

The Dynamics of Social-Communicative Characteristics of Students with Down Syndrome in An Educational Context: A Comparative Case Study

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Abstract: Down syndrome is a developmental condition characterized by heterogeneous patterns of communication and social participation. The manifestation of social-communicative abilities is not always consistent across all contexts; therefore, understanding students' behavior requires consideration of the interaction between individual characteristics and the environment. This study aims to explore the social-communicative characteristics of two students with Down syndrome in a special education school by examining communication, social participation, peer interactions, attention, task engagement, and behavioral responses in different contexts. The study employed a qualitative approach using a comparative case study design involving two students ST and SY as well as four informants consisting of parents and classroom teachers. Data were collected through observation, semi-structured interviews, and analysis of educational documents. Data analysis was conducted using thematic analysis, while data credibility was strengthened through triangulation of sources and methods. The results indicate that the social-communicative characteristics of both students are heterogeneous and contextual. ST demonstrated increased participation, verbal expression, and imitation skills in meaningful activities but still exhibited selective peer interactions, difficulty sustaining attention, task refusal, and slow task completion. Meanwhile, SY's social-communicative characteristics remained relatively stable following the transition to a higher level of education. These findings suggest that assessment and instruction for students with Down syndrome should be tailored to individual profiles, activity characteristics, and environmental conditions that support optimal communication and participation.

Keywords: Comparative case study, down syndrome, social communication, social participation, special education.

INTRODUCTION

Down syndrome (DS) is a genetic condition associated with intellectual disability and a distinctive profile of strengths and difficulties in cognitive, adaptive, language, and social development. Communication is one of the areas that may present persistent challenges in individuals with DS, particularly in expressive language. Recent evidence indicates that expressive vocabulary, syntax, and speech intelligibility are associated with adaptive functioning, including interpersonal relationships, coping skills, and community participation. However, considerable heterogeneity exists among individuals with DS, indicating that chronological age or cognitive level alone does not sufficiently explain differences in their communicative and adaptive profiles (del Hoyo Soriano et al., 2022).

Social communication is particularly important because communication abilities are closely connected to children's opportunities to participate in everyday social activities. Research involving young children with Down syndrome has shown an association between joint engagement and early language abilities, highlighting the importance of social interaction as a context for language development. Joint engagement, for example, provides opportunities for children to participate in interaction and may support the development of expressive and receptive language (Mattie & Fanta, 2023). Similarly, a 2024 systematic review found that participation among children and young adults with DS is influenced by multiple personal, social, political, and environmental factors. Participation is influenced by various interrelated factors, which can generally be categorized as personal, social, environmental, and policy and program

factors. The findings indicate that the availability of programs and professionals with specialized competencies, access to transportation, and attitudes and behaviors are the factors most frequently cited in relation to both barriers and facilitators of participation. This indicates that increased participation depends not only on individual characteristics, but also on the availability of appropriate services, environmental support, and supportive policy and program conditions. (de Sousa & Souto, 2024).

Students with Down syndrome form good relationships with their peers, but they still face a number of challenges in educational settings, particularly regarding teacher competence and training, collaboration between support teachers and subject teachers, and limited support from specialized professionals (Carbone et al., 2023). A qualitative study in an inclusive school setting in Indonesia found that children with DS may experience difficulties in social interaction, particularly because of articulation limitations, while supportive interaction with teachers and peers can facilitate their participation. Another Indonesian study examining communication behavior in an inclusive school similarly demonstrated that children's communicative behavior needs to be understood through their actual social interactions rather than through isolated language abilities (Ghazia & Rusmawan, 2023).

In special education settings, clear role allocation, collaboration between personnel, training tailored to the needs of students with Down syndrome, and adequate time for planning and adapting learning are essential. This support is essential for learning to be more focused, individualized, and tailored to the needs of students. (Boundy et al., 2023)

Recent intervention research further emphasizes the importance of interaction, engagement, and regulation in supporting children with DS. The ASCEND feasibility trial demonstrated the feasibility of a parent-delivered social communication intervention focusing on shared attention and language development. (Stojanovik et al., 2024) Likewise, the JASPER pilot study identified communication, engagement, and emotion regulation as relevant intervention targets for children with DS and reported heterogeneous responses among participants. (Engelstad et al., 2024) Recent intervention research involving young children with Down syndrome has also treated

communication, engagement, and regulation as related but distinguishable areas of development, with heterogeneous responses across participants.

