

Comparison of Cognitive and Behavior Development Between Typical Students and Students with Multiple Disabilities (Deaf and Autism)

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Abstract

The development of children encompasses interconnected aspects such as cognitive, physical, socioemotional, language, and behavioral domains. However, not all children are born following typical developmental trajectories. This is because some children have disabilities that may affect their cognitive, emotional, and physical development differently from typically developing children. Therefore, the purpose of this case study is to explore the developmental comparison between typically developing students and students with Special Education Needs (SEN) with multiple disabilities. This study is crucial for schools, especially teachers, to plan teaching and learning activities that are appropriate for students' developmental stages. Furthermore, this case study involves two participants, a 10-year-old typically developing student from a mainstream school and another student from a Special Education School (SPK) with multiple disabilities, including hearing impairment and autism. The data collection methods include interviews, document analysis, and observation. Two teachers and two parents also participate as interviewees in this study. The students' worksheets are used as document analysis to observe the cognitive development comparison between the two students. Meanwhile, observation methods are conducted using a checklist form to observe the students' behavioral comparison. The findings of this study indicate that the behavior of typically developing students is more controlled, while students with SEN require rewards to control their behavior. Additionally, the cognitive development of typically developing students aligns with their age, whereas the cognitive development of students with SEN is at a minimum level. The implications of this study suggest that teachers and parents need to employ appropriate approaches and methods in educating children because they have different developmental stages. Further studies can also be conducted, such as a survey study on teaching and learning methods, to examine effective teaching and learning methods for typical and special needs students.

Keywords: Special Education Student, Mainstream Student, Comparison, Cognitive, Behaviour

Introduction

According to research conducted in the field of psychology by the National Association for the Education of Young Children (NAEYC) (2018), it was found that there are predictable developmental patterns during the first 8 years of a child's life, namely in early childhood at ages 0-3 years, 3-5 years, and 6-8 years, where the developmental process is crucial and occurs rapidly. Similarly, according to Tracey et al (2021), early childhood development is an optimal and critical process because language, cognitive, motor, and socioemotional development occur rapidly.

However, there are also deviations from the predicted developmental patterns, which may lead to children experiencing different disabilities compared to other normal children (NAEYC, 2018). According to the Education Regulations (Special Education) (2013), students with special educational needs (SEN) are students certified by medical practitioners, optometrists, audiologists, or psychologists, as applicable, whether in government service or not. This means that children experiencing abnormal growth and development require referral to certified specialists.

Furthermore, according to Boggs (2019), children experiencing abnormalities are often due to delayed development and specific impairments in cognitive, language, motor, and emotional development. Additionally, there are studies indicating that typically developing students also exhibit negative behaviors despite having normal development. According to Denham (2000), typically developing students may be less actively engaged and display passive behavior during learning, especially when interacting with teachers. Therefore, this study aims to explore the comparison of cognitive and behaviour development between typical students and special education student (SEN) with multiple disabilities who is deaf and autism at the same time.

This study is important as it is expected to assist teachers in enhancing pedagogical skills for teaching students with varying developmental stages. When teaching quality is improved and learning activities become more engaging, students will be more motivated to learn. Furthermore, this study is significant and can serve as a guide for teachers to determine suitable methods and techniques for students while enhancing teaching quality. Subsequently, the Ministry of Education Malaysia (MOE) and relevant authorities may plan new strategies to improve teaching quality among teachers, such as implementing suitable courses or workshops.

Literature Review

Children Development

Development is intricately linked within human beings. It encompasses aspects such as size, shape, and maturity throughout the growth period (Noel, 2021). The term development refers to the process of human beings growing through physical, personality, socioemotional, cognitive, and language development (Rita, 2010). Additionally, early childhood development that aligns with their age can have positive effects on their education, health, and adult life (Aguilera, 2019).

However, there are several factors that hinder children's development. Among these are nutritional deficiencies and stimuli during early childhood that affect cognitive and psychosocial stimulation (Walker, 2011). Furthermore, there are other contributing factors

that pose obstacles to children's development, such as low-income family groups affecting delayed development due to low health awareness (Black, 2017). Additionally, children's development can be aided by support tools and early interventions to ensure optimal development (Eangle, 2011).

