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Empowering Social Environment as Scaffolding for Students with Autistic Spectrum Disorder (ASD) in Teaching Basic Communication

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ABSTRACT

Students with ASD have obvious characteristics that they have limitations in making communication and have low social awareness. For that reason, they need to be supported on how they can improve their communication ability. This research aimed to describe how the social environment is empowered and created to help students with ASD learn to communicate. The study's design was a multi-case study conducted in an inclusive school in North Bali. Three cases of students with ASD with their teachers, the school principal, and a technical assistant were involved as the study's subjects. The data were collected for 12 months and analyzed qualitatively. The study results show that several types of social environments were modified to teach students about basic communications such as morning circles, cooperative buddy programs, sensory garden programs, modelling, and go-play activities. The use of the programs functions as scaffolding, which then indicates improvements in the students ' social interactions and basic communication. The implication of this study suggests the importance of creating a supportive social environment program for students with ASD to enhance their social awareness and interaction.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a type of pervasive developmental disorder (PDD) that involves long-term difficulties in social interaction skills and a tendency to exhibit repetitive and limited communication behaviours (Chang et al., 2021; Minaabad, 2020). Students with ASD frequently encounter challenges in forming and maintaining social bonds. They typically experience restrictions on social communication and often try to socialize in a very structured manner. It is important to understand that these issues are not a sign of disinterest or reluctance to socialize but arise from their struggle to use appropriate social, communication, and language skills (Adnyani & Munir, 2022; Ali et al., 2019; Minaabad, 2020). Autism is classified as a spectrum disorder due to the various types of symptoms and severity. The National Institute of Mental Health (2023) highlighted that not all people with ASD will encounter the same characteristics. Still, most of them will experience several of the following difficulties: it is hard to listen and make eye contact while talking to others, infrequently telling others about their interests and emotions, giving a delayed or no response to verbal cues, it is hard to communicate information reciprocally, to adapt their behaviours in social life, having difficulty changing the established routines and feeling distressed or agitated by even minor changes to those routines, and showing heightened or decreased sensitivity to sensory input such as light, sound, clothing, or temperature.

Indeed, a significant issue for children with ASD is difficulty in social communication, which is linked to their challenges in using social skills. Conversely, a person with ASD mostly has several strengths, including the capability to learn and

recall detailed information for a long period. Furthermore, most of them are great visual and auditory learners, which supports their proficiency in various fields such as science, mathematics, art, and music (Courchesne et al., 2020). They have a great visual interest in colours, lines, numbers, shapes, and objects (Chen et al., 2023; Padmadewi & Artini, 2017; Zhou et al., 2023). Similarly, the National Institute of Mental Health (2023) highlights that students with ASD demonstrate a long-term and highly focused attraction to particular subjects, which may include images, numbers, details, or factual information. Thus, teachers can incorporate visual aids in the teaching and learning process since they can grasp the information more easily and for a longer period than spoken or heard words (Sperotto, 2016).

The symptoms and daily functioning of someone with ASD can be enhanced through therapies and services, even though it might be a lifelong disability (National Institute of Mental Health, 2023). Some programs and strategies aim to address the main challenges of social communication in autism, for instance, social skills training programs that have shown moderate helpful evidence. This can involve the participation of family members and friends, lengthening the sessions, incorporating targeted activities to enhance self-awareness of one's emotional states, and utilizing more visual aids (Ali et al., 2019; Lord et al., 2020; Padmadewi & Artini, 2017). Providing educational support to students with ASD early on is crucial for their long-term academic success and overall quality of life as adults (Kumar & Behera, 2021). Furthermore, starting intervention during preschool and primary school is highly beneficial but practical and feasible for implementation.

Creating an effective inclusive environment is very highly essential in teaching communication skills to students with ASD. It can promote a sense of belonging and encourage positive social interactions which enable students with ASD to practice and develop their communication skills in a comfortable and understanding context (Paraskevi, 2021; Silveira-Zaldivar et al., 2021). There are several characteristics of an effective classroom environment, such as supporting all students in the classroom in ways that are a “natural and unobtrusive environment, continuing to use supports that fit into their daily classroom routine, changing what happens in the classroom which maintains a successful inclusive environment so students with ASD can receive instruction within a supportive environment (McLeskey & Waldron, 2007 in Denning & Moody, 2013). In an inclusive and supportive setting, students with ASD have opportunities to engage with their peers, learn from social cues, and practice communication in real-life situations (Chen et al., 2022; Silveira-Zaldivar et al., 2021). Socializing within a structured and encouraging environment helps bridge the gap in social communication difficulties often encountered by students with ASD.