Despite growing evidence regarding communication and participation in individuals with DS, much of the recent literature has focused on early childhood, standardized language outcomes, or structured intervention programs. Less attention has been given to how the expression of social-communicative abilities may change across everyday school contexts, particularly among school-aged students in special education settings. Moreover, individual differences in developmental trajectories remain important because children with DS may demonstrate abilities differently depending on their social environment, interaction partners, and opportunities for participation. The Indonesian literature has documented communication and interaction difficulties among students with DS, but contextual changes in students' behavior across different periods of schooling remain less explored (Susilowati & Nurhadi, 2024).

This distinction becomes particularly important when students exhibit significant differences in behavior between home and school environments, or experience changes in engagement following changes in the classroom environment. This situation may indicate that apparent passive behavior does not always reflect a lack of communication or social skills, but may instead be influenced by the environmental conditions in which those skills emerge. Conversely, an increase in social and verbal expression does not necessarily mean that difficulties with attention, task engagement, or behavioral regulation have been resolved. Therefore, these patterns must be understood by considering the interaction between individual characteristics and the environmental context in which students engage in activities.

Therefore, this study aims to explore the dynamics of social-communicative behavior among two students with Down syndrome in a special school by examining their communication, social participation, peer interaction, and behavioral responses across educational contexts. Particular attention is given to changes observed in one student across different school periods and to the relatively stable characteristics of another student following transition to a higher educational level. Through comparison of observations, teacher and parent perspectives, and relevant educational documents,

this study seeks to provide a context-sensitive understanding of how social-communicative abilities are expressed and how environmental conditions may be associated with differences in students' participation and behavior.

METHODS

Time and Research Setting

This study employs a qualitative approach using a comparative case study design. This design was chosen to gain an in-depth and contextual understanding of the socio-communicative characteristics of students with Down syndrome and to compare the patterns that emerge in each case. The case study approach allows researchers to preserve the uniqueness of each case while conducting cross-case analysis to identify similarities and differences based on data obtained from various sources (Stapley et al., 2022). The research was conducted from June to July 2026 at a Special Education School (SLB) in Malang City, East Java. The selection of the location was based on the presence of students diagnosed with Down syndrome enrolled in the SLB program, as well as the availability of access to the learning context and informants relevant to the research focus.

Population and Sample

The contextual population in this study consists of students at the SDLB level diagnosed with Down syndrome who receive educational services at the school where the research was conducted. The sample, or research participants, was determined using purposive sampling, which involves selecting participants based on characteristics aligned with the study's objectives. The primary participants in this study consisted of two students at the SDLB with a diagnosis of Down syndrome, who were subsequently coded as ST and SY to protect their identities. Participant criteria included: (1) having a diagnosis of Down syndrome; (2) being enrolled as a student at the SDLB level; (3) participating in learning activities at the school during the study period; and (4) allowing the researcher to obtain information regarding their communication behaviors and social interactions.

In addition to the main participants, the study involved four supporting informants: the parents and classroom teachers of each student. The inclusion of multiple informants was intended to obtain complementary information

regarding the students' communication characteristics, social interactions, participation, attention, engagement in activities, and behavioral responses in different contexts. The use of multiple information sources in case studies of children with Down syndrome has also been employed in recent research to gain a more contextual understanding of students' experiences and behaviors (Kelly et al., 2026).

Research Procedures

The research procedures were carried out through four main stages: initial observation, development of research instruments, data collection, and analysis of results.

Initial Observation

The study began with an initial observation to obtain a general overview of the social-communicative characteristics of the two students in school learning situations. The observation focused on several aspects, including communication initiation and responses, forms of verbal and nonverbal communication, interactions with teachers and peers, participation in activities, attention, engagement in tasks, and behavioral responses to social and learning situations. The observations were conducted directly on the students' activities during naturally occurring learning situations. The initial information from the observations was used as the basis for determining the focus of further observations and developing subsequent data collection instruments.