According to Marinda (2020), in Piaget's Cognitive Development Theory, cognitive development is considered based on neurological development and human environmental factors. Additionally, according to McLeod (2018), Piaget's theory emphasizes human cognitive development rather than learning. The purpose of this theory is to explain the mechanisms and processes of how human cognitive development occurs from infancy. According to Nina & Paskalia (2020), there are three components underlying this theory: schema, adaptation processes, and stages of cognitive development. Meanwhile, according to Nuryati & Darsinah (2021), Piaget believes that the learning process will be effective if it aligns with the child's cognitive stage.

Autism

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that involves impairments in social communication and restricted and repetitive behaviors (Hodges, 2020). Autism is a developmental disorder that includes impairments in language/communication, social interaction, and behavior. Some children with autism dislike communicating verbally with others. However, there are also children with autism who can speak but do not use language correctly, making their speech difficult for others to understand (Ayu et al., 2021).

This means that children with autism often prefer to be alone, as if they exist in their own world without being surrounded by others, where they have limited abilities to communicate and interact with others. According to the National Institutes of Health (NIH) (2021), the ability of children with autism to communicate and use language depends on their intellectual and social development. Some of them may not be able to communicate using speech or language, and some may have very limited speaking skills. They are not like typical children who have a wide vocabulary and can discuss a topic in detail.

However, the primary symptoms experienced by most children with autism are weak social communication, restricted, and repetitive behavior patterns. This aligns with the opinion of Risch et al (2018), who stated that abnormal development in certain areas has made it difficult for them to communicate, maintain eye contact with others, use abnormal gesture movements, and pretend to be happy when socializing with others. This means that children with autism prefer solitary activities over interacting with others.

Special Education Student with Multiple Disabilities

According to the World Health Organization (WHO) (2020), approximately 466 million individuals worldwide experience hearing impairment. Of this number, 34 million are children aged seven to 19 years old. Individuals with hearing problems are said to have hearing loss when they cannot hear sounds at a level of 25 dB (sound intensity). According to Special Education data from 2017, there are 3,035 students with hearing impairment at the pre-school, primary, and secondary education levels attending Special Education Schools (SKPK) and Integrated Special Education Programs (PPKI) in mainstream schools (Zarina, 2019).

However, nowadays there are many cases of children experiencing disabilities other than hearing impairment. Multiple disabilities refer to the combination of at least two types of impairments. For example, someone who has both hearing impairment and learning difficulties such as autism at the same time (Thomas, 2020). Individuals with hearing

impairment tend to have multiple disabilities. Multiple disabilities include intellectual disabilities, autism spectrum disorder (ASD), attention deficit disorder (ADD), attention deficit hyperactivity disorder (ADHD), orthopedic disabilities, emotional disturbances, speech and language disorders, brain injuries, visual impairments, blindness, and deafness (Catherine & Susan, 2019). Therefore, individuals with hearing impairment tend to have another disability. Additionally, individuals with multiple disabilities will face challenges in communication, cognition, social interaction, behavior, and physical aspects (Davis et al., 2010).

Research Methodology

Research Design

The study conducted is a qualitative research using a case study approach. According to Cresswell (2005), qualitative research is employed to examine complex phenomena such as relationships, organizations, individuals, and others. Zetty et al (2021) further elaborates that qualitative research utilizes descriptive qualitative methods to explore issues that have been meticulously identified in a holistic manner. In the context of this study, the researcher has employed a case study to address the research question, which involves exploring the developmental differences in terms of cognition and behavior between typical students and special education student (SEN). The case study method allows the researcher to conduct comprehensive investigations within a real-world context (Rasid & Raman, 2016). Therefore, this method was chosen to explore the developmental differences between typical students and those with various disabilities from a cognitive and behavioral perspective.

Research Participant

This study involved only two students. First, SEN with multiple disabilities and one typical student. Study Participant 1 (SP1) and Study Participant 2 (SP2) were both 10 years old. According to Othman (2014), qualitative research emphasizes quality over quantity. The study explored the developmental comparison between these two students, and the sample was selected using purposive sampling techniques. Gall & Borg (2003) suggest that purposive sampling involves a small sample size, allowing researchers to examine a phenomenon in greater detail. The sample selection for this study was based on age and abilities relevant to the research objectives.