An effective social environment provides a platform for implementing targeted interventions and strategies. Teachers can utilize scaffolding techniques within this environment to facilitate communication learning for students with ASD. Scaffolding can be defined as contingency support intended to assist students in acquiring new skills and knowledge. The word "scaffolding" describes the conditional assistance that more experienced individuals give a novice student, especially in the early phases of learning (Maksić & Jošić, 2021). According to van de Pol et al. (2012), scaffolding emphasizes a crucial aspect of students' learning processes that others assist and guide. Arifin et al. (2004) conducted research in the form of a case study of EFL Teacher Scaffolding of an ASD Learner's Shared Reading with a Storybook App. It was noticed that the EFL teacher supported the ASD student during shared reading sessions using the Storybook app by utilizing the three types of scaffolding—cognitive, affective, and technical.

Other studies on the subject of instructing students with ASD have been conducted. Silveira-Zaldivar et al. (2021) studied related literature on evidence-based practices to increase social skills for students with ASD through various engagement, representation, and expression methods. Lasintia, Prihantoro, Edy, and Ariani (2021) studied English language teaching strategies for ASD students, especially regarding implementing teaching strategies conducted at SMP LB in Bengkulu, Indonesia. Cook et al. (2022) carried out a study on practical teaching techniques for students with ASD used by teachers from mainstream and special schools. The current state of research on ASD has made significant progress in exploring the challenges and strengths of students with ASD, with a specific emphasis on difficulties in social communication and diverse intervention approaches. However, a notable gap emerges when considering the limited exploration of how the social environment functions as scaffolding for students with ASD in their journey to learn and improve communication skills. This gap raises critical questions about the extent to which modifications to the social environment can positively influence the communication skills of students with ASD. Therefore, the study aims to analyze and investigate how the social environment acts as scaffolding for students with ASD in learning to communicate.

METHODS

The study was carried out as a multi-case study involving three cases of students with ASD who study in an inclusive school in North Bali that provides an inclusive education system for teaching students with ASD in the school. The ages range from 8 to 12 years old. They are classified as students with ASD because they have limitations in communication, low social awareness, and a very narrow interest in certain things, even though they can say certain words and identify certain objects around them. Their competency is lower than the competency of their similar-age friends.

The inclusive education system is conducted by having a pull-out system and providing integration. The students are pulled out of the regular classroom for an intensive and individualized program tailored to their needs. However, for certain courses like art, music, and physical exercise (PE), students with ASD are included and integrated into the regular classroom.

The data were collected using observations, interviews, and document analysis. The analyzed documents include the Individual Education Plan (IEP) made by the teachers for each student, the learning sheets, the assessment instruments, the media used, and the reports.

The observation was conducted for about 12 months (two semesters), and interviews were conducted every time some information was needed for clarification. The interviews were conducted with the teachers, the school principal, and the technical assistance of the school. The data were collected until they were considered to be saturated. The collected data were then analyzed. The data about the kinds of social environments utilized as scaffolding for the students were analyzed qualitatively using Qualitative Data Analysis proposed by Miles and Huberman (1994) which covers data reduction, data display, and conclusion. Meanwhile, the data about the students' achievements as the results of implementing the social environments were analyzed descriptively. The results of the analysis are presented in the following section:

RESULTS AND DISCUSSION

Results

The findings in this section are to describe and analyze the social environment as scaffolding for students with autistic spectrum disorder (ASD) in teaching basic communication. The social environment is highly essential in students' lives. Nolan and Raban-Bisby (2015) claim that the environment influences children's development.

No	Social environment program	Description	Purpose
1	Morning Circle	Simulation of interaction in the morning using visual support and grouping activities.	To introduce a system of conversation in the morning time.
2	Cooperative Buddy program	Assigning students with regular students to do certain activities to enhance their communication skills. Assign all students with ASD to have activities together and stimulate their communication ability.	To learn cooperatively from friends in a natural context
3	Sensory garden program	Using the garden as a source of learning, practising certain behaviours, and social interaction.	To have sensory therapy and learn to respond to the teacher's instructions.
4	Modelling	Using examples as a source of learning, for example, a teacher showing an activity and followed by the student.	To learn from a model provided (either from a teacher or a friend)
5	Go-play activity	Using the playground as a source of learning for students with ASD to play with regular students in the classroom	To practice social interaction with other students in the playground.

