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Preschool teachers' practices and understandings of engaging children with autism: a qualitative study

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This study examines the arrangements preschool teachers make in the classroom to support the participation behaviors of children with autism and their knowledge about the types of participation. Using a holistic case study research design, 56 preschool teachers participated in this study, and data were collected through structured interview forms. The findings revealed that most teachers lacked knowledge about the types of participation of children with autism and typically developing children. Additionally, the strategies used by teachers to increase participation were often superficial and insufficient to support engagement behaviors in depth. The engagement of children with autism in learning activities tends to be functional and observational, with functional engagement involving active participation in structured tasks, while observational engagement entails observing peers or teachers. In contrast, typically developing children exhibit more complex engagement behaviors, such as social and integrated participation. These findings highlight the need for teachers to adopt strategies tailored to children's interests, reinforce engagement behaviors, and provide individual support. Furthermore, structured professional development programs focusing on practical strategies and reflective practices should be implemented. The study emphasizes the importance of bridging the gap between theoretical knowledge and classroom practice through effective training and support systems. By addressing these challenges, this study contributes to promoting more inclusive educational practices for children with autism globally.

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Introduction

Student engagement is a multidimensional and dynamic construct, typically encompassing behavioral, emotional, and cognitive dimensions (Fredricks et al., 2004; Jimerson et al., 2003). These dimensions reflect students' active participation, emotional involvement, and mental investment in classroom activities. The International Classification of Functioning, Disability, and Health (ICF) defines engagement as being actively involved in an area of life, with or without support, and having access to necessary resources (World Health Organization, 2001). In addition, the Division for Early Childhood (DEC) and National Association for the Education of Young Children (NAEYC) (2009) emphasize engagement as a cornerstone of high-quality early childhood education, highlighting active participation, social interaction, and developmental appropriateness. Similarly, the Department of Children and Youth Affairs underscores engagement as essential for fostering inclusion, participation, and positive developmental outcomes (Department of Children and Youth Affairs, 2014). Engagement, therefore, includes both individual effort and environmental support and is shaped by teacher interactions and the quality of classroom arrangements (Appanaitis, 2003; McWilliam and Ware, 1994; Shafer and Wanless, 2023; Skinner and Kindermann, 2009; Williford et al., 2013). This conceptualization aligns with Vygotsky's Social Constructivist Theory, which emphasizes socially mediated learning, and Bronfenbrenner's Ecological Systems Theory, which highlights the layered influence of context on development (Golubović et al., 2022). In addition, research has shown that early social interactions, such as joint attention and teacher scaffolding, play a critical role in fostering engagement and communication among children with autism (Adamson et al., 2010). Understanding these frameworks enables educators to design strategies that support meaningful participation, particularly for children with developmental differences. In this study, the focus is specifically on children with autism, whose engagement behaviors in preschool contexts remain a critical yet underexplored dimension of inclusive education.

Building on this conceptual foundation, it is also important to consider how engagement strategies vary across cultural and educational contexts. Engagement strategies are shaped by cultural and systemic contexts, which influence how teachers design and implement classroom practices. In individualistic societies, such as those in Western countries, educators often prioritize personalized, child-centered strategies like interest-based activities or individualized education plans to promote engagement (Ruble and Robson, 2007; Chen and Hapgood, 2021). In contrast, collectivist cultures, such as many Asian nations, emphasize group harmony and peer collaboration (Hu et al., 2016; Wong and Liem, 2022). These cultural orientations influence how teachers design engagement strategies in their classrooms.

In addition to cultural orientations, systemic and resource-related factors also shape how engagement strategies are implemented. Additionally, the feasibility and form of engagement strategies are shaped by systemic and resource factors. For example, schools in resource-rich environments can integrate visual supports, structured routines, and multimodal interventions, while low-resource settings may depend on community-based or flexible approaches (Smith, 2020). Understanding these contextual factors is essential for developing inclusive practices that are both theoretically grounded and culturally adaptable. In Türkiye, inclusive education is regulated by national policies that mandate the use of Individualized Education Programs for children with special needs. The preschool curriculum emphasizes both differentiation and developmentally appropriate practices, shaping how teachers support engagement in early childhood classrooms.

Beyond systemic and resource factors, engagement itself plays a central role in shaping children's learning outcomes. Although engagement is sometimes viewed as an intermediate factor for learning (Hart, 2013; Morningstar et al., 2015; Reid et al., 2008), it is a fundamental element deeply influencing outcomes. Without engagement, learning becomes significantly more challenging (Chen and Hapgood, 2021; McWilliam et al., 1985). Engagement not only facilitates the acquisition of new concepts and skills but also enhances children's interaction with peers, enjoyment of the classroom environment, and overall learning experience (Carter et al., 2008; Hart, 2013; McWilliam and Bailey, 1990). As such, fostering engagement behaviors is a primary goal of early intervention and preschool education (Division for Early Childhood (DEC) and National Association for the Education of Young Children (NAEYC), 2009). A more detailed classification of participation types is presented in the theoretical framework section below.

Engagement offers significant benefits for children's education. It enhances cognitive development by helping children process and internalize knowledge effectively (Chen and Hapgood, 2021). Engaged children understand information more deeply, supporting their cognitive growth. Engagement also increases enjoyment in learning, fostering motivation to explore further (Erden and Schertz, 2023). As learning is interactive and contextual, engagement helps children develop problem-solving and critical thinking skills naturally (Abou-Khalil et al., 2021). Thus, engagement transcends involvement in activities, reflecting a lifelong learning behavior.

Children exhibit seven types of engagement in learning activities: sophisticated, social, integrated, functional, observational, undifferentiated, and non-engagement (McWilliam and de Kruif, 1998; Willison, 2020). Integrated engagement involves performing consecutive actions with multiple objects, while undifferentiated engagement includes repetitive behaviors without attention to surrounding stimuli. Non-engagement refers to behavior problems during activities (McWilliam and de Kruif, 1998). Children with disabilities often display observational, undifferentiated, or no engagement in learning activities, highlighting the need for strategies to foster their participation. Educators and families can use individualized interventions, which have been shown to significantly improve engagement in students with developmental challenges (Prykanowski et al., 2018). Understanding these distinctions is essential for structuring effective educational strategies.

When children lose interest in an activity, struggle to understand instructions, or face overly long tasks, their engagement decreases, and problem behaviors increase (Prykanowski et al., 2018). To support engagement, teachers can offer choices, let children lead activities, adapt tasks, rotate materials, create interest-based corners, assign manageable tasks, and allow children to choose peers for group activities. Observing engagement behaviors and identifying activities with high participation levels are also crucial. Teachers should modify activities with low engagement and ensure all children have opportunities to participate by using cues, reminders, or modeling strategies. These practices help create inclusive environments that support the engagement of all children, including those with developmental challenges (Prykanowski et al., 2018).

Each child's participation in learning activities varies based on their developmental characteristics, with children with disabilities, particularly those with autism, engaging for shorter periods and at lower levels (Tsao et al., 2008; McWilliam and Bailey, 1995). Autism presents unique challenges to engagement, especially in social interaction and communication, as well as limitations in joint attention and Theory of Mind skills (Meindl

et al., 2020). These limitations create a complex relationship where autism characteristics affect engagement behaviors, and inadequate engagement further hinders interaction, communication, and joint attention (Dykstra Steinbrenner and Watson, 2015; Hilton et al., 2021). Children with autism spectrum disorder (ASD) often participate as observers or through functional engagement, limiting the depth of their involvement (Ruble and Robson, 2007; Hilton et al., 2021). Educators must account for these challenges by developing tailored strategies that address the specific engagement difficulties faced by ASD children, including attention spans and interaction capacities (Meindl et al., 2020).

Early childhood research emphasizes the decisive impact of engagement on learning (Langeloo et al., 2020; Yogman et al., 2018), linking child engagement with important components of educational quality such as peer interactions (Diebold and Perren, 2022) and teacher-child relationships (Roorda et al., 2017). In this context, engagement should be considered as an important form of behavior that mediates the relationship between supportive environments, positive behaviors, and learning (Morales-Murillo et al., 2020). Due to its vital role in learning and development, engagement is considered a natural outcome of early childhood interventions (Shafer and Wanless, 2023).

Teachers must differentiate instruction and create supportive learning environments to enhance the engagement behaviors of children with disabilities (Mahoney and Wheeden, 1999). Effective communication is critical, as trust-based relationships improve bonds with children, making learning more efficient and increasing engagement (Dykstra Steinbrenner and Watson, 2015; Purvis et al., 2017). Individualized teaching and environmental arrangements also play a key role in fostering engagement (Ruble and Robson, 2007). However, teachers often face challenges in recognizing and addressing the learning needs of children with disabilities, including insufficient knowledge and difficulty in developing instructional plans (Coates et al., 2020; Florian, 2014). They may also struggle with effective communication and accessing resources, such as teaching materials or professional support (Cahyo Adi Kistoro et al., 2021; Smith, 2020). Collaboration with colleagues and experts is therefore emphasized as a critical factor in supporting engagement behaviors (Hargreaves, 2021).

