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Learning trajectory on understanding monetary values for autistic students through a modified monopoly game

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Abstract

Children with autism spectrum disorder (ASD) often have difficulty understanding abstract concepts, such as monetary values, due to limitations in executive functioning and concept generalization. This study aimed to develop and test a learning trajectory for understanding monetary values through a modified Monopoly game according to the characteristics of autistic students. The study employed a design research approach with validation type, using hypothetical and actual learning trajectory (HLT-ALT) analysis through the stages of preparation, design experiments (pilot and teaching experiments), and retrospective analysis of the data. The research subjects were eight autistic students at the junior high school level at SLB Bina Autis Mandiri, Indonesia. Data were collected through student activity sheets, observations, interviews, and documentation and then analyzed qualitatively. The results showed that the learning trajectory consisting of four activities (playing modified Monopoly, recognizing the value of money, counting the number of pictorial patches of money, and adding up the value of money) effectively helped students gradually understand the concept of monetary value. Game-based activities also increased students' engagement and understanding of the material. This study contributes to a replicable and inclusive learning trajectory that integrates structured gameplay with mathematical reasoning for students with autism.

Keywords: autistic students; inclusive learning; learning trajectory; modified monopoly; understanding monetary values

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Introduction

Education for children with special needs, including those with autism spectrum disorder (ASD), faces major challenges both nationally and globally. Autism spectrum disorder is a neurodevelopmental condition that affects a child's social, communication, and behavioral aspects (CDCP, 2024). The prevalence of ASD is increasing globally. A meta-analysis of data by Issac et al. (2025) showed that one in 100 children worldwide has an autism spectrum disorder. In Indonesia, the Ministry of Health (MoH) also noted an increase in the number of children with ASD (MoH, 2022), but this has not been balanced by the optimization of learning strategies that are appropriate to their characteristics, especially in mathematics.

One of the main difficulties experienced by autistic students is understanding abstract mathematical concepts due to limitations in executive functioning and concept generalization (Lord et al., 2018). Mathematics learning for students with autism requires more concrete, visual, and structured representations to facilitate understanding (Chiang & Lin, 2007; Geary, 2013). These studies highlight that autistic students often perform better when mathematical ideas are connected to real-life, tangible contexts rather than to symbolic or purely abstract ones.

Money, as a fundamental mathematical domain, is particularly important for students with disabilities. It is functional, as it is directly used in daily life; socially relevant, as it supports participation and independence in community interactions; and aligned with life-skill curricula commonly applied in special-education settings. Mastery of monetary values allows students to practice numerical operations in authentic contexts and strengthens their adaptive and social functioning skills.

Autistic children tend to experience difficulties learning abstract concepts that require complex cognitive and executive abilities (NIMH, 2024). Moya and Blanco (2024) also stated that autistic students have difficulty acquiring mathematical concepts and skills related to numbers and operations. Caria et al. (2019) found that autistic students had difficulty managing the concept of money in practice.

In response to these challenges, special education experts have emphasized the importance of more contextual, enjoyable, and activity-based learning strategies to deepen knowledge about monetary values. Baron-Cohen (2019) stated that children with autism spectrum disorder show increased focus and interaction when learning through structured and meaningful games. Educational games are considered effective for teaching mathematics because they facilitate conceptual understanding through direct experience (Kurniawan & Sari, 2023; Lestari & Nugroho, 2022). Meanwhile, Rahmawati and Sari (2021) emphasized the importance of contextualizing games to support the understanding of basic mathematical concepts among autistic students. Monopoly, as a widely recognized educational medium, can be modified to integrate monetary value concepts and social interactions that support both cognitive and affective development in autistic children (Wulandari & Prasetyo, 2022).