Table 1: Social Environment Program for students with ASD

From Table 1, it can be seen that social environments were created to help students understand the concepts they learned. The programs function as scaffolding, which leads students to build meanings in their brains by building hypotheses based on direct experiences through the programs. The importance of scaffolding for students has been stated by Hannafin & Hannafin (2003), Mahan (2022), and Padmadewi et al. (2023).

The utilization of the programs supports students in building their conclusions about the concept, which leads them to develop their communication skills from the baseline of their communication ability. The communication ability before the data were collected is described as the baseline, which is described as follows.

Case 1: A student with ASD at the age of 8 years old (the name code is DV)

No	Communication Ability	Baseline: October 2022				
		1	**2**	**3**	**4**	**5**
1	Basic social interaction					
	• Able to greet friends and teachers	+	+	+	+	+
	• Able to respond to simple questions	√	√	√	√	√
	• Able to communicate about own feeling	√	√	√	√	√
2	Writing skill					
	• Writing based on examples with an emphasis on the use of capital letters and periods.	√	√	√	√	√
	• Filing in a blank with words in a short story	√	√	√	√	√
3	Reading					
	• Reading a short text of 3-4 words.	+	+	+	+	+
	• Reading words with 3-4 syllables	+	+	+	+	+
	• Reading one simple paragraph	√	√	√	√	√
4	Speaking Skill					
	• Able to say basic information (3-4 words) in Bahasa Indonesia	+	+	+	+	+
	• Able to say simple words in English	+	+	+	+	+
5	Listening					
	• Able to understand teachers' instruction and do it.	√	√	√	+	+

Table 2: The baseline of communication ability of the 8-year-old student with ASD

Note: - means not observable
√ means able to do the instruction but need to be stimulated by the teacher
+ means able to do the instruction without being stimulated by the teacher
++ means willing to do instructions by himself.

Case 2: A student with ASD at the age of 10 years old (the name code is SN)

No	Communication Ability	Baseline: October 2022				
		1	**2**	**3**	**4**	**5**
1	Basic social interaction					
	• Able to greet friends and teachers	√	√	√	√	√
	• Able to respond to simple questions	√	√	√	√	√
	• Able to communicate about own feeling	√	√	√	√	√
2	Writing skill					
	• Writing based on examples with an emphasis on the use of capital letters and periods.	√	+	+	√	√
	• Filing in a blank with words in a short story	√	√	√	√	√
3	Reading					
	• Reading a short text of 3-4 words.	√	√	√	√	√
	• Reading words with 3-4 syllables	√	√	√	√	√
4	Speaking Skill					
	• Able to say basic information (3-4 words) in Bahasa Indonesia	√	+	+	√	√
	• Able to say simple words in English	√	√	√	√	√
5	Listening					
	• Able to understand teachers' instruction and do it.	√	√	√	√	√

Table 3: The baseline of communication ability of the 10-year-old student with ASD

Note: - means not observable
√ means able to do the instruction but need to be stimulated by the teacher
+ means able to do the instruction without being stimulated by the teacher

++ means willing to do instructions by himself.

Case 3: A student with ASD at the age of 12 years old (the name code is AP)

Communication Ability		**Baseline: October 2022**				
No		1	2	3	4	5
1	Basic social interaction					
	• Able to greet friends and teachers	√	√	√	√	√
	• Able to respond to simple questions	√	√	√	√	√
	• Able to communicate about own feeling	√	√	√	√	√
2	Writing skill					
	• Writing based on examples with an emphasis on the use of capital letters and periods.	√	√	√	√	√
	• Filing in a blank with words in a short story	√	√	√	√	√
3	Reading					
	• Reading a short text of 3-4 words.	√	√	√	√	√
	• Reading words with 3-4 syllables	√	√	√	√	√
4	Speaking Skill					
	• Able to say basic information (2-3 words) in Bahasa Indonesia about the names of the teachers	√	√	√	√	+
	• Able to say simple words in English (Bye-Bye)	√	√	√	√	√
5	Listening					
	• Able to understand teachers' instruction and do it.	√	√	√	√	√

Table 4: The baseline of communication ability of the 12-year-old student with ASD

Note: - means not observable
√ means able to do the instruction but need to be stimulated by the teacher
+ means able to do the instruction without being stimulated by the teacher
++ means willing to do instructions by himself.

