive instruments and know the proper way of playing them.

### 4.3 Case 3: Kindergarten 2 lesson

In Appendix A (**Table A3**), a 45-minute lesson plan is illustrated for K2 students to differentiate and position the respective fingers on the keyboard, in order to play a simple tune with 5 fingers: “Open Shut Them” by Super Simple Songs (Adam Sakiyama, Devon Charles Thagard, James Brett Jubinville, Morghan Fortier and Troy McDonald), “Ode to joy” (Beethoven), all in the key of C major. This is a class of 15. These six-year olds typically progress up the levels together from PG, with some drop outs and newcomers along the years. In music class, it is common practice that students start the lesson by singing first before engaging with the physical instruments. This helps them warm up their voices and also have a better sense of pitch. Students are also aware that notes can be represented by numbers or solfèges, and they can transfer these notes onto different instruments in different ways. By the end of K1, students would have been taught the proper finger names and have familiarized themselves with tapping each finger individually. This means that by the start of K2, they will be able to respond to instructions given for each finger. Students are proficient with the proper names of each finger and can respond to fingering patterns by tapping the respective fingers on the floor or the keyboard charts. On the actual instrument, they can play single notes with each of their five fingers and recognize notes C to G on different octaves. They also identify ascending and descending patterns independently.

## 5. Discussion

### 5.1 A framework to foster a signature pedagogy of care through universal design for music learning

Building on the practice case exemplars, we present a framework for early childhood curriculum design based on principles of UDL and Noddings’ work on the pedagogy of care. This framework is built on the theoretical foundation and practice cases presented in the previous sections, which foregrounds the “ethic of care” as a way of designing inclusive teaching practices in early childhood education.

As shown in **Figure 1**, the four quadrants represent the core tenets in a pedagogy of care: *viz.* modeling care through curriculum design, facilitating dialog, inviting engagement through the collaborative practice of caring for one another, and enabling students to confirm their better selves as they aspire to be. Principles of UDL are embedded in a deliberate enactment of pedagogical care, with reference to representation (in purple), engagement (in green) and action and reflection (in blue). As the instructor designs learning environments with greater accessibility, various facets of the pedagogy will grow to be more pervasive and routine. Collectively, this framework radiates a commitment to provide multiple

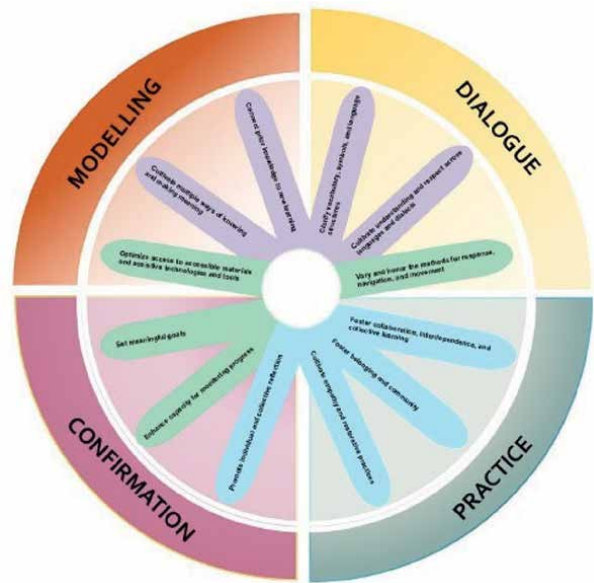


**Figure 1.**  
*Framework for signature pedagogy of care.*

means of engagement, representation and action/expression to foster a pedagogical signature of care.

Modeling care through the curriculum requires teachers to take on the role of “leaders of their flocks”, where they foster deep, authentic and caring relationships so that students feel at home [25, 27]. From a pedagogical perspective, this involves cultivating multiple ways of knowing and understanding, connecting prior knowledge to new learning, and facilitating access to materials through assistive technologies or tools (see **Table 1**). As shown in the practice case exemplars, modeling care is further enabled through the optimization of choice in the learning of music. For instance, offering options to musically respond to an opening greeting in the PG music lesson in

| Modeling                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Provide options for building knowledge in a variety of modalities, including kinesthetic and auditory approaches, visual mediums that are enlarged or enhanced with colour, other digital and multimedia (such as films with video captions) [39–41] |
| Introduce assistive technology such as the music or adaptive instruments, shared or help with note-taking/ writing conductor instructions within the music score [42]                                                                                |
| Create opportunities to perform different parts of a song and on different instruments [43].                                                                                                                                                         |
| Enact learning through games, by imitating the teacher singing at different tempos and dynamics, singing in a call and response manner, completing the phrase and so forth.                                                                          |
| Offer instrument charts and practise instruments first to scaffold the learning process, one step at a time by learning the fingerings separately from bowing for example [39]                                                                       |
| Know and value individual student identities, circumstances, experiences and goals [44]                                                                                                                                                              |
| Develop ways to repeat the same musical material in multiple perspectives [45].                                                                                                                                                                      |

**Table 1.**  
*Fostering care through modeling in the music curriculum.*

Case 1 allows students a chance to experience the same material in a variety of ways to outwardly show care for one another [43]. Furthermore, providing an adaptive pop-it toy enables students to personally connect with the learning to position their fingers on the keyboard in the K2 music lesson in Case 3, nurturing enjoyable and trusting musical relationships [45].

Much of the work in modeling a pedagogy of care is done during lesson design, where building knowledge through diverse modalities of visual, aural and kinesthetic representations widens alternative ways to build perception of knowledge [39]. In the case of pre-schoolers, kinesthetic support for the otherwise abstract concepts of singing and pitch recognition is particularly helpful [40, 41]. For example, providing number mats for children to jump or walk supports pitch comprehension [46]. Additionally, while teaching is important to model care, designing action-oriented interventions, such as body percussion to create rhythms in the N2 music lesson, actively demonstrates the teacher’s attentive care, which increases motivation [46].

Both verbal and musical modes of communication are quintessential components of dialog in a pedagogy of care. In the music classroom, teachers need to communicate information effectively by establishing a common vocabulary through language and symbols in music [47]. For instance, as shown in practice case exemplar 1, teaching songs in both the original language and in the mother tongue of the child cultivates understanding and respect across languages and dialects [48]. Consequently, this fosters care by valuing a diversity of perspectives and identities in authentic ways. Sign language is another pedagogical strategy that provides a physical method of communication for students to non-verbally express their musical thinking processes [49]. As shown in **Table 2**, authentic dialog is also enabled when teachers reflect on the verbal and visual language used in class to mitigate negative or stereotypical messages while promoting images in the music room that make content socially and culturally relevant to children [43].

Practice in care is best evidenced when learners mutually enact care among themselves. This can be facilitated through a design for learning where collaborative engagements are valued. When children are tasked to make music in an ensemble by using a variety of instruments or singing in groups, this creates opportunities for them to work with their peers and practice care for one another. For example, assigning different handbells so that every child plays only one note in practice case exemplar 1 each fosters interdependent learning. Another way to foster collective music

| Dialog                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Explore different ways to sign a song, including showing volume with hands, and other gestures for size, weight and flow [41, 49]                                                                                       |
| Use guiding questions to bring students’ attention to critical content, while providing flexibility for students’ responses [48]                                                                                        |
| Teach songs in multiple languages. For instance, the song “ke ren lai” (or “Guest has come”) is taught in both the original mandarin and English version. School bells ringing can be taught in Korean and English [47] |
| Ensure that images of composers in the music room reflect a variety of cultural and social background [45].                                                                                                             |
| Allow for a variety of mediums in which students can respond to music, including singing, drawing, dancing and acting [48].                                                                                             |

**Table 2.**  
*Fostering care through dialog in the music curriculum.*

making is by encouraging students to greet their friends by singing their names in the N2 class (see case 2). Crowther et al. [38] suggest that once children have discerned the meaning of a song, they can make a creative contribution by adding instrumentation to the melody, writing a new verse, choreographing relevant dance moves or designing visuals for a music video. Such activities enable children to clarify and de-code vocabulary, symbols and musical structures, leading them towards a deeper investment in their practice through peer collaboration [43]. Other examples in **Table 3** illustrate how inclusive practices of care can support students to co-construct their own meanings and goals by adjusting the musical environment. In recognizing that all children are entitled to participate in music making challenges exclusionary practices, we invite creative pedagogical possibilities to develop a sense of belonging for students situated on the margins [with disability] in mainstream schools. As Rose and Adams [50] observe, an educator’s willingness to prioritize the learner’s goals over their own creates a “relational dynamic” where care flows towards fostering the learner’s aspirations [51].

Lastly, confirmation in a caring relationship motivates students to grow and develop themselves in their learning [52]. This is exemplified not merely through grades and assessments but also when the teacher checks in with learners to see how they are feeling make adjustments and plan alternatives to improve learning with the class [53]. Such practices provide customized support and personalized choices

| Practice                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assign every child to different component of the drum set—the bass drum, hi-hat and snare. For students with physical limitations, mallet cuffs could also be used to adapt the drum set [49]. |
| Create vocal percussion by distributing roles in the ensemble—to keep a steady beat by clapping, with another patting their legs, stomping feet, bobbing head, tapping a drum [50].            |
| Group children of different abilities to help one another in playing together in student-to-student support [51].                                                                              |
| Offer children the choice to swap instruments to make music in different ways like singing or playing hand bells instead of the xylophone [49].                                                |
| Allow children to be involved in shared musical decision-making in creatively augmenting a familiar song [35].                                                                                 |
| Rotate students as support provider to activate responsibility in completing a task, not only from their own perspective but also from that of the friend they act with [51].                  |
| Pair students, so that when one is struggling, the other can guide.                                                                                                                            |

**Table 3.**  
*Fostering care through practice in the music curriculum.*

| Confirmation                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assess how students are doing in the moment—check in with learners to see how they are feeling about their progress and make adjustments using different channels of student feedback, and discuss any adjustments with the class [45]. |
| Provide students with techniques and strategies to regulate their own practice [54].                                                                                                                                                    |
| Design multiple performance options, which may include solo performances with the teacher, group settings, or recorded submissions [47].                                                                                                |

**Table 4.**  
*Fostering care through confirmation in the music curriculum.*

for expression, or even address biases, threats and distractions. Confirmation can also occur by acknowledging the students' progress, reassuring them that they are doing well and celebrating small milestones. Creating a space for exploring affective engagement with assessments in early childhood music education will be relevant to deeper understanding of confirmation. Designing multiple ways to express their creativity that align with student needs (see **Table 4**) gives neurodivergent learners multiple avenues to express their understanding and progress [43] and to manage their learning independently [47].

## 6. Conclusion

Viewing UDL strategies as a pedagogy of care has three broad implications in shaping the role of teachers to foster inclusivity for students with disability within mainstream school settings. First, embracing the principles of representation, engagement, action and expression will debunk normative assumptions and expectations on traditional teaching approaches. According to Greenstein [55], we can approach inclusive pedagogy more radically when we start to design lessons from the edge by embracing a disability perspective to recognize that every individual is differently embodied and positioned in the world [21].

Second, underlying the pedagogical signature of care is the reciprocity to explore differences respectfully. All three UDL principles are founded on this notion of a collaborative relationship between instructor and students, where “power is renegotiated, shared, and comaximized” to strengthen the community of musical practice [25]. Since the framework emphasizes on enabling students to seek and envision an ethical and attainable better self that can even extend to care for public good [30], building intentional opportunities for every student to develop care (even for their own learning) leads to better student engagement, agency and empowerment as lifelong learners [9]. It reminds of what matters most in humanizing pedagogy: relationships, care and compassion [56].

Third, the concept of community starts with the premise that it takes a village to raise a child. It reminds us that care transcends beyond the narrow conception that every child is responsible to act “rationally” towards themselves. Instead, a pedagogy of care offers the building of deep relationships where there is reciprocity with one another to explore differences respectfully [57]. Such an approach requires the active creation of shared social spaces to bring children together. This study also extends the pedagogical space to consider possibilities of democratizing and careful pedagogies through which we may construct a new lens for pedagogical signatures of the future.

Challenging exclusionary practices especially for those situated in the margins will help to create more inclusive social geographies within mainstream schools for students with disability [30]. A persistent and intent-full way of developing care will bring about learning to deeply engage with habits of the heart that can be transformative [58]. Through a pedagogy of care, we find possible alternatives for social transformation, so that the students gain a sense of their own value, agency, capability and own a future that is closer to their dreams. The practical implications of this chapter point to the importance of enacting pedagogical care with UDL principles in curriculum planning, to better support engagement and well-being of children in early music instruction.

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## Conflict of interest

The authors declare no conflict of interest.

## Appendix.

Practice case exemplars  
See **Tables A1–A3**.

| Plan         | Teacher will...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Student will...                                                                                                                                                                                                                                                                                                                                                                                                                            | Reference to UDL principles                                                                                                      |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Introduction | <i>Sing</i> : “Greeting Song” by Tunes with Tim<br><i>Ask</i> : “how are you?”<br><i>Say</i> : “how do you say hello to your friends and teachers? Let us wave to our friends on our left and right!” and guide students to say “hello”, “hola” and “bonjour”                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Sit on the markings on the floor as a routine.<br>Wave hello.<br>Repeat after the teacher.                                                                                                                                                                                                                                                                                                                                                 | UDL Checkpoint 2.3: Representation (Language & Symbols) <i>Cultivate understanding and respect across languages and dialects</i> |
| Warm up      | <i>Teacher plays</i> “hot cross buns” on the xylophone once through.<br>Then teacher plays the song again, but this time, only plays the first three notes (E, D, C), and repeats this phrase thrice.<br><i>Instead of playing, teacher now repeats the same three note phrase in the form of singing, in these ways:</i><br>“hot cross ____”<br>“3...2...____”<br>“mi...re...____”<br>leaving out the last note (C).<br><i>Say</i> : “the missing note is buns, or one, or Do. It is in red.”<br>Invite students to come to the front to play on one note “C”.<br><i>Say</i> : “listen to me as I sing hot cross buns, but when I stop, you will have to continue for me by playing the next missing note. It will be the note in red.” | Students listen to the teacher playing the melody of hot cross buns.<br>Students listen to the teaching playing the first three notes of hot cross buns (E, D, C) three times.<br>The missing note where the teacher stops singing is “Buns/1/Do”. Students will sing this last note of the phrase when the teacher stops and gestures to the students.<br>Students will play the missing note (C) on the xylophones on the teacher’s cue. | UDL Checkpoint 1.2: Representation (Perception) <i>Support multiple ways to perceive information</i>                             |

| Plan    | Teacher will...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Student will...                                                                                                                                                                                                                               | Reference to UDL principles                                                                                                            |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Body    | Assign C, D, and E handbells to three different students, one note each, and have the rest of the class engage by identifying the student who has the specific note.<br>Practice (working together as a group)<br><i>Ask:</i><br>“who has note Do? What is the color”<br>“who has note Re? What is the color”<br>“who has note Mi? What is the color”<br>Sing: “Mi” and point to student who has Mi<br>Sing: “Re” and point to student who has Re.<br>Sing: “Do” and point to student who has Do.<br>Optional: ask the class “who has Mi?”<br>“who has Re?”<br>“who has Do?”<br>To involve all students, with instruments or not. This also helps them be aware of their peers. | Students observe their given note based off the colors—Red (Do), orange (Re), and yellow (Mi).<br>Tap the bells when their respective notes are called.<br>Other students observe the hand bells given to their peers and identify each note. | UDL Checkpoint 8.3: Engagement (Sustaining Effort & Persistence) <i>Foster collaboration, interdependence, and collective learning</i> |
|         | For students who grasped the concept quicker, teacher assigns xylophones to them.<br>For students who are behind, teacher assigns percussive instruments for them to play along to the rhythm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Move to newly assigned instruments based on students’ paces.<br>Students play “Hot cross buns” together.                                                                                                                                      | UDL Checkpoint 7.2: Engagement (Welcoming Interests & Identities) <i>Optimize relevance, value, and authenticity</i>                   |
| Closure | Attempt playing the whole song (hot cross buns):<br>E...D...C...-<br>E...D...C...-<br>C C C C D D D D<br>E...D...C...-<br>Sing at a slower tempo and concurrently point to students who have the corresponding notes to play at each given time.<br>Repeat this activity while singing and addressing the notes as solfeges, numbers and colors.                                                                                                                                                                                                                                                                                                                                | Students will respond to the teacher’s gestures by playing their respective notes when they are addressed.                                                                                                                                    | UDL Checkpoint 4.1: Action & Expression (Interaction) <i>Vary and honor the methods for response, navigation, and movement</i>         |