SP1 was chosen as a study participant because this student has multiple disabilities, including hearing impairment and autism. SP1 attends a special education school for the deaf. On the other hand, SP2 was selected because this student is typical and exhibits age-appropriate development. The choice of SP2 aligns with the study's goal of comparing developmental differences between typical students and those with multiple disabilities. Both students came from similar family backgrounds, as their parents work in professional fields and reside in the urban center of Kuala Lumpur. Additionally, two teachers who instruct SP1 and SP2, along with the mothers of both students, participated in interviews to further strengthen the study's findings.

Research Instrument

In conducting this study, several instruments were employed to gather information and address the research question. The first instrument utilized was interviews. According to Puvunesvary (2008), interviews involve a question-and-answer process between study participants and researchers to obtain data, insights, and opinions. In this study, a semi-

structured interview format was employed, with a predefined set of questions. These interview questions were carefully prepared and reviewed by an expert to ensure their relevance in addressing the research question. The expert in question is a distinguished educator with over 15 years of experience, specializing in both special education and the Malay language. The interviews aimed to explore student behavior development from the perspectives of parents and teachers.

Next, observation was used as another data collection method. Suseela (2016) asserts that observation helps control and verify the validity and reliability of a study. Othman (2014) considers observation a valuable research tool for achieving study objectives. For this research, a checklist form was employed to record real-time observations during teaching and learning sessions. These observations allowed us to closely examine the behavior of the study participants while they were engaged in learning activities.

Lastly, the study involved document analysis. The documents used in this study consisted of worksheets provided to both students. These worksheets covered three subjects: Mathematic, Science, and the Malay language. By analyzing these worksheets, we aimed to identify cognitive differences between the two students. The specific tasks included completing sentences based on pictures (Malay language), filling in correct numbers (Mathematic), and categorizing animals (Science). All the worksheets have been reviewed and approved by three distinguished teachers in each subject, namely Malay language, Mathematics and Science.

Data Collection Method

This study was conducted using interviews, observation, and document analysis related to the research topic. According to Aini (2016), employing various data collection methods allows researchers to triangulate findings and strengthen the study's conclusions.

As for the Interviews method, the study began by seeking permission from parents to involve their children throughout the data collection process. This request was communicated via letters and WhatsApp messages. Additionally, formal written consent was obtained from the school authorities to meet both students and their teachers. After obtaining consent and reviewing interview questions, the researcher conducted face-to-face interviews with a teacher and the parents of both students. These interviews were recorded using smartphones to ensure no information was overlooked and to facilitate data processing.

In performing the observation method, during teaching and learning sessions, the researcher observed student behavior and recorded video footage. A checklist form was used during the observation process. Both interviews and observations were conducted in person, and the conversations were documented and recorded for storage purposes.

The final method is Document Analysis. The study analyzed worksheets provided to the sample students. Three worksheets from three subjects - Mathematic, Science, and the Malay language were used. These worksheets aimed to identify cognitive differences between the students. Each student received the worksheets and completed the exercises within the specified time frame. The researcher has observed, reviewed, and analyzed the worksheets for the purpose of data collection, as well as to examine the cognitive differences between the two students.

Data Analysis Methods

The data from the study findings were manually analyzed. According to Creswell (2008), researchers who analyze data manually can develop a closer understanding of their data. The

process of data analysis involved revisiting the collected data. During this process, interview transcripts were converted into written text and data were interpreted and summarized in a narrative report. Additionally, the researcher captured photos and video recordings while the study participants worked on the provided worksheets. These visual records facilitated a closer examination of how the participants engaged with the tasks and contributed to the overall interpretation. Furthermore, document analysis was conducted on the worksheets. The results of the review and notes from the document analysis were incorporated into the final report.

Study Findings

This section outlines the results obtained during the data collection process. The study aimed to explore cognitive and behavioral differences between typical students and those with multiple disabilities (MBPK). The findings were analyzed based on the research questions. Below are the demographics of the two study participants:

Table 1

Study Participants Profile

Subject	Study Participant 1 (SP1)	Study Participant 2 (SP2)
Age	10 tahun	10 tahun
Years in School	Year 4	Year 4
Disability	Autism and hearing impairment	Typical
Type of School	Special Education School	National Primary School

Table 1 presents information about the student participants in the study. Student A is a SEN with multiple disabilities who is deaf and autism attending a special education school. In contrast, Student B is a typical student enrolled in a national school. Both students are 10 years old.