The achievement of the students after 2 (two) semesters:

Case 1: A student with ASD, the name code of DV, after one year of learning

Communication Ability		**After 1 (one) year: October 2023**				
No		1	2	3	4	5
1	Basic social interaction					
	• Able to greet friends and teachers	+	+	+	+	+
	• Able to respond to simple questions	+	+	+	+	+
	• Able to communicate about own feeling	+	+	+	+	+
2	Writing skill					
	• Writing based on examples with an emphasis on the use of capital letters and periods.	+	+	+	+	+
	• Listening to a short story and answering simple questions	+	+	+	+	+
3	Reading					
	• Reading a simple paragraph	+	+	+	+	+
	• Doing a monologue after watching the video he likes.	+	+	+	+	+
4	Speaking Skill					
	• Able to say basic information (3-4 words) in Bahasa Indonesia	+	+	+	+	+
	• Able to say simple words in English	+	+	+	+	+
5	Listening					
	• Able to understand teachers' instruction and do it.	+	+	+	+	+
	General Comments: can make simple reciprocal conversation					
	Difficulties:					

	Cannot follow the routines of the class if integrated into the regular classroom;

Table 5: The improvement of communication ability of DV, the student with ASD

Note: - means not observable
√ means able to do the instruction but need to be stimulated by the teacher
+ means able to do the instruction without being stimulated by the teacher
++ means willing to do instructions by himself.

Case 2: A student with ASD with the name code SN after one year of learning

Communication Ability		**After 1 (one) year: October 2023**				
No		1	2	3	4	5
1	Basic social interaction					
	• Able to greet friends and teachers	+	+	+	+	+
	• Able to respond to simple questions	+	+	+	+	+
	• Able to communicate about own feeling	+	+	+	+	+
2	Writing skill					
	• Writing based on examples with an emphasis on the use of capital letters and periods.	+	+	+	+	+
	• Listening to a short story and answering simple questions	+	+	+	+	+
3	Reading					
	• Reading a simple paragraph	+	+	+	+	+
	• Doing a monologue after watching the video he likes.	+	+	+	+	+
4	Speaking Skill					
	• Able to say basic information (3-4 words) in Bahasa Indonesia	+	+	+	+	+
	• Able to say simple words in English	+	+	+	+	+
5	Listening					
	• Able to understand teachers' instruction and do it.	+	+	+	+	+

General Comments:
Clear improvement: able to take the initiative, able to make simple reciprocal conversation

Difficulties:
Cannot follow the routines of the class if integrated into the regular classroom;
Mostly passive if included in the regular classroom for attending daily routine.

Table 6: The improvement of communication ability of SN, the student with ASD

Note: - means not observable
√ means able to do the instruction but need to be stimulated by the teacher
+ means able to do the instruction without being stimulated by the teacher
++ means willing to do instructions by himself.

Case 3: A student with ASD with the name code AP after one year of learning

Communication Ability		**After 1 (one) year: October 2023**				
No		1	2	3	4	5
1	Basic social interaction					
	• Able to greet friends and teachers	√	√	√	√	+
	• Able to respond to simple questions	√	√	√	√	√
	• Able to communicate about own feeling	√	√	√	+	+
2	Writing skill					
	• Writing based on examples with an emphasis on the use of capital letters and periods.	√	√	√	√	√
	• Listening to a short story and answering simple questions	√	√	√	√	√
3	Reading					
	• Reading simple words (1-2 syllables)	√	√	√	√	√

4	Speaking Skill					
	• Able to say basic information (3-4 words) in Bahasa Indonesia	√	√	√	√	√
	• Able to answer question	√	√	√	+	+
	• Able to say simple words in Bhs Indonesia (greeting, asking about favourite food, asking about the day and weather)	+	+	+	+	+
6	Listening					
	• Able to understand teachers' instruction and do it.	+	+	+	+	+
	General comments: Clear improvement: taking the initiative to give simple comments in Bahasa Indonesia and English for greeting weather. Able to write own name and trace words; Able to do instruction/routines, e.g. cleaning the room; Having an obsession with the curtain and obvious improvement if rewarded with the curtain, the thing he likes. Difficulties: Cannot follow the routines of the class if integrated into the regular classroom; Cannot make reciprocal conversation yet; Mostly cannot stay still in the classroom.					