**Table A1.**  
 PG lesson plan with universal design for music learning strategies.

| Plan         | Teacher will...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Student will...                                                                                                                                                                                                                                                                                                         | Reference to UDL principles                                                                                                            |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Introduction | <p><i>Says:</i> “Hello song” by Music Together – “hello, everybody, so glad to see you”</p> <p>Say: “hold a friend’s hand, on your right and left. Once you have done that, sit down nicely”</p> <p>Teacher will invite personal responses from students so they feel socially relevant</p> <p><i>Ask a student:</i> “who would you like to greet?”</p> <p><i>Display:</i> rule of the day, read out loud “to be polite and kind to the people around you”</p> <p><i>Remind:</i> make space for their friends</p> <p>Acknowledge their efforts to think of their friends.</p> | <p>Students will hold their friends’ hands and sit in a semicircle.</p> <p>When picked, student will pick another student by singing their names “hello, Emma, so glad to see you”</p> <p>Read aloud after the teacher.</p> <p>Shuffle around to make sure their friends have enough space by feeling knee to knee.</p> | <p>UDL Checkpoint 7.2: Engagement (Welcoming Interests &amp; Identities)</p> <p><i>Optimize relevance, value, and authenticity</i></p> |
| Warm up      | <p>Teacher claps a steady beat. <i>Says:</i> “how am I making the sound? Now join me!”</p> <p>Using this interactive activity that involves every student physically, teacher will now clap a rhythm and add variations: loudly/quietly, fast/slow.</p> <p>This guides exploration and new understandings.</p>                                                                                                                                                                                                                                                                | <p>Students will identify that it is the sound of hands clapping and then join the teacher in clapping a steady beat.</p> <p>Students mimic.</p>                                                                                                                                                                        | <p>UDL Checkpoint 3.3: Representation (Building Knowledge) <i>Cultivate multiple ways of knowing and making meaning</i></p>            |

| Plan    | Teacher will...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Student will...                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Reference to UDL principles                                                                                             |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Body    | <p>Tools for exploration:</p> <p>Ask: “what other ways can you make these different sounds? This is called body percussion. Can you identify the body parts I am using just by listening?”</p> <p>Says different rhythms represented by animals of one, two, and four syllables, while exploring body percussion.</p> <p>Say: “now, let us stomp for our next rhythm! Can I get a volunteer to suggest a four-beat rhythm? The beat goes: 1, 2, 3, 4”</p> <p>Say: “I will continue stomping the beats, can I get everyone to stomp your new rhythm?”</p> <p>Swap—opportunity for practicing and assessing learning</p> <p>Celebrate their participation in the activity</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>Students respond:</p> <ul style="list-style-type: none"> <li>• Slap thighs</li> <li>• Stomp feet</li> <li>• Snap fingers</li> <li>• etc.</li> </ul> <p>Repeat rhythms after the teacher.</p> <p>Student will stomp their own four-beat rhythm according to the teachers beats.</p> <p>Class joins in to stomp the rhythm given.</p> <p>Class stomps beat, while teacher stomps rhythm.</p>                                                                        | <p>UDL Checkpoint 7.1: Engagement (Welcoming Interests &amp; Identities)</p> <p><i>Optimize choice and autonomy</i></p> |
|         | <p>Say: “now, can we do both at the same time? Let us stomp to the beat while clapping the rhythm!”</p> <p>Teacher distributes percussive instruments (e.g. Hand bells, castanets, boomwhackers, and rhythm sticks).</p> <p>Say: “without looking, can you guess this instrument by its sound?”</p> <p>Say: “can all the castanets play four steady beats? Ready, go – 1, 2, 3, 4. Now find your fellow castanet players and group yourselves together.”</p> <p>Repeat for the other instruments and group students accordingly.</p> <p>Teacher will assign each group to a note value to bridge concepts with relevant analogies and metaphors and to make explicit cross-curricular connections. This will be done using animal names and syllables to represent different note values.</p> <p>Teacher will group the students in the following manner:</p> <ul style="list-style-type: none"> <li>• 4 each on hand bells, castanets, and boomwhackers</li> <li>• 6 on rhythm sticks</li> </ul> <p>Teacher provides a new rhythm and practise with the class.</p> <p>Say: “this is my new rhythm, now castanets will play steady beats, everyone else plays when your respective note values appear.”</p> | <p>Students follow the teacher.</p> <p>Students guess the instruments by listening.</p> <p>Students move into their respective groups.</p> <p>Students practise the new rhythm.</p> <p>Students on the hand bells will play crotchets and say “bear”.</p> <p>Students on castanets will play quavers and say “zebra”.</p> <p>Students on boomwhackers will play semiquavers and say “capybara”.</p> <p>Students on rhythm sticks will play beats and say “beat”.</p> | <p>UDL Checkpoint 3.1: Representation (Building Knowledge) <i>Connect prior knowledge to new learning</i></p>           |
| Closure | <p>Presuming competence and nurturing a belief in the capabilities of every learner,</p> <p>Say: “I will now get some volunteers to create and play their own rhythms, and I want everyone else to listen and count the number of beats.”</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p>Students will volunteer and showcase their improvised rhythms.</p> <p>Students will listen and answer the question.</p>                                                                                                                                                                                                                                                                                                                                           | <p>UDL Checkpoint 9.3: Engagement (Emotional Capacity) <i>Promote individual and collective reflection</i></p>          |

**Table A2.**  
*N2 lesson plan with universal design for music learning strategies.*

| Plan         | Teacher will...                                                                                                                                                                                                                                                                                                                                                                                          | Student will...                                                                                                                                                                                | Reference to UDL principles                                                                                          |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Introduction | <p><i>Sing:</i> "Hello song" by Music Together, and greet each student – "hello, everybody, so glad to see you"</p> <p><i>Ask:</i> "have you had lunch yet? Do you know if it is now morning or afternoon?"</p> <p><i>Display:</i> guide students to look at the clock, and teacher writes the time on the board</p> <p><i>Remind:</i> students to sit in a semicircle, make space for their friends</p> | <p>Students will sit in a semicircle</p> <p>Respond to the question on morning or afternoon.</p> <p>Greet the teacher.</p> <p>Shuffle around to make sure their friends have enough space.</p> | UDL Checkpoint 8.4 Engagement (Sustaining Effort & Persistence) <i>Foster belonging and community</i>                |
| Warm up      | <p><i>Sing:</i> ascending and descending scales of Canon in D (Pachelbel), in C "do re mi fa sol la ti do ti la sol fa mi re do"</p> <p><i>Ask:</i> "can you point to the correct notes on the keyboard with one finger while singing this scale?"</p>                                                                                                                                                   | <p>Sing along to the teacher to warm up their voices.</p> <p>Sing the scale and point on the keyboard or keyboard chart with one finger.</p>                                                   | UDL Checkpoint 3.3: Representation (Building Knowledge) <i>Cultivate multiple ways of knowing and making meaning</i> |

| Plan    | Teacher will...                                                                                                                                                                                                                                                                   | Student will...                                                                                                                                                                                                                                                                    | Reference to UDL principles                                                                                                                              |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Body    | Teacher to distribute pop-it toys and instruct students to press the bubbles with each finger in order from their thumbs to pinkies, and repeat in the other direction.                                                                                                           | Students will help to distribute the toys. Students will practise pressing the bubbles at their own pace.                                                                                                                                                                          | UDL Checkpoint 4.2: Action & Expression (Interaction) <i>Optimize access to accessible materials and assistive and accessible technologies and tools</i> |
|         | Teacher will label each finger with numbers 1 to 5 in the order of thumb, index, middle, ring, and pinky.                                                                                                                                                                         |                                                                                                                                                                                                                                                                                    |                                                                                                                                                          |
|         | Then teacher will sing the song "Open shut them" according to the finger numbers.                                                                                                                                                                                                 | Students will respond by singing back the same numbers, while pressing the bubbles with the respective fingers.                                                                                                                                                                    | UDL Checkpoint 7.3: Engagement (Welcoming Interests & Identities) <i>Nurture joy and play</i>                                                            |
|         | Teacher will display a matrix on the screen that guides students on the shape of the melody.<br>Ask: "what key are we in?"                                                                                                                                                        | Student will recognize the key of this new song by locating the number "1" and finding its corresponding note name.                                                                                                                                                                | UDL Checkpoint 2.2: Representation (Language & Symbols) <i>Support decoding of text, mathematical notation, and symbols</i>                              |
|         | Teacher will pair students up and position them at the keyboards.<br>The pop-it toys will be used when students are distracted<br>Using the toy gives students access to alternative scaffolds that support understanding progress in a manner that is understandable and timely. | Students will bring their pop-it toys and stand in front of the keyboards, two students to one instrument.<br>Students can shift their focus on learning positioning on the toy and use the respective fingers on it, as an alternative to learning the fingering on the keyboard. | UDL Checkpoint 4.1: Action & Expression (Interaction) <i>Vary and honor the methods for response, navigation, and movement</i>                           |
|         | Teacher will incorporate explicit and supportive opportunities to help students play the correct notes on the keyboard.<br>Say: "let us place our thumbs on C, and the rest of the fingers on the following notes"                                                                | They will respond by placing their fingers on the correct keys.<br>Sing and play back:                                                                                                                                                                                             | UDL Checkpoint 3.4 Representation (Building Knowledge) <i>Maximizing transfer and generalization</i>                                                     |
|         | Sing:<br>• "3 5 3 1"<br>• "3 5 3 1"<br>• now repeat "3 5 3 1"<br>• now we are ascending from 1 "1 2 3 4 5 5 5"<br>• let us go back to the first pattern "3 5 3 1"<br>• and again "3 5 3 1"<br>• lastly, we will descend "5 4 3 2 1 1"<br>Repeat.                                  | • "3 5 3 1"<br>• "3 5 3 1"<br>• "1 2 3 4 5 5 5"<br>• "3 5 3 1"<br>• "3 5 3 1"<br>• "5 4 3 2 1 1"                                                                                                                                                                                   |                                                                                                                                                          |
| Closure | Say: "now let us put the whole song together"<br>Sing: "3 5 3 1, 3 5 3 1, 1 2 3 4 5 5 5, 3 5 3 1, 3 5 3 1, 5 4 3 2 1 1"                                                                                                                                                           | Students will sing and play to express themselves.                                                                                                                                                                                                                                 | UDL Checkpoint 5.1: Action & Expression (Expression & Communication) <i>Use multiple media for communication</i>                                         |

**Table A3.**  
*K2 lesson plan with universal design for music learning strategies.*

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# The Importance of Sensory Integration Assessment: Implementing Reasonable Adjustments for Inclusion in Special and Regular Education

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## Abstract

In Mexico, education continually evolves to embrace inclusivity, with the Secretary of Public Education advancing a “Universal Design for Learning,” which emphasizes accessible education for all. Inclusive education relies on reasonable adjustments—modifications in the educational environment that support each student’s engagement with learning and foster meaningful participation. This paper emphasizes sensory integration, where challenges in sensory processing can influence core learning skills, especially reading and writing. Sensory integration adjustments can be essential for equitable learning experiences. Sensory assessments are often limited to individuals with specific neurodevelopmental needs; however, sensory processing variations affect a wider spectrum of learners. Accordingly, this study evaluates the Winnie Dunn’s Sensory Profile 2 among undiagnosed, neurotypical students in regular elementary schools in northwestern Mexico. The results showed a high internal consistency in all its dimensions ( $\alpha > .70$ ), confirming its reliability. Confirmatory factor analysis showed adequate fit indices, validating its structure in the population studied. The results support its use to assess sensory patterns and to guide more inclusive educational interventions. By proposing this tool, we aim to support educators in identifying sensory profiles to facilitate reasonable adjustments, enhancing inclusion across diverse educational contexts and meeting students’ unique sensory and learning needs.

**Keywords:** reasonable adjustments, sensory integration, neurotypical development, education, sensory profile

## 1. Introduction

The National Institute for the Evaluation of Education in Mexico (Instituto Nacional para la Evaluación de la Educación, INEE) points out that it is due to

education that the social, economic, and cultural conditions of a country can improve and that education also promotes freedom and personal autonomy [1].

Education is a fundamental aspect in the life of any person and is part of his or her development as a citizen. The education process begins from the first years of life within the home, and shortly after, within the school context, this allows a person to develop different areas such as biological, social, cognitive, affective, and motor skills, among others. It is important then that people receive an adequate education from the first moment they are involved in school activities [2].

The first cycles of primary education are fundamental for student development, and it is during this period that students are in a literacy process, that is, learning to read and write in addition to acquiring essential skills for learning in general; it is thus that a good quality education can lay the foundation for success in the overall development of any individual [3, 4].

The author of the sensory integration theory, Jean Ayres, based her studies on the importance of the relationship between behavior and the processing of stimulus information by the central nervous system; such a relationship would help explain possible difficulties in the participation of the individual in different contexts, which may occur in academic, social, emotional, or motor areas [5].

“Until the age of 7, the brain is primarily a sensory processing machine” [6]. This refers to the fact that from birth, each person understands his environment and has contact with stimuli through the information he receives from his sensory receptors; in other words, the person learns mainly through experiences that produce stimulating sensations in his body [7, 8].

Many children with learning and behavioral difficulties may have sensory integration dysfunction [9]. This implies problems in organizing and processing information received through their sensory organs, which may affect their performance in the school environment.

In the same sense, Ref. [10] emphasizes that learning can be affected when sensory integration is deficient, making it difficult for some students to meet school demands.

Given this situation, it is of great importance to design educational environments that promote the integration of different stimuli and the development of relevant and essential competencies for learning. Therefore, it is important for educational authorities to be aware of the importance of the relationship between sensory integration and students' academic performance.

On the other hand, in the northwestern region of Mexico, there is very little empirical evidence and information on the relationship between sensory integration and learning processes in elementary school students [11]; therefore, it is necessary to strengthen the scientific literature on sensory integration and its forms of evaluation.

Therefore, the above highlights the relevance of sensory integration in human development and education. This process unfolds concurrently with activities such as locomotion, verbal communication, recreation, play, and acquiring fundamental competencies and basic skills imparted within the academic setting.

In this sense, the aim is to contribute to the knowledge of sensory integration, as well as to propose a tool to assist educators in evaluating the sensory processing of students, in order to generate practical and applicable strategies, based on Ayres' theory, that will help solve learning difficulties in the educational environment.

In 2015, as part of the actions directed within the Education Action Framework of the 2030 Agenda, an agreement was reached among countries on the establishment of reference indicators related to the indicators of Sustainable Development Goal 4, “Quality Education” (SDG4).

Under the goal of ensuring inclusive, equitable, and quality education that promotes lifelong learning opportunities for all, a commitment is made to ensure that all children complete primary and secondary education with relevant learning outcomes by 2030.

Similarly, another aspect that is addressed is the construction of adequate infrastructure that allows people with special needs to access the facilities and physical spaces of schools and emphasizes the importance of educational institutions to provide safe learning spaces that are inclusive and effective in order to guarantee the right to education for all [12, 13].

It is known to many that the damage caused by the health contingency caused by COVID-19, which began in 2019 and culminated in 2023, significantly limited the achievement of the Sustainable Development Goals four of the 2030 Agenda worldwide; due to the closure of schools, education in general was affected in its progress toward the achievement of the goals, presenting an inevitable delay, and thus, many countries had difficulty in maintaining high response rates in their schools. Ref. [13] stated that 43% of students at the primary level reached the minimum levels of reading literacy and warns that, based on an assessment conducted in 2020 by several institutions and experts, the set of indicators in the world will remain the same until at least 2025.

In Mexico, the education system was also affected by the school closures and faced several challenges that affected student learning. Among the main problems identified were the limited availability of adequate educational materials to carry out school activities, the lack of access to electronic devices, and a stable Internet connection to take online classes.

In addition, family support to complete homework at home was an important factor in the educational process. These factors negatively affected the educational progress of the country [14].

This is evidence of an emergency situation in education that could pose a risk not only to the achievement of the fourth Sustainable Development Goal but also for society in general.

The skills acquired in the early years of primary education are essential for a person's academic development. Basic skills such as literacy are the foundation for continued learning and educational progress [15].

Therefore, it is crucial to address this issue by ensuring quality and inclusive education that promotes equitable learning opportunities for all students through the development of accurate policies and the use of relevant assessment tools, such as those that assess sensory integration.

## **2. Sensory integration and learning**

In the above, some theoretical concepts that are fundamental to understand how through sufficient sensory integration, children can better learn some academic skills, such as writing, reading, or arithmetic, as well as some motor skills related to coordination, balance, and postural control, among others. The sensory integration theory proposed by Ayres [16] is constituted by several precepts whose primary intention is to explain how some behaviors of individuals are altered or affected by the way in which the central nervous system processes sensory information.

Sensory integration arises from the neurobiological understanding of behavior. Its author, Jean Ayres, published several essays on this theory where she exposed the key components of the relationship between sensory integration and performance.

She also conducted research defining many of the sensory dysfunctions and deficits related to motor learning, academic skills, attention, and behavior [17].

Within the same framework, some authors have made contributions based on the same postulates of the theory, making conceptual revisions and emphasizing terms such as sensory processing or modulation [18] or with the standardization of tests for the assessment of sensory patterns [19, 20].

Returning to the main concept of the theoretical proposal, sensory integration can be directly defined as “the act of organizing sensations for use” [21]. This assumption holds that the central nervous system obtains information from the environment and from sensations within the body itself through the senses and this sensory information is processed by the brain at all times.

For Dunn [20], it is the ability to modulate the responses of the central nervous system, that is, to organize the information received from all stimulus-receptor sources and thus achieve a balance of modulation and discrimination of sensations in order to respond appropriately to the demands of the environment.

Beaudry [22] defines sensory integration as the ability of the central nervous system to process and organize all the information perceived by the different sensory organs of the body and then use it to interact appropriately with the environment; that is, the brain is responsible for integrating all the information it receives from the senses to plan an adaptive response according to the stimulating environment. An adaptive response is the behavior that an individual has in relation to a sensory experience and whose purpose is to fulfill a criterion.

The process of sensory integration consists of four stages: First, there is registration, which consists of the perception of the stimulus by the relevant sensory organ; second, there is modulation/regulation, which is the ability of the individual to precisely regulate the intensity with which he/she receives the stimulus; then, third, there is discrimination, which consists of distinguishing the characteristics of the stimulus to create an interpretation; and finally, fourth, there is integration, which consists of giving meaning to the interpretation of the information from the sensory input in order to plan an adaptive response [23].

Sensory integration theory points out that reading, writing, and arithmetic can be very demanding for the child's brain and that poor management of sensory sensations can be a factor for the presence of problems in learning. When brain activity is disorganized, learning some of the academic content can be a major problem for the student.

Thus, learning will depend on the person's ability to process and integrate sensations in order to use them and organize behavior; inadequate sensory integration may result in difficulty in producing appropriate actions in the classroom, which in turn may interfere with learning curricular content and adaptive behavior; on the other hand, properly integrated sensations that are challenging for the student may contribute to improve central nervous system processing, improving learning and thus behavior [24].

Sensory integration theory is configured by three general postulates, the first describing the relationship between sensory integration and learning, the second defining the dysfunction of sensory integration in an individual, and the third guiding the modes of intervention to be adopted for the development of a correct sensory integration in an individual.

## **2.1 Human senses**

Within Ayres' theory, the integration of all the senses is of great importance, and it is fundamental that it is carried out for the execution of the adaptive response;

thus, all the sensory processing systems such as auditory, visual, tactile, olfactory, gustatory, vestibular, proprioceptive, and interoceptive are relevant for its development; however, there are three sensory systems that are of even greater importance, which are the vestibular, proprioceptive, and tactile systems, since if any of these fail to function properly, the person is likely to respond inadequately to environmental demands [6], dyspraxia, and hyperactivity. They are the vestibular system, the proprioceptive system, and the tactile system, because if any one of them is not functioning properly, the person is likely to respond inadequately to environmental demands [6]. Dyspraxia and hyperreactive and hyporeflexive responses are the behavioral result of underdeveloped sensory integration, since motor planning and sensory registration are not adequate when these difficulties occur. Dyspraxia affects the information processing of vestibular, proprioceptive, and tactile sensations; limiting the child's motor skills, and hyper- or hyporeflexic responses may also be a limiting factor in learning or in the execution of adaptive responses [22].

### *2.1.1 The vestibular system*

The integration of vestibular stimuli is critical for psychosocial development because the vestibular system allows the individual to sense the movement of his body, especially acceleration and deceleration; this system also allows him to sense the force of gravity and the balance of the body; in addition, the information it detects helps the body to know whether any input received by any of the sensory receptors (whether visual, tactile, or proprioceptive) is related to the movement of that or is a function of the environment. Vestibular information provides the stability we get from the visual images that are constantly being captured by our eyeballs [16]. For example, if a person observes a moving car while standing still, they are able to determine that the person is not actually moving, but the car is. If the same person is moving and observes a parked car, he will also be able to know that the car is not moving and the person is, thanks to an integrated combination of information received from the environment by several sensory systems, mainly the visual, proprioceptive, and vestibular systems. Thus, the vestibular system "tells" the body when it is in motion, that is, when it jumps, walks, runs, goes up or down in the elevator, accelerates, or decelerates its transportation and so on. The structure of the vestibular system is located in the inner ear and is composed of several main components, such as the cochlea, the semicircular canals, the saccule, the utricle, the vestibule, and the vestibular nerve; this complex system is in charge of processing the horizontal, vertical, and angular movements of the head and sending all the information to the brain [24].