Development of Interview and Observation Instruments

The research instruments were developed based on the research focus and a review of the literature on communication and social interaction among children with Down syndrome. The interview instrument took the form of a semi-structured interview guide used to gather information from parents and classroom teachers regarding communication skills, social interaction, relationships with peers, participation in activities, attention, engagement in tasks, behavior, activities at home, and contextual factors influencing the students' behavior. The use of semi-structured interviews allows researchers to maintain the focus of the questions while providing informants with the space to explain their experiences in greater depth (Kelly et al., 2026).

The observation instrument was designed as an observation guide containing indicators of students' communication and social behavior. The communication aspects in the instrument were structured by considering the purpose of communication and the forms of communication used by students, in accordance with the principles used in the Communication Matrix. The use of the Communication Matrix as an observational framework has been applied in research to identify communicative functions and behaviors in individuals with communication impairments (Şimşek et al., 2026) .

Data Collection

Research data were collected through three techniques: observation, semi-structured interviews, and documentation. Observations were conducted to obtain direct data on students' social-communicative behaviors during school activities. Interviews were conducted with the parents and homeroom teachers of each student to obtain information that could not be fully observed directly, particularly regarding students' behaviors in the home context, daily communication patterns, social relationships, and factors related to the emergence of specific behaviors. Documentation is used as supplementary data in the form of relevant educational documents, such as student progress records, assessment results, individualized education programs, and teacher documentation related to students' communication skills, social interaction, participation, and development. The use of observation, interviews, and documentation in qualitative research within the context of special education has also been applied in studies on learning strategies and communication among children with Down syndrome in special education schools (Rusdiansyah & Sudana, 2024).

Data Analysis

The data were analyzed using inductive thematic analysis. The analysis was conducted in several stages: (1) familiarization with the data, (2) initial coding, (3) grouping codes into themes, (4) revisiting the themes, (5) defining and naming the themes, and (6) compiling the analysis report. These stages follow the principles of thematic analysis, which emphasize a systematic process for identifying patterns of meaning within a set of qualitative data (Byrne, 2022). In the initial stage, observation notes, interview results, and documents were read and thoroughly reviewed.

Relevant data were then coded based on the research focus, such as communication, social participation, peer interactions, attention and engagement, behavioral responses, and contextual factors. Codes with similar meanings were subsequently grouped into themes and subthemes.

The analysis was conducted in two stages. First, a within-case analysis was performed to fully describe the characteristics of each student. Second, a cross-case analysis was conducted by comparing the findings for ST and SY to identify similarities and differences in the sociocommunicative characteristics of the two students. Cross-case analysis was used to preserve the characteristics of each individual case while identifying patterns that could be compared across participants (Stapley et al., 2022) . Specifically for ST, the analysis also considered changes in social-communicative characteristics based on information regarding the previous school period and conditions during the study period.

FINDINGS AND DISCUSSION

The findings reveal that the social-communicative characteristics of children with Down syndrome are not consistently expressed across contexts. Differences were particularly evident between home and school environments and between the two participants. The data indicate three main themes: (1) changes in social participation and communication in relation to the school environment, (2) the role of peer relationships and meaningful activities in facilitating expression, and (3) the coexistence of increased social expression and persistent difficulties in attention and behavioral regulation.

1. Changes in Social-Communicative Expression Across School Contexts

The most notable change was observed in ST, a fifth-grade student who had previously shown a considerable difference between home and school behavior. Based on the previous interview with the mother, ST was described as active, talkative, and physically active at home. In contrast, observations at school previously showed a passive tendency, withdrawal from social interaction, and limited participation in classroom activities. This difference suggested that ST's social and communicative abilities were not fully reflected in the school setting.

In the current semester, ST demonstrated a different pattern. She was willing to participate in

group exercise activities, frequently talked, and spontaneously imitated movements and songs that were popular on TikTok. These behaviors indicate that ST's participation and expressive behaviors have become more visible in the school environment. However, the change was not accompanied by consistent social interaction with all peers. ST continued to select particular friends and tended to limit interaction with others.