Table 7: The improvement of communication ability of AP, the student with ASD

Note: - means not observable
√ means able to do the instruction but need to be stimulated by the teacher
+ means able to do the instruction without being stimulated by the teacher
++ means willing to do instructions by himself.

The findings shown in the table previously presented indicate that the social environment program provided is a kind of multimodal activity that can provide students with beneficial support in the scaffolding to help them gradually improve their understanding of the concepts.

Discussion

The multimodal social environment implemented at the school can help the students improve their language skills, even though the improvements seem slow despite the observation time being one year or two semesters. Wilson (1997) proposed that play in the environment is essential to developing social and cognitive skills. Youngsters will get to know other kids, play, and work together to create things. The policy of inclusive education of the school has been able to provide an essential environment where regular students and students with ASD can mix and mingle together from which they all can learn and practice social interaction and improve their social rules and awareness in addition to improvement in basic communication skills.

Several social environment programs are implemented to provide students with activities that function as sources of learning. Nolan and Raban-Bisby (2015) claim the importance of the environment's influence on children's development. The morning circle simulates how greeting and simple social interaction must be conducted. The activities practised during the morning circle visually show the students how interactions must be conducted. As a type of visual learner, the use of visual aids can engage the students and enable them to grasp the information more easily and for a longer period (Intepe-Tingir & Whalon, 2023; Sperotto, 2016). During the morning circle, the students sat in a circle, and the teacher used a circle of pictures with the keywords. The pictures functioned as a clue for the spellings and stimulated the students on what to say and how to say the greetings. With one year of treatment, the student with the AP code shows the most obvious improvement. He is slow to adapt to the environment and improve his verbal abilities. However, after one year, not only can he say several words, but also his vibes of living in the school environment are much more alive, and he has a lot of fun at school. The improvements in the communication skills of the other two students are also significantly obvious. As indicated in the data of Cases 1, 2, and three, the students with ASD all improve their language skills even though the improvements are not equal.

The use of a buddy program also indicates its meaningful support. The buddy program pairs the student with an older student from a regular classroom assigned to work and study together. This is usually conducted during the project day. The older student is assigned to lead the student with ASD in conducting any tasks or projects. In this program, the older

student not only has an essential chance to exercise character values like leadership, responsibility, and acceptance, but also he has the opportunity to practice explaining a certain concept, a skill of simplifying any explanation to make the students with ASD easy to follow and finish the task/project. They practised authentic cooperative learning, which benefits both of them. Moreover, by implementing a buddy program, the students with ASD are engaged with other students in an authentic environment. This is in line with other research (Steinbrenner et al., 2015) that claims that children with autism spectrum disorder (ASD) need to be engaged in activities since it is vital to their growth and learning.

The social environment program is also provided through sensory garden activities. In this program, the students are trained to exercise their basic communication skills in an authentic environment by practising listening to teachers' instructions. The teacher said, “Please pull that pipe!”, or “Please water that part!” and other instructions. The students are trained to understand the instruction by looking at the action examples provided by their teachers. Besides being used for authentic language learning practice, the sensory garden is also used for sensory therapy. They practice balancing if they have to walk on a small path, holding a pipe and watering the garden, sensing the feel of the leaves or tree trunk, and practising body coordination. The students are exposed to important training in social interactions, awareness, and norms through this natural environment. One research offers a narrative summary of the necessity of addressing sensory integration processes to assist in increasing awareness among carers and professionals for children with ASD. This favours the stimulation of the cognitive and physiological processes, which are crucial for the autonomous development of ASD children in daily activities (Vives-Vilarroig et al., 2022). The effectiveness of sensory activities for students with ASD aligns with other research. Children with autism benefit greatly from sensory integration therapy because it helps them become more autonomous and participate in daily activities (Karim & Mohammed, 2015).