The quality of teachers' interventions to support the engagement behaviors of children with autism significantly influences their relationships with peers and their level of engagement in learning activities. It is crucial for teachers to have comprehensive knowledge of the needs of children with autism, implement individualized strategies to improve communication skills, and receive support in these practices (Esqueda Villegas et al., 2024). Given the multifaceted nature of engagement and its role in learning and social interactions, teachers must make targeted arrangements and apply effective strategies to support engagement.

Conceptual framework

Engagement is a multidimensional concept critical to children's learning and development, encompassing cognitive, emotional, and behavioral aspects. In children with autism, engagement involves three dimensions: functional engagement, which refers to active participation in tasks, such as building with blocks; social engagement, which includes interactions like turn-taking and cooperative play; and observational engagement, where learning occurs through observing others, such as listening during storytime. These dimensions form the foundation for targeted interventions and highlight engagement's role in fostering academic success, social skills, problem-solving, and self-regulation. Teachers' understanding of these dimensions is vital, particularly for children with special needs, as it enables the creation of effective learning environments and encourages active participation.

The dimensions of engagement and its role in learning. Engagement is a multidimensional concept that plays a critical role in children's learning and development, encompassing cognitive, emotional, and behavioral aspects (Fredricks et al., 2004). It refers to individuals' active participation in educational settings, including lessons and social interactions (McWilliam and Bailey, 1992). Due to its central importance, engagement is a key focus for educators and policies. Fredricks et al. (2004) analyze engagement in three dimensions:

- *Cognitive engagement:* mental effort in deep thinking, problem-solving, and learning, reflecting focus and commitment (Pintrich and De Groot, 1990).
- *Emotional engagement:* emotional responses to the educational environment, including a sense of belonging and attitudes toward learning (Roorda et al., 2017).
- *Behavioral engagement:* observable participation in classroom activities, such as attending classes and completing tasks (Skinner et al., 2009).

These dimensions provide educators with a framework to understand and support students' active involvement in learning. Physical presence alone is insufficient; students must also be mentally and emotionally engaged to improve learning outcomes (Finn and Zimmer, 2012). Understanding these dimensions is essential for designing effective classroom strategies. The following section explores how these principles can be applied to foster engagement in diverse educational settings.

Enhancing different types of engagement in educational settings. Engagement impacts not only cognitive and academic success but also social skills, problem-solving, and self-regulation (Zimmerman et al., 2022). For children with special needs, diversifying engagement types encourages active participation (Ruble and Robson, 2007). McWilliam and de Kruif (1998) categorized engagement behaviors into seven types, providing a framework for teachers to develop tailored strategies:

1. *Sophisticated engagement:* symbolic use of language and objects, fostering complex thinking and social skills (Willison, 2020).
2. *Social engagement:* verbal or signed communication to explain events, initiate interactions, or respond to others (Bourque and Goldstein, 2020).
3. *Integrated engagement:* performing multiple consecutive actions with objects, promoting problem-solving (Schatz et al., 2022).
4. *Functional engagement:* using objects as intended and imitating verbal or motor behaviors (McWilliam and de Kruif, 1998).
5. *Observational engagement:* watching or listening for more than 3 s and following instructions (Prykanowski et al., 2018).
6. *Undifferentiated engagement:* repetitive behaviors without attention to surrounding stimuli.
7. *Non-engagement:* disruptive behaviors during activities (McWilliam and de Kruif, 1998).

This categorization helps educators observe and enhance children's participation in learning processes effectively. Understanding these types of engagement allows educators to develop more appropriate classroom arrangements and teaching strategies for both children with special needs and typically developing children. Teachers' awareness of engagement types enables them

to observe and intervene more accurately in children's participation behaviors (Ritoša et al., 2023).

The impact of engagement on learning and development. The role of engagement in education is not limited to academic achievement; it is also a key factor in the development of social interaction, problem-solving, creativity, and self-regulation skills (Abou-Khalil et al., 2021). Children who actively engage in the learning process show deeper interest in learning materials and higher cognitive development (McWayne et al., 2023). Therefore, engagement should be considered not merely as a tool, but as a fundamental component of learning. Engagement in classroom activities enables students to form meaningful connections with the content, helping them internalize knowledge and develop critical thinking skills. Additionally, for children with ASD, engagement goes beyond participation in activities—it serves as a context where the specific challenges of autism, such as difficulties in social interaction and communication, can be addressed and improved (Esqueda Villegas et al., 2024). Thus, engagement contributes to both cognitive and emotional development by supporting a child's learning, socialization, and communication abilities. To increase engagement behaviors, teachers need to use strategies such as adapting activities to children's interests, reinforcing positive behaviors, and creating environments that motivate active participation (Finn and Zimmer, 2012).

This study synthesizes four complementary frameworks: (a) the International Classification of Functioning, Disability, and Health (ICF), (b) Vygotsky's sociocultural theory, (c) Bronfenbrenner's ecological systems theory, and (d) Fredricks et al.'s multidimensional model of participation, to provide a coherent theoretical foundation for understanding participation behaviors in early childhood education. The ICF offers a biopsychosocial lens for conceptualizing children's functioning in a variety of contexts (World Health Organization, 2001), while Vygotsky's emphasis on mediated learning and the zone of proximal development (ZPD) emphasizes the role of adult scaffolding in participation (Vygotsky, 1978). Bronfenbrenner's ecological theory, on the other hand, characterizes participation by embedding it within multilayered environmental systems, from microsystem interactions in the classroom to macrosystem-level sociocultural values (Bronfenbrenner, 1979). Fredricks et al.'s (2004) model, which focuses on the behavioral, emotional, and cognitive dimensions of interaction, also defines participation as an act that transforms broader frameworks into observable structures. Taken together, these theories provide a robust framework for interpreting how preschool teachers conceptualize and support interactions among children with ASDs, considering both individual needs and systemic influences.

While earlier studies have explored teacher perspectives on the engagement of children with autism, they have rarely integrated multiple theoretical perspectives or translated findings into a structured framework for practice. This study addresses this gap by examining preschool teachers' engagement strategies within the cultural context of Türkiye and by proposing the Engagement Support Framework for Children with Autism (ESFCA) as a conceptual contribution to the literature.

This study aims to explore the engagement behaviors of children with autism in preschool settings based on teachers' perspectives and addresses key questions to understand how teachers can better support engagement. Also, based on the findings of this study and existing theoretical frameworks, we propose—rather than test—the ESFCA. This framework is introduced as a conceptual contribution, aiming to guide future research and practice rather than representing an intervention implemented in the current study. In line with this aim, the study was guided by the following research questions:

1. What is preschool teachers' knowledge about engagement and types of engagement?
2. Do the engagement behaviors of children with autism and typically developing children differ in preschool education settings?
3. What physical and instructional arrangements do preschool teachers implement to support the engagement of children with autism?
4. What measures do preschool teachers take to increase the engagement behaviors of children with autism and typically developing children in their classrooms?

While engagement is broadly recognized as a cornerstone of learning processes, its distinct dimensions—cognitive, emotional, and behavioral—require a more nuanced understanding within educational contexts. The following section explores these dimensions and their interplay in greater detail.

Methods

Research design. The purpose of this study is to explore preschool teachers' understanding and practices regarding the engagement of children with autism, including classroom arrangements, instructional strategies, and broader contextual factors. This aim is consistent with the Introduction, which highlights cultural and systemic influences on engagement. Within the framework of this purpose, a structured interview form was used to determine teachers' knowledge about the types of engagement and to what extent they reflect this knowledge to classroom practices. The holistic case study research model (Creswell, 2021; Yin, 2013), which allows a phenomenon to be examined in its reality, was used in the study. In this study, the engagement behaviors of students with autism were examined through their own teachers, who knew them closely.

Participants. Criterion sampling, one of the types of purposive sampling that enables the determination of the people who will be included in the research according to certain criteria, was used to determine the participants. In this context, two criteria were sought in the participants who were included in the study: (a) being a preschool teacher and (b) having at least one student with autism in their class currently or in the past. In addition, it was ensured that a wide group, ranging from new teachers to teachers with 18 years of experience, was included in the study. The demographic characteristics of the participants included in the study are given in Table 1.

According to the information given in Table 1, 68% of the teachers participating in the study were female and 32% were male. In terms of professional seniority, 20% of the teachers had 0–2 years of experience, 18% had 3 years of experience, 21% had 5–7 years of experience, 18% had 8–10 years of experience, and 23% had 11 or more years of experience. When the class sizes of the teachers are analyzed, they have a class size between 11 and 20. This rate is 63%. When analyzed in terms of the number of students with special needs in the class, 66% stated that there was at least one student with special needs, while only 7% stated that there were no students in this category. When preschool teachers were asked about the diagnosis of the students in their classrooms, 73% of the participants answered that 73% of the children had autism, 16% had Asperger's, and 11% had Rett Syndrome. When asked whether the preschool teachers had received any training or courses on special education, 21% stated that they had not received any courses, while the remaining 79% stated that they had received at least one training or course.

Table 1 Characteristics of participants.