Several studies have examined the effectiveness of game-based learning in children with special needs. Putra and Lestari (2020) demonstrated that card media could improve the ability to recognize money values among students with mild intellectual disabilities. Another study by

Yuliana and Hidayat (2021) concluded that real-life, activity-based game strategies enhance autistic students' engagement and motivation to learn. Khowaja and Salim (2019) showed that using games can improve vocabulary in autistic students. Vallefuoco et al. (2022) found that personalized serious games can enhance daily living skills, particularly shopping, attention, and problem-solving. Furthermore, El-Sattar et al. (2024) found that developing the SALY serious game improved learning outcomes for autistic children, while Blanco et al. (2024) created the TEAtreves application to help autistic students solve mathematical problems. Recent studies by Bouzas et al. (2024) found that autistic students' social-emotional skills improved after interventions with gamified environments.

However, most research has yet to systematically develop a learning trajectory to help autistic students understand monetary value concepts. A learning trajectory, as defined by Simon (1995) and further elaborated by Clements and Sarama (2009), links learning goals, instructional activities, and anticipated student thinking in a coherent and developmental pathway. Suryani and Hartono (2023) emphasized that designing an adapted learning trajectory can significantly enhance the cognitive abilities of autistic students, particularly when supported by structured and engaging media.

Based on this foundation, the present study aimed to develop and analyze a learning trajectory for monetary value understanding among autistic students through a modified Monopoly game. The research question addressed is as follows: How can a learning trajectory based on a modified Monopoly game facilitate autistic students' understanding of monetary values? This research focuses on preparing contextual learning stages aligned with the cognitive and social characteristics of autistic students so that the learning process becomes not only cognitively effective but also inclusive and meaningful.

Methods

This study employed a design-based validation research method aimed at developing a Learning Trajectory (LT) for the topic of recognizing monetary values through a modified Monopoly game context. The research involved eighth-grade autistic students from SMPLB Bina Autis Mandiri (BAM) in Indonesia. Participants were selected using purposive sampling based on specific inclusion criteria: students with an ASD diagnosis confirmed by the school psychologist, verbal IQ scores above 70, the ability to follow two-step verbal instructions, and consistent classroom attendance. These criteria ensured that the participants could engage in verbal interactions and comprehend structured learning sequences. Although formal quantitative measures, such as standardized adaptive behavior scales, were not collected, qualitative observations provided insights into the students' social and cognitive abilities relevant to the learning process. This limitation is acknowledged as part of the study scope.

The research was conducted in three main phases: preparation of the experiment, experimental design, and a retrospective analysis. In the research preparation stage, the researchers conducted a needs analysis through interviews, pre-tests, and curriculum reviews to determine students' readiness and initial understanding. A review of the relevant literature on monetary value learning, design research methodology, and Indonesian realistic mathematics

education (PMRI) was also conducted. Based on these inputs, the researcher designed a hypothetical learning trajectory (HLT) in the form of a student activity sheet that included learning objectives, student activities, and conjectures of student thinking, using a modified Monopoly game as the context.

The design experiment consisted of two stages: a pilot and a teaching experiment. In the pilot experiment, the initial HLT was implemented with a small group of two autistic students, with the researcher acting as the teacher and the classroom teacher as an observer. Observational and interview data from this stage were analyzed to identify areas needing refinement, such as the clarity of game instructions, the level of visual scaffolding required, and the sequencing of activities. Based on these findings, the HLT was revised by simplifying the task wording, adjusting the visual supports on the game board, and reorganizing the activity flow to match the students' attention span and cognitive processing pace.

After these revisions, the teaching experiment phase was implemented in one class of six eighth-grade autistic students, with the classroom teacher as an instructor and the researcher as an observer. The lessons followed the sequence of activities outlined in the revised the HLT. Prior to this phase, the teachers participated in a short orientation session to ensure a clear understanding of the LT structure, objectives, and step-by-step learning procedures. During implementation, the researcher observed and documented classroom interactions to verify their consistency with the LT design.

In the final phase, retrospective analysis, the actual learning trajectory (ALT) observed in the classroom was compared with the initially designed HLT. This analysis aimed to examine how learning trajectories for recognizing monetary values developed through the modified Monopoly game and how they supported students' conceptual understanding of money.

Data collection techniques included: (1) student activity sheets to identify students' thinking processes and changes in understanding, (2) classroom observations during both the pilot and teaching experiments, (3) semi-structured interviews conducted after teaching experiments to validate findings from student work, and (4) documentation consisting of learning photos, videos, and student-written work. Data were analyzed qualitatively through descriptive interpretations of learning patterns and behaviors observed during the activities.

To ensure data validity, triangulation was performed by comparing information from the student activity sheets, observation notes, and interview responses. Prior to data collection, both verbal and written consent were obtained from the principal of SMPLB Bina Autis Mandiri and the guardians of the participating students. This study adhered to ethical research standards, ensuring confidentiality, voluntary participation, and the well-being of all participants throughout the process.

Results

Preparing for experiment

Based on the results of the needs analysis through interviews, pretests, and curriculum review, the design HLT was produced as shown in Table 1 with the main context in the form of a modified monopoly game.

Table 1. Design HLT on monetary values

Activities	Aims	Conjecture
Playing the modified Monopoly game.	Students understand the game rules and recognize the context of the game	- Students understand that each space on the game board represents a certain amount of money. - Some students may focus only on the game mechanics (rolling dice, moving around the board) without paying attention to the monetary values shown on each space.
Recognizing the money values shown on the game board.	Students recognize various denominations of money and are able to state or write them correctly.	- Students are able to connect the images of money with the corresponding nominal values. - Some students may become confused between denominations (e.g., Rp5,000 and Rp50,000).
Counting the number of spaces with money images on the game board	Students can count the number of spaces that contain money images and record the result correctly	- Students can mark and count the spaces containing money images using visual aids (fingers, check marks), or color markers). - Some students may double-count or skip certain spaces due to focus or visual perception difficulties.
Adding the money values found in two specific spaces (e.g., space 2 and 6)	Students can add the money values from two or more spaces to find the total amount of money.	- Students are able to perform addition vertically and determine the correct total. - Some students may add the values without paying attention to the currency unit (e.g., writing 20 + 5 = 25 without including 'thousand').

A learning trajectory is a conceptual sequence that connects learning objectives, anticipated student thinking, and the activities designed to support this process (Simon, 1995). Reconstructing the HLT by integrating these three elements clarifies the cognitive relationships between activities, allowing each stage to represent conceptual progress rather than merely procedural steps. In line with Gravemeijer and Cobb (2006), a learning trajectory serves to bridge theory and classroom practice through activity designs that focus on the development of students' thinking.

Experiment design

Pilot experiment

The results of the learning trajectory trial on two autistic students at SMPLB Bina Autis Mandiri show that students have performed the identification and calculation process as instructed. The addition process has been done sequentially and logically. Although there were problems with the accuracy of writing (perhaps due to motor aspects or visual perception difficulties common in autistic children), the basic understanding of the concept of addition and recognition of currency values appeared to have emerged. In general, the student demonstrated the ability to follow stepwise instructions. The steps given (marking, counting, and adding) appeared to be followed in their entirety although the student's writing was still sloppy and there were spelling or number errors. As a note for revision, there should be fine motor training to minimize writing errors.

Teaching experiment

The implementation of student activity sheets for six autistic students at the teaching experiment stage was carried out to validate the learning trajectory that had been prepared. The Understanding Monetary Values material is presented through monopoly game-based activities that have been modified for autistic children. The goal is for students to recognize the various currency values in the game.

Activity 1: Students play modified monopoly

The purpose of this activity is for students to understand how to play monopoly. Figure 1 presents the modified Monopoly board and the game rules used in the study. The board displays Indonesian rupiah denominations and colorful icons designed to capture students' attention, along with clearly written instructions on how to play. Each square on the board is filled with engaging, animated images and various representations of money values. Through these visually appealing elements and clear game procedures, the modified Monopoly game effectively supports autistic students in recognizing and understanding money values within a familiar and structured learning context.

English version:

MONOPOLY – The Value of Money

How to Play:

1. Decide the order of the players.
2. Players take turns rolling the dice and move according to the number rolled.
3. Players may buy the space they land on if it does not already have an owner.
4. The game ends when a player runs out of money.

Figure 1. Modified monopoly rame and rules of the game

In addition, the Monopoly board was adapted to reflect the Indonesian context and the characteristics of autistic students. Each square on the board displayed familiar visuals such as real images of Indonesian rupiah denominations (e.g., Rp1,000, Rp5,000, and Rp10,000) along with simple, colorful illustrations to attract attention. The game rules were simplified and presented step-by-step to support clarity and reduce potential confusion. This cultural and structural adaptation aimed to increase learning relevance, reduce cognitive dissonance, and help students connect the mathematical concept of money value with real-life experiences.

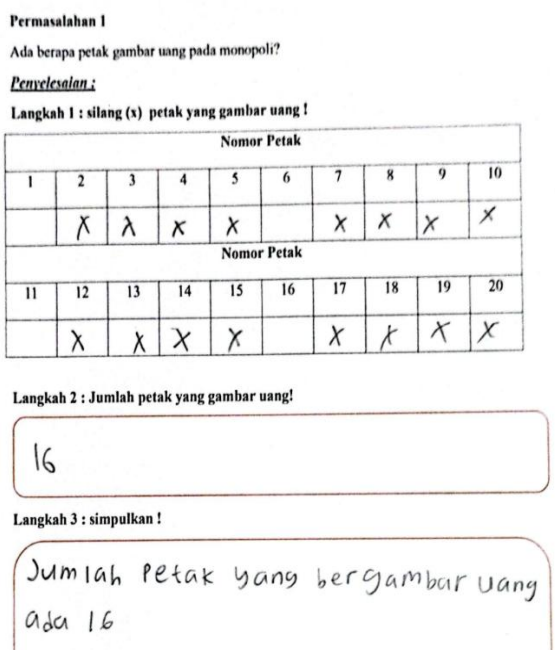
Activity 2: Students recognize the understanding monetary valuess found on the monopoly board

The purpose of this activity is for students to recognize the understanding monetary valuess. In Figure 1, which shows a picture of a modified monopoly game for children with autism, it is known that it contains pictures of monetary values in Indonesia. In addition to visual images, the game also contains symbols to write each monetary value. Through learning that begins with students playing this modified monopoly game, students can understand and remember what types of fractions of currency values and writing them in mathematical form.

Activity 3: Counting the number of plots on the monopoly board with the picture of the monetary value

The purpose of this activity is for students to count the number of squares containing money value images. Figure 2 presents an example of a student's response in Activity 3, showing the use of cross marks ("X") to identify and count those squares. This indicates that the student is able to follow sequential instructions and apply simple counting strategies effectively.

In Figure 2, it is known that students can mark the plots that have pictures of money by writing "x" in the plot number column. Students have also been able to follow the instructions asked by the question, namely adding up the plots that have pictures of money and drawing the conclusion that the number of plots that have pictures of money is 16. This shows that students can identify plots that have pictures of fractional values of money.



Permasalahan 1

Ada berapa petak gambar uang pada monopoli?

Penyelesaian :

Langkah 1 : silang (x) petak yang gambar uang !

Nomor Petak									
1	2	3	4	5	6	7	8	9	10
	X	X	X	X		X	X	X	X
Nomor Petak									
11	12	13	14	15	16	17	18	19	20
	X	X	X	X		X	X	X	X

Langkah 2 : Jumlah petak yang gambar uang!

16

Langkah 3 : simpulkan !

Jumlah petak yang bergambar uang ada 16

English version:

Problem 1

How many squares with money pictures are there on the Monopoly board?

Solution:

Step 1: Cross (x) the squares that have money pictures!

Student's answer :

Put a cross on the square with the picture of money

Step 2: Number of squares with money pictures:

Student's answer :

16

Step 3**:** Conclusion:

Student's answer :

The number of squares with money pictures is 16

Figure 2. Student answers in activity 3 showing the use of the cross mark (X) to identify and count the squares

Activity 4: Calculating the number of monetary values contained in plots 2 and 6

The purpose of this activity is for students to calculate the number of monetary values. The results of students' answers for activity two are presented in Figure 3.

Permasalahan 2

Jumlah uang pada petak 2 dan 6?

Penyelesaian :

Langkah 1 : Nilai uang pada petak!

No.	Gambar Mata Uang	Nilai Mata Uang	Dibaca
1.		Rp. 1.000,00	Seribu Rupiah
2.		Rp.2.000,00	Dua Ribu Rupiah
3.		Rp.5.000,00	Lima Ribu Rupiah
4.		Rp.10.000,00	Sepuluh Ribu Rupiah
5.		Rp.20,000,00	Dua Puluh Ribu Rupiah
6.		Rp.50,000,00	Lima puluh Ribu Rupiah
7.		Rp.100.000,000	Seratus Ribu Rupiah

Langkah 2 : jumlah uang petak 2 dan 6!

20.000
5000 +
25.000

Langkah 3 : Simpulkan !

Jumlah uang petak 2 dan 6
25.000

English version:

Problem 2

The amount of money in boxes 2 and 6?

Solution:

Step 1: The value of the money in each box

Student's answer :

No.	Picture of Banknote	Value of Banknote	Read As
1.	(Rp1,000 note)	Rp 1,000.00	One Thousand Rupiah
2.	(Rp2,000 note)	Rp 2,000.00	Two Thousand Rupiah
3.	(Rp5,000 note)	Rp 5,000.00	Five Thousand Rupiah
4.	(Rp10,000 note)	Rp 10,000.00	Ten Thousand Rupiah
5.	(Rp20,000 note)	Rp 20,000.00	Twenty Thousand Rupiah
6.	(Rp50,000 note)	Rp 50,000.00	Fifty Thousand Rupiah
7.	(Rp100,000 note)	Rp 100,000.00	One Hundred Thousand Rupiah

Step 2: The total amount of money in boxes 2 and 6!

Student's answer :

20.000
5.000 +
25.000

Step 3: Conclusion!

Student's answer :

The total amount of money in boxes 2 and 6 is 25,000 rupiahs.

Figure 3. Student answers on activity 4 show that students are able to accurately record the value contained in each square

As shown in Figure 3, students not only recorded the monetary values correctly but also performed vertical addition accurately, reflecting comprehension of both numeric and symbolic representation. The value was written in currency format, for example “Rp ...”, and students could also read the notation of the monetary value. After identifying the value per plot, students added the values using the vertical addition method correctly and concluded that the total amount from plots 2 and 6 was Rp25,000.

Overall, students demonstrated emerging procedural fluency in identifying and summing monetary values. Their sequential actions-marking, identifying, and adding reflected consistent understanding of procedural steps. However, minor difficulties were observed in maintaining attention during multi-step problems. For example, one student skipped a square when counting and initially wrote “Rp2,500” instead of “Rp25,000,” showing confusion between digit placement and currency unit recognition**.** After receiving brief scaffolding from the teacher, the student was able to self-correct and complete the addition accurately.

These variations in performance illustrate that while most students reached the intended learning objectives, some required additional guidance to consolidate their understanding. Such differences emphasize the importance of structured scaffolding and teacher mediation during contextual, game-based mathematical learning for autistic students.

The teacher also conducted an interview with one of the students to support the findings on the results of the student activity sheet. The following is a summary of the interview results:
Teacher: *"Son, look at this board. Which plots have money on them?"*
Student: *"This, this, this..... and this, Mom. (pointing and marking)"*
Teacher: *"Good! Now, count how many squares have money on them"*
Student: *“(counting while using fingers) Sixteen tiles, Mom!”*
Teacher: *“Great! Now, look at tiles number 2 and 6. What are their values?”*
Student: *“Square 2 is Rp20,000, square 6 is Rp5,000.”*
Teacher: *“If you add them up, how much is it?”*
Student*: “Rp25,000!”*
Teacher: *"Awesome, did this game make you able to recognize and add up the understanding monetary values?*
Student: *“Yes, mom”*

The interviews between teachers and students above show that students are able to recognize the pictures of money on the game board, count the number of plots with pictures of money, and add up the monetary values correctly. Students' active and precise responses, such as mentioning the number of plots (16), the value of money in certain plots (Rp20,000 and Rp5,000), and the result of the sum (Rp25,000), indicate that game-based learning activities help improve students' understanding of the concept of understanding monetary values. A comparative analysis between HLT and ALT in Activity 4 can be seen in Table 2.

Table 2. Analysis of HLT vs. ALT for activity 4

Component	HLT	ALT	Alignment/Divergence Analysis
Learning Objective	-Students are expected to correctly add the monetary values from two specific	Students were able to record the monetary values of plots 2 and 6 and perform vertical	The intended learning objective in the HLT was successfully achieved in the ALT. All students performed the addition accurately, though with

Component	HLT	ALT	Alignment/Divergence Analysis
	plots (e.g., plots 2 and 6).	addition to obtain the result of Rp25,000.	varying neatness in their written work.
Anticipated Student Strategies (HLT)	- Identify the monetary value on each plot.- Write the addition vertically.- Conclude the total amount of money.	- Students wrote the values “Rp20,000” and “Rp5,000” on plots 2 and 6.- Arranged the addition operation vertically.- Produced the total “Rp25,000.”	The students’ actual strategies aligned closely with the anticipated ones. Minor handwriting issues were observed, likely due to fine motor difficulties typical among students with autism.
Anticipated Misconceptions	- Students might omit the currency unit (e.g., writing 20 + 5 = 25).- Students might confuse “thousand” with “ten thousand.”	No conceptual misconceptions were observed. Students correctly included currency units, although some had difficulty writing clearly.	The anticipated misconceptions did not occur significantly, suggesting that the game context effectively reduced conceptual errors.
Supporting Evidence (Student Work and Interview)	- Hypothetical (no real data expected).	“Teacher: If you add them up, how much is it? — Student: Rp25,000!” (interview excerpt).Student work (Figure 4) showed accurate vertical addition.	Both the interview and student work confirmed that the students’ understanding was consistent with the intended learning trajectory.
Interpretation	Students were expected to perform simple addition through a concrete and contextual setting.	Students demonstrated solid conceptual and procedural understanding. The game fostered engagement and focus during learning.	There was a high degree of alignment between the HLT and ALT. No significant divergence was identified in students’ reasoning. The game-based activity effectively supported understanding of fractional money values.

Qualitative evidence further illustrates how students’ understanding evolved during Activity 4. Initially, some focused on the visual aspects of money images *“I like the green one”* without recognizing their numerical meaning. After guided questioning, they began connecting color with value *“Green means twenty thousand.”*

Several students used alternative strategies, such as finger counting to represent money units before writing totals. Minor procedural errors, like misplaced digits (e.g., 2 + 5 = 20500), were corrected after teacher feedback.

An interview excerpt highlights this progression:

Teacher: *"If you add them up, how much is it?"*
Student: *"Rp 25.000, because twenty thousand plus five thousands makes twenty five thousands"*

These qualitative findings confirm that students not only performed accurate addition but also demonstrated growing conceptual understanding through meaningful connections between concrete and symbolic representations.

Retrospective analysis

Based on the comparison of the initial HLT with the results of the learning process during the experiment design activity, it is known that the students showed the ability to follow step-by-step instructions. The steps provided (marking, counting, and adding) appear to have been followed in their entirety. The results showed that the students' learning trajectory to understand the concept of understanding monetary values consisted of four activities: students playing a modified monopoly game, students identifying the understanding monetary values contained on the monopoly board, students counting the number of plots with pictures of understanding monetary values, and students calculating the amount of understanding monetary values. The monopoly game approach successfully facilitated students' interest and engagement in the learning process, which is important for children with autism.

Based on the comparison between the initial HLT and the actual learning process during the design experiment, the students generally followed the given steps (marking, counting, and adding) consistently. The learning trajectory helped students progressively build conceptual and procedural understanding. However, the findings also indicate a range of student responses, from fluent procedural performance to cases requiring additional visual or verbal prompts to solve the problem. This reinforces that the modified Monopoly based trajectory not only facilitates engagement but also provides diagnostic insight into each student's learning needs, validating the necessity of scaffolding to ensure conceptual mastery in the learning process.

Discussion

The modified Monopoly game reflects several evidence-based practices (EBPs) in autism education, such as structured teaching, visual support, and predictable learning sequences (Bouzas et al., 2024). The board layout, color-coded money, and step-by-step instructions serve as visual aids to help students maintain focus and reduce anxiety. In addition, turn-taking structures and repetitive activities provide natural opportunities to practice social communication and adaptive behavior (Verdian et al., 2024). Thus, this game context effectively supports both cognitive and social development in students with autism.

This study aimed to develop a learning trajectory for understanding monetary value in autistic students through a modified Monopoly game. The results showed that this game-based approach successfully helped students gradually and logically recognize and add monetary values, aligning with the study's initial objectives. Students were able to follow instructions systematically, demonstrate an understanding of monetary symbols, and perform basic addition operations. Although fine motor challenges, such as messy handwriting, were observed, students showed substantial cognitive and affective progress, which are important indicators of success in inclusive education.

Analysis of the four LT components revealed that the use of authentic rupiah images and color-coded visuals was the most effective element, as it minimized confusion regarding numerical symbols and enhanced the connection between abstract value and real-world currency. Furthermore, students' procedural fluency does not always indicate full conceptual mastery. Some students could add values correctly but struggled to articulate the reasoning

behind the operations or explain the relationship between currency units. This distinction between procedural success and conceptual understanding underscores the need for continued scaffolding and reflection during similar instructional design.

From a curricular perspective, the LT can be embedded into life-skill or vocational education programs in special schools. Monetary value learning through structured game contexts aligns with financial literacy competencies and everyday functional skills such as shopping, budgeting, and money management. Teachers can adapt LT for broader skill training by incorporating role-play or digital simulations that extend beyond classroom gameplay. This approach supports the integration of mathematical reasoning into daily living skills, thereby ensuring both academic and adaptive development.

Theoretically, these findings support the perspectives of Baron-Cohen (2019) and Mesibov et al. (2005), who emphasized that children with autism learn best through concrete, visual, and structured experiences. The results are consistent with Rahmawati and Sari (2021) and Wulandari and Prasetyo (2022), who concluded that educational games enhance autistic students' focus, motivation, and conceptual understanding. In this study, the modified Monopoly game enabled direct visualization of monetary values, strengthening conceptual assimilation and generalization processes, which are often challenging for students with ASD.

Compared with previous research, this study offers novelty through the systematic development of a learning trajectory comprising four contextually linked activities based on a modified version of the Monopoly game. This approach not only uses the game as a medium but also embeds it within a structured pedagogical sequence that connects goals, activities, and anticipated student thinking. This demonstrates that visual, contextual, and game-based instruction effectively bridges the abstraction difficulties that autistic students commonly experience. The success of the LT opens up opportunities for the inclusion of game-based learning models in the curricula of special education and inclusive settings.

Conclusion

The systematically and contextually arranged learning trajectory, consisting of four stages–playing the modified Monopoly, recognizing monetary values, counting the number of plots with money images, and adding up the