This finding suggests that social-communicative competence in children with Down syndrome should not be understood solely as an individual and static characteristic. The same child may demonstrate different levels of participation depending on the social and emotional context in which interaction occurs. The previous findings in this study also indicated that ST was more expressive in familiar and emotionally comfortable environments, particularly at home. Thus, the current change may be understood as an indication that the school environment has become more accessible for ST's social participation, although her interaction remains selective.

The change in classroom composition may be one contextual factor associated with this development. According to the former teacher, ST previously appeared to be afraid of a classmate with ADHD. In the current semester, the two students are no longer in the same class. Although this study cannot establish a causal relationship between the classroom change and ST's behavioral development, the difference in classroom composition provides an important contextual explanation that should be considered when understanding her increased participation.

2. Meaningful Activities, Imitation, and Selective Peer Interaction

ST's increased participation is also evident in his ability to imitate. He is willing to follow along with exercise routines and often mimics songs and dance moves that are currently popular on TikTok. Based on a previous interview with his mother, ST has had fairly intensive exposure to smartphone use at home. The similarity between the digital experiences familiar to ST and the behavior he exhibits at school indicates that familiar and meaningful activities can serve as a means to support self-expression and enhance his social engagement.

However, digital exposure should not be interpreted as the direct cause of ST's increased communication. Rather, digital content appears to

function as one of the contexts from which ST obtains familiar material for imitation and expression. This finding is consistent with the previous study data showing that ST's communication repertoire was influenced by experiences in the home environment and that audio-visual content could attract her attention and encourage imitation.

Peer interaction, on the other hand, remained selective. ST did not demonstrate an equal willingness to interact with all classmates but preferred several particular peers. This finding indicates that increased participation does not necessarily mean that social interaction has become generalized across people and situations. For children with Down syndrome, opportunities to interact may still depend on familiarity, perceived safety, and the characteristics of the interaction partner. Therefore, classroom participation should not only be assessed based on whether a child is active or passive. The quality, initiations, responses, partners, and contexts of interaction are also important indicators of social-communicative development.

3. Increased Expression and Persistent Difficulties in Behavioral Regulation

Although ST currently demonstrates greater social and communicative activity, several challenges remain. She increasingly refuses when asked to complete learning tasks, has difficulty maintaining attention, and requires a relatively long time to complete assignments. These behaviors indicate that increased social expression does not automatically correspond to improved attention and behavioral regulation.

This finding is important because behavioral changes can be interpreted differently depending on the aspect being considered. From one perspective, ST's increased verbal expression, movement, and willingness to participate represent positive changes in social engagement. From another perspective, difficulty maintaining attention and refusal to complete tasks indicate continuing needs in self-regulation and learning engagement.

These findings indicate that social-communicative development and behavioral regulation should be understood as two interrelated aspects that nonetheless possess distinct characteristics. Improvements in a child's ability to express themselves and interact socially are not always accompanied by the ability to sustain attention, follow instructions, transition

between activities, and complete academic tasks independently. Thus, children may still require structured support even after demonstrating progress in social engagement and communication.

This situation underscores the importance of designing a learning environment that takes into account the child's interests, experiences, and the most appropriate ways for them to engage. Meaningful activities aligned with the child's interests can serve as a starting point for increasing participation, while consistent routines, brief and clear instructions, visual supports, and appropriate reinforcement can help the child gradually maintain engagement in academic activities.

4. Relatively Stable Characteristics of SY Across Educational Transition

Unlike ST, SY, who has now entered junior high school, still exhibits characteristics that are relatively similar to those found in previous data. Previous research indicates that SY has been able to initiate communication independently and use communication for pragmatic purposes in daily interactions. However, SY still faces challenges in articulation and sentence construction. These characteristics remain evident even after SY's transition to a higher educational level, suggesting that the change in educational level has not yet been fully accompanied by significant changes in his social-communicative abilities.

A comparison between ST and SY reveals that chronological age and educational level do not always correlate directly with the level of social-communicative development in students with Down syndrome. ST demonstrated fairly noticeable changes in social participation and expression even while still in elementary school. In contrast, SY's social-communicative characteristics tended to remain relatively stable even after moving on to middle school. These findings indicate significant developmental variation among students with Down syndrome.