### *2.1.2 The proprioceptive system*

Proprioception refers to information arising from the body, especially from muscles, joints, ligaments, and receptors associated with bones. Although all senses are integrated to respond to different situations we face, the vestibular and proprioceptive systems are inseparable, but are considered separately because each has special implications.

The function of the proprioceptive system is elementary for the motor action of reflexes, automatic responses, and for the planning of behavior [16]. It contributes to the development of body awareness, and through proprioception, the organism is able to perceive how the parts of the body are positioned without the need to perceive

them with another sensory organ such as the eyes through sight; thus, proprioception allows the individual to realize where his body is located in relation to space [22].

Likewise, it can be understood that the proprioceptors that are distributed throughout the body are like sensors that “warn” us where our body is specifically located. Everyday activities such as climbing stairs, going through a door, getting in and out of a car, carrying an egg with enough force not to break it, or carrying a jug of water with enough force to move it would be difficult to carry out without well-developed proprioception [6].

### *2.1.3 The tactile system*

In addition to the vestibular and proprioceptive systems, the tactile system plays a very important and essential role in the perception of the body. Touch is one of the senses that is particularly involved in the continuous process of perceiving and processing other types of sensation, and is also the first sense to develop in the fetus in the womb. Tactile function is a sensitive indicator of the degree of integration of the central nervous system and is an important source of information about environmental conditions [16]. The brain is responsible for processing all tactile sensations, determining whether incoming stimuli are painful, soft or scratchy, cold or hot, wet or dry, and the shape or location of these sensations based on information received from tactile receptors in the skin.

## **2.2 Sensory dysfunction**

Sensory dysfunction is understood to be a sensory organization disorder in which the central nervous system is unable to adequately process the sensory stimuli it receives so that the person is unlikely to have adaptive responses and, by not properly processing sensory inputs, will have difficulty obtaining information from his or her own body and environment. Sensory integrative dysfunction is reflected in a person's behavior and academic performance and learning. The main signs of impaired sensory integration that can be observed include hyperactivity, language deficits, motor coordination problems, and learning problems in reading, writing, and mathematics [22].

A person with a sensory integration disorder may have difficulty with one of the information processing steps of sensory integration, either registration, modulation, or discrimination. If the individual does not register the stimulus, that is, their sensory organs do not detect sufficient stimulation of the input, this means that they have hyposensitivity to these inputs, which may cause the person's responses to seek constant sensory stimulation, or they may be completely indifferent to the stimulus “as if they were ignoring it”. If the dysfunction is in sensory modulation, the person will tend to be hypersensitive to stimuli, which means that he/she will show avoidance and overwhelming responses to the inputs that he/she is processing. Finally, if the problem is in the discrimination of the sensory stimulus, the individual will show dyspraxia and his responses will have difficulties in motor execution and in the general organization of behavioral planning [25].

Dyspraxia can be understood as the difficulty a person has in planning new movements due to a poor representation of the body, resulting in deficiencies in the processing of vestibular, proprioceptive, tactile, and even visual sensations [21]. In each of the processes where sensory dysfunction is found, the person will be prone to generate non-adaptive responses.

### **3. Stimulation of sensory integration as part of reasonable accommodations in special and regular education**

Despite the importance of increasing academic skills in the educational process of any student, many children present difficulties in the acquisition or progress of learning, and it has been observed that some of these also present difficulties in sensory processing, pointing out the importance of using strategies for the stimulation of sensory integration in the classroom environments of schools [2, 26, 27]. This suggests that there is a relationship between people's sensory processing and academic performance.

Therefore, the need for research studies that provide information on the relationship of these variables is imperative as they may have direct implications [27].

Several studies have shown an increasing number of students with learning difficulties related to sensory integration (short attention span, difficulty in following instructions, as well as difficulties in basic academic learning) and have highlighted the importance of incorporating sensory integration training into the curricula of preschool and elementary schools, highlighting the relevance of subjects such as those related to sports and the arts, because they are subjects that work directly with the senses, and although these subjects are necessary for the full development of the student, in Mexico, they have not been considered as high priority as those related to mathematics or languages [28].

As Ayres [6] points out, the most important academic skills are called basic, but they are very complex processes that can be achieved only when there is a well-developed sensory integration. The theory formulated by the author seeks to understand the relationship between deficiencies in the interpretation of information and its influence on the development of competencies in children, being one of its objectives to explain part of the learning problems and maladaptive behavior that may occur.

In particular, the theory of sensory integration argues that if sensory processing is inadequate, it could explain some disorders related to low learning performance and that improving it would cause academic learning to be more effective for those children whose main problem is in this area. Thus, the ability to organize sensory information can be improved by consciously controlling the input of stimuli using certain methods to facilitate the registration, modulation, and discrimination of information, thus increasing the likelihood of making an appropriate response to the demands of the environment [16].

As mentioned above, many of the students who present with learning and behavioral problems have problems with sensory integration dysfunction. Learning may have a limited basis of sensory integration and consequently some children may have difficulty meeting academic demands [13]. Therefore, students with these characteristics will manifest problems in adapting to the curricular demands within the classroom and school environment, since not only do they have to learn a wide range of academic content, but they also have to deal with a variety of stimulus-rich situations, such as interacting with teachers, other classmates, and the school environment itself, which is usually highly demanding, where pressure is exerted in such a way that those who are not able to organize sensations properly will have to work twice as hard to complete the same tasks as others.

"Many children with inadequate sensory integration feel anxious and helpless in school" [6]; that is why it is essential the creation of favorable environments that use adequate stimulation that allow the development of elementary competencies for learning through stimulation for a good development of sensory integration and that

school agencies notice the importance of sensory information processing in these contexts [29] as the National Council for Culture and the Arts [30] states that the school is essential as a place for learning specific skills and knowledge where reasonable accommodations are required where they include, among others, environments conducive to the proper growth of sensory integration. Thus, the implementation of programs in which these educational strategies are implemented in all contexts of interaction becomes necessary [29].

### **3.1 Relevance of the sensory integration approach in regular education**

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) provides a normative structure for identifying and classifying neurodevelopmental disorders, including some related to alterations in sensory integration. However, it is important to note that even without a formal diagnosis, both infants and adults may experience significant barriers to learning and participation in daily activities. These barriers, often manifested in maladaptive behaviors, may be profoundly related (as discussed above) to sensory processing difficulties that affect the ability to adapt to social and educational environments. In the Latin American context, Ref. [14] highlights that information on the effects of intervention programs based on sensory integration training is still scarce. This lack limits the understanding of how these approaches can positively influence children's development, especially in school settings where sensory and cognitive demands are high.

Moreover, research on these topics is still scarce in the region, which underscores the urgent need to generate contributions that contribute to the description, analysis, and practical application of this variable in educational institutions. Specifically in Mexico, this knowledge gap translates into an opportunity to address issues related to learning in vulnerable populations, taking into account the cultural and contextual characteristics of the region [13]. On the other hand, it is difficult to find existing literature on sensory integration in regular education contexts, as this variable is mainly associated with populations with specific diagnoses, such as children with autism spectrum disorder, learning disabilities, epilepsy, communication disorders, and attention deficit/hyperactivity disorder, among others [31–34]. These studies have demonstrated the importance of analyzing how sensory modulation affects cognitive processes that are fundamental to the learning of literacy, language, and other skills; however, it is equally necessary to broaden the focus to typically developing populations who meet regular standards for social and academic participation.

In this sense, research that addresses the relationship between sensory integration and academic performance in the different relevant areas of school demand can provide a more detailed or complete understanding of the dynamics of the acquisition of new knowledge, in addition to providing empirical evidence to support intervention strategies in both regular and inclusive education. These types of studies not only contribute to the development of more effective programs in Latin America but also offer new and valuable ideas for optimizing learning and participation in populations with diverse characteristics and needs.

### **3.2 Sensory integration and reasonable accommodations**

Reasonable accommodations in school settings are essential to ensure an inclusive environment that primarily promotes learning and the active and successful participation of all students, regardless of their individual characteristics [35].

These implementation measures aim to address the needs of those students who, due to the presence of sensory processing impairments, face significant barriers to learning and participation that limit their optimal academic and social development. To this end, it is important to design and implement interventions that favor sensory organization and promote the emergence of appropriate responses to stimuli found in the school environment.

One of the key strategies is to incorporate sensory regulation activities into the school day [26]. These activities can include the creation of sensory corners within classrooms or in common areas, as well as the use of specific tools such as those shown in **Table 1**.

The creation of adapted physical environments is an indispensable reasonable accommodation within schools, which means that it is not only the implementation of new spaces or materials but also the order and arrangement of these that is of great

| Vestibular               | Proprioceptive                     | Tactile                                                 | Visual               | Olfactory                                  | Gustatory                                                               |
|--------------------------|------------------------------------|---------------------------------------------------------|----------------------|--------------------------------------------|-------------------------------------------------------------------------|
| Exercises on a yoga ball | Elastic bands                      | Sensory boxes (with rice, beans, chickpeas, and sand)   | Projector            | Smelling aromatic bags with herbs          | Tasting different foods and detecting differences                       |
| Exercises on a bosu ball | Pressure massages                  | Viscous materials such as cream, glue, and shaving foam | Shadow games         | Guessing smells                            | Sharing lunch with classmates                                           |
| Balancing on beams       | Passing the body through a hoop    | Finger and hand painting                                | Soap bubbles         | Smelling different flowers                 | Guessing flavors                                                        |
| Slides                   | Throwing a ball into a hoop        | Playing with modeling clay                              | Lava lamps           | Creating smell jars with natural materials | Distinguishing between sweet, sour, bitter, and salty flavors           |
| Swings                   | Use of weighted vests              | Guessing objects by touch                               | Sand timers          | Painting with coffee on paper              | Trying snacks with different flavors and textures (crunchy, soft, hard) |
| Seesaw                   | Using balls with different weights | Walking barefoot on different textures                  | Color filter glasses | Essential oil diffusers                    | Mixing flavors                                                          |
| Jump rope                | Tug of war game                    |                                                         | Kaleidoscopes        |                                            |                                                                         |
| Jumping between hoops    | Push heavy boxes                   |                                                         | Coloring             |                                            |                                                                         |
| Rolling on mats          | Crawling through a tunnel          |                                                         |                      |                                            |                                                                         |
| Dancing                  |                                    |                                                         |                      |                                            |                                                                         |
| Note: own elaboration.   |                                    |                                                         |                      |                                            |                                                                         |

**Table 1.**  
*Activities and materials for the stimulation of the different sensory systems.*

importance to reduce or neutralize some stimuli in the environment. In terms of reasonable accommodation, it is essential to implement Universal Design for Learning (UDL) as a theoretical and practical framework to ensure flexibility and accessibility of teaching methods. This includes the implementation of didactic materials presented in different formats, such as visual, auditory, and tactile, as well as the adaptation of activities to the individual needs of each student [35].

The implementation of reasonable accommodations will not only benefit students with barriers to learning and participation due to sensory dysfunction but also promote a culture of inclusion that respects and values the cognitive and sensory processing diversity of all students. By removing or reducing barriers to learning and participation, sensory integration strategies and reasonable accommodations contribute to the development of the whole child and strengthen academic achievement and social interaction skills.

#### **4. Validation of the Winnie Dunn Sensory Profile—2 instrument**

As discussed in this chapter, the importance of having knowledge of the response patterns related to sensory integration can lead to the generation of precise strategies that can be implemented as reasonable accommodations within school institutions; however, in the Latin American context, there is little information as well as valid tools that can assist in this purpose.

Therefore, the validation of the Sensory Profile—2 instrument in its school version by Dunn [20] is addressed, in order to add another tool to assist in the assessment of sensory processing of students for the creation of relevant curricula that address the training or stimulation of sensory integration.

##### **4.1 Methodology**

###### *4.1.1 Participants*

The study sample consisted of 120 students (children between 6 and 8 years of age,  $M = 6.78$ ), randomly and clustered, first and second graders from different public elementary schools in the city of Hermosillo, Sonora, northwestern Mexico. The students had no diagnosis of disability, neurodevelopmental disorder, or epilepsy; no pharmacological treatment; no apparent barriers to learning and participation; and no extracurricular participation. In total, there were 61 girls and 59 boys, 61 in first grade and 59 in second grade. Because the students were minors, their parents or guardians signed an informed consent form to allow the use of the instrument.

The sample was part of a larger investigation of the relationship between the variables of reading, writing, and sensory integration.

###### *4.1.2 Instrumentation*

This is the adaptation of the Spanish version of the Sensory Profile—2 School Instrument (Perfil Sensorial—2 Escolar) by Pearson Clinical and Talent Assessment et al. [36] for the Spanish population, which contains a total of 44 items divided into three assessment areas: sensory and behavioral sections (divided into auditory processing, visual processing, tactile processing, movement processing, and behavioral response), sensory quadrants (divided into registration profile, search profile,

sensitivity profile, and avoidance profile), and school factors (divided into school factor 1, school factor 2, school factor 3, and school factor 4).

Responses are collected using a Likert scale as follows: 0 = not applicable or not observable, 1 = hardly ever or never, 2 = occasionally, 3 = half the time, 4 = often, and 5 = almost always or always.

The instrument is intended for teachers who are constantly observing students' behavior on a daily basis, and its main purpose is to assess students' sensory processing patterns in the school context. The test takes between 10 and 20 minutes to complete.

#### *4.1.3 Procedure*

Initially, information was obtained from public elementary schools in the city of Hermosillo, Sonora. The schools were randomly selected, and then, the corresponding school administration was contacted to request permission to collect data in the selected groups and to plan the visit schedules. Then, the teachers in charge of the first and second grade groups were contacted, and the informed consent form was presented to them and agreements were made to carry out the data collection, in which the students were randomly selected (according to the inclusion and exclusion criteria).

The form of application of the instrument was individual, where the teacher in charge was given the test and the necessary instructions to answer it; once the instruments were answered, they were collected, and the corresponding analyses were made.

#### *4.1.4 Data analysis*

To adapt the instrument, reliability and validation analyses were conducted, starting with the analysis of Cronbach's alpha coefficient to estimate the reliability of internal consistency, where values should be between .70 and .90 to indicate that it is strong [37–39].

Construct validation was also performed using confirmatory factor analysis to demonstrate the dimensional structure of the instruments to be used. The acceptance criteria for the confirmatory factor analysis model are the comparative fit index (CFI), the Tucker-Lewis fit index (TLI), or the non-normed fit index (NNFI), which must have a value equal to or greater than .9, the root mean squared error of approximation (RMSEA) and the standardized root mean squared residual (SRMR), both of which should have a value of .08 or less [40–43].

### **4.2 Results**

**Table 2** shows the internal consistency of each of the dimensions that make up the instrument, as well as the three areas of evaluation and the general analysis. In all dimensions, Cronbach's alpha coefficient values greater than .70 are observed, indicating satisfactory internal consistency.

The correlation matrix in **Table 3** shows the relationships between the variables evaluated. All reported correlations are significant ( $p < .001$ ). High correlations were identified as between the variables SEP-SF2 and BR-AVP. The correlations between AP-VP, RP-VP, and SF3-AP present values between .70 and .86, and some relationships such as SF1-TP, SF4-MP, MP-TP, and AVP-SP show a moderate level of correlation ranging between .40 and .45.

| Areas of evaluation             | Cronbach's alpha |
|---------------------------------|------------------|
| <b>Sensory Profile—2 School</b> |                  |
| Auditory processing             | .78              |
| Visual processing               | .77              |
| Tactile processing              | .73              |
| Movement processing             | .79              |
| Behavioral response             | .82              |
| Search profile                  | .75              |
| Register profile                | .87              |
| Avoidance profile               | .82              |
| Sensitivity profile             | .84              |
| School factor 1                 | .85              |
| School factor 2                 | .85              |
| School factor 3                 | .77              |
| School factor 4                 | .73              |
| Sensory and behavioral sections | .90              |
| Sensory quadrants               | .91              |
| School factors                  | .92              |
| General                         | .92              |

**Table 2.**  
*Internal consistency of the Sensory Profile—2 School Instrument.*

|     | AP    | VP    | TP    | MP    | BR    | SP    | RP    | AVP   | SEP   | SF1   | SF2   | SF3   |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| AP  | 1     |       |       |       |       |       |       |       |       |       |       |       |
| VP  | .73** | 1     |       |       |       |       |       |       |       |       |       |       |
| TP  | .54** | .59** | 1     |       |       |       |       |       |       |       |       |       |
| MP  | .49** | .62** | .44** | 1     |       |       |       |       |       |       |       |       |
| BR  | .60** | .50** | .47** | .48** | 1     |       |       |       |       |       |       |       |
| SP  | .54** | .72** | .67** | .81** | .46** | 1     |       |       |       |       |       |       |
| RP  | .80** | .81** | .48** | .71** | .62** | .62** | 1     |       |       |       |       |       |
| AVP | .60** | .51** | .51** | .42** | .91** | .45** | .57** | 1     |       |       |       |       |
| SEP | .73** | .73** | .84** | .46** | .59** | .64** | .59** | .63** | 1     |       |       |       |
| SF1 | .58** | .74** | .43** | .91** | .50** | .75** | .86** | .44** | .47** | 1     |       |       |
| SF2 | .68** | .77** | .83** | .56** | .58** | .76** | .60** | .60** | .95** | .53** | 1     |       |
| SF3 | .86** | .68** | .62** | .49** | .80** | .55** | .76** | .81** | .77** | .54** | .72** | 1     |
| SF4 | .57** | .53** | .52** | .40** | .76** | .38** | .61** | .77** | .61** | .44** | .54** | .71** |

*Note:* AP, auditory processing; VP, visual processing; TP, tactile processing; MP, movement processing; BR, behavioral response; SP, search profile; RP, register profile; AVP, avoidance profile; SEP, sensitivity profile; SF1, school factor 1; SF2, school factor 2; SF3, school factor 3; SF4, school factor 4.

\* $p < .05$ .

\*\* $p < .001$ .

**Table 3.**  
*Correlation statistics between the dimensions of the Sensory Profile-2 School instrument.*

| Areas | X <sup>2</sup> | DF | X <sup>2</sup> /DF | P    | NNFI | CFI | RMSEA | SRMR |
|-------|----------------|----|--------------------|------|------|-----|-------|------|
| AP    | 12.82          | 8  | 1.60               | .118 | .95  | .97 | .07   | .04  |
| VP    | 8.00           | 7  | 1.14               | .333 | .99  | .99 | .03   | .04  |
| TP    | 8.57           | 8  | 1.07               | .380 | .99  | .99 | .02   | .04  |
| MP    | 19.61          | 13 | 1.50               | .105 | .95  | .97 | .06   | .05  |
| BR    | 30.47          | 17 | 1.79               | .023 | .93  | .96 | .08   | .07  |
| SP    | 21.91          | 11 | 1.99               | .025 | .90  | .95 | .09   | .06  |
| RP    | 79.74          | 41 | 1.94               | .000 | .90  | .92 | .08   | .06  |
| AVP   | 13.42          | 10 | 1.94               | .201 | .97  | .98 | .05   | .04  |
| SEP   | 27.79          | 24 | 1.15               | .269 | .98  | .99 | .03   | .04  |
| SF1   | 56.22          | 32 | 1.75               | .005 | .92  | .94 | .08   | .05  |
| SF2   | 41.71          | 24 | 1.73               | .014 | .93  | .95 | .07   | .04  |
| SF3   | 37.59          | 24 | 1.56               | .038 | .92  | .95 | .06   | .06  |
| SF4   | 19.99          | 12 | 1.66               | .067 | .91  | .95 | .07   | .05  |

*Note: AP, auditory processing; VP, visual processing; TP, tactile processing; MP, movement processing; BR, behavioral response; SP, search profile; RP, register profile; AVP, avoidance profile; SEP, sensitivity profile; SF1, school factor 1; SF2, school factor 2; SF3, school factor 3; SF4, school factor 4. All factor loadings are significant.*

**Table 4.**  
*Goodness-of-fit indices of the Sensory Profile—2 School Instrument.*

**Table 4** shows the results of the goodness of fit indices of the models obtained by confirmatory factor analysis. The indices belonging to each of the 13 factors that make up the Sensory Profile—2 School Instrument are shown.