Demographic characteristics	Variables	*f*	%
Gender	Woman	38	68
	Man	18	32
Professional seniority	0–2 years	11	20
	3–4 years	10	18
	5–7 years	12	21
	8–10 years	10	18
	>11 years	13	23
Number of students in the class	0–10	13	23
	11–20	35	63
	>21	8	14
Number of students with special needs in the class	0	4	7
	1	37	66
	2	7	13
	3	8	14
Diagnosis of the student in the class	Autism	41	73
	Asperger	9	16
	Rett Syndrome	6	11
Number of courses/training on special education	0	12	21
	1	29	52
	2	15	27

Data collection and procedure. The data collection tool used in the study consists of two parts: demographic information of the participants and structured and non-directive interview questions. In qualitative research, the aim is for the participants not to answer the questions in a simple way, but to share detailed and deep information with the researcher in terms of the questions asked (Roberts, 2020). Therefore, the following criteria were taken into consideration when preparing the questions in the structured interview form:

Preliminary preparation stage for the development of the interview questions: in the stage of developing the questions in the structured interview form, firstly, a literature review on the subject area was conducted. Then, preschool teachers (three different teachers working outside the research group), who were the target group of the study, were interviewed about what kind of practices they made regarding the engagement behaviors of students with autism, and teachers were asked to write essays on this subject. The information in the essays written by the teachers was subjected to content analysis and the first version of the questions in the interview form was formed from the common statements. Specifically, the form was reviewed by two experts in early childhood education, one expert in special education, and one scholar specializing in qualitative research methods to ensure content validity and clarity. Maxwell (2008) stated that when the researcher prepares the questions in qualitative research, the researcher should first ask himself/herself basic questions such as what he/she would think and how he/she would feel if he/she were a participant and faced these questions and organize the questions accordingly. At this stage, researchers should especially ask themselves which questions they would ask if they were participants in this study, and how they would think in the face of these questions. How would he/she think in the face of these questions? Afterwards, the opinions of field experts were consulted for these questions. The question items were reorganized from the expert opinions and the common expressions that emerged in the literature. Then, the resulting question statements were sent to a different group of experts ($n = 5$) to determine whether the questions were appropriate for the purpose of the study. In this context, Kappa statistics (Cohen, 1960) was used to determine the consistency between the evaluations made by the experts. Kappa value takes a value between −1 and +1. These ranges are $k < 0.00$: poor, 0.00–0.20: slight, 0.21–0.40: fair, 0.41–0.60: moderate, 0.61–0.80: substantial, 0.81–1.00: almost perfect agreement (Landis and Koch, 1977). The inter-expert consistency within the scope of this study was calculated as 0.98, indicating that this value has an almost perfect agreement level of consistency.

Before data collection, all participants were informed about the purpose and procedures of the study, and their voluntary participation was obtained in accordance with institutional ethical standards. Written informed consent was obtained from one group of participants on October 12, 2023, and from the second group on November 21, 2023, as data collection continued until data saturation was achieved. Interviews were conducted face-to-face ($n = 78\%$) and online ($n = 21\%$). During the interviews, the researchers also kept a diary and recorded their impressions about the interviews. Accordingly, face-to-face interviews lasted between 26 and 38 min, and online interviews lasted between 16 and 31 min. To ensure the reliability and depth of the interviews, all responses were transcribed verbatim and analyzed using NVivo qualitative analysis software. Member checking was conducted by sharing the transcriptions with a subset of participants ($n = 10$) to confirm accuracy. Additionally, an inter-rater reliability analysis was performed on the coding process, yielding a Cohen's Kappa coefficient of 0.86, indicating high agreement between coders. These methodological steps enhance the validity and credibility of the findings, ensuring that the reported themes accurately reflect teachers' perspectives. To strengthen the validity of findings, future research should integrate classroom observations alongside interviews. Observational data can provide insights into real-time engagement dynamics, highlighting potential gaps between teachers' perceptions and actual practices. For instance, observing how children with autism respond to specific engagement strategies during free play or structured activities could offer nuanced insights into the efficacy of these methods.

Data analysis. In qualitative research, the data analysis process starts with the first observation or the first interview (Merriam, 2018). While this study primarily relied on teacher interviews as the main data collection method, this approach provides valuable insights into teachers' perspectives, beliefs, and self-reported practices regarding engagement of children with autism. Additionally, combining qualitative interviews with ethnographic classroom observations would help explore how contextual factors, such as class size, resources, and teacher-student interactions, influence the implementation of strategies to foster engagement. By adopting a mixed-methods approach, future research can strengthen the validity of findings and provide a robust framework for designing practical interventions. Due to the nature of qualitative research, data analysis continued while the data collection process continued in this study. Thus, by determining and shaping the nature of the research (Glesne, 2020; Patton, 2014), it was possible to follow whether data saturation occurred more reliably. In this study, the data analysis process started after the interviews were conducted in October 2023, when the data collection process started. In the data analysis of qualitative research, two approaches are adopted in the creation of coding, themes, or categories that constitute the process. These approaches are the creation of categories previously in the literature or the creation of themes and categories inductively during the research (Patton, 2014). In this study, firstly, coding was done, and categories based on the codes and themes were created to explain these categories. Then, these themes were associated with the literature and discussed. In this study, meaning was used as the coding unit (Miles and Huberman, 1994) in the coding process. The research data analysis process was conducted as shown in Fig. 1.

As seen in Fig. 1, the coding process started with the data collection process and continued until data saturation (Nelson,

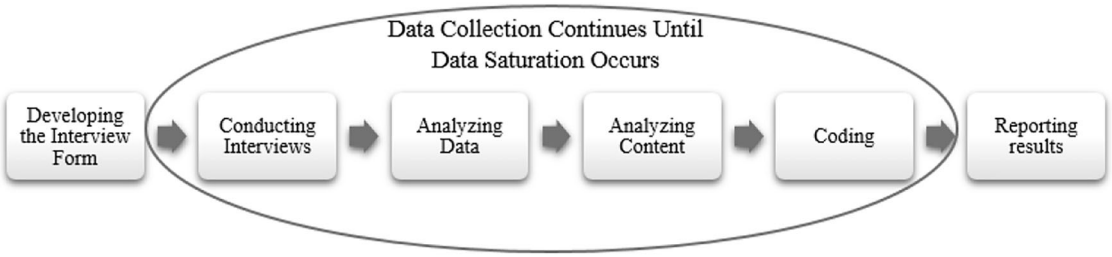

Fig. 1 Research process.

2016) occurred. After interviewing each participant, the interviews were transferred to a word processor, and coding was carried out. The coding process was carried out separately for each question by focusing on the meaning of the answers given by the respondents. In addition, categories were created using common codes, and themes were developed to explain these categories (Strauss and Corbin, 1990; Denzin and Lincoln, 2008). At the end of the coding process, Cohen's Kappa coefficient of agreement was calculated for the codings made by both coders, and the consistency of both coders was examined. In this study, the Kappa coefficient of agreement between coders was calculated as 0.96. A Kappa coefficient of 0.80 and above indicates a very good agreement between the coders (Rubinstein and Brown, 1984). In this context, it can be stated that the inter-coder consistency is quite high.

Results

Behavioral engagement. Building on the methods outlined above, the findings provide key insights into how preschool teachers perceive and implement strategies to support engagement behaviors among children with autism. For example, teachers who utilized interest-based activities reported noticeable improvements in functional engagement among students with autism. Similarly, incorporating structured breaks reduced instances of non-engagement behaviors, creating a more inclusive classroom environment. These results are categorized and presented below. The findings of the study were reflected by modeling the sub-themes determined in the context of the main themes and the codes related to these sub-themes. Additionally, codes and sub-themes were supported by direct quotations from the participants. Teachers' views on the engagement behaviors and types of engagement behaviors of students with autism are shown in Fig. 2.

In Fig. 2, it is notable that children with autism exhibit engagement across five sub-themes: "Functional," "Observational," "Undifferentiated," "Irrelevant," and "Non-engagement." The findings reveal that children with autism predominantly engage in the "Functional" engagement type, with a higher engagement rate in "Preferred activities" (33.3%) and "Activities of interest" (66.6%). Within the "Observational" engagement type, the children were found to be involved in four distinct activity types: "Individual activities" (42.85%), "Short-term activities" (28.57%), "Teacher-supported activities" (14.28%), and "Uncomplicated activities" (14.28%). In the "Undifferentiated" engagement type, the children participated in five different types of activities: "Activities involving various tools" (20%), "Engaging activities" (20%), "Simple activities" (20%), "Short-term activities" (20%), and "Teacher-supported activities" (20%). The "Non-engagement" type is characterized by the prominent code "Lack of desire to participate" (62.5%), as frequently highlighted by the teachers. Responses from teachers that did not align with the engagement types mentioned in the literature were categorized under the "Irrelevant" sub-theme. Under this sub-theme, the codes were classified into five categories: "Adult guidance" (28.57%), "Motivation" (14.28%), "Assistance" (14.28%), "School-based engagement" (14.28%), and "Individual education" (14.28%). Other codes emphasized in this sub-theme were grouped under "Experiencing difficulties" (12.5%), "Crowded classroom" (12.5%), and "Showing resistance" (12.5%).