The examples provided by others, such as modelling by the teacher or friends in carrying out certain activities followed and imitated by the students with ASD, are a source of learning for students. This natural modelling technique is also reconfirmed by creating a program from which modelling can be carried out. This is done by creating a buddy program where the teacher assigns a student to stand up in front of the student with ASD intentionally to show examples of opening his clothes. It has been demonstrated that peer-mediated interventions improve social conduct in autistic kids (Paterson, 2004).

During break time, the students with ASD can mingle in a schoolyard for a go-play activity. Play is a highly rewarding and abundant activity in developing children (Ginsburg et al., 2007; Lillard, 2017). Wilson (2010) asserts that kids play by setting their own rules and being free to select what they want to do. Children learn to recognize their surroundings through play. The authentic environment of playing together is a real practice of social awareness where the students are trained to live in a natural setting to understand verbal instruction and social rules. The environment provided functions as scaffolding, providing guided support. Play is essential for the optimal growth and maturation of children. Engaging in play offers many developmental advantages, encompassing physical, emotional, cognitive, and social benefits. It offers a safe and stimulating setting for children and teenagers to enhance their athletic abilities, explore their social behaviours, mimic various situations, and consider their activities' positive and negative consequences (Nijhof et al., 2018). The significance of socialization through various social programmes was reaffirmed in earlier studies (Iswari & Efrina, 2019; Koegel et al., 2013; Silveira-Zaldivar et al., 2021).

The social environment programs provide students with scaffolding before they can understand and respond to the social rules. The programs made students independent and involved in an authentic communications setting. In the context of education, scaffolding can take many different forms, such as providing students with guidance, remarks, and support while they work through an assignment or problems (Barzilai & Blau, 2014; Muhonen et al., 2016; Zhang & Quintana, 2012).

The effects of the program's implementations are reflected in the improvements of the students with ASD. The changes in the student’s communication ability from 2022 to 2023, where the students can read several words, are obvious. For example, the student with the AP code shows improvements despite being the lowest compared to the other two. DV and SN show significant improvements in that they can initiate certain verbal expressions and can read certain vocabulary. DV and SN have been able to have reciprocal simple conversations. Despite their improvements, the results of observations show that social interactions do not highly improve. The students show their ability to express certain

vocabulary and have one-to-one conversations verbally. Still, they are not competent yet to have social communications involving longer conversations. Giving kids the chance to play as they study helps them develop into competent adults. According to DEEWR (2009) and Nolan & Paatsch (2018), children learn about their surroundings through play. Not only is playing enjoyable, but it also helps kids learn. Children will actively explore their desires, options, and chances for self-expression while playing. While adults or educators can provide guidance when needed, they should allow children to lead their play and learning activities. This approach fosters children's independence, problem-solving skills, and capacity, contributing to their eventual competence.

The limitation of this study is related to the sample size of the study. This study primarily focuses on three cases of students with ASD within a specific inclusive school in North Bali. Although these cases provide valuable insights into the impact of the social environment programs on language skills and social interactions for students with ASD, the generalizability of the findings might be constrained due to the limited sample size and the specific context of the inclusive school. The diversity within the ASD population and potential variations in responses to the social environment programs among students from different backgrounds and educational settings may not be fully captured by the selected sample. Therefore, future research with larger and more diverse samples could further enhance the external validity of the findings and offer a more comprehensive understanding of the implications of social environment programs for students with ASD.

CONCLUSION

This study explored the implementation and the impact of social environment programs as scaffolding for students with Autism Spectrum Disorder (ASD) in an inclusive school setting. The findings revealed that the implemented social environment programs, such as the morning circle, cooperative buddy program, sensory garden program, modelling, and go-play activity, served as effective scaffolding for students with ASD to enhance their language skills and social interactions. the results demonstrated significant improvements in the communication abilities of the three students with ASD over one year. although the improvements in language skills were evident, challenges in extended social communications were acknowledged. this study implied the significance of these social environment programs as scaffolding for students with ASD to enhance their social awareness and interaction. It is expected that this study can inspire language teachers not only in the context of inclusive schools but also in regular mainstream schools on how environments can be utilised for learning. However, it is essential to recognize the limitations of the study, particularly the small sample size and the specific context of the inclusive school in North Bali. Future research with larger and more diverse samples could contribute to a more comprehensive understanding of the implications of social environment programs for students with ASD across various settings.

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