## 5. Conclusions

The validation of the instrument in the specific context of Hermosillo, Sonora, represents a significant advance in the assessment of sensory integration in elementary school students. The results obtained demonstrate the psychometric robustness of the instrument, as evidenced by satisfactory internal consistency coefficients in all the dimensions evaluated ( $\alpha > .70$ ) and goodness-of-fit indices within acceptable ranges. These figures confirm the usefulness of the instrument for exploring sensory patterns and their relationship to academic performance.

Thus, the adaptation of the Sensory Profile—2 School provides a valid and reliable tool to assess sensory processing in children in the northwestern region of Mexico, a resource that was scarce in this region; thus, by identifying specific areas of sensory difficulty, the instrument allows teachers and specialists to design pedagogical and personalized strategies, enhancing learning and eliminating or minimizing barriers to learning and participation.

The findings of the present study have important implications in the applied field of education. The identification and understanding of the sensory profile of the student allows the generation of relevant strategies for physical, academic, and social accessibility.

In terms of physical accessibility, and as mentioned in the section on sensory integration and reasonable accommodations, physical environments are of great

relevance since the adaptations that can be made can facilitate the sensory regulation of children, as it can lead to better attention and greater concentration to do tasks. Creating sensory “zones” with specific materials for the stimulation of sensory integration (especially of the vestibular, proprioceptive, and tactile systems) can represent an effective adjustment to serve those students with difficulties in self-regulation.

In addition, it is important to adapt the general spaces within the classroom, such as lighting, arrangement of materials and desks, as well as noise control. Flexibility in the arrangement of furniture can be an element that favors student participation, through the use of balls as seats or the use of elastic bands on chairs for motor regulation.

In terms of academic participation, UDL is key to ensuring that all students can participate in the activities in an equitable manner; to achieve this from a sensory integration perspective, it is possible to present the information of the curriculum content through different presentation formats (e.g., working with letters through cards, drawing them in sand, and using phonemes, multimedia content, and so forth) to favor the sensory processing of each of the students.

Adapting schedules can play an important role, as some students may need a little more time to complete activities due to possible sensory distractions. Also, combining time for sensory rooms and academic activities can help improve academic performance.

Regarding social accessibility, it is important to understand that sensory integration is an area of great relevance to learning, and traditional interventions combined with those based on sensory integration often have a greater impact on academic performance [44], so understanding and accepting sensory diversity in the community at large is needed.

Information and sensitization through conferences or trainings for the academic body of institutions (especially educators), students, and parents can reduce stigmatization and promote inclusive environments.

The study confirms the importance of sensory patterns as a basis for the academic, social, and behavioral development of students. Adequate sensory integration allows not only the acquisition of basic skills such as literacy and numeracy but also the management of adaptive behaviors [6]. The findings also highlight the importance of implementing reasonable accommodations in school environments to ensure the inclusion and optimal development of students with sensory difficulties [26].

It is important to mention that the results of the construct validation by confirmatory factor analysis could be enriched by the analysis of a larger and more diverse sample, including students in higher grades. Also, although the main purpose of the study was to evaluate a standard compliance population within regular education, future research could include in its studies the evaluation of students who have a diagnosis of disability, neurodevelopmental disorder, who are under pharmacological treatment, who have extracurricular assistance, or who have some other barrier.

Finally, the present study not only validates an instrument that can be considered critical to inclusive education but also opens a path for future research on sensory integration and the impact that this variable may have on elementary school students' learning. Thus, reliable diagnostic tools and evidence-based intervention strategies (such as appropriate accommodations within the educational environment) have the potential to promote inclusive and equitable education for all students.

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RF-B contributed to the conceptualization and design of the study, acquired the data, ran formal analysis, and organized the databases. BF-S and MM-B contributed to supervising the study, methodological tasks, and data interpretation. CT-F made substantial contributions by editing and revising the manuscript critically for important intellectual content. RF-B and MM-B provided the writing of the original draft. All authors contributed to manuscript revision and read and approved the submitted version.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Section 4

# Involving Stakeholders

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# Early Childhood Settings as a Ramp for Inclusion: Staff and Parents' Collaborations to Promote Peer Relations

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## Abstract

This paper examines how staff and parents in early childhood education and care (ECEC) in Norway collaborate on provisions to promote peer relationships as a prerequisite for inclusion. Data were collected through interviews with parents and staff in four different ECEC settings. The results show that parents and staff collaborate mainly through daily dialog about the child and the child's interaction in the pick-up and drop-off situations. This dialog is about how the child is doing socially in ECEC. The collaboration also occurs by facilitating shared meeting places where parents, staff, and children are present, usually gathered around an activity. It is about creating a community to get to know each other better. A third form of collaboration is based on staff and parents having a shared understanding and interest in a common focus on promoting peer relationships by supporting children's social skills and inclusion. The findings show an interest in focusing on the community. However, there is a lack of basic common strategies and systems for promoting relationships between children to create an on-ramp for inclusion. One implication of these findings' emphasis is the need for further dialog about how staff and parents can promote peer relationships.

**Keywords:** ECEC, parent, staff, collaboration, inclusion, peer-relationships

## 1. Introduction

The first years of children's lives are of great importance for children's well-being, learning, and development [1–3]. Parents, early childhood education and care (ECEC) staff, and peers affect children's well-being, learning, and development within the family and in ECEC services. Research and policy guidelines have highlighted the importance of inclusion for children's well-being, development, and learning, both for children with and without special needs, even if the research base regarding the effects of academic achievement, socioemotional development, and well-being of children with special educational needs has been relatively poor over the last decades [4, 5].

## **1.1 Inclusion**

Since 2015, there has been an international agreement to achieve 17 Sustainable Developmental Goals, where goal number four (SDG 4) is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all by 2030. This goal is also clearly reflected in research within the ECEC [6]. According to target 4.2, all girls and boys should have access to quality early childhood development, care, and pre-primary education, and this contribution concerns this field. Target 4.5 aims to eliminate gender disparities in education, ensure equal access to all levels of education and vocational training for the vulnerable, and ensure the inclusion of persons with disabilities, Indigenous peoples, and children in vulnerable situations [7]. Furthermore, education facilities should be child, disability, and gender sensitive and provide safe, non-violent, inclusive, and effective learning environments for all. Thus, inclusive education is on the global agenda, based on economic arguments [8], human rights [9], and educational science [10–12].

Despite an apparent agreement on values, intentions, and policies, definitions and conceptualizations of inclusion and inclusive education may vary widely, depending on political and educational policy systems and research approaches. On a very general level, according to Lawrie et al. [13], “Inclusive education can be defined as a global movement in overcoming barriers to participation and success, but it has different scope depending on the international context” (p. 18). Following Haug’s [10, 14] perspectives on inclusion in school, one can and should distinguish between three dimensions of inclusion: how teaching is organized (fellowship and placement), teacher and student activities (support, involvement, and participation), and benefits from teaching. Haug [10] distinguishes between a narrow and a broad definition of inclusion. The narrow definition deals with special education only [15], whereas a broad definition of inclusion, in line with the Salamanca Declaration [16], concerns all students and marginalized groups, not only those with disabilities.

In most Nordic countries, children have a statutory right to a place in ECEC, so the first moment in Haug’s conceptualization seems fulfilled. In this contribution, we will focus on fellowship between children and expand the second perspective to include cooperation with parents as a significant factor in promoting peer relationships as a means of inclusion. Fostering relationships between children primarily concerns inclusion, i.e., community participation, as Lund et al. [17] emphasized that children’s well-being is mainly linked to friendship and being included in the play; having no one to play with is what children fear most. Thus, peer relationships appear to be one crucial factor in promoting inclusion in ECEC.

## **1.2 Peer relations**

Peer relationships are essential development drivers for all children, regardless of their functional prerequisites [18–20]. For instance, children with disabilities and difficulties related to self-regulation participate less in social activities than their peers. These children spend more time with material play, takes, or with no particular focus [21]. Recent research consistently shows that early peer relationships are meaningful in infancy [20]. Relations are expressed through verbal and nonverbal actions, such as babbling, laughter, and humor, as well as bodily and facial expressions, such as smiles, gestures, touch, and movements [22]. Shehu et al. [23] identified three factors influencing peer acceptance: socio-economic conditions, social skills, and communication skills. However, both children with and without special needs can

experience serious challenges to initiate and maintain good relationships with their peers and gain a foothold in the group of children. Children with inadequate or weak prerequisites for interaction, limited vocabulary, or lack of requirements for holding joint attention may be at risk of rejection or exclusion [19, 24]. To participate in social interaction with their peers, Hay et al. [20] point out that children must be able to hold joint attention, regulate emotions, inhibit impulses, imitate the actions of others, understand cause and effect, and master language and communication.

Howes and Clements [25] identified already in 1994 three areas to support peer relations: creating conditions for peer interaction (e.g., the availability, accessibility, and affordability of ECEC provisions), adults acting as models for and in the interaction between children, and “management” referring to how adults involve themselves in children’s peer interaction. This is in line with the conclusions of Os [26], who distinguished three approaches to support relationships between 1 and 3-year-old children: involvement in children’s play, visibility of individual children, and regulation of children’s interaction. Another main finding from Os [26] is that the mediation of the youngest ECEC children’s peer interaction occurs mainly in individual children and not in groups. Children need guidance in interaction with other children, for example, through the regulation of adults, and it is in this perspective that cooperation with parents seems particularly important.

We follow Corsaro [27], who defines peers as a group of children who regularly spend time together. Thus, we understand peer relations as the social interactions that exist between the members of this group [28]. When creating inclusive ECEC environments, we recognize peer relationships as the most prominent context that supportive interventions should target. The microsystems of family and ECEC should be united (mesosystem) in joint activities to facilitate the conditions for good peer relationships.

### **1.3 Collaboration between staff and parents**

Research in the Norwegian context has mainly focused on cooperation with parents or with specific groups, such as minority language children or children with special needs, and to a lesser extent on collaboration to promote peer relationships. There is a need for more knowledge about how staff can support peer relationships and collaboration between parents and kindergarten staff on this issue. The national Norwegian framework plan for kindergarten emphasizes the importance of cooperation between parents and staff, as the Norwegian Directorate for Education and Training demands [29], claiming that staff “...shall oversee the relationships between children in groups, between children and staff and between staff and parents” (p. 15). Staff and parents, representing children’s decisive microsystems, have a shared responsibility and are crucial for creating good conditions for peer relationships and an inclusive environment in ECEC settings (mesosystem). Beyond collaboration, several other terms in today’s discussion refer to the relationship between staff and parents, e.g., involvement and partnership. Drawing on Epstein’s [30] widely used involvement typology, including parenting, communicating, volunteering, learning at home, decision-making, and community collaboration. Norheim and Moser [31] claim that the concept of partnership extends the idea of involvement by emphasizing the collaboration between the two primary microsystems, home and ECEC. Thus, partnership is recognized as a foundation in bridging these contexts to create coherence in the child’s learning and caregiving environments and leverage each system’s resources to support one another.

We see the value of the partnership concept in characterizing this relationship's nature. Yet, we apply the term collaboration to emphasize the importance of the actions that help to constitute partnerships around promoting children's communities to strengthen inclusion. Thus, we follow Ravn [32], who defines collaboration between home and school as follows:

*“Collaboration is a relationship between people who, concerning each other's different knowledge, skills, qualities, and attitudes, work towards the same goal on the basis of a common sum of resources. The ideal cooperation rests on mutual trust and a common sense of responsibility and decision-making. It is about an equal relationship” ([32], p. 204).*

According to the Norwegian framework plan for ECEC [29], collaboration between ECEC staff and parents should be about the child's well-being and development and creating a good environment. It should take place at an individual and group level. An individual level refers to collaboration concerning each child, and a group level concerns collaboration for the whole group of children.

Furthermore, the framework plan emphasizes that it is the ECEC staff who are responsible for facilitating parents having a good dialog and collaboration with the parents ([29], p. 29). Norwegian ECEC policy documents emphasize three levels of collaboration as essential for the collaboration between parents and staff: information, dialog, and participation [29, 33]. The information represents the lowest level of collaboration, and most ECEC settings in Norway have good routines for this, including parent interviews and ongoing information [34, 35]; parents seem generally satisfied with the information they receive [36].

The daily contact between parents and staff in ECEC settings constitutes a crucial context for collaboration [37]. Family gatherings and daily interactions are central to building friendships and inclusion. Positive relationships between employees and parents are primarily expressed in good dialogs as prerequisites for collaboration [38]. According to Wolf [39], daily informal conversations at pick-up and drop-off are essential for building relationships, while formalized parent-teacher conversations (meetings) are often perceived as one-way communication. On the other hand, studies show that this pick-up and drop-off zone focuses more on children than adults and could be superficial [40].

It has been documented that mutual and warm communication between parents and staff even has a positive effect on the child's well-being and functioning in ECEC [41]. When it comes to inclusion, Lund et al. [42] point to the importance of dialog with parents as a means for preventing bullying, harassment, and exclusion, which seems tremendously crucial for both mainstream children and children with special needs. Participation, as the highest level of cooperation, challenges some parents due to various barriers [39, 43].

To ensure excellent quality of inclusion, Catlett and Soukakao [44] consider staff and parents' involvement in children's peer relationships a promising practice. It further suggests that parents can contribute to planning, documentation, and reflection by providing relevant information about the children's needs and development and sharing ideas about different types of support. Staff can support the family by working closely, reflecting on documentation for the ECEC provision, exchanging perspectives, communicating with each other, and supporting each other in identifying goals. Communication about the family within the staff group can lead to an effective plan so the child can participate in extensive group interactions in ECEC [44]. There are

various approaches to how the staff can support children in peer relationships. They may use the opportunities to help children take the initiative or maintain relationships with other children by organizing social activities, interactions, and play activities that may encourage them to participate in activities (joint attention). Modeling turn-taking and deliberately organizing pairs or groups of children are other opportunities to foster peer relationships and, through this, strengthen inclusion [44].

However, establishing strong parent-professional collaborations in inclusive environments is a demanding process that requires dedication and comprehension [45]. Sira et al. [46] discovered that, despite supporting the principle of inclusion in childcare facilities, parents felt less confident in explaining the restrictions related to special needs to their young children. Thus, creating educational activities and collaborating with families and professionals can enhance parental involvement and support in inclusive ECEC settings [46]. Samuelsson and Ingebrigtsen [43] have recently claimed that one should focus on collaborative approaches to a greater extent on the pedagogical content of ECEC.

Some studies have investigated the collaboration between staff and parents, focusing on supporting peer interactions. Öngören [47] examines how teachers support children's social relations with their families, peers, teachers, and staff in the preschool period in Turkey. How teachers supported the families is highlighted in this article. The result showed different ways the staff involved the parents in supporting children's social relationships. One practice was to have the family participate in activities in the children's group. Teachers cooperate with parents and invite them into the classrooms to socialize through different activities. The second practice was to provide the children with some tasks to perform at home with their families so they could participate in the children's education process. The third practice was meeting with the families. This is daily communication with an instant messaging application. Finally, the fourth practice was family education. This occurs in face-to-face meetings and works to be done daily, etc. In a study conducted in the USA, Hollingsworth and Buysse [48] investigated how teachers and parents support friendships in early childhood inclusive settings between children with and without developmental delays. Parents and teachers supported the friendship in a variety of strategies: shared beliefs about the nature and importance of the friendship, practices to support friendships (setting the tone of the social environment, providing opportunities for dyadic interactions, and facilitating dyadic interactions or play), and parent-teacher communication about friendships. The three themes related to this communication were: *Teachers gave parents information about specific friendships, parents asked for or gave teachers information about specific friendships and barriers to communication, and the reason for the lack of communication*. Informal conversation was the most used and preferred method of communication between parents and teachers. The findings indicate that the strategies are more incidentally than intentionally focused on friend support. Zhang, Leung, and Li [49] showed that important contextual factors, such as the life circumstances of low-income families with children with disabilities, are not sufficiently considered. Parents with different religious backgrounds and ethnicities appreciated inclusive ECEC but, at the same time, called for more early intervention and assistance. Getting the opportunity to develop effective coping skills led to positive changes and improved the overall well-being of families and their children with disabilities.

#### 1.4 Aim and research question

Based on knowledge of the importance of peer interaction for young children and the importance of home and staff collaboration to create an inclusive environment

by fostering peer interactions, this study aims to examine how staff and parents in Norwegian ECEC provisions collaborate to promote peer relationships as a prerequisite for inclusion in ECEC.

The research question of this study is: *How do the staff and parents collaborate to promote relationships among children and create a ramp for inclusion in ECEC?*

## **2. Method**

The article adopts a qualitative approach to gain insight into the complex phenomenon of collaboration. By exploring the subjective experiences of staff and parents in ECEC regarding how they collaborate to promote relationships among children, we can capture diverse experiences, perspectives, and emotions that underlie how parents and staff perceive and interpret the collaboration.

### **2.1 Sample**

The sample consisted of parents with children in both the toddler and preschool groups and the staff in the respective groups. The selection was strategic, meaning ECEC settings were contacted near the researchers. The researchers contacted the leaders of the ECEC provisions, which recruited parents and staff from the preschool.

### **2.2 Data collection**

The data was collected through group interviews with parents, ECEC teachers, and staff from four childcare centers in three municipalities in Norway in 2022. Two parents and two of the staff were interviewed together, forming four groups. Thus, eight childcare groups are represented. Four interviews were completed with an interview guide that contained ten questions. Some examples of questions are: “What can parents do to foster peer relations?”, “What can the staff do to foster peer relations?”, “How can staff and parents collaborate to secure an inclusive environment for all children?”, “Do all children engage in peer relations?”, and “How do you keep track of peer relations?” We have not asked specifically about children with special needs but focused on peer relations as inclusion. In the Norwegian policy on inclusion, children at risk or with special needs were not addressed as a specific target group for inclusion. The policy emphasizes that the educational mission applies to all children regardless of their individual circumstances. Inclusion is thus, as reflected in this contribution, a pedagogical goal that characterizes the entire educational mission also for children with specific needs.