Research Objective 1: To compare the cognitive development of typical students and those with multiple disabilities (MBPK)

The findings are based on document analysis of the provided worksheets. Here's the information from the administered worksheets for both study participants:

Table 2

Worksheet Score

Subject	SP1	SP2
Malay Language	0/10	10/10
Mathematic	0/10	8/10
Science	2/10	10/10

According to Table 2, SP1 scored 0 on the Malay language worksheet. Despite having a relatively long time to complete the task, SP1 left the worksheet blank. SP1 struggled with completing both the Malay language and Mathematics sections due to time constraints and

uncontrolled emotions. Instead of answering, SP1 merely copied the instructions and words from the worksheet. Additionally, SP1 had difficulty understanding most of the words in the worksheet. A teacher had to guide SP1 using sign language to explain the instructions and meanings, but clear comprehension remained a challenge. However, SP1 managed to complete the Science worksheet with minimal assistance. Initially, SP1 copied words without correctly categorizing the animals, but with encouragement from another teacher, SP1 eventually completed the task. Each worksheet took SP1 approximately 20 minutes to finish and promises of rewards were used to motivate successful completion.

Meanwhile, Student B (SP2) completed the sentences by filling in the blanks with the correct words and received a perfect score. Moving on to the Mathematic worksheet, SP2 scored 8 out of 10 for successfully completing the number line provided. However, there were two errors made while writing the numbers on the designated number line. Next, for the Science worksheet, SP1 obtained 2 out of 10 marks, whereas SP2 accurately answered and wrote about animals according to their habitat categories. Based on these scores, it is evident that SP2 answered all questions correctly. Despite having small handwriting that can be challenging to read, SP2 managed to spell all words correctly.

In conclusion, there are notable cognitive developmental differences between SP1 and SP2. SP1 struggled to complete the assigned worksheets due to difficulties in understanding instructions conveyed through sign language by the teacher. Additionally, SP1 faced challenges in recalling number sequences (e.g., numbers 1–20) and failed to complete the given number line. SP1 also exhibited weak sign language skills, struggling to connect hand signs with written words. For instance, SP1 might make the sign for number 7 but write the number 6 in the designated space on the worksheet. During the Science worksheet, SP1 still struggled with several animal sign language terms, merely rewriting the animal names without fully comprehending the task, despite receiving instructions and explanations. In contrast, SP2 answered questions accurately and independently. SP2 demonstrated an understanding of instructions, word meanings, sentence structures, and number sequences.

Research Objective 2: To compare the behavioral development of typical students and SEN with multiple disabilities.

The study findings were divided into two parts based on interviews and observations. First, interviews were conducted with teachers and parents of the participants to gather insights related to the students' behavior during classroom session and at home. Second, observations were carried out while the study participants were learning in the classroom.

Interview Findings

SP1 exhibited unpredictable behavior. SP1 often engaged in preferred activities and avoided participating in recommended school activities. Additionally, SP1 would become agitated if teachers did not comply with their wishes. According to SP1's teacher, there was an improvement in attitude from the beginning of schooling until Year 4. However, SP1 would calm down and start working when promised a reward upon completing assigned tasks.

“He is a happy go lucky person but at the same time it is hard to get him to complete his tasks other than coloring activity. We have to give him stickers to get his interest.”

As SP1 matured, their behavior began to change. SP1 showed affection and concern for their younger sibling, and their aggressive and confrontational tendencies decreased. SP1 even helped their mother with household chores, as reported by the mother.

“...but now he is getting older, he is starting to understand and get less aggressive. Sometimes he will help me with his siblings, and sometimes helped to fill up their water bottle...”

Meanwhile, according to the feedback from SP2’s teacher, SP2 could understand given instructions easily and a polite student who have a high respect to the teachers. SP2 actively participated in class and willingly assisting classmates when tasks were assigned. The following is the statement from SP2’s teacher:

“...he is an obedient student. When we are having group activities in class, he will help and teach his classmates..”

According to SP2’s mother, SP2’s behavior initially leaned toward aggression and quarreling with their sibling. However, as SP2 grew older, they became more courteous and respectful toward others, as confirmed by PK 2’s mother:

“...he is a good student in school, but when at home he is aggressive and would quarrel over food and toys with his siblings. There was a time when he was younger when he got into a fight with the neighbour kid. Nowadays it happens no more...”

Observation

Observation was conducted while the study participants were learning in the classroom. A checklist form was used during this observation process. Here’s the information obtained during the observation:

Table 3
Behavior Checklist During Teaching and Learning Sessions (PdP)

NO.	OBSERVED BEHAVIOR	SP1		SP2	
		YES	NO	YES	NO
1.	Engaged with PdP activity		/	/	
2.	Focus during PdP		/	/	
3.	Listening to teacher’s instruction		/	/	
4.	Giving response		/	/	
5.	Not focusing during PdP	/			/
6.	Talking with classmates during PdP		/	/	

Based on Table 3, it was observed that SP1 did not exhibit interest or positive behavior throughout the teaching and learning sessions. SP1 was reluctant to participate in activities conducted by the teacher and other classmates. Instead, SP1 focused on other tasks, such as coloring. The teacher had to persuade and provide incentives to engage SP1 in activities alongside peers. Additionally, SP1 did not follow the teacher's instructions. Despite being prompted several times, SP1 remained silent and continued their preferred coloring activity, even when asked questions.

On the other hand, SP2 actively participated in teacher-directed activities during PdP. SP2 paid attention during explanations and asked questions when clarification was needed. Furthermore, SP2 understood and followed instructions during group activities. SP2 even volunteered to be the group leader and successfully presented their work to the class. However, after completing tasks, SP2's lost his focus, and he engaged in conversations with classmates.

In conclusion, based on the study findings from all three instruments, it was observed that both SP1 and SP2 underwent changes in behavior as they matured. These changes may be attributed to their experiences and the guidance provided by teachers and parents throughout their developmental process. Additionally, in terms of cognitive development, SP2 followed age-appropriate milestones, while SP1 struggled with basic skills and did not progress at the same pace as typical children. Despite the distinct cognitive and behavioral differences between the two study participants, both still required rewards and motivation to encourage positive behavior.

Discussion

This study aimed to delve deeper into the cognitive and behavioral differences between SEN with multiple disabilities and typical students. Overall, the findings revealed significant disparities in cognitive development and behavior. SEN exhibited minimal cognitive progress compared to their typical peers. The study holds implications for schools, particularly teachers, as it emphasizes the importance of selecting and planning appropriate teaching and learning strategies to enhance student understanding in the classroom. Furthermore, parents play a crucial role in educating their children at home, recognizing that each child's abilities and development are unique.

The study also highlighted that SP1 only completed the Science worksheet, leaving the Mathematic worksheet blank. The Mathematic worksheet focused on basic math skills, such as completing number sequences. In contrast, the typical student (SP2) successfully completed both the Mathematics and Science worksheets. SP2 also filled in the blanks with correct numbers. According to Jean Piaget's theory of cognitive development, every individual progresses through four stages of intellectual development. Zhou & Brown (2017) explain that Piaget introduced four main stages to assess the cognitive development of children and adolescents. These stages include the sensorimotor stage (from birth to 2 years old), the preoperational stage (from 2 to 6 years old), the concrete operational stage (from 6 to 12 years old), and finally, the formal operational stage (12 years old and above).

Both study participants are currently in the concrete operational stage, as they are 10 years old. According to Alon & Adventrianis (2021), children in this stage can think logically. At this point, they have matured enough to engage in logical thinking or operations. Additionally, children at this stage can handle more complex tasks that require logic, such as solving mathematical problems. Piaget considered the concrete operational stage a

significant turning point in children's cognitive development because it marks the beginning of logical thinking or operations (Wina, 2010).

This observation aligns with the study findings, where the typical student successfully completed all three provided worksheets accurately. It demonstrates that typical students can apply logic to complete the Mathematic worksheet. In contrast, SEN with multiple disabilities still struggle to master core subjects like Mathematics, Science, and the Malay language. This discrepancy is due to the lower cognitive level of SEN compared to their typical peers, even at the same age (Azmil & Hamdi, 2021). Furthermore, research by Tai & Hanafi (2019) indicates that literacy proficiency and attitudes toward Mathematics significantly impact academic achievement. Individuals with multiple disabilities may face challenges across several aspects such as communication, cognitive, behavior and physical. Therefore, the roles of teachers and parents are crucial in guiding students SEN with multiple disabilities to master basic mathematical skills.

Furthermore, based on the conducted study, behavioral development between typical students and those SEN with multiple disabilities also differs. Interview findings revealed that MBPK students experienced behavioral improvements from the early school years until Year 4. However, SEN still exhibited aggressive behavior when asked to perform tasks while engaged in coloring activities. Additionally, MBPK students displayed negative behaviors such as throwing paper or books. According to Miftahul & Ahmad (2023), behaviorism theory suggests that human behavior is influenced by the consequences or outcomes of their actions. This aligns with the interview results, as MBPK students responded positively to reward stickers. Their teacher mentioned that reward stickers would be placed on their cheeks or hands upon successful completion of assigned tasks. Similarly, Al-Shammari (2019) emphasized that stimuli lead to responses and learning occurs through the association between stimuli and reactions. This demonstrates that SP1's behavior depends on the rewards provided by the teacher in the form of stickers.

In contrast, typical students exhibit controlled behavioral development. Interview data from teachers and parents indicate that typical students actively listen and easily comprehend instructions. They are polite and willingly assist their peers. For instance, they express gratitude when teachers offer congratulations and help classmates complete assigned tasks in the classroom. These findings align with Nila's (2020) assertion that learning is influenced by punishment, rewards, and reinforcement, which impact the likelihood of new behaviors emerging. However, even typical students still require praise and recognition when they complete tasks to feel valued. Therefore, in teaching and learning processes, praise and rewards can serve as motivation for students to engage more enthusiastically in their studies.

Additionally, this theory emphasizes reinforcement as a reward for specific demonstrated behaviors. According to Devanda et al (2022), in cognitive development theory, B.F. Skinner explained that reinforcement can be either negative or positive. Positive reinforcement includes praise, rewards, and gifts. For instance, in the study, teacher for the typical student will give praises after completing tasks. Similarly, students with multiple disabilities received reward stickers as recognition for good behavior or successful task completion. Besides, negative reinforcement serves as a warning to discourage undesirable behavior from recurring.

However, applying negative reinforcement is easier with typical students because they readily understand instructions and the reasons behind receiving positive or negative reinforcement. Rafki (2019) emphasizes that teachers need to be more creative and innovative in managing teaching and learning process, as behaviorism theory emphasizes

stimuli and responses to engage students. In summary, behaviorism theory focuses on the learning process and the behaviors exhibited by individuals due to external stimuli.

Next, this study specifically focused on comparing the cognitive development and behavior between typical students and those with hearing-related multiple disabilities. Therefore, the study findings are directly related to the cognitive development and behavior of these two students only. However, further research could expand by involving a larger sample size to obtain more precise data. Studies on language development and socioemotional aspects in children could also be conducted. Additionally, investigating effective teaching and learning strategies for both typical students and SEN would be valuable.

Conclusion

In summary, based on the study findings and discussions mentioned above, it is evident that typical students and those with multiple disabilities indeed exhibit distinct cognitive and behavioral development. Typical students do not face difficulties in completing assigned tasks, as they have undergone the expected developmental processes for their age group. However, this differs from MBPK students, who do not follow the same developmental process as their typical peers. Ironically, development is an interconnected process experienced by all individuals. Furthermore, human growth and development are closely tied to theories of learning pioneered by past psychologists. The discussion linking theory to student development has implications for both teachers and parents in educating and guiding children. Effective management of teaching and learning processes is crucial to creating a conducive and effective learning environment. In this context, teachers play a vital role in designing and implementing strategies according to the cognitive levels of the students they teach. Therefore, a teacher needs to wisely plan and select the most suitable methods for conducting teaching and learning activities and provide appropriate reinforcement to students to make them feel more motivated to complete assigned tasks.

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