These differences underscore that the development of students with Down syndrome is heterogeneous and does not proceed uniformly. Social-communicative development can be influenced by individual characteristics, prior learning experiences, environmental conditions, opportunities for social interaction, and the consistency of support provided by families and schools. Therefore, instructional planning in special education schools must be based on

students' functional profiles, current abilities, barriers, and individual needs not solely on chronological age or grade level. This approach allows learning objectives, strategies, media, and forms of support to be tailored to each student's specific circumstances, ensuring that interventions are more relevant and focused on functional development.

5. Cross-Case Interpretation: Social-Communicative Development as Context-Dependent

A comparison of ST and SY shows that social-communicative behavior results from the interaction between individual characteristics and the environmental context. ST demonstrated increased participation following changes in the school's social environment, whereas SY's patterns remained relatively stable despite moving to a higher level of education. These findings reinforce previous results indicating that ST is more active and communicative at home but tends to be passive at school. Thus, these behavioral differences cannot be fully explained by individual abilities alone; they must also be understood in terms of environmental conditions, the quality of interactions, and students' opportunities to participate. In the context of special education schools, assessment and instructional planning must therefore take into account variations in student performance across different contexts and provide an environment that supports the development of social-communicative skills.

The current findings indicate that this difference is not necessarily permanent. Changes in the school context may coincide with changes in the way the child expresses existing abilities. Therefore, the central finding of this study is not simply that children with Down syndrome experience communication difficulties, but that the visibility of their social and communicative abilities may vary according to the context in which those abilities are expressed. A supportive and familiar environment may provide greater opportunities for children to demonstrate abilities that are less visible in other settings.

At the same time, the findings caution against interpreting increased activity as an indication that all developmental difficulties have been resolved. ST's increased expression and participation coexist with selective peer interaction, difficulty sustaining attention, task refusal, and slow task completion. Similarly, SY's

ability to initiate communication coexists with persistent articulation and language organization difficulties.

These findings emphasize the need for individualized educational support that considers not only what children can do, but also content may provide meaningful opportunities for imitation, communication, and engagement, although its educational effects require further empirical investigation. Overall, the comparison of ST and SY suggests that the educational needs of students with Down syndrome cannot be adequately determined from diagnostic characteristics alone.

A context-sensitive and individual needs oriented approach is necessary to identify the conditions under which learners are able to communicate, participate, interact, and engage optimally. This perspective views the environment not merely as a setting for learning, but as a crucial component that influences opportunities for social and communicative behaviors to emerge. Unlike ST, SY exhibits relatively stable social-communicative characteristics even after transitioning to junior high school. A comparison of these two cases shows that chronological age and educational level do not directly determine the development or visibility of social-communicative abilities in students with Down syndrome.

These findings suggest that educational support should not focus solely on improving individual communication skills but must also create a safe, comfortable, and meaningful environment so that students can participate and generalize their skills across various social contexts. Therefore, assessments and interventions must consider the interrelationships among individual characteristics, peer relationships, family experiences, classroom conditions, and behavioral regulation. Meaningful activities that align with students' interests including appropriately used digital experiences can serve as entry points for increasing engagement, while remaining focused on individual learning objectives.

Discussion

Research findings indicate that the social-communicative characteristics of students with Down syndrome are heterogeneous and can be influenced by both individual characteristics and environmental context. A comparison of ST and SY shows that a shared diagnosis does not

necessarily result in uniform patterns of communication, social participation, peer interaction, attention, and engagement in learning. These findings are consistent with those of (Soccorso et al., 2024) who demonstrated substantial variation in developmental achievements and service needs among children with Down syndrome, indicating that educational and developmental support must be tailored to the individual needs of each student.

Changes in ST's behavior during the observation period were also a key finding. Previously, ST's mother reported that he was more active and communicative at home but tended to be passive at school. In the current observation, ST demonstrated increased verbal expression, engagement in gymnastics activities, and the ability to spontaneously imitate popular songs and movements. These differences indicate that the social-communicative behavior observed in students with Down syndrome can vary depending on the context of the interaction. Thus, communication competence cannot be assessed solely based on performance in structured situations but must be understood through the variation in students' abilities across different environments, activities, and social conditions. This perspective is crucial in developing assessments and interventions in special education schools so that evaluations do not focus solely on apparent limitations but also identify conditions that allow students' social-communicative abilities to emerge optimally.