The structure was that the parents answered first and then the staff. Four ECECs participated in the study (**Table 1**).

### **2.3 Analysis**

An abductive approach to thematic analysis [50] was used to analyze data. This means that the analysis has taken place in various stages and with different researchers to maintain a broad approach with sufficient distance to the data. The following iterative steps were used in the analysis process: (1) Familiarize with the data, (2) code the data by deconstruction, (3) generation of initial themes through reconstruction, (4) review of themes, (5) define and name themes, and (6) report writing.

| ECEC setting number | Ownership of ECEC setting | Number of departments | Number of children | Age group |
|---------------------|---------------------------|-----------------------|--------------------|-----------|
| 1                   | Private                   | 1                     | 18                 | 1–5       |
| 2                   | Municipal                 | 9                     | 102                | 1–5       |
| 3                   | Municipal                 | 4                     | 74                 | 1–5       |
| 4                   | Municipal                 | 6                     | 111                | 1–5       |

**Table 1.**  
*Descriptives of the ECEC settings.*

Transcripts were analyzed thematically to identify and report patterns (themes) within the data set [51]. The transcriptions were read multiple times and analyzed collectively by the researchers to identify overarching thematic areas from each interview group before they were recorded in a chart as a basis for further work to identify common themes and patterns between the different interview groups.

### 2.4 Ethical considerations

Ethical considerations were thoroughly addressed in this study. The research was conducted in accordance with established ethical guidelines, and participants' rights to confidentiality were prioritized throughout the process. Informed consent was obtained from all participants, and all data were anonymized to protect privacy. The study was reviewed and approved by SIKT (Knowledge Sector Service Provider), ensuring compliance with institutional and international ethical standards. The staff were informed about the project and made aware that participation was voluntary and that they could withdraw from the study at any time without explaining or facing any negative consequences. In planning the survey, during observations, data analysis, and subsequent discussions with the staff, we followed the current national ethical guidelines for research [52] regarding honesty, respect, integrity, and confidentiality.

### 3. Results

This study examines how ECEC staff collaborates with parents<sup>1</sup> to promote relationships among children and create a ramp for inclusion. Findings were categorized into three groups: those related to collaboration through daily dialogs, joint activities, and shared educational beliefs related to peer relations and social skills.

#### 3.1 Collaboration through daily dialogs

Both staff and parents describe how they collaborate about the child and their interaction with peers through daily dialogs when the child is delivered or picked up from the ECEC. This is the situation the staff and parents emphasize the most when they describe how they collaborate to promote relationships among children. The dialog could be about children who lack someone to play with or about new friendships. They also highlight dialogs about the child and his/her interaction in other meeting

<sup>1</sup> In the presentation of results, we use the term parents but include all forms of guardians.

places, such as parent-teacher meetings, parent meetings, via phone calls, and when the child started in ECEC.

One ECEC teacher highlights that she has “... a good dialogue with parents...” and adds that “... this dialogue concerns the child’s interaction with the other children” (ECEC setting 3). Another staff member points out “... the importance of the dialogue between parents and staff, enabling them to address issues to help the children build relationships, such as handling conflicts and friendships” (ECEC setting 3).

The staff and parents collaborate by mutually informing each other when there are challenges related to individual children. A staff member emphasizes the following: *We try to keep an eye on things to inform about small conflicts that are simmering or new emerging friendships* (ECEC setting 3). A good relationship between staff and parents is thus considered a prerequisite for the dialog about the children and their interaction with other children. *“The staff is committed to building good relationships with parents during drop-off and pick-up times”* (ECEC setting 3). Another staff member stresses that the parents are different and that being sensitive in these meetings is important. She said, *“It’s about tuning into the family and the parents, building trust and understanding, and collaborating with them.”* This also illustrates the importance of having a generally good collaboration. One of the parents emphasizes that having a good and open dialog is important and that the daily talk is most important (ECEC setting 3). Another parent underlines the importance of dialog and gives an example about which children accompany and visit each other at home by saying, *“I believe that parents would support a little, and if one can invite.... especially if there are large groups. Who gets to come home with the child, and which child doesn’t get invited? That can be challenging. It’s difficult for parents to keep track of; a lot is happening. Yes, it’s important to have a dialogue”* (ECEC setting 4). This also emphasizes how daily dialogs create the basis for children going home with each other after a day in ECEC, a potentially vulnerable area for those children who feel excluded or are at risk of being excluded from the peer community.

The staff and parents describe how they collaborate about the child and the child’s interaction with their peers through daily dialogs when the child is delivered or picked up from the ECEC. However, these dialogs as a basis for collaboration in pick-up and drop-off situations do not seem to be systematically and intentionally planned to any great extent. There is a significant risk that some parents may be overlooked over time, and it is likely that the parents with whom staff find it easy to communicate are particularly likely to benefit in these situations.

### **3.2 Collaboration through joint activities**

Organizing shared activities is an arena where the intention is that children, parents, and staff can get to know each other better and experience community. Staff and parents emphasize this as an important arena for their collaboration that can promote relationships between children and contribute to inclusion. Such arenas can be initiated and organized by both staff and parents, individually or jointly. For example, staff take the initiative for activities and invite parents to attend volunteer work, lantern parties, or Christmas performances.

One parent states, “I think it’s so nice to have volunteer work or a lantern party or things like that, that everyone is together—*both parents and the child*” (ECEC setting 1). This illustrates the sense of community that these activities can lead to.

Also, from the parents’ side, activities for parents and children that promote relationships between children have been initiated. One parent says, *“We’ve always*

*arranged things for the whole department in a way. In our spare time. Whether it's eating waffles, celebrating Halloween, or... The parents organize and develop ideas - everyone is involved"* (ECEC setting 3). Regarding the activities organized by the parents, they take place without staff and are organized solely for parents and children. It is emphasized that all children and parents are invited to these activities and can be inclusive for the children. However, parents or staff say something about what should characterize these arenas, i.e., what prerequisites should be in place to make them inclusive for all children.

Staff and parents' utterances indicate that they collaborate to promote peer relations by organizing shared activities. In this arena, it is endeavored that all children, parents, and staff can improve their knowledge and understanding of each other and experience a sense of community. The staff or the parents take the initiative, but there are a few indications that these joint activities are also planned and prepared jointly.

### 3.3 Shared educational beliefs related to peer relations and social skills

There is widespread agreement among staff and parents about the importance of peer relationships for children's well-being, learning, and inclusion. One of the parents highlighted the following: *"It's about well-being in ECEC, really, that they have someone to be with, to learn from, and strive for"* (ECEC setting 2). The staff supported this and said, *"It's important that they feel part of a community and included with others"* (ECEC setting 1). This indicates that parents and staff are unanimous that relationships between children are fundamental to an inclusive community and the basis for children's well-being and development.

The staff and parents describe their strategies to promote peer relations differently, yet the common theme is supporting social skills and teaching children to include other children.

Another member of staff is clear about how important it is to support children in conflicts: *"It's important how we meet children who conflict with each other. Adults manage to be the one who recognizes both parties in a conflict, helping them to find solutions. Both recognize feelings; it's okay to be angry, what we can't do - and what we can do in such situations. Resolving such situations well can quickly positively affect relationships"* (ECEC setting 3). Including is a goal for the staff. A staff member emphasizes the following: *"Everyone must feel included and be a part of the community. That is our goal."*

The staff also describes how they support relationships between children by creating small playgroups. One member of staff mentioned the following: *"Create small playgroups. Support them in different situations and be present, trying to find what they have in common. Create something and facilitate play they like, like shop play"* (ECEC setting 1).

When the staff describes their practice of promoting relationships between children, they are mainly concerned with the whole group of children.

Parents are concerned that they must be good role models and, in this way, also teach or educate children about relationships. Numerous parents clearly believe it is important to be good role models to promote relationships between their children. One parent says, *"I think it's very much a case of us adults being role models for the children. I think it's basic how we as adults are with each other, around each other, talking to each other. The children copy their role models"* (ECEC setting 1). They are also committed to teaching children how to treat each other and include other children in play. They clearly emphasize their role as parents teaching children social skills to promote good peer relationships. Another parent is keen to teach children how to be inclusive

and says, “*Maybe teach them a bit about relationships, that maybe you don’t have to be best friends with everyone, but that you should be nice to everyone. You should welcome everyone*” (ECEC setting 2). However, it appears that parents are most concerned with supporting their children’s social skills.

Thus, staff and parents agree about the importance of peer relationships and that they are important for well-being, learning, and inclusion. Both parents and staff describe their own practices for facilitating these relationships with a common ground in supporting social skills and teaching children to include other children. However, there is a conspicuous lack of common strategies and systematic approaches to collaborate about supporting peer interactions to ensure inclusion.

The findings indicate that parents and staff share an understanding of and interest in viewing children’s communities as an on-ramp to creating an inclusive ECEC environment. Furthermore, it can be stated that the staff and parents in this study recognize collaboration between the home and the ECEC as a prerequisite to contributing to an inclusive community. However, there is less evidence that staff and parents’ collaboration to promote peer relations also includes support of communication skills [19, 23, 24] and involvement in children’s play, visibility of individual children, and regulation of children’s interaction [26].

#### **4. Discussion**

This study revealed that staff and parents collaborate to promote relationships among children and create a ramp to inclusion through daily dialogs, joint activities, and agreeing about shared educational beliefs and social skills.

Daily dialog is what parents and staff highlight as the most important aspect of their collaboration to promote relationships between children. The staff and parents collaborate by having a dialog about children and their interactions with their peers during the delivery and pick-up of children. The content of the dialog is about friendship, lack of friendship, conflict situations, or which children can visit at home later that day and if all the children receive invitations. This result is consistent with the findings of Hollingsworth and Buysse [48], who emphasize that the staff and parents mutually inform each other about friendships, communicate about friendships, communication barriers, and reasons for lack of communication. The informal conversation was the most used and preferred method of communication between parents and teachers, which is supported by Epstein’s [30] typology of involvement, which highlights communication as an important form of collaboration. It also corresponds with Öngören [47] study, which showed that teachers supported children’s relationships through daily communication with their families. Daily communication and dialogs are also consistent with previous research from Samuelsson and Ingebrigtsen [43], Wolf [39], Drugli and Undheim [38], and Clarke-Stewart [41]. This result is in line with several other findings in the literature. Despite these consistently positive findings, it should be noted that, as Solberg [40] has pointed out, the pick-up and drop-off situation may not be the best arena for good dialog. The study shows that the dialog could be superficial and focused on the child, not on communicating with the parent. Hollingsworth and Buysse [48] stated that communication about friendship may have some barriers. Approximately half of the teachers in their sample and a few parents chose not to communicate with each other about specific friendships. They conclude that this strategy may have been more incidental than intentional. In our study, little emerges, whether the dialogs are random or planned.

The staff and parents are committed to the idea that shared activities, including staff, children, and parents, can help promote relationships between children. This may express a shared assumption that joint activities can facilitate relationships and work as a ramp for inclusion. Arranging activities for the children is also supported by Öngören [47], which suggests that family participation in educational activities can help families socialize and get to know each other better. Howes and Clements [25] identify three areas that support peer relations. The first area, creating conditions for peer interaction (availability, accessibility, and affordability), matches our findings about collaboration through joint activities. Catlett and Soukakaou [44] also include organizing social activities and interactions in inclusion, which supports our findings. Also, Hollingsworth and Buysse [48] can support our findings as they reveal the importance of facilitating opportunities for interactions among friends and facilitating interactions or play. In other words, converging views in the literature support our findings that organizing joint activities is a promising way to create opportunities for supporting relationships between children. As Haug [10, 14] emphasized, community experiences are the first level of inclusion. Yet, collaboration through shared activities takes more than just being together at the same time around activities to promote peer relations between the children and the parents.

Our findings show that parents and staff have shared educational beliefs about peer relations and social skills. Consistent with the findings of Hollingsworth and Buysse [48], our data suggests that parents and staff agree on the importance of peer relationships between parents and staff in ECEC and feel this is an important prerequisite for children's well-being, learning, and inclusion. An interesting finding in the study of Hollingsworth and Buysse [48] is that parents and teachers justify friendships as emotional resources for children. Our study does not provide any insight into whether and how this is expressed in the collaboration, for example, whether it has been a topic connected with parent meetings. The parents and staff are concerned with supporting children's social skills and inclusion, which aligns with research indicating that social and communication skills are important for developing friendships [23]. They lack common strategies and a systematic approach to this work. Both parents and staff speak little about how they specifically use strategies and directly support peer relationships. For example, cooperation to support children's social skills and communication skills [23], involvement in children's play, visibility of individual children, and regulation of children's interaction [26].

The three findings are consistent with the Norwegian framework plan [29] that the collaboration between the staff and parents emphasizes three levels: information, dialog, and participation, and that collaboration is both on an individual and group level.

## 5. Limitations

A limitation of the study is the small sample size and the recruitment process (self-selection of participants), which means the findings are not generalizable. More studies applying diverse methodological designs are needed to investigate how staff-parent collaboration can support peer relationships to create a ramp for inclusion in ECEC. Also, observational studies should be considered to shed light on new aspects of the phenomenon. Further studies should also include large-scale quantitative surveys. There are sufficient findings based on qualitative data that would enable the development of suitable questionnaires. At the same time, this study provides

important insight into what parents and staff experience as meaningful for cooperation, where they can delve deeply into the phenomenon of collaboration to promote relationships between children.

Norwegian policy documents on inclusion rarely address children with special needs as a specific target group. Rather, the policies emphasize that inclusion applies to all children regardless of their individual circumstances, based on a radical approach to education for all, where every child, regardless of ability, has the right to attend ECEC and school on an equal footing with other children.

## **6. Conclusions and implications**

This study reveals that staff and parents primarily work together to promote relationships between children through dialogs in delivery and pick-up situations. The dialogs between staff and parents mainly focus on individual children and their children's interactions with other children. We have used a broad definition of inclusion concerning all children and marginalized groups, not only those with disabilities, and focus on cooperation between parents and staff in promoting peer relations as a means of inclusion. A widespread form of cooperation to promote relationships between children is to arrange joint social meeting places and activities for children, parents, and staff. These meeting places can help children, parents, and staff get to know each other better and strengthen the sense of community. All the participants are present simultaneously and have a shared focus on something [53], such as the activities, which can contribute to shared references that they can recall later in play and activity as a base for peer interactions. Staff and parents describe their practices for promoting relationships between children separately but rarely address the cooperation with the other party. They collaborate by having a common focus on supporting children's social skills. Parents are concerned with supporting their own children, while staff focus more on the interaction between the children.

As a means of inclusion, cooperation between parents and staff is essential for promoting peer relations among all children. For children with special needs or others at risk of being excluded, cooperation is even more critical because they participate less in social activity and have weaker interaction prerequisites, limited vocabulary, or a lack of joint attention. Thus, the collaboration should focus on the ECEC community and ensure that every child feels included. Targeted dialogs between the parents and staff are essential to identify children with special needs and develop tailored strategies to foster peer relations. Facilitating participation in joint activities requires attention, as these children often need specific support to engage in activities. This study indicates a need for systematic and intentional strategies to promote peer relationships and enhance daily dialog quality to ensure social interactions and potential challenges for children with special needs. In addition to designing joint activities, focus on fostering interaction and inclusion, for example, in small groups and peer pairing. Developing shared understandings and strategies for supporting social skills to support children in ECEC settings and at home. It is also important to dedicate time and space for staff and parents' reflections on inclusion and community and to promote a whole-community approach to inclusion by focusing on the dynamics of the practice.

In summary, based on this study, the following advice and suggestions can be given to strengthen parent-staff collaboration in ECEC to strengthen peer relationships as a ramp for inclusion:

- Build strong relations with all parents.
- Identify children at risk of exclusion as early as possible.
- Organize community-building activities for children, parents and staff.
- Encourage parents to share their observations about the child's social relationships outside the ECEC setting and seek feedback from parents on how well the ECEC is supporting their child's social development and sense of belonging.
- Facilitate opportunities for parents to connect with each other.
- Train staff to have focused questions for daily check-ins with parents regarding their children's social interactions.
- Train staff to discuss strategies to promote inclusion and supporting relationships within the children's group. Train staff to support peer relationships, focusing on including all children.
- Use social stories both at home and in ECEC for children who need extra support. Focus on facilitating children's initiation and leading the tone of the relation through organized activities and play opportunities.
- Support children in understanding and navigating social situations by modeling turn-taking and organizing small, inclusive playgroups.

A key implication of these findings is the need for a more systematic and conscious approach to parental collaboration and that knowledge of and attitudes towards community become an explicit topic in the collaboration with parents. The idea of the community should be a central concept here, both in terms of the children's group and, not least, the parent group. Space and time for joint reflection on inclusion and community should also be created to a much greater extent, both in the staff group and in collaboration with parents. In collaborating with parents, it seems particularly important to emphasize that attention should not only be focused on individual children, i.e., their child, but that the community of children is equally important as a ramp for inclusion.

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# Perspective Chapter: Helping the Child and His Family to Cope with Behavioral and Emotional Difficulties at School

*Rasa Braslauskienė*

## Abstract

Implementation of the provisions of the principle of inclusion at school (to create conditions for each person to develop, cultivate their powers and abilities, receive the necessary help, experience success in learning, social, cultural and/or other activities and not be discriminated due to the diversity of educational needs and/or the need for educational assistance) is a continuous and never-ending process. The chapter “Helping the Child and Family Cope With Behavioral and Emotional Difficulties at School” will highlight the most important aspects of helping the child experience academic success. Effective methods of support for children with behavioral and emotional difficulties are discussed, long-term work strategies are developed, and effective methods of support with limited material and human resources are revealed. Tools and support techniques that help motivate children and family members to make positive changes are also analyzed. This chapter will discuss and identify the main mitigating factors in child and family support that influence children’s behavioral and emotional difficulties and their family well-being as well as methodical practical advice, correction of children’s behavior and goals of correctional work. This chapter will answer these questions and also discuss and identify the main mitigating factors in child and family support that affect children’s behavioral and emotional difficulties and their family’s well-being. As well as methodical practical advice, correction of children’s behavior and goals of correctional work.

**Keywords:** child, behavioral emotional difficulties, family, support methods, techniques

## 1. Introduction

The topic of increasing the inclusion and accessibility of education which ensures a safe environment for each individual is gaining more and more importance in modern society, both in the global and national context. According to the Education Law of the Republic of Lithuania (2020), “The education system provides conditions for every person to be educated, to develop their powers and abilities, to receive the

necessary help, to experience success in learning, social, cultural and/or other activities and to not be discriminated against due to the diversity of educational needs and (or) needs for educational assistance” (Law of the Republic of Lithuania on Education No. I-1489 5, 14, 21, 29, law amending Articles 30, 34 and 36 and supplementing the law with Article 451) [1].

This right is also regulated in the United Nations Convention on the Rights of Persons with Disabilities (Article 24 Education): “States, parties of the Convention must not only ensure the implementation of the right to education of persons with disabilities at all levels of state-mandated and guaranteed education (according to pre-school, primary and basic education programs), but also to enable participation in universal education, including pre-school, secondary education, vocational training, higher education studies, lifelong learning, non-formal education of children (as well as in education supplementing formal education), for all persons (students), including persons with disabilities, without discrimination and with equal rights with other persons” [2].