The direct views of some preschool teachers regarding their efforts to support the engagement behaviors of children with autism are as follows:

- "No matter how difficult it is for them to participate in the activities, as teachers, we try to help them participate in the activities by taking into account their different interests and developmental characteristics." (P20)
- "In general, there is no problem in engagement, but when there is something they do not want, they shout loudly, disrupt the activities, and tear the activity papers." (P28)
- "I have three students with severe autism, one of them is academically good, he concentrates his attention between 20 and 25 minutes and works efficiently and finishes the activity, two of them have an attention span of 5 seconds, that is, looking at the paper and eye contact." (P15)
- "Since they show many symptoms and effects of autism, only eye contact and small commands are practiced. Unfortunately, there is no positive attitude in terms of participating in activities. Even if they are role models, they do not participate." (P24)
- "We do it as individual education. It is necessary to guide the activities. Therefore, I guide the activities." (P34)

The findings show that teachers' responses regarding the engagement of children with autism in activities generally do not match the types of engagement in the literature. In other words, it can be said that the activities in which children with autism are involved do not meet the types of engagement expressed in the literature.

While most of the observed behaviors could be mapped onto standard engagement categories, some responses did not align with the established framework. These were categorized as "Non-engagement" and "Irrelevant" engagement. The most prominent code under Non-engagement was "Lack of desire to participate" (62.5%), reflecting frequent withdrawal or resistance behaviors. Under Irrelevant engagement, teachers mentioned themes such as "Adult guidance" (28.57%), "Motivation" (14.28%), "Assistance" (14.28%), "School-based engagement" (14.28%), and "Individual education" (14.28%). Additional codes included "Experiencing difficulties" (12.5%), "Crowded classroom" (12.5%), and "Showing resistance" (12.5%). These categories underscore the challenges teachers face when interpreting engagement beyond conventional definitions.

Emotional engagement. In addition to behavioral aspects, emotional engagement is a critical component of student involvement, particularly in early childhood education settings. It reflects children's affective responses to classroom activities, their

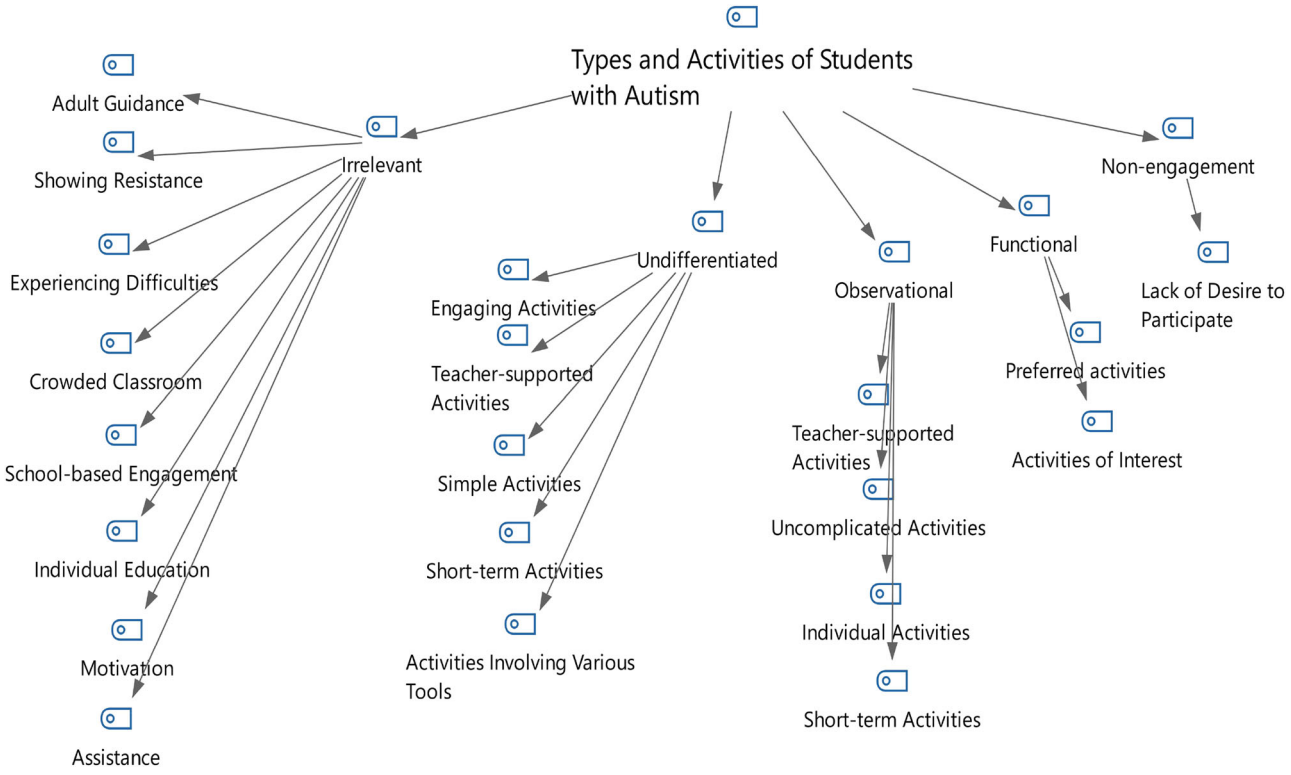

Fig. 2 Classroom engagement types and activities of students with autism.

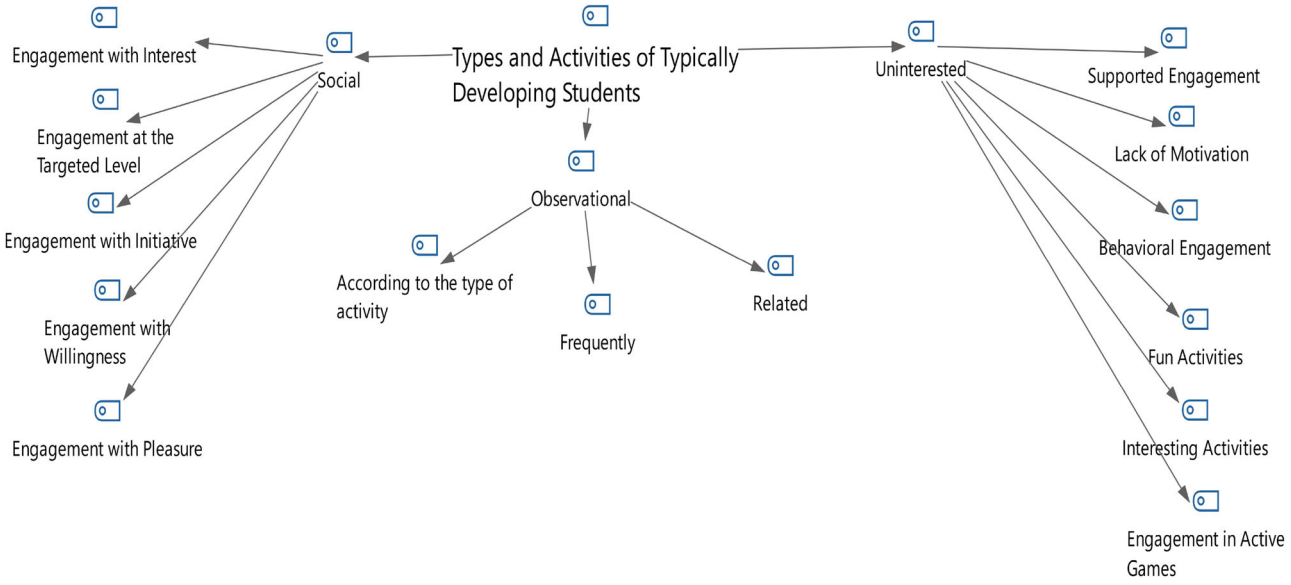

Fig. 3 Classroom engagement types and activities of typically developing students.

sense of belonging, and the emotional quality of their interactions with peers and teachers. In this study, preschool teachers' perceptions offered important insights into the emotional engagement of both typically developing children and those with autism.

In Fig. 3, it is noteworthy that preschool teachers emphasized the engagement of typically developing children in activities in three sub-themes: "Social," "Observational," and "Disinterested." The findings show that the most emphasized codes in the social engagement sub-theme were "Engagement with pleasure" (33.3%), "Engagement with willingness" (16.66%), "Engagement with interest" (16.66%), "Engagement with initiative" (16.66%), and "Engagement at the targeted level" (16.66%).

In contrast to the varied engagement patterns observed in children with autism, teachers described more consistent emotional engagement among typically developing peers.

- "Engagement in activities is quite high and they are enthusiastic. They participate in the activities willingly and willingly." (P28)

Some teachers also noted emotional withdrawal among children with autism:

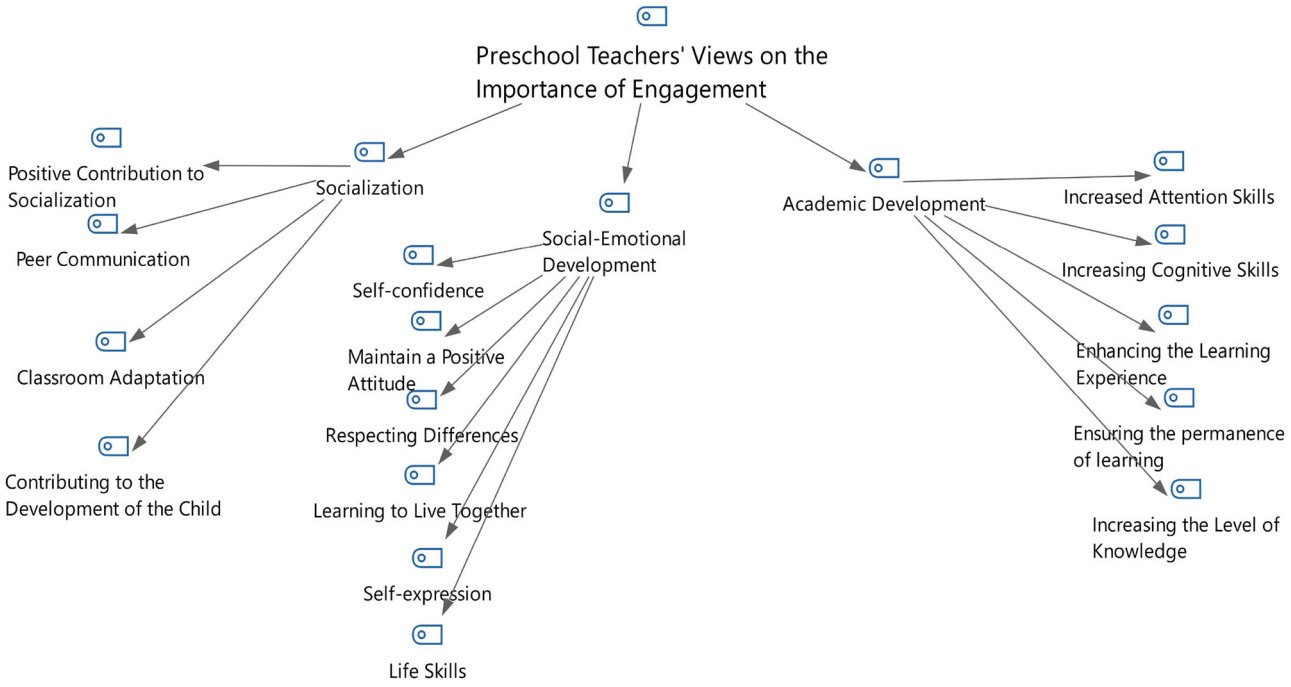

Fig. 4 Preschool teachers' views on the importance of engagement.

- "Since they show many symptoms and effects of autism, only eye contact and small commands are practiced. Unfortunately, there is no positive attitude in terms of participating in activities." (P24)
- By enriching the activities for children, we can make it productive for them to participate by attracting their sense of education, fun and curiosity. We can motivate disinterested children to the learning environment in this way." (P20)

Emotional engagement was also inferred from teachers' descriptions under the social-emotional development sub-theme in Fig. 4, including "Self-confidence," "Expressing oneself," "Respecting differences," "Learning to live together," and "Having a positive attitude."

- "Engagement is the proof of the child's presence in the classroom… It is a trigger for the classroom climate and his/her own spiritual satisfaction." (P23)

Teachers' accounts indicate that although emotional engagement is not explicitly labeled as such, their observations suggest awareness of its presence and impact in the classroom.

Cognitive engagement. Although direct references to cognitive engagement were less frequent, several findings reflect elements of cognitive investment and mental effort in classroom tasks. Preschool teachers identified certain activities that appeared to stimulate attention, learning, and cognitive development among children with autism and typically developing peers.

The academic development sub-theme in Fig. 5 highlights this dimension through codes such as "Increasing the learning experience" (44.44%), "Increasing cognitive skills" (22.22%), "Increasing the level of knowledge" (11.11%), "Ensuring the permanence of learning" (11.11%), and "Increasing attention skills" (11.11%).

- "Of course, yes. Engagement is an element that makes learning permanent and healthy at all levels of education." (P22)
- "Since the activities prepared are activities aimed at developing their cognitive, language, motor skills, of course I think it is important to support these developmental areas." (P28)

Additionally, cognitive engagement is implicitly described in teacher strategies involving interest-based or structured learning tasks:

- "He concentrates his attention between 20 and 25 minutes and works efficiently and finishes the activity." (P15)
- "I prolong the attention span with interesting voice tone or feedback." (P22)

These strategies reflect teacher efforts to maintain students' attention, interest, and investment in cognitively demanding tasks. In summary, while cognitive engagement was not always labeled directly, the findings indicate that teachers observed and supported cognitive processes in children's participation. These processes include sustained attention, effective completion of tasks, and development of academic skills.

Engagement behaviors of typically developing children. In addition to observations regarding children with autism, teachers provided detailed reflections on the engagement behaviors of typically developing children. While many of these responses were not explicitly framed within the theoretical dimensions of behavioral, emotional, or cognitive engagement, they still reflect valuable insights into classroom practices.

Figure 3 demonstrates that teachers conceptualized the engagement of typically developing children across three primary subthemes: Social, Observational, and Disinterested. The most commonly emphasized indicators in the social sub-theme included: "Engagement with pleasure" (33.3%), "Engagement with willingness" (16.66%), "Engagement with interest" (16.66%), "Engagement with initiative" (16.66%), and "Engagement at the targeted level" (16.66%). In the observational sub-theme, teachers noted engagement in entrepreneurship (16.66%), frequency of participation (62.5%), relevance (25%), and variability depending on activity type (12.5%).

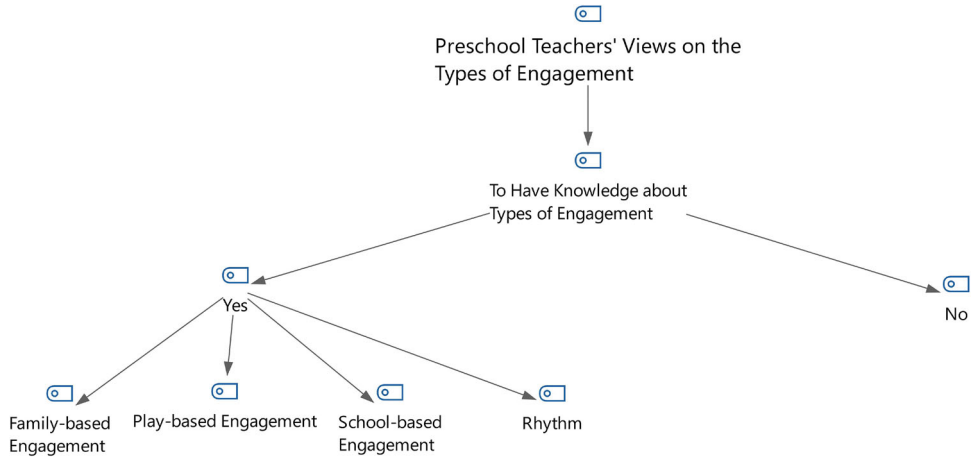

Fig. 5 Preschool teachers' views on the types of engagement of typically developing children and children with autism.

In the disinterested sub-theme, codes such as "Lack of motivation," "Supported engagement," "Fun activities," "Interesting activities," and "Engagement in active games" were reported with roughly equal emphasis (11.11%), with "Behavioral engagement" mentioned by 44.44% of participants.

Some illustrative quotes include:

- "They participate in activities up to a point with adult support, but their attention span is very short." (P27)
- "Children participate behaviorally. Their engagement in activities develops behaviorally." (P36)

These responses were mapped onto Fredricks et al.'s engagement framework where possible. However, as also indicated in the analysis, teachers often described engagement in generic terms, such as participation, attention, or motivation, rather than aligning them explicitly with behavioral, emotional, or cognitive dimensions. Teachers also emphasized the importance of participation for children's social, emotional, and academic development. These perceptions, which guided their strategies for implementation, are presented in Fig. 5.

As illustrated in Fig. 5, 82.98% of teachers reported unfamiliarity with established engagement types. Even among those who claimed awareness, responses included non-standard terms such as "School-based engagement" and "Play-based engagement." This underscores a significant conceptual gap and calls for targeted professional development to bridge theory and practice. This suggests a conceptual gap: while teachers recognize engagement in practical classroom scenarios, their understanding lacks a theoretical foundation. This reinforces the need for professional development programs that integrate engagement theory with applicable classroom strategies.

Despite this gap, teachers emphasized the significance of engagement. As shown in Fig. 5, engagement was perceived as contributing to:

- *Socialization:* "Positive contribution to socialization" (50%), "Peer communication," "Adaptation to class," etc.
- *Social-emotional development:* "Self-confidence," "Respecting differences," "Life skills," "Expressing oneself."
- *Academic development:* "Increasing the learning experience" (44.44%), "Cognitive skill development," "Learning permanence."

Quotes such as the following underscore this perspective:

- "Engagement is the proof of the child's presence in the classroom. It is a trigger for the classroom climate and his/her own spiritual satisfaction." (P23)
- "Since the activities prepared are aimed at developing cognitive, language, motor skills, of course, I think it is important to support these areas." (P28)

Despite their extensive classroom experience, 82.98% of teachers stated that they were unfamiliar with engagement types defined in the literature. Among those who claimed to have some knowledge, most cited non-standard terms such as "School-based engagement" (54.54%), "Play-based engagement" (27.27%), "Rhythm" (9.09%), and "Family-based engagement" (9.09%). These findings highlight a significant conceptual gap between practice and theory, suggesting the need for structured professional development to bridge this divide. Overall, while terminology may differ, teachers clearly associate engagement with positive developmental outcomes and emphasize the importance of engagement-related strategies.

Teachers' physical and ınstructional arrangements to support engagement. While the research questions predominantly address physical and instructional arrangements, the data analysis also revealed the use of behavioral and social strategies that can be conceptualized as classroom-based interventions. These include practices such as antecedent-based supports, the use of positive and negative reinforcement, and peer-mediated approaches, all aimed at enhancing student engagement. Accordingly, in the following section, these strategies are integrated into the broader category of engagement-supporting practices implemented by teachers.

The findings revealed that preschool teachers employed various physical and instructional strategies to enhance the engagement of both children with autism and typically developing peers. These arrangements encompassed adjustments in classroom layout, individualized supports, behavior management strategies, and creative instructional techniques.

From a physical arrangement perspective, teachers emphasized the importance of creating personal spaces to help students feel secure and reduce overstimulation. Some teachers reported minimizing physical contact and using environmental boundaries to support students' sensory needs:

- "I prefer games with less contact. As a precaution, I set boundaries inside and outside the classroom." (P9)

In terms of instructional arrangements, participants frequently mentioned the use of interest-based activities, visual aids, and interactive teaching to sustain students' attention and participation. Teachers adapted content based on individual needs and

preferences, highlighting a strong commitment to inclusive practices:

- "In order to increase the engagement of children with autism, I try to increase the number of individual stimuli, I prolong the attention span with interesting voice tone or feedback." (P22)

Under the behavioral intervention sub-theme, teachers reported using both positive reinforcement (e.g., praise, rewards) and negative reinforcement (e.g., withdrawal of privileges) in equal measure to shape engagement behaviors. Additionally, antecedent strategies such as identifying children's areas of interest (50%), providing information about activities (25%), and designing fun or creative tasks (25%) were used to preemptively encourage participation.

Teachers also highlighted the role of peer interaction, adult and physical support, and emotional safety in increasing engagement. For example:

- "Although I keep them close in games so that they can integrate with their friends, I make them sit close to me because they sometimes hit." (P24)

In the social arrangements category, practices like using videos, daily diaries, family cooperation, and individual support were reported. These findings suggest that preschool teachers apply a multidimensional and often intuitive approach to creating supportive environments for engagement, even in the absence of formal training. As detailed in Table 2, the strategies reported by preschool teachers encompassed physical arrangements, instructional designs, behavioral interventions, and social supports tailored to the needs of students with autism. The findings indicate that teachers adapted their engagement strategies according to the developmental characteristics of children. While children with autism required more individualized support, structured routines, and environmental adjustments, typically developing children were supported mainly through peer interaction and group-based activities. These differences are visually summarized in Fig. 6.

Discussion

Understanding engagement requires a theoretical lens that captures both individual participation and environmental influences (Fredricks et al., 2004). Bronfenbrenner's Ecological Systems Theory provides a valuable framework for analyzing how various factors shape engagement behaviors in early childhood settings (Bronfenbrenner, 1994). Engagement is a multifaceted concept describing students' active involvement in the learning process. Bronfenbrenner's Ecological Systems Theory explains how layers of a child's environment (microsystem, mesosystem, exosystem, macrosystem) influence engagement behaviors. For example, the classroom setting (microsystem) interacts with family dynamics (mesosystem) to shape participation. This theoretical framework helps educators understand how individual, social, and environmental factors collectively influence engagement. Scaffolding techniques, such as breaking tasks into smaller steps, align with Vygotsky's principles and enhance engagement, particularly for children with limited attention spans (Vygotsky, 1978). Building on this theoretical foundation, Vygotsky's framework offers valuable insights into the social and cognitive dimensions of engagement, particularly in collaborative learning contexts. The findings of this study strongly align with Vygotsky's Social Constructivist Approach, which underscores the socially mediated nature of learning and the importance of scaffolding within the ZPD (Wood et al., 1976). At the same time, the findings also reflect cultural influences on engagement practices. For example, teachers' reliance on group-based activities and peer support resonates with approaches commonly emphasized in collectivist contexts, whereas individualized scaffolding and interest-based activities echo strategies more prevalent in individualistic educational systems. This suggests that while Vygotsky's principles of socially mediated learning provide a universal foundation, their classroom application is shaped by broader cultural norms and systemic factors. However, these results diverge from the findings of Hu et al. (2016), who observed that teachers in Asian educational settings tend to prioritize structured engagement through peer collaboration rather than individual scaffolding. Similarly, Smith (2020) found that resource availability significantly affects the implementation of engagement strategies, with teachers in well-funded educational systems incorporating multimodal engagement techniques, whereas those in low-resource settings rely more on direct instruction. These differences suggest that engagement strategies are not only influenced by individual teacher knowledge but also by systemic and cultural factors, necessitating context-sensitive approaches to professional development. The findings also indicate partial alignment between teacher strategies and established engagement types. Strategies such as using interest-based activities, offering structured routines, and providing individualized support reflect behavioral and cognitive engagement dimensions. However, some

Table 2 Teachers' physical and instructional arrangements to support engagement.

Main theme	Sub-theme	Codes	Illustrative quotations
Physical Arrangements	Personal Space and Safety	Setting physical boundaries, minimizing contact, rearranging classroom layout	"I set boundaries inside and outside the classroom." (P9)
	Classroom Safety	Removing dangerous items, monitoring physical proximity	"I move toys or objects that may pose a danger to the safe area." (P24)
Instructional Strategies	Interest-Based Activities	Activities tailored to student interests, use of feedback, prolonged attention span	"I prolong the attention span with interesting voice tone or feedback." (P22)
	Creative Engagement	Use of interactive methods, engaging materials	"I increase the group address and proceed as interactive lessons." (P22)
Behavioral Interventions	Reinforcement Strategies	Positive reinforcement (50%), Negative reinforcement (50%)	-
	Antecedent Strategies	Identifying interests (50%), providing activity info (25%), fun/creative activities (25%)	-
Social Support Strategies	Peer and Adult Support	Supporting peer communication, adult scaffolding, physical support	"I make them sit close to me because they sometimes hit." (P24)
	Family and Community	Family cooperation, diaries, individual support, video/dictionary use	"We cooperate with families and try to support engagement at home as well." (P13—if cited)

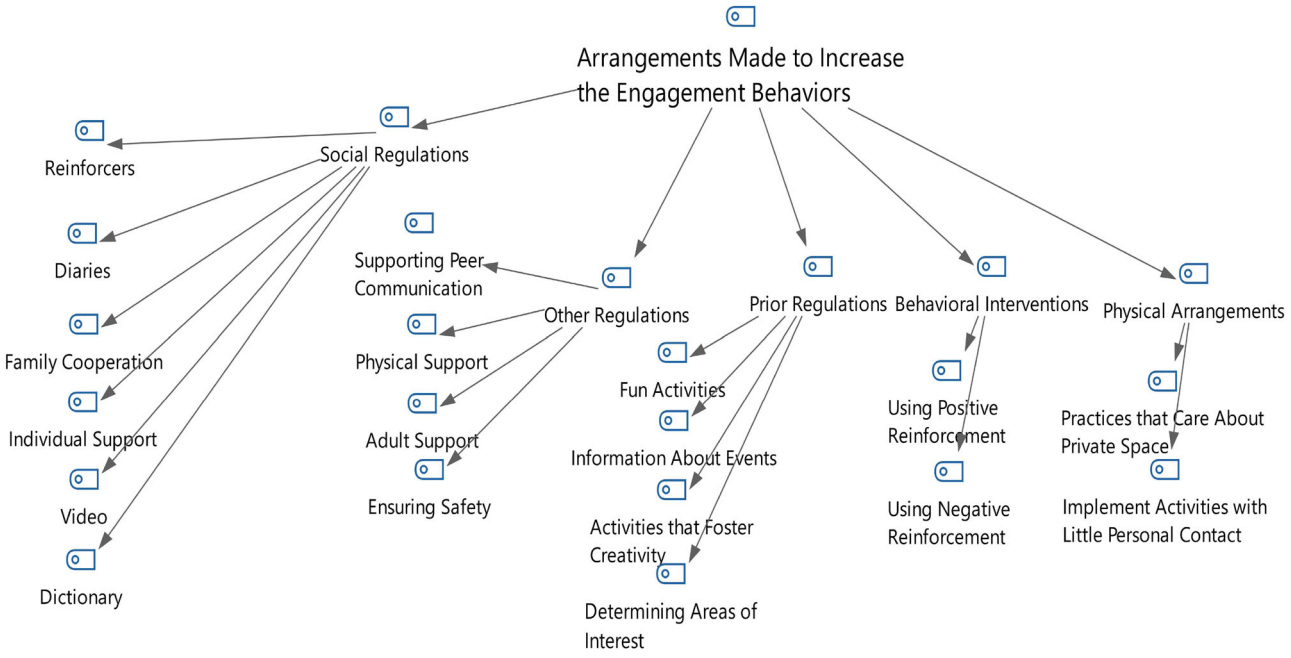

Fig. 6 Arrangements made to increase the engagement behaviors of children with autism and typical development.

responses—such as emphasizing "school-based engagement" or relying solely on directive teaching—did not clearly align with any specific engagement type in the literature, suggesting a conceptual gap. This highlights the need for further training to help teachers recognize and intentionally target all three dimensions of engagement. The limited engagement behaviors observed in children with autism, such as functional and observational engagement, highlight the need for targeted strategies that leverage scaffolding and peer-mediated interactions to foster deeper engagement (Steinbrenner, 2015). Additionally, the study reflects the multidimensional engagement model (Fredricks et al., 2004), emphasizing the interplay of cognitive, emotional, and behavioral aspects of engagement. Although some teachers reported using interest-based activities and visual supports, these practices were applied inconsistently. This inconsistency suggests missed opportunities to leverage these strategies more systematically to enhance multiple dimensions of engagement. By integrating the ESFCA model, this study bridges these theoretical frameworks with practical strategies, demonstrating how tailored interventions can not only improve engagement behaviors but also promote developmental outcomes in children with autism. This approach reinforces Vygotsky's emphasis on social interaction as foundational to learning while addressing Fredricks et al.'s multidimensional perspective, offering a comprehensive framework for addressing the challenges identified in the findings. Teachers' strategies to foster engagement reflect adaptations within the microsystem, while broader cultural and policy contexts (macrosystem) define norms and expectations, emphasizing the need for context-specific approaches. This alignment between theory and findings underscores the need for context-sensitive approaches that translate conceptual models into classroom practice.

In line with Vygotsky's Social Constructivist Approach, engagement is a socially mediated process where the teacher, as the "more knowledgeable other," uses scaffolding to help children achieve higher levels of engagement. The social constructivist approach views learning as a process shaped through interactions within a social context, a perspective closely aligned with Vygotsky's concept of the "more knowledgeable other." According to Vygotsky, learning occurs in the ZPD, where individuals accomplish tasks they cannot complete independently but can achieve with guidance or collaboration. Engagement, within this framework, is not merely individual participation but also a context where developmental opportunities arise through social interactions. For instance, in a block-building activity, a child might construct a more complex structure with peer guidance, showcasing how scaffolding strategies enhance both functional and social engagement. This highlights the role of teachers in creating scaffolding opportunities, fostering peer interactions, and providing individualized support to help children engage actively. By emphasizing social interactions as foundational to cognitive, emotional, and social growth, Vygotsky's framework offers a robust theoretical basis for understanding and enhancing engagement behaviors in educational settings. One limitation of this study is the lack of direct observational data. While teacher interviews provide valuable information about engagement behaviors, they reflect subjective interpretations rather than direct behavioral evidence. This reliance on self-report data may have led to underreporting or overgeneralization of certain engagement patterns, particularly when teachers lack a theoretical understanding of engagement types. Furthermore, without triangulating these perspectives with observational data, it is difficult to verify the accuracy or consistency of reported behaviors across different classroom settings. Incorporating observational methods into future studies will allow for a more comprehensive and objective assessment of engagement, providing a clearer understanding of how engagement behaviors unfold in real-time interactions and structured classroom settings. Peer-mediated interactions and structured routines foster both cognitive and social engagement. Engagement encompasses physical, emotional (Fredricks et al., 2004), cognitive (Pintrich and De Groot, 1990), and behavioral (Skinner et al., 2009) dimensions, highlighting the importance of student-centered learning strategies in enhancing achievement. This study found that teachers lack sufficient knowledge and effective strategies to support the engagement behaviors of children with autism. To address this, the ESFCA is proposed. The ESFCA model provides a holistic and practical approach for early childhood educators by integrating three core dimensions of engagement and five evidence-based strategies. It bridges the gap between theoretical knowledge and classroom

practice, meeting the diverse needs of children with autism across various educational and cultural contexts. It is important to note that the ESFCA model was not applied as part of this study. Instead, it was inductively developed by the authors, drawing from both the findings and relevant theoretical perspectives, to provide a conceptual roadmap for supporting engagement in children with autism.

The ESFCA model was developed through a dual grounding process, drawing inspiration from key theories and models related to participation, such as the ICF, Fredricks et al.'s behavioral, emotional, and cognitive theories of participation, and Bronfenbrenner's ecological systems theory. This grounding creates a conceptual framework.

During the ESFCA data analysis, recurring thematic patterns, particularly around *Ease* (E), *Structure* (S), *Feedback* (F), *Choice* (C), and *Adaptive Support* (A), emerged inductively from teacher interviews (e.g., interest-based strategies, structured routines, adult feedback, choice provision, individualized support). In this context, the ESFCA model can be said to represent the integration of deductive elements drawn from the literature with inductive components based on teacher reports. This blended structure supports both theoretical coherence and ecological validity. Figure 7 illustrates how these five dimensions (E-S-F-C-A) interrelate and collectively support the participation of children with autism in preschool settings. These dimensions are visually depicted in Fig. 7.

The ESFCA model was inductively derived from both the study's findings and existing theoretical perspectives. Each component reflects a recurring theme in teachers' reported practices: *Ease* highlights the importance of reducing task complexity to encourage participation; *Structure* refers to predictable routines and clear expectations; *Feedback* emphasizes the role of reinforcement and guidance; *Choice* reflects the value of interest-based and student-centered activities; and *Adaptive Support* captures the flexible adjustments teachers make to accommodate diverse needs. Together, these dimensions provide a practical roadmap for supporting the engagement of children with autism in early childhood classrooms.

The study reveals that 82.98% of teachers lack knowledge about the types of engagement in typically developing children and children with autism. Understanding these types is essential for developing effective strategies to enhance engagement (Amerstorfer and Freiin von Münster-Kistner, 2021; Han, 2021; McWilliam and de Kruif, 1998). Educational systems' structural features, such as access to resources and the quality of teacher training programs, significantly affect teachers' ability to support engagement (Smith, 2020; Ghani and Taylor, 2021). Low-resource settings, in particular, highlight the need for tailored training programs that address local needs and equip teachers with practical skills. Professional development programs should focus on hands-on workshops, modeling strategies like peer-mediated interventions, and scaffolding techniques. Reflective practices, such as maintaining journals or engaging in peer feedback, can further help teachers evaluate and improve their methods, fostering continuous professional growth.

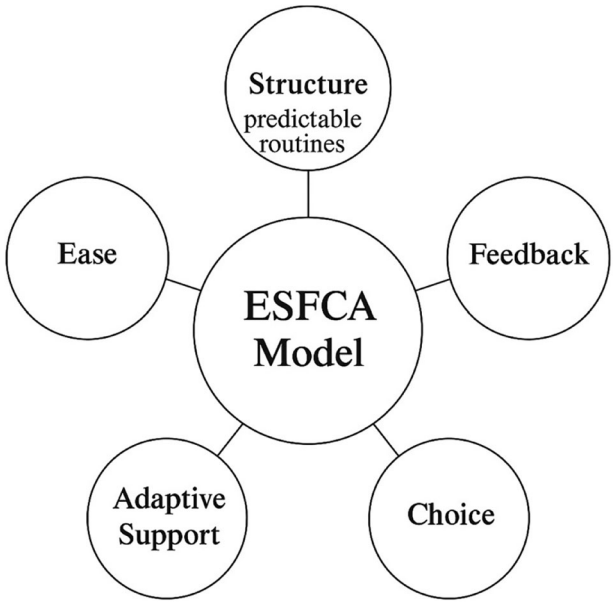

Fig. 7 ESFCA model.

The findings revealed that while teachers made arrangements to increase engagement behaviors in children with autism and typically developing children, these efforts were often superficial and insufficient. To enhance engagement, targeted strategies such as interest-based activities and visual supports, like pictorial schedules and social stories, can help reduce anxiety and promote participation. Embedding these strategies into daily classroom practices fosters inclusive environments and active learning. Cultural norms also influence engagement strategies; for example, in countries like China and Japan, balancing group harmony with individualized support is critical (Hu et al., 2016). Aligning instructional approaches with cultural contexts is essential.

The ESFCA model proposes five key strategies to foster engagement: (1) interest-based activities to motivate participation, (2) peer-mediated interactions to enhance social engagement, (3) visual supports to strengthen observational engagement, (4) individualized scaffolding to meet specific needs, and (5) structured breaks to address sensory needs. These adaptable strategies can be tailored to diverse educational settings. Engagement plays a crucial role in learning and cognitive development, as it enhances learning experiences and supports cognitive growth (Finn and Zimmer, 2012; Chen and Hapgood, 2021). Therefore, teacher training and professional development programs must emphasize effective strategies to support engagement behaviors among children. To better contextualize these strategies, Table 2 presents implementation processes and concrete classroom examples that illustrate practical applications in early education settings.

A structured professional development program to enhance engagement behaviors in children with autism can follow a clear sequence. Teachers can begin with assessments, using tools like engagement checklists to identify strengths and areas for support. Based on these, targeted interventions tailored to children's interests can be designed. For example, a child interested in animals could engage in counting games using animal figures, promoting functional and social engagement. Activities can be implemented in small groups with visual supports, such as pictorial schedules, to aid transitions and clarify expectations. Teachers monitor and adjust activities as needed, ensuring comfort and participation. Family involvement can be fostered by sharing activities for home use, promoting consistency across settings. Teachers can then reflect on the strategies' effectiveness, share insights with peers, and refine their approaches for future applications.

In the preschool period, children's engagement in activities is crucial for effective learning. The ESFCA model employs a cyclical process of assessment, planning, implementation, and monitoring to adapt strategies to each child's needs and development. Teachers assess engagement levels, design interest-based activities, implement strategies flexibly, and evaluate their effectiveness through continuous monitoring. Professional development programs are essential to equip teachers with practical

Table 3 Implementation classroom examples for the ESFCA model.

ESFCA component	Description	Classroom implementation example
Ease	Reducing task complexity to promote participation and prevent frustration.	Simplify multi-step art activity into sequential stages; provide visual cues and verbal prompts for each step.
Structure	Establishing predictable routines and clear expectations to support engagement.	Use a daily visual schedule with picture symbols; maintain consistent transitions between free play and group time.
Feedback	Reinforcing engagement through verbal praise, tokens, or reflective discussion.	Give immediate verbal feedback ("You built it carefully!"); use sticker rewards for sustained attention.
Choice	Allowing children to select preferred materials or activities to increase motivation.	Offer two centers (puzzle corner or music area) and let each child choose; rotate options weekly based on interests.
Adaptive Support	Adjusting instruction and environment to individual needs and sensory profiles.	Provide noise-reducing headphones for sound-sensitive children; pair each child with a supportive peer during group tasks.

strategies, such as peer-mediated interventions, visual supports, and individualized scaffolding (Guskey, 2002).

To operationalize these recommendations, the following workshop structure provides a practical framework for equipping teachers with strategies to enhance engagement behaviors in children with autism. Reflective practices, like maintaining teacher journals and engaging in peer feedback, promote continuous improvement. Collaboration with families ensures consistency across home and school environments (Epstein, 2018). To implement these recommendations, Table 3 shows workshop outlines, practical professional development activities aimed at providing teachers with effective strategies to increase engagement behaviors in children with autism.

To effectively operationalize these professional development strategies, practical implementation processes and classroom examples can provide a clearer path for educators to adopt these practices. Table 3 shows the Implementation Classroom Examples for the ESFCA Model.

Student-centered methods, such as project-based and play-based learning (Hmelo-Silver et al., 2007), behavior management strategies (Esqueda Villegas et al., 2024; Marzano et al., 2003), and effective communication skills are critical for supporting engagement in both children with autism and typically developing peers. Tailored strategies, such as integrating interest-based activities, adjusting task durations, and providing clear instructions, help sustain engagement and minimize disruptive behaviors. Regular observations enable teachers to adapt routines, ensuring equal participation and fostering a more inclusive learning environment.

The findings from the study show that students show higher engagement in activities that they like. Children with autism and typically developing children are more likely to participate in activities such as arts and crafts (Kuo et al., 2022), sensory games such as sandboxes and water games (Case-Smith and Arbesman, 2008), music and movement activities that support motor skills such as rhythm and dance (Reschke-Hernandez, 2011), puzzle and construction activities (Battocchi et al, 2010) and nature activities such as walking and interacting with animals (Kuo et al., 2022). It is seen that the favorite activities of preschool children with autism vary in line with their individual interests and needs. Taking the interests of children with autism as the basis for their engagement in activities and enriching the teaching environment in this context will support the engagement behaviors of these children (Tonkin et al., 2014).

The findings indicate that children with autism primarily engage in activities through functional, observational, and undifferentiated types of engagement, which are more limited and superficial (Esqueda Villegas et al., 2024). To enhance functional engagement and support continuity, teachers should identify children's interests and adapt activities accordingly. Additionally, teachers require greater knowledge and skills to effectively support the engagement behaviors of children with autism (Dykstra Steinbrenner and Watson, 2015; Zimmerman et al., 2022). In contrast, typically developing children mostly exhibit social engagement, using verbal or sign language to explain events, communicate, and initiate interactions. To promote at least social or integrated engagement in children with autism, teachers must adapt curricula and create supportive environments. Engagement not only involves participation but also serves as a context for enhancing social interaction and communication skills, positively contributing to the development of children with autism (Esqueda Villegas et al., 2024). Drawing from these findings, the study provides actionable strategies to improve engagement behaviors in early childhood education.

One of the key limitations of this study is the reliance on self-reported data obtained through interviews. While teachers' narratives provide valuable insights into their perceptions and practices, these accounts may be subject to personal bias, memory distortions, or social desirability effects. The absence of observational data limits the ability to cross-validate reported practices with actual classroom behaviors. As a result, interpretations of engagement strategies should be viewed with caution, considering the potential discrepancies between stated practices and enacted behaviors. Future research incorporating classroom observations could offer a more comprehensive and objective perspective on engagement practices, particularly in the dynamic settings of early childhood education (Maxwell, 2013; Creswell and Poth, 2018). A limitation of this study is the absence of observational data, which may limit the ability to verify the alignment between teachers' reported strategies and their actual classroom practices. Future research could address this limitation by incorporating classroom observations alongside interviews to create a more comprehensive understanding of engagement-supporting practices. Observational data would allow researchers to identify discrepancies between perceived and actual practices, offering a richer and more nuanced perspective on the dynamics of engagement in real-time contexts.

Conclusion and recommendations

This study highlighted the multifaceted nature of engagement and the challenges faced by preschool teachers in supporting children with autism. The findings emphasized the gap between theoretical models and classroom practices, particularly in understanding and applying engagement strategies. Based on these findings, the following recommendations are presented for educators, school administrators, and policy makers in a structured and prioritized manner:

For Teachers;

1. *Enhance Understanding of Engagement Types:* participate in targeted professional development sessions focused on the

behavioral, emotional, and cognitive dimensions of engagement (Fredricks et al., 2004).
2. *Utilize the ESFCA Model:* implement the five core strategies—Ease, Structure, Feedback, Choice, Adaptive Support—to address individual needs in inclusive classrooms.
3. *Apply Interest-Based Learning:* integrate students' interests into classroom activities to increase functional and cognitive engagement, particularly for children with autism.
4. *Incorporate Visual and Structured Supports:* use scaffolding, visual cues, and predictable routines to enhance both emotional and cognitive engagement.

For School Administrators;

1. *Support In-Service Training Programs:* provide regular, research-based professional development opportunities related to inclusive teaching practices and engagement strategies.
2. *Foster Collaborative Teaching Environments:* encourage peer mentoring, team teaching, and reflective practice among teachers to share successful engagement strategies.
3. *Ensure Resource Availability:* allocate time and material resources (e.g., visuals, assistive tech, learning corners) necessary for implementing engagement-supportive practices.

For Policy Makers;

1. *Integrate Engagement into Curriculum Guidelines:* Embed clear definitions and expectations around engagement behaviors in national early childhood education frameworks.
2. *Mandate Engagement-Focused Training:* Include engagement and autism-focused pedagogies in pre-service teacher training programs.
3. *Support Evidence-Based Models like ESFCA:* Promote and fund research-based models, such as the ESFCA framework, for scaling in early childhood settings, especially in inclusive classrooms.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Author contributions

Sinan Kalkan (SK)—conceptualization; research design; data collection coordination; data analysis; writing—original draft preparation; revision and final approval of the manuscript. Durmuş Özbasi (DÖ)—methodology; instrument development; data validation; supervision of data collection; writing—review and editing. Esra Erbaş (EE)—literature review; data coding and qualitative analysis; visualization (figures and tables); writing—initial draft sections. Serdar Arcağök (SA)—theoretical framework development; interpretation of findings; critical review of the discussion section; editing and language revision. Yahya Han Erbaş (YHE)—data verification; reference management; ethical documentation; proofreading and technical editing. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Competing interests

The authors declare no competing interests.

Ethical approval

This study was reviewed and approved by the Çanakkale Onsekiz Mart University, Institute of Graduate Education Ethics Committee for Scientific Research and Publication Ethics (Approval Code: 12/30, Date: 05 October 2023). The research was conducted in full compliance with the ethical principles of the Declaration of Helsinki (1964) and subsequent revisions, as well as the institutional ethical standards of Çanakkale Onsekiz Mart University.

Informed consent

All participants were informed about the purpose, scope, and procedures of the study and voluntarily provided written informed consent (first group on October 12, 2023, and second group on November 21, 2023) prior to participation. Participants were assured of the confidentiality of their responses and their right to withdraw from the study at any time without any negative consequences.

Additional information

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