Recent research has emphasized the need to examine social communication in naturalistic settings and across everyday interactional contexts. (Channell et al., 2023), for example, demonstrated that social skills in youth with Down syndrome encompass multiple domains, including social engagement, communication, cooperation, and self-control, rather than a single global construct.

The increased verbal and physical participation observed in ST also suggests that communication should be understood broadly, including verbal expression, imitation, gesture, movement, and participation in shared activities. This interpretation is supported by research demonstrating that individuals with Down syndrome may rely on multiple communicative modalities and may show strengths in social engagement even when expressive language remains relatively challenging. (Frizelle et al., 2023) found that communication between

children with Down syndrome and their parents could be supported through multimodal interaction involving spoken language and key-word signs, highlighting the importance of providing communication opportunities within meaningful shared activities. Similarly, research on language development has shown that language abilities in Down syndrome are multidimensional, with vocabulary and morphosyntactic abilities contributing differently to broader communicative outcomes (2024).

ST's willingness to imitate songs and movements that were currently popular on TikTok is particularly noteworthy. Rather than interpreting this behavior as evidence that social media directly improved her communication, it may be understood as an indication that familiar and personally meaningful content can become an entry point for social participation and imitation.

This interpretation is supported by recent research showing that technology and social media have become part of the daily lives of individuals with Down syndrome. (Morris et al., 2024), through a survey of 220 parents and caregivers of individuals with Down syndrome aged 5–35, found that technology and social media play an important role in the lives of most participants, although concerns regarding online safety and barriers to technology use still exist. In the context of ST, exposure to digital media should therefore be understood as part of the sociocultural environment that shapes their daily experiences, rather than being directly regarded as a form of intervention or a factor causing behavioral change.

Although participation among individuals with Down syndrome has generally increased, their engagement with peers remains selective. These findings suggest that improved communication abilities do not necessarily lead to the generalization of social skills across all peers and interaction situations. (Channell et al., 2023) emphasize that social skills in individuals with Down syndrome encompass several distinct domains; therefore, social functioning must be assessed based on the variety of interaction forms and contexts. In line with this, (Astutik et al., 2024) demonstrated that students with Down syndrome are capable of exhibiting social interaction skills in the school setting, but the quality of that engagement must be understood in relation to the support and social conditions surrounding them.

Changes in the composition of ST's peer group also constitute a contextual factor that warrants attention. Previous information from the teacher indicated that ST felt uncomfortable or afraid of a classmate with ADHD. During the current semester, the two were no longer in the same class, and this change coincided with an increase in ST's participation. However, this finding cannot be used to conclude a causal relationship between changes in class composition and the development of ST's behavior. These changes are better understood as environmental conditions that have the potential to influence students' opportunities for participation and sense of social safety. This interpretation aligns with Carbone et al. (2023), who demonstrated that the quality of the teacher–student relationship is closely related to the socialization and learning experiences of students with Down syndrome.

The importance of the school context is further emphasized by Boundy et al. (2023), who demonstrate that the successful participation of students with Down syndrome in education is linked to the clarity of educators' roles, the provision of appropriate instruction, and contextual support within the school environment. Thus, the social-communicative development of students with Down syndrome must be understood in a multidimensional way, taking into account individual characteristics, digital experiences, peer relationships, relationships with teachers, class composition, and the overall school environment.

Therefore, ST's change should not be interpreted simply as an improvement in an individual trait. Rather, it may reflect an interaction between her individual characteristics and changes in the social environment. This perspective is particularly relevant for special education because it shifts attention from asking whether a student is “social” or “not social” toward examining under what conditions the student is more willing and able to participate.

At the same time, increased social and verbal participation did not eliminate ST's difficulties in learning activities. She continued to demonstrate task refusal, difficulty maintaining attention, and prolonged task completion. These findings are important because they demonstrate that social participation and academic engagement do not necessarily develop at the same pace. Recent research has identified attention and engagement as relevant challenges

for children with Down syndrome. (Bridi et al., 2024), for instance, found that children with Down syndrome demonstrated differences in attention during instructional tasks and that animated visual support could improve attentional focus and motivation during motor-skill instruction. Similarly, (Schworer & Esbensen, 2025) examined the feasibility of computer- and tablet-based executive-function assessment in youth with Down syndrome, reinforcing the relevance of attention and executive functioning when examining learning behavior in this population.