Given the fact that in modern society, more and more attention is paid to individual human needs, the education system is also moving increasingly along the path of inclusion, in which a lot of attention is paid to students with special educational needs. Students with special educational needs are divided into the following groups: those with disabilities (intellectual, visual, hearing impairments, cochlear implants, movement and positional as well as neurological disorders, multiple complex developmental disorders, deafblindness, and complex disorders), those with disorders (learning disabilities, behavioral and/or emotional disorders, speech and language disorders, and complex disorders) and those with learning difficulties (learning in a language other than their native tongue or living in a different cultural or linguistic environment, having delayed development, having health problems, experiencing adverse environmental factors, experiencing an emotional crisis; not applying unique abilities) [1].

Behavioral and emotional disorders are defined as a heterogeneous group of disorders manifested by behavioral and/or emotional reactions that are significantly different from normal age, cultural and ethical norms and expressed inattention, impulsivity, and/or poor regulation of behavior. They are characterized by the fact that they are not only a temporary, probable reaction to stressful environmental events but rather manifest themselves continuously and in no less than two different areas and also do not respond to interventions applied in the general education environment [3].

In the educational context, children with behavioral and emotional difficulties are perhaps the group that poses the greatest challenges to educators and educational support specialists because they can manifest inappropriate, unacceptable, aggressive, provocative, insolent behavior in certain situations, sudden changes in emotions, low self-esteem, anxiety, worries, and fears. Therefore, educators and specialists choose to only focus on the individual educational needs of the student or the behavior that arises as a problem in the educational environment.

It is extremely important for pedagogues and educational support specialists working with children with behavioral and emotional difficulties and disorders to rely on detailed knowledge about the nature and origin of the child's problems. Working effectively with students with behavioral and emotional difficulties and disorders requires many areas of knowledge.

All educators and educational support professionals must have a good understanding of the interrelationship of various systems such as general and special education,

child delinquency prevention and intervention, family and child health, mental health, child rights protection, social support, and family support. It is important to understand that the child's problems are found in the system: the child and his environment. Only such ecological access to support can ensure student success. In the search for effective methods of support for children with behavioral and emotional difficulties as well as in the development of long-term work strategies, it is necessary to find out the main facilitating factors of support for the child and his family. Also, what tools help motivate children and family members to make positive changes? What position must teachers and other support professionals take to remain sensitive, considerate, and impartial? Emotional disturbances for students with behavioral and emotional difficulties are manifested by anxiety about their behavior, studies, homework, exams, the future and other subjects, avoidance of usual activities, persistent sad mood, unhappiness, irritability, sensitivity, loss of previous interest, as well as fatigue and tension. Emotional difficulties are characterized by social inhibition, shyness, anxiety, and unhappiness. Therefore, help is needed for these children and their parents at school.

## **2. Aspects of helping a child with behavioral and emotional difficulties at school**

In order to help children who have behavioral and emotional difficulties, have conflictual behavior, and are unable to manage and properly express their emotions, we have to use various methods of support. The successful education of these children is associated with the complexity of assistance when the help of specialists from the health, education, and social security systems is combined as well as when interpersonal interaction between these specialists is encouraged in providing assistance to children. Also, a very important ability of teachers is to identify the causes of inappropriate child behavior and, if necessary, to take proactive actions to prevent such behavior from occurring (**Figure 1**) [4–8].

The main principles of helping children with behavioral and emotional difficulties in an educational institution are distinguished based on the analysis of the scientific literature [4–9]:

1. the welfare and interests of the child: taking any actions or making decisions aiming to ensure the best interests of the child. The support is based on the child's needs and not on matching them with available services;
2. validity of assistance: decisions are made based on the evidence acquired from the assessment of the child's education and the family's needs;
3. early and well-timed help: the aim is to identify the child's need for help as early as possible and ensure the timely provision of the necessary professional, coordinated help to the child and his family for no longer than needed. If no intervention is applied, behavioral and emotional difficulties persist and may later be diagnosed as behavioral and emotional disorders;
4. individualized assistance: the child's age, maturity, individual needs, abilities, mental and physical characteristics, the needs and possibilities of his immediate environment (family), social environment, and other important circumstances

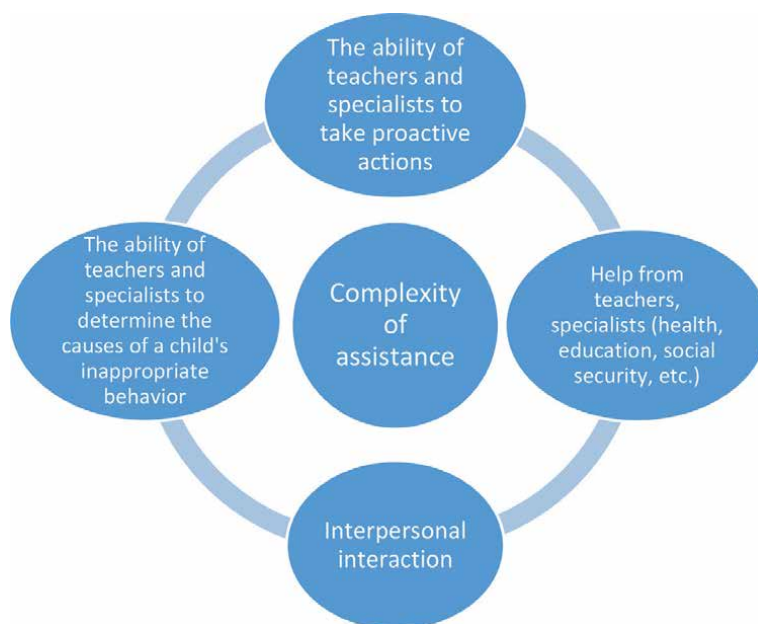


**Figure 1.**  
*Complexity of assistance.*

must be taken into account. When dealing with matters relating to the child, the child must be heard directly, and the child's views must be given due consideration, taking into account the child's age and maturity;

5. appropriate interventions: help is primarily provided where the child is, when teachers and specialists working with the child and family provide help according to their competence, in order to distract the child from his usual educational learning and/or living environment as little as possible;
6. teamwork and shared responsibility: since most children's behavioral and emotional difficulties and disorders are complex, the assistance provided must include the services of various specialists. Every teacher or specialist who works with a child and his family notices certain alarming signs and has a shared responsibility for timely, appropriate, and quality help for the child and family;
7. cooperation: in case of need, the organization and provision of services to the child and his family are based on the necessary, reasonable, coordinated, and consistent cooperation between the educational institution, family, non-governmental organizations, and state and municipal institutions.

Possibilities of support for children with behavioral, emotional difficulties and disorders provided in the general education school are guaranteed by pedagogues and educational support specialists [9–13]:

1. The teacher: observes the child's behavior and achievements, assesses their changes, identifies learning and socially problematic areas, and seeks appropriate solutions in time: informs parents and educational support specialists about

the child's disturbing behavior, cooperates with other child-raising pedagogues and educational support specialists, parents and inter-institutional teams. The teacher teaching the child is the first and main person in the educational institution who can notice the child's educational needs and decide on the need for help.

2. Psychologist: solves the child's personal and communication problems and assesses educational needs. Counseling individually or in a group strengthens children's psychological resilience and teaches them to successfully overcome difficulties, adapt properly in society, and resist bad habits. Also advises teachers and parents.
3. Special pedagogue: works in the areas of students' special educational needs identification and satisfaction: performs an initial assessment of the child's special educational needs, identifies gaps in educational subjects, and, taking into account the real level of abilities, cultivates undeveloped children's functions in the specialist's office or provides assistance in the classroom, helps the teacher adapt the educational program, select methods, educational methods and tools.
4. Social pedagogue: represents the child and his family by helping parents to get involved in the child's education process and takes an active interest in the student's life at school. It is a research of the child's problem situation analyzing the student's social environment, interest in his family, friends, free time, favorite activities, etc. A social pedagogue finds out the factors of a social nature that influence the educational process.
5. Assistant teacher: works with a student or a group of students in cooperation with the teacher and other specialists. Together, they foresee the methods of achieving the goals and tasks of the child's education, providing assistance to students and applying them. Also helps the teacher to prepare the necessary educational materials, the student—to navigate safely in and outside the school, to get involved in educational activities by explaining, reading, or writing down tasks.

By applying complex help to children with behavioral and emotional difficulties [4, 9, 14], the complex problems of these children's behavioral and emotional difficulties are effectively solved. That way, the aim is to reduce the risk factors associated with severe behavioral and emotional problems in children.

### **3. Tools that help while working with children with behavioral and emotional difficulties**

One of the relevant topics in the field of behavior therapy is eliminating a child's misbehavior and forming/reinforcing desired behavior. In recent decades, more and more attempts have been made to apply methods that are effective in solving the problems of children's behavior, anxiety, various intrusive thoughts, and repetitive behavior that has already become a habit.

Eliminating inappropriate behavior in children and forming/reinforcing desired behavior is one of the current topics in the field of behavioral therapy. In recent decades, there have been increasing attempts to apply various strategies and methods

that are effective in solving problems of children’s behavior, anxiety, various intrusive thoughts, and repetitive behavior that has become a habit.

The philosophy of behavior correction (Pavlov, Skinner, p. 120) states that a child behaves inappropriately because he does not know how to respond adequately in certain life situations, is unable to realistically assess the situation and his actions, and does not take personal responsibility for what he does. **Table 1** presents the recommended behavior change strategies and assistance methods and techniques for children with behavioral and emotional difficulties (**Table 1**).

So, the essential rules that help to achieve certain results in eliminating a child’s misbehavior are:

1. Fast and frequent feedback (it does not matter if a child behaved well or badly; the specialist’s response should not be delayed during the period of assistance).
2. Detailed incentives and reinforcement systems (the most important term in this principle is “detailed”).
3. Continuous recording of the current situation and progress (it can be a diary, schedule, or other methods).

To achieve the desired behavioral outcomes for a child, teachers, and support professionals must involve people from the environment of a child with behavioral and emotional difficulties, as well as follow some important rules. It is especially important that parents and professionals who work with the child regularly follow these rules [3]:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Recommended behavior change strategies for children with behavioral and emotional difficulties:</b></p> <ul style="list-style-type: none"><li>• Apply disciplinary measures immediately after inappropriate behavior: explanation, remark, apology, etc.)</li><li>• Teach children replacement behaviors. Children need to know what behaviors are undesirable but be clear about what behaviors are desirable.</li><li>• Helping children experience success.</li><li>• Together with your children, establish clear and detailed rules of conduct for every social situation where the likelihood of inappropriate behavior increases. The rules must be consistent and fair. The child must know both the rules and what will happen if they break them.</li><li>• Apply educational programs to children (social skills, conflict resolution, anger management, etc.).</li></ul>                                                                                                                                                        |
| <p><b>Methods and techniques for helping children with behavioral and emotional difficulties:</b></p> <ul style="list-style-type: none"><li>• to notice and affirm the child’s value during activities and games</li><li>• be specific, noting and confirming what the child perceives as a difficulty, what problems they have, and what they are worried about</li><li>• encourage activities that provide pleasure and strengthen self-esteem;</li><li>• assess how the child tries to defend himself, protect himself</li><li>• praise the child when he knows what is wrong. Tell him about forbidden or dangerous things, using drama and problem situations; use music that reflects different moods, where the child can name whether the sounds of the music reflect joy, anger, etc.</li><li>• use exercises involving physical activity and/or multiple senses, where the child’s attention is alternately directed to thoughts, feelings, and actions or to different sensations (stress and anxiety management exercises).</li></ul> |

**Table 1.**  
*Recommended strategies and support options.*

1. The child's problems must be specifically defined (not suitable: does not listen to teachers/parents, treats animals badly at home; suitable: smeared on the wall at school, broke three plates in the canteen, etc.)
2. The child must not hear a negative evaluation of himself as a personality (instead, a specific action performed must be evaluated negatively).
3. A child as a person (student, son, etc.) needs to constantly feel and hear that he is loved and accepted as a person (regardless of his behavior).

When working with children with behavioral and emotional difficulties, it is very important not to try to solve all the problems at once. It is important to evaluate (mark) them and arrange the order in which the problems will be solved one by one.

The child's problems must be separated and placed on each step according to their relevance. One step—one problem. The first step is the problem that should be solved first. The next step is another pressing problem. This is how all problems should be arranged. Jumping over steps is not recommended. It is important to solve problems consistently. The next problem cannot be solved until the first problem is solved. The only exception to this work strategy is extremely dangerous behavior of the child toward himself or others. Each problem must be evaluated by the child himself, parents, or other professionals who know the child according to the following structure (**Figure 2**) [13]:

As depicted in **Figure 2**, the following problem assessment parts are indicated:

- stimuli that cause the problem (e.g., task requiring attention and difficult situations);

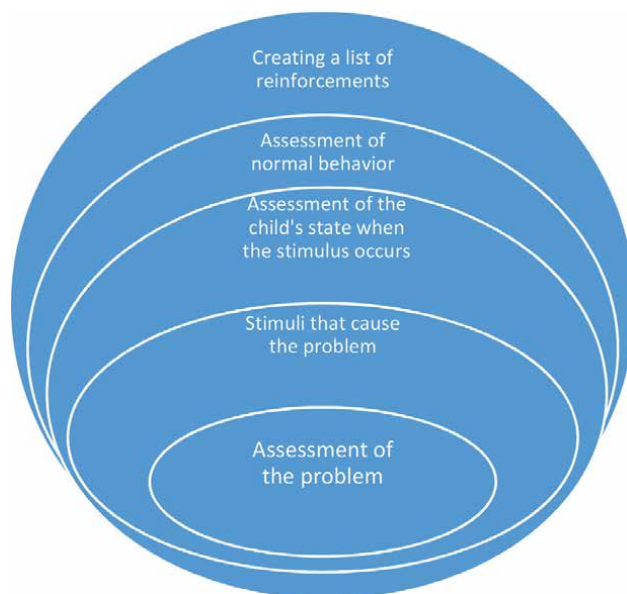


**Figure 2.**  
*Problem assessment scheme.*

- what is the state of the child when the stimulus appears (anger, irritation, sleepiness, confusion, etc.);
- what normal behavior looks like in the absence of any stimulus.

After this analysis and hierarchy of problems, the next step is to create a list of reinforcements. Reinforcements are both positive (rewards) and negative (discipline). The list of reinforcements is prepared by both teachers and support specialists.

When carrying out such structured work with a child with behavioral and emotional difficulties according to a specific action plan, it is important to pay attention to whether the child himself takes responsibility and initiative to change his behavior. *An example can be a child voluntarily coming and inviting adults to discuss a problem they have. Such behavior must be viewed extremely positively. The teacher and support professionals must try to show the child that his current actions are his responsibility; to say that what he was like until now is not so important, what matters is how he behaves now; not trying to be the child's father/mother, but simply a partner.* When working with children with behavioral and emotional difficulties, it is necessary to strengthen the child's confidence.

#### **4. Work with parents**

Work at the school is closely related to help and support parents which would ensure the well-being of the child. The main common tasks:

- a. to help the family overcome the difficulties that have arisen;
- b. educate parents on child rearing and other issues;
- c. empower parents to solve problems related to their children by themselves. The pedagogue is the specialist who must ensure the maintenance of constant communication between the family and the educational institution, and the involvement of parents in making decisions about the child in the educational institution.

The *main directions* of the pedagogue's work with parents are as follows [15, 16]:

1. Collection of necessary information about the family and the child's social development.
2. Helping the child's parents understand the child's educational needs.
3. Helping parents to find their child's strengths.
4. Support for the family during stressful situations (informing, bringing clarity, calming).
5. Counseling of parents on various issues related to social problems hindering the child's education process.
6. Education of parents on the topics of negative social phenomena.

7. Developing positive parenting skills in groups.
8. Organization of support groups in educational institutions helping to overcome the problems that have arisen.
9. Involvement of parents and children in social projects, various actions aimed at improving relations between parents and children.
10. Providing information to parents about opportunities to receive social support.

This list of areas of work with parents also includes general support for parents whose children have behavioral and emotional difficulties. On the other hand, these children are distinguished by their need for individualized and often complex assistance. Thus, the educator's work with the parents of these children first of all requires creating a suitable contact with the parents, so that it is possible to cooperate constructively in the long term.

Working together with children with behavioral and emotional difficulties requires considerable effort. Many professional, personal, and institutional barriers are encountered. The first step in meeting parents of children with behavioral and emotional difficulties is to review and reflect on what can hinder and help cooperation in the aforementioned aspects: professional, personal, and institutional (**Figure 3**).

#### 4.1 Professional barriers

Educators and educational support professionals need to keep in mind that many parents whose children have problems at school want their children to behave well and learn well and try to help them in various ways. It is important to provide help and support to these parents, who have to overcome very difficult family problems, rather than showering them with accusations, criticism or relying on derogatory attitudes [3].

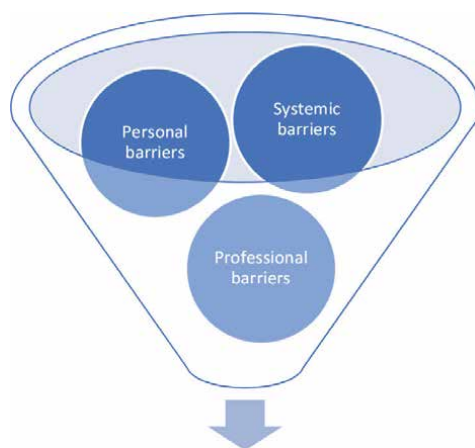


**Figure 3.**  
*Aspects of cooperation.*

## **4.2 Personal barriers**

Working with children with complex problems, such as behavioral and emotional difficulties, requires personal emotional resources and individual resources. Research shows that both pedagogues and educational support specialists are at a high risk of experiencing professional burnout [10]. Therefore, it is very important to understand the personal factors that can hinder or help in working with difficult children and their families. Knowing one's areas of vulnerability, personality development, resilience resources, the ability to take care of one's mental health is a very important foundation in this work.

## **4.3 Systemic barriers**

Working with children with behavioral and emotional difficulties presents situations that are difficult or impossible for a single professional to solve. A team is necessary for this [15]. Teams also need support, both professional and emotional, which can be provided by team supervision, for example, in collaboration with educational psychological services.

Cooperation with a child's parents is one of the most important areas of a teacher's work with parents. Institutions that work with parents and encourage cooperation emphasize the approach of empowerment and joint problem-solving. The term empowerment pedagogy describes dialog and cooperation between the child and those who educate him, involvement in decision-making, and providing options. It is not only the duty of the pedagogue but also of educational support specialists to help parents feel competent (enable) to educate their child. Being able to help a child gives parents a sense of responsibility and satisfaction. Professionals need to help parents be optimistic and realistic at the same time and allow them to simply be parents. The meeting between the teacher and the parents, which usually starts with a consultation, is a very important factor that enables long-term communication, parent involvement, team cooperation, and partnership.

Parents of children with behavioral and emotional difficulties are, like children, very sensitive to rejection and become defensive if someone does not accept them. They have the experience of being blamed and other people being biased or even against them. One of the most harmful things that can happen at the beginning of contact is when the educator tries to rely on stereotypes and hearsay about the child and his parents. Troubled children quickly become "notorious," just like their families. This can become an obstacle to listening to parents and creating an authentic relationship with them. In order for the initial contact to be successful, positive, and constructive, it needs to be planned [16].

## **5. Practical suggestions for helping children with behavioral and emotional difficulties and disorders**

1. Teacher: monitors the child's behavior and achievements, assesses their changes, identifies learning and socially problematic areas (special educational needs, problem behavior, signs of social risk, etc.) and seeks appropriate solutions in a timely manner: informs parents, class teacher, educational support specialists about the child's disturbing behavior, cooperates with other educators raising the child and inter-institutional educational support specialists, parents and teams.

The teacher teaching the child is the first and main person in the educational institution who can notice the child's educational needs and decide on the need for assistance.

*For example, in order to help a child change his inappropriate behavior, it is useful to determine what benefits he receives from it. One way is to observe the child which allows you to record the consequences that arise as a result of the observed child's behavior. During observation, the teacher can notice the stimuli that provoke the child's behavior and the reasons that encourage the child's problematic behavior: fear, failure, attention-seeking, anger, etc.*

2. Psychologist: solves the child's personal and communication problems and assesses educational needs. Individual or group counseling strengthens children's psychological resilience and teaches them to successfully overcome difficulties, adapt properly in society, and resist harmful habits. Also provides counseling to teachers and parents. Often, children's behavior prompts the use of subjective terms, and teachers' complaints are presented, but it is difficult to distinguish what the child's behavior is.

*For example, "the child is disobedient." This is a very general description. When observing such a child, one can see that he finds ways to avoid working in the classroom. It may become clear that the problem is not the child, but that the teacher expects the child to do tasks that he cannot do (a child with attention deficit hyperactivity disorder can only retain short instructions in working memory). Or the teacher makes demands on the child that do not correspond to his skill level and the teacher describes such a child as aggressive, disobedient. During the help of a psychologist, it may turn out that in these situations there is no problem with the child's behavior, but there is one with teaching. Thus, the formulation of the problem from the statement "the child is aggressive" to the statement "he behaves aggressively in this situation" leads to a different approach - the child's aggressiveness is variable. In either case, the psychologist describes the observed behavior in a way that others can recognize and identify.*

3. Special educator: works in the areas of identifying and meeting the special educational needs of students: performs an initial assessment of the child's special educational needs, identifies gaps in educational subjects and, taking into account the real level of abilities, develops underdeveloped functions of children in the specialist's office or provides assistance in the classroom, helps the teacher adapt educational methods, educational program, tools and select an educational program. In order to achieve targeted individual assistance, it is very important that the child is included in this process. With the help of a special educator, the child can set goals and identify priorities that would improve his functioning at school. It is important here that the child himself (taking into account his age, maturity, ability to make decisions, etc.) participates in choosing goals - this will also encourage his responsibility.

*For example, the first goal should be to change the behavior that causes the most difficulty in interacting with teachers or peers. Once this goal is formulated, the special educator can help determine the "who, when, what and how" to do in order to achieve that goal. You can work with the child on smaller steps toward that goal, focusing on the easiest things first. This will increase the likelihood of faster success, which in turn will lead to a sense of success and a stronger commitment to the goal. Each plan should be tailored to the individual child's prob-*

*lem and needs. Since the special educator usually acts as a coordinator in the team, his or her responsibility may be to draw up a plan and involve other support professionals: What can a psychologist offer? Is medication consultation necessary for the child? What support is needed for the parents and who will provide it? Interagency support is necessary in cases of complex problem behavior.*

4. Teacher's assistant: works with a student or a group of students in cooperation with the teacher, educator, and specialists. At the same time, he/she provides methods for achieving the child's educational goals and objectives, methods for providing assistance to students, and applies them. He/she also helps the teacher prepare the necessary teaching materials, helps the student safely navigate in and out of school, and engages in educational activities by explaining, reading, or writing down assignments. The teacher's assistant helps children engage in the educational process and participate in it.

*For example, they explain tasks to students and help them complete them, help them use teaching aids, and, if necessary, take care of personal hygiene. Also, the help of a teacher's assistant is not only needed during lessons, but also during breaks, after-school activities, events, and trips. The teacher's assistant thus cooperates with teachers, other support specialists and parents or guardians of students. It is important to note that a student assistant helps the teacher prepare or adapt educational materials for the student but his or her tasks do not include organizing the student's educational process itself. It is much more important to be next to the student and provide him or her with assistance if necessary.*

In order to provide quality assistance to children with behavioral and emotional difficulties in an educational institution, the following factors increase the success of the assistance provided by pedagogues and educational assistance specialists:

1. Positive attitude of the school administration, pedagogues, specialists working in the school, teacher's assistants toward children with behavioral and emotional difficulties and their education together with their peers, as well as the desire and initiative to cooperate with colleagues and other specialists in order to overcome differences between pupils.
2. Positive attitude of the staff of the educational institution toward the inclusive education of children with behavioral and emotional difficulties. Ensuring continuous learning opportunities, necessary resources, professional and emotional support and assistance.
3. Having the knowledge and understanding of pedagogues and educational support specialists about the origin and expression of behavioral and emotional difficulties. Understanding the environmental influences on the emotions and behavior of these children and knowing the principles of environmental adaptation.
4. The activities of the educational institution are focused on the creation of a favorable environment and constructive behavior, implementing a positive behavior support system. Its purpose is to promote the personal development of participants in the educational process (children, their parents, classmates, teachers, specialists, etc.) by changing the style and quality of activities when

episodes of inappropriate, unwanted behavior are eliminated by encouraging the child's purposeful activities.

By understanding what is happening with a child with behavioral and emotional difficulties, we will be able to help him most effectively (change the parenting strategy, act preventively, contact specialists, apply their recommendations, etc.).

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# Co-Learners as Co-Agents for Inclusion: Promoting Classroom Inclusivity through Face-to-Face Interaction

*Selma Dzemidzic Kristiansen and Jocelyne Von Hof*

## Abstract

Given the context of ‘Learning Together’, the primary goal of education is to develop ‘ways of doing and ways of being’ through a joint effort to strengthen responsive co-learning environments and promote pupils’ co-agency for inclusion. To facilitate inclusive processes, co-agents must promote face-to-face interactional skills that accommodate their diverse social and learning backgrounds and ensure responsiveness to each other’s needs. While cooperative skills are essential for fostering co-agency in an inclusive classroom environment, international research indicates that pupils often lack these skills due to insufficient mutual support. This deficiency can lead to negative interdependence that may contribute to social exclusion, school disconnectedness, and increased school dropout rates among disadvantaged pupils. Although research indicates that cooperative learning principles have become valuable resources for fostering inclusive classrooms in countries globally, this chapter delves deeper into face-to-face promotive interaction (FtFPI), enhancing the social willingness, connectedness, and responsiveness needed for social inclusion. This chapter aims to describe the role of FtFPI peers, drawing on a larger exploratory study that examined co-learners’ inclusivity through previous research and key issues related to co-learning pedagogy in primary classrooms. Thus, building on the reviewed literature on FtFPI, this chapter examines its resources among co-learners to foster inclusion.

**Keywords:** inclusive education, pupils’ co-agency, socially responsive co-learners, cooperative learning, prosocial connectedness, inclusive responses, face-to-face interaction

## 1. Introduction

The future of education lies in strengthening the inclusive learning environment, pupil’s co-agency, and social benefits of education while effectively addressing learners’ diverse needs and challenges [1–4]. Inclusive pedagogy, which responds to individual differences while avoiding marginalisation and social exclusion, highlights

the importance of fostering participation in collaborative and group activities to ensure all learners are actively engaged in the classroom community [5]. In the social reality of classrooms today, societal changes lead to educational challenges associated with diverse pupils' learning capacities and needs. They may be caused, among other things, by socio-economic heterogeneity and migration in an increasingly challenging economic situation today. According to the United Nations Refugee Agency (United Nations High Commissioner for Refugees (UNHCR)) report for 2024 [6], 68.3 million are refugees, and 122,6 million are forcibly displaced people worldwide. As a result, many pupils may be discouraged and distracted from effectively participating in classroom learning or may be at risk of societal failure. While gathering data for the lead author's doctoral study in 2021, the same source revealed that 81 million people had been displaced. Addressing this growing issue by making learning more responsive involves rethinking inclusive resources to respond to diversity in the classroom, thereby strengthening a socially inclusive environment for the social and academic benefits of education.

In this regard, truly inclusive education requires relational pedagogies that foster engagement and cooperation, ensuring everyone is valued and socially included while enabling learners to work together [7]. For this reason, research consistently highlights the significance of fostering a sense of school connectedness to encourage positive behaviours, enhance social and academic engagement, and prevent risky behaviours [8]. Since school connectedness embodies a reciprocal relationship within classroom environments, exploring potential intervention strategies and mechanisms to foster this connection is crucial. Such efforts should extend beyond traditional approaches that focus solely on changing individual behaviours [8]. To address the critical need for fostering collective connections between pupils, grounded in Vygotsky's concepts and ideas, educators can implement diverse 'learning together' activities. These activities can promote a sense of connectivity, responsivity, and inclusivity while also contributing to the overall well-being and collective success of all pupils by nurturing social bonds and fostering an inclusive environment.

In line with the Learning Together context [9], which is a model grounded in cooperative learning principles through working in small groups (as discussed in Section 3), understanding the concept of pupils' interactive role as co-learners is crucial for recognising their co-agency in shaping inclusive classroom environments. Given the complexity of inclusive classroom practices concerning pupils' diversity and social inclusion, co-learners should be understood as those 'who are able to give and receive help, share their ideas, listen to others' perspectives, seek new ways of clarifying differences, resolving problems, and constructing new understanding and knowledge' ([10], p. 35) within a cooperative learning environment. In the pursuit of supporting each other's learning engagement and fostering a sense of connectedness, co-learners need to develop and maintain positive relationships with others [11]. Practically, face-to-face relations appear to be some of the most evident factors that may affect how pupils work and live together in creating cooperative environments and inclusive classrooms that directly influence improving social relations among pupils [12]. For that purpose, co-learning relationships between pupils and between pupils and teachers are crucial in fostering co-agency to promote social inclusion. As such, these relationships can potentially position pupils as co-agents of both individual and social change. In this regard, research has shown the importance of proactive and cooperative interaction for inclusive education [13]. Likewise, fostering social competence and prosocial behaviours, such as socially responsive problem-solving, within school settings can indirectly enhance inclusivity in diverse classrooms by equipping

pupils with the skills needed to respond sensitively to others [14]. This may involve providing the necessary resources and opportunities to strengthen the prosocial face-to-face classroom environment to support socially responsive relationships, such as connection for sociality and inclusivity needed in pupils' engagement for learning together. In this light, the potential of co-learners' face-to-face interactional skills lies in enhancing all pupils' co-learning experiences by teaching cooperative skills and supporting the teacher's role, thereby strengthening pupils to become competent 'co-agents' in achieving inclusive education [15].

Ten years ago, research indicated that one of the biggest challenges of twenty-first-century education would be building face-to-face interpersonal relationships [16], which are crucial for responding positively to learners' diversity [1, 15], particularly in supporting those who are disadvantaged [17]. Promoting interpersonal skills and cooperation, associated with quality human resources, relies on face-to-face connections to foster pupils' inclusivity in quality education [2, 18]. In light of this, a broader set of positive face-to-face interactions in schools and classrooms, associated with two significant classroom factors—learning to cooperate and social behaviours—is critical for successful cooperative interactions among diverse pupils while learning together [19]. However, learning engagement and social inclusion may become complex in schools with more disadvantaged learners [17]. By disadvantaged learners, this chapter refers to students at higher risk of social exclusion and low academic performance due to socio-economic, cultural, or familial factors, such as low parental education, poverty, limited parental support, and minority or immigrant backgrounds (4).

Key factors in understanding the engagement and social inclusion of disadvantaged pupils in the classroom involve the relationships between pupils and teachers, peer relationships, and the pedagogical strategies employed [20]. Based on previous research, school disengagement continues to be an issue facing educators today within educational, inclusive settings, which can be seen as an engagement gap among learners [21] and may be linked to belonging motivation to connect with others [22]. Various factors can create challenges in classroom practices related to social inclusion and engagement gaps, which may ultimately contribute to school dropout among disadvantaged pupils. Both risk and protective factors have been identified at various levels: (1) at the individual level (e.g., demographic factors, learning ability, health condition), (2) societal level (e.g., socio-economic status, migration), (3) organisational level (e.g., school characteristics, school culture, cooperation of professionals), and (4) interpersonal (e.g., the pupils-pupil and teacher-pupils interaction) [21].

In the classroom context, as the fundamental aim of education is to foster 'values, attitudes, ways of doing, and ways of being' ([23] p. 102) and contribute to quality interactions among learners, this chapter discusses face-to-face socially responsive interactions among co-learners [24] concerning the previously mentioned level (4), interpersonal relationships. Consequently, co-learners need these face-to-face skills to become co-agents capable of driving progressive change within a mutually supportive and inclusive environment. For this to happen, previous studies have indicated that cooperative skills and social capabilities are crucial for promoting a collective, cooperative effort to facilitate social inclusion [10]. However, previous studies have also revealed a lack of truly cooperative interactions, particularly socially supportive ones [25–27]. For this reason, learning together activities are key for all young people to learn and become socially engaged co-learners who significantly may influence their classroom realities within the complex societal context [1, 15]. Addressing this issue requires understanding cooperative learning pedagogy as inclusive pedagogy in action by getting engaged and included for every pupil. Consequently, cooperation

should be the primary mode of working together to achieve inclusivity as a shared goal, thus paving the way for co-agency approaches in educational practices. This chapter will argue that structured cooperative learning activities provide a pathway for fostering inclusivity by strengthening co-learners' social connectedness, face-to-face engagement, and prosocial skills. By drawing on previous research and theoretical perspectives, the chapter will discuss the potential of cooperative learning as an inclusive pedagogy and offer insights into how co-learners can become co-agents of social change within diverse classrooms.

## **2. Cooperation as a face-to-face arena to foster co-agents of inclusion**

As highlighted in the OECD's (Organisation for Economic Co-operation and Development) Future of Education and Skills 2030 initiative [2], education focused on cooperation and social engagement serves as a cornerstone for equipping pupils with the knowledge, skills, and values necessary to address the complex demands of becoming co-agents of individual and collective change for quality inclusive practices. Practically, pupils' co-agency refers to having the responsive ability and the willingness to 'positively influence their own lives and the world around them and having the capacity to affect change in interactive, mutually supportive, and enriching relationships with their peers' ([2], p. 16). Addressing the issue of disadvantaged peers and truly social inclusion requires understanding everyday face-to-face peer interaction and forming and functioning cooperation in a school context. When cooperating in a classroom context, learners interact to achieve outcomes that benefit themselves and all other members by working in small groups [28]. Some of the achieved outcomes refer to better interpersonal relationships (more supportive, caring, and committed relationships), better psychological health and social competence leading to social adaptation and inclusion, attachment and acceptance, a more realistic self-perception, as well as the ability to cope with adversity and stress [29].

While the quality of face-to-face peer relations plays a crucial role in facilitating a learning together approach, it requires fostering social connectedness and support to enhance overall outcomes for all pupils within a positive socio-emotional group ethos, promoting inclusivity [30, 31]. However, the ability to form connections with others, such as within small working groups that foster a sense of belonging, becomes meaningless if there are no opportunities to build those connections [22]. Thus, by providing all pupils with the opportunity to learn through peer groups, educators enable them to 'learn how to behave, form a self-image, cope with defeat and victory, acquire social skills, and learn to help, share, and cooperate' ([31], p. 17). Moreover, research has shown that cooperative peer groups have the potential to increase engagement, particularly for those who struggle in the early stages [32, 33]. Indicating the social nature of cooperation among learners' diversities, co-learners forming and functioning skills may be socially reinforced through face-to-face mutual acceptance, response, engagement, and inclusion. Accordingly, face-to-face promotive interactions (FtFPI) refer to direct and reciprocal exchanges among peers in small learning groups, characterised by active encouragement and mutual support. These interactions arise from positive interdependence, meaning that pupils perceive their success as interconnected with their peers' success. FtFPI not only foster engagement and co-learning [9] but also promote socially responsive and inclusive group processes by creating opportunities for equitable participation and shared responsibility for learning [24]. Although cooperation is recognised as a crucial twenty-first-century

skill [2], it plays a significant role in fostering inclusive face-to-face peer relationships, pupils' cooperation also supports ways of doing co-agency. In this regard, doing co-agency means that pupils actively shape and influence their own and others' learning processes through diverse responses in the complex processes of inclusion, such as mutual engagement and fostering inclusivity. However, co-learners should not take for granted the ability to cooperate. Instead, it is a process that asks for learning together to cooperate that must be systematically fostered over time, both through and for cooperative learning [34].

### 3. Cooperative learning pedagogy

A diversity of generic pedagogies is used to respond to pupils' social and learning needs to become engaged socially and academically in a classroom environment. One such approach is cooperative learning (CL), an inclusive socio-dynamic pedagogy linked to active engagement, preparing pupils to cooperate with a common goal [35]. For example, in classrooms with pupils from disadvantaged backgrounds aiming to promote social inclusion, it is important to provide CL activities that help them develop both academic skills and socially responsive behaviours. By aiming for face-to-face responsive contact with peers, cooperative activities also have the potential to support the development of inclusive communication skills, enhancing group cohesion and fostering a deep sense of belonging. Known as an umbrella pedagogy, CL positively affects interpersonal relationships for diverse learning needs while pupils work to enhance their own and their groupmates' learning goals [28]. Previous research has highlighted how CL promotes inclusivity and reduces inequalities [18], promotes culturally responsive classrooms and intercultural competence [36, 37], and develops democratic classrooms [38]. Since CL facilitates the development of prosocial interactions that are essential for inclusivity [13, 39] and have the potential to strengthen engagement among pupils at risk of societal failure [32], CL is recommended as a pedagogy to promote social inclusion [11, 13, 38]. Overall, to advocate for stronger cooperative efforts and encourage direct face-to-face interactions to improve peer relationships and CL outcomes, five principles (positive interdependence, individual accountability, face-to-face promotive interaction, social skills, and group processing) are critical to the success of CL (see **Table 1**).

Cooperative learning has consistently aimed to design group activities that allow every group member to engage, contribute, and gain experiences from their learning together situations. When properly structured, CL group work helps pupils from different academic backgrounds, cultures, and socio-economic life experiences enhance one another's learning, fostering meaningful educational outcomes by drawing on each individual's knowledge, understanding, and perspective of the world [34]. Without the five principles, cooperative interactions among learners cannot be structured and functional. In other words, one of the five key elements of the CL pedagogy, FtFPI, plays a significant role in shaping pupils' supportive engagement and co-learners' ability to connect, include, and encourage each other's social life and learning together effectively. Facilitating pupils' participation and the quality of their interactions is critical to getting all pupils to be actively involved, contribute, and succeed, but it is a challenging venture [34]. A review of the empirical research on cooperative learning, including an article by the lead author on FtFPI factors for successful CL, identified a need to reinforce pupils' interpersonal skills and supportive communication ability necessary for effective cooperation [40].

| Key principles                             | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Positive interdependence                   | <p>This is the core of cooperative learning. Teachers set up cooperative goal structures to ensure group success when individual goals are met. Pupils to develop a sense of ‘group’ “swim or sink” together.</p> <p>Positive interdependence occurs when students think ‘we’ instead of ‘I’. Pupils must feel that they are connected to the other group members in such a way that they cannot achieve positive results unless the other group members achieve positive results, and vice versa.</p>                                                                                                                                                                                                                                                           |
| Individual accountability                  | <p>Each pupil is required to contribute towards the achievement of the group goals</p> <p>Having a specific role to fulfil within the task</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Face-to-face promotive interaction (FtFPI) | <p>Pupils working together/interacting as a group</p> <p>Pupils providing one another with effective help and encouragement</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Small group skills                         | <p>Interpersonal (social) skills training and reflection.</p> <p>Students need to practice social skills to develop cooperative competence. A group cannot function effectively unless the students have communication, conflict resolution, and decision-making skills.</p> <p>To ensure good cooperation, students must:</p> <ul style="list-style-type: none"> <li>• Get to know each other to build trust</li> <li>• Communicate clearly and effectively</li> <li>• Listen and ask questions</li> <li>• Support and encourage each other</li> <li>• Resolve conflicts that may arise during the work</li> </ul>                                                                                                                                              |
| Group processing                           | <p>Pupils analyse and reflect on group functioning as well as task outcomes.</p> <p>Group processing involves students reflecting on what each individual said and did to help the group, and what they could have done to make the group function even better. In this way, students receive feedback on their engagement in the group and are reminded that cooperative skills must be applied. Some prerequisites for successful group processing are that:</p> <p>Enough time is allocated</p> <ul style="list-style-type: none"> <li>• The teacher communicates clear expectations for the work.</li> <li>• The procedure is clear.</li> <li>• Concrete assessments are emphasised.</li> <li>• Positive feedback within the group is emphasised.</li> </ul> |

**Table 1.**  
*An extended overview of the key elements of CL [9].*

Cooperation fostered through positive interdependence, interpersonal connections, and inclusive communication among learners is essential for genuine promotive interactions in face-to-face heterogeneous group work, providing resources to promote inclusivity among co-learners. Just as the need for CL can shape sociality and inclusivity [41], pupils’ social and inclusive capacities can also support their ability and opportunity for socially responsive co-agency in driving change. This is one of the challenges educators face today. Researchers call for more detailed interactional knowledge to facilitate co-learners’ social engagement in learning and reinforce positive behaviour among pupils [25, 26, 42]. For this reason, experiencing promotive face-to-face interaction in diverse small CL group works has the potential to increase engagement in inclusive learning processes. However, peer cooperation is challenging since it requires continually strengthening positive behaviours among pupils, particularly for the engagement of pupils at risk of academic and societal failure. Despite the potential

of face-to-face promotive interaction of CL for pupils' co-agency to affect change in classroom practice and inclusive education [11], relatively less explicit research attention is paid internationally. This highlights the complexity of facilitating the inclusive interactions necessary for daily socially responsive classroom practices. These practices require positive interdependence among pupils, which serves as the pillar of cooperative learning, enabling co-learners to become active promoters of quality face-to-face interactions and co-agents of change for themselves and the common good.

### **3.1 Social (positive) interdependence and promotive interactions**

Social interdependence theory, introduced by Morton Deutsch in 1940, suggests that individuals are socially interdependent when their personal outcomes are affected by the actions of others [43]. The core idea of this theory is that individuals' goals, actions, psychological processes, interactions, and outcomes are shaped by how social interdependence is structured within a group work while individuals work together. According to the social interdependence theory [44], the way interactions are structured affects how individuals interact with each other. Thus, social interdependence can be structured in three ways:

- positive interdependence, where pupils work together and support each other
- negative interdependence or oppositional interactions, where pupils might compete or conflict
- a lack of interdependence or no interaction at all

In this sense, the quality of co-learners' face-to-face interactions and the progress of groupmates can be enhanced when pupils within a group work experience positive interdependence. This means that group success is linked to each peer's success, and for this dynamic to be effective, it must be intentionally structured. By organising joint tasks that require mutual support, shared goals, and both individual and group responsibility, co-learners are encouraged to engage in socially responsive face-to-face promotive interactions that foster inclusivity. In other words, Deutsch [43] explains that positive interdependence occurs when group members believe they can only achieve their own goals if others in the group also achieve theirs. Consequently, pupils engage in effective, task-oriented actions towards a shared goal, during which three psychological processes—cathexis, substitutability, and inducibility—emerge, influencing the appearance of promotive interactions [43]. These three psychological processes are key for understanding socially responsive motives and promotive interactions, demonstrating how self-interest can be expanded to joint interest, which is needed to facilitate social and learning engagement. That is when, for example:

- first, substitutability supports adaptability and flexibility with which the actions of one person substitute for the actions of another person
- second, cathexis refers to readiness and willingness to invest positive psychological energy (knowledge, time, attention, support...) outside of oneself to others and
- third, inducibility refers to openness to being influenced and influencing others [44].

As previously mentioned, positive interdependence among individuals tends to positively influence these three psychological processes, which give rise to promotive interaction. Accordingly, promotive interaction is a type of interaction in which individuals provide one another with effective help and encouragement that, in turn, will lead to positive outcomes for the individuals in the learning together group context [9]. Quality face-to-face interaction and positive interdependence among diverse learners are crucial for inclusive processes [11]. However, CL research and practice indicate [26] that inclusive processes can be challenging, as they are closely tied to interpersonal skills and social competencies needed to engage others and work effectively as a true CL group [25, 27]. Thus, when reconsidering FtFPI pedagogical approaches, the question of how to support disadvantaged groups of pupils in strengthening their socially inclusive engagement may arise. Helping these pupils become true co-learners and co-agents of change requires structured facilitation. In light of this, can educators develop an additional facilitative approach to enhance co-learners' face-to-face promotive skills? Such an approach might involve rethinking the quality of human interaction—how we connect, engage, relate, and socially respond to one another—to foster a sense of belonging in diverse learning groups. Recent research indicates the need for a deeper understanding of FtFPI skills to facilitate the quality of interactional dimensions for diversity in education [11]. As such, pupils should be given opportunities to become socially responsive FtFPI co-learners, 'interactionally dimensioned' [43], and to engage with 'actual conditions of life' through the listening and observation skills of their own experiences ([45], p. 48). This strengthening approach should enable pupils to become co-agents of change, influencing social values around inclusivity [2].

For this reason, the literature reviews and research findings on FtFPI among co-learners provide a foundation for a deeper understanding of experiential skills, particularly through co-learners' interpersonal behaviours and supportive communications [24]. Focusing on the role of FtFPI skills in engaging for the co-agency of change as a relational process requires recognising and involving pupils, teachers, and possibly other actors, such as parents, as co-learners in a school context. Research recommendations open the possibility of a facilitating approach to support personal, interpersonal, and group FtFPI socially responsive processes associated with co-agency engagement to influence change for new inclusive educational ventures responsive to educational disadvantages.

#### **4. Key co-agency features of face-to-face promotive interaction**

Who are the socially responsive co-agents that a new potential school approach can facilitate? Previous research indicates that they are co-learners who are active contributors engaging with the prosocial features needed to co-create face-to-face social responses [11]. In the co-learning process, they might learn how to engage and become responsive to each other's needs. The research literature on FtFPI skills suggests 'recognition, willingness, paying attention, encouragement, and praising' as socially responsive skills. They are needed to strengthen change for true social inclusion, emphasising the need for a re-examination of existing challenges—both visible and invisible (non)responses—through understanding interpersonal face-to-face behaviour and supportive communication (see **Table 2**) ([24], p. 16).

In these socially responsive ways, co-learners can learn more about each other's needs and concerns while being equipped with FtFPI skills, becoming co-agents

| FtFPI skills for inclusive needs in socially responsive engagement |                                                                                    |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Interpersonal Face-to-Face Behaviour                               | Recognising and Willingness                                                        |
| Supportive Communication                                           | Paying attention, Encouraging, and Praising                                        |
|                                                                    | Sense of Connectivity,<br>Prosocial Behaviour,<br>Responsiveness, and<br>Belonging |

**Table 2.**  
*Previous research’s synthesised overview of the FtFPI skills in CL clarifies co-learners’ engagement in socially responsive processes for addressing diverse learning needs [24].*

capable of driving positive change towards inclusion. While co-learners do not learn from experiences they do not reflect on, previous research pointed out that group processing (see **Table 1**) is often neglected or done superficially in a learning together context [26]. However, it is key to the changes occurring, particularly within pupils’ socially disadvantaged reality [46]. Simply reflecting on and reinforcing appropriate face-to-face behaviour is not enough; pupils also need to understand and learn the socially responsive processes that co-learners should experience and engage with, particularly regarding FtFPI skills and needs.

What nuanced and diverse psychological needs, such as prosocial interpersonal skills (recognition, willingness) and supportive communication (paying attention, encouragement, praising), do co-learners need, or should they co-create to support promotive experiences and shared reflection on them? These and other questions and the answers can be found in creating a potential school-facilitating programme to strengthen the quality of personal, interpersonal, and group FtFPI skills. For this reason, educators and researchers need to take into consideration possible aspects that may play a significant role in facilitating the co-agency processes for inclusion:

- The first aspect refers to internal school capacity regarding human and social resources, such as quality relationships, networks, and cooperation within the school, including the school’s previous experience using CL or another socio-dynamic learning pedagogy.
- The second aspect is related to the external need to consider where the school is located in the community, for example, in existing so-called “ghetto schools”. One possible social issue is that the community may play a significant role in planning “Learning together” activities and fostering face-to-face connectedness and belongingness through the potential of FtFPI’s socially responsive programme reinforcing the need for a more inclusive and equitable environment for all pupils in segregated schools. This phenomenon describes schools often in marginalised communities located in economically disadvantaged urban areas where ethnic or minority groups are segregated, often due to social, economic, or racial factors [47].
- The third aspect may include studying the school database for a co-planning programme with the school intern and extern co-agents of social inclusion that should meet pupils’ and teachers’ socially responsive needs, engagement, and co-learning roles.

However, to stimulate socially responsive face-to-face interactions among pupils, research findings suggest that a potential school-facilitating programme requires diversified teacher roles during FtFPI processes, focusing on promoting interpersonal behaviours and supportive communication regarding pupils' socially responsive processes [11].

#### **4.1 The role of CL teachers in strengthening FtFPI through professional development**

Teachers play a crucial role in fostering face-to-face interaction in diverse co-learning classrooms by promoting pupils' cooperation and inclusion, modelling supportiveness and responsiveness to individual differences. Questions may arise regarding teachers' ability and commitment to effectively implement, monitor, assist, and reflect on pupils' promotive interactions, which are crucial for supporting socially responsive skills [48] and the successful use of CL competencies [49]. Although teachers' diverse interpersonal behaviours and ability to communicate supportively are key in facilitating pupils' face-to-face promotive interactions, previous research indicates that implementing a CL pedagogy is challenging for teachers [26]. A main challenge in practice is teachers' insufficient ongoing professional development [50]. For this reason, teachers must get support to understand how CL and FtFPI features shift their roles from expert lecturers to facilitators, supporting pupils' co-learning experiences [51]. As a result, this can transform teachers into co-learners, promoting socially responsive practices in the classroom and professional teams, which is essential to fostering co-agency ventures [11]. Previous research indicates that supporting teachers in teams has become increasingly essential to allowing teachers' collaborative professional development that encourages teaching changes for inclusive education. The necessity rests in supporting the teachers' profession by learning about and through FtFPI skills to strengthen the teaching profession based on the reflective common experiences for promotive actions [45]. Considering engaging those who have experienced societal challenges, in line with previous research, the FtFPI skills development should include the whole school culture framework as an organisational practice for internal and external cooperation networking [52]. This highlights that FtFPI skill development should become integral to the professional, inclusive culture embedded in daily face-to-face interactions and practices.

In inclusive education, teachers must practice cooperative behaviour and engage in prosocial actions to build their CL skills for responsive pedagogical practice [39, 50]. Without a solid understanding of the five principles of effective cooperation and adequate CL training, teachers implementing FtFPI in co-learning classrooms may undermine practice. In this regard, previous research shows that low-CL performing teachers, in other words, low-skilled CL practitioners, struggle more with pupils' positive behaviour and struggle more to provide an active role in supporting and guiding pupils to make their inclusivity and group work effective [52]. By contrast, high-CL performing teachers, so-called high-skilled CL practitioners, experience more positive changes in pupils' social and academic outcomes. All these issues can be described as relational competence, referring to a teacher's skills necessary to foster engagement and cooperation, as mentioned earlier in the Introduction, enabling learners to work together [7]. Given that CL challenges are often encountered in relational and inclusive group processes to engage all learners through mutually supportive behaviours [41], FtFPI skills might bridge the gap between high-skilled and low-skilled CL teachers, which has the potential to promote responsive engagement and inclusivity

with human quality in education and teacher profession. Consequently, the significant potential of the FtFPI programme may lie in its application to schools where teachers are transitioning to transformative roles or still rely on teacher-directed instruction, as well as in schools with a high proportion of pupils from disadvantaged backgrounds [11, 53].

## 5. Return to co-learning for co-agency of inclusion

As co-agents of social inclusion, twenty-first-century schools need to build strong connections with their agents while fostering co-learning and becoming co-learners equipped with the twenty-first-century skills needed to create new opportunities for inclusion in education [2, 15]. Besides teachers and pupils, other school staff, school parents, and the local community are significant in these educational ventures. Without them, schools cannot become genuine co-agents to address complex challenges by independently developing a responsive and inclusive environment. The potential of the FtFPI approach lies in addressing this issue by fostering the development of co-learners' socially responsive skills, which are recognised as a critical component in most school-based intervention activities aimed at promoting school connectedness [8]. In this context, FtFPI skills focus on practice-oriented interactive teaching and learning, such as CL, and their development may be supported through three potential stages (see **Figure 1**).

- The first stage is understanding these skills through intersubjective and learning together interactional processes. Consequently, without understanding the FtFPI skills and their socially responsive role in connection and engagement with others, the following question arises: What kind of humans are our learners becoming in and with their co-learning reality? Are they becoming enough attentive, responsive, and engaged co-learners for inclusive processes and ventures in their mutual educational environment?
- In the second stage, the facilitating activities should allow participants to use their experiences, knowledge, and skills to meet and understand challenges. Involving pupils' voices and experiences is a starting point for turning challenges into co-learning processes for social change while supporting inclusivity.

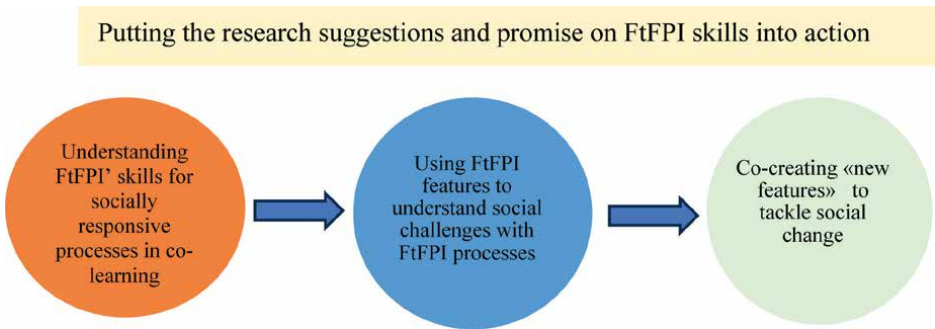


**Figure 1.**  
*Three stages of possible facilitating activities to support the development of FtFPI skills.*

- The third stage should involve co-creating new features to make change happen towards promoting a socially responsive and inclusive relational environment. Nevertheless, previous research [1] has indicated that sufficient FtFPI functional knowledge is a prerequisite. Accordingly, the three-stage facilitating approach may provide a framework for how socially responsive features can contribute to functional co-acting change processes. In the context of a ‘knowledgeable other,’ who helps guide those from disadvantaged backgrounds to their Vygotskian ‘zones of proximal development,’ understanding how FtFPI skills and activities contribute to ‘ways of doing and ways of being together’ [23] may help avoid marginalisation and social exclusion [5].

## **6. Conclusion**

This chapter describes the relational resources for strengthening face-to-face promotive interaction (FtFPI) among co-learners to support their development as co-agents of inclusion within a school context. The ‘Learning Together’ approach within CL pedagogy and the development of FtFPI skills, combined with the other four CL elements, play a critical role in fostering cooperation for social inclusion in schools worldwide. Consequently, the principle of inclusivity emphasises interpersonal behaviours and supportive communication in promoting FtFPI co-agency for all pupils. However, previous research has indicated insufficient supportive interactional skills among co-learners, considered prerequisites for learner connections. Research in the field indicates that these relations can act as protective and risk factors for school connectedness, particularly in fostering inclusivity for individuals at risk of disadvantage. The three-stage facilitating approach proposed in this chapter, drawing on FtFPI literature and research, outlines a valuable framework for understanding and integrating FtFPI skills into everyday classroom practices. As co-agents of change, pupils, teachers, and the broader school community must work together to promote these skills, creating opportunities for meaningful engagement that prevent marginalisation and exclusion. By embracing co-learning strategies, schools can foster a more inclusive and equitable educational experience for all pupils contributing to positive long-term social outcomes.

A globalised world needs responsive globalised schools to prepare all pupils for the future in their social and professional lives [2]. Consequently, worldwide classrooms need socially responsive co-learners to be prepared to influence our shared future positively. Thus, the FtFPI co-agency calls for rethinking the quality of face-to-face interactions, which tackle “humanised interactions” for responsive engagement today to shape positive change towards our more humanised future. Finally, the responsibility lies with progressive educators and their FtFPI resources to create an environment that fosters co-learners’ connectedness, inclusivity, and cooperation for genuine social inclusion in education.

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The placement of children with disabilities in schools has been a long-standing discussion in education and human rights forums, including the United Nations (UNESCO, 1994, 2023). Education for all children is a key goal highlighted in the United Nations' Sustainable Development Goals (SDGs). In support of ensuring pupils can learn alongside their peers, this book offers practical applications of research-informed approaches focusing on Physical, Academic, and Social access (or ramps) to inclusion. The PAS framework serves as a central concept in this book, outlining a process for educators and schools to use in supporting inclusion work. The book is organized into four sections, featuring chapters that highlight current research in inclusive education from various contexts and countries, offering practical applications across multiple sectors and curricula to support students, teachers, and their families in understanding the value of inclusive education.

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