ST's task refusal should therefore not immediately be interpreted as simply "noncompliance." It may represent an observable behavioral response to task demands, limited sustained attention, difficulty processing instructions, low task motivation, or a mismatch between the task and the student's current abilities. This interpretation is supported by recent research examining contextually inappropriate social behavior in children with Down syndrome, which emphasizes the importance of identifying the environmental and functional conditions associated with behavior rather than treating behavior as an isolated individual characteristic (Izquierdo et al., 2024). For educational practice, this suggests that teachers should examine what happens before, during, and after task refusal, including task difficulty, instructional format, available prompts, motivation, and environmental distractions.

The finding regarding ST's imitation of songs and movements is also relevant to instructional design. Rather than treating these interests as unrelated to learning, preferred activities may provide opportunities to establish joint attention, imitation, turn-taking, and communication. Recent intervention research supports the importance of socially mediated activities for communication development. (Stojanovik et al., 2024), through the ASCEND feasibility trial, examined an intervention targeting early social communication and shared attention in children with Down syndrome and demonstrated the feasibility and acceptability of a parent-delivered social communication approach. Similarly, (Ronski et al., 2023) examined a parent-implemented augmented communication intervention and emphasized the potential of caregiver-mediated strategies to support communication development in children with Down syndrome. Although these studies involve

younger children than the participants in the present study, they reinforce the broader principle that communication develops through meaningful interaction rather than through isolated language practice alone.

The current findings also suggest that imitation may constitute a meaningful bridge between individual interests and social participation. ST's spontaneous imitation of popular songs and movements indicates that she can recognize, reproduce, and share socially meaningful content. This behavior could potentially be used by teachers as a starting point for expanding communication for example, by encouraging the student to request a song, choose between activities, imitate a peer, take turns, or comment on an activity. However, such possibilities should be regarded as educational implications rather than demonstrated intervention effects because the present study did not experimentally test the effectiveness of digital-media-based intervention.

In contrast, SY demonstrated relatively stable social-communicative characteristics following the transition to junior secondary education. The difference between ST and SY reinforces the importance of examining developmental trajectories individually. (Soccorso et al., 2024) similarly reported substantial variability in developmental skills, behavioral characteristics, and receipt of educational and therapeutic services among children with Down syndrome. Their findings indicated that older children may demonstrate greater developmental needs while receiving fewer targeted services, emphasizing the importance of individualized support across developmental transitions. Thus, SY's relatively stable profile should not be interpreted as evidence of developmental stagnation; rather, it indicates the need to examine which domains are changing, which remain stable, and whether existing educational supports correspond to her current needs.

CONCLUSION

Overall, the research findings indicate that the social-communicative characteristics of students with Down syndrome are heterogeneous, multidimensional, and context-sensitive. A comparison of ST and SY reveals that the observed variations in participation and communication may be related to differences in

peer composition, activity characteristics, individual interests, developmental stages, and learning demands. However, these findings cannot be used to conclude that changes in students' behavior are caused by a single specific contextual factor. Instead, the research results emphasize that social-communicative behavior must be interpreted based on the dynamic interaction between individual characteristics and environmental conditions. This perspective implies that assessments and instructional planning for students with Down syndrome must consider not only individual abilities but also the social context, activity characteristics, and environmental supports that can influence opportunities for optimal participation and communication.

This interpretation has several implications for special education practice. First, assessment should include observations across different contexts rather than relying exclusively on formal academic tasks. Second, teachers should identify activities and interests that naturally increase participation and use these as opportunities for communication and social learning. Third, selective peer interaction should be addressed gradually through structured and positive peer experiences rather than requiring immediate generalized interaction. Fourth, task refusal and limited attention should be examined functionally, considering task characteristics, motivation, instructional support, and environmental conditions. Finally, digital media should not simply be viewed as a distraction; when appropriately mediated, familiar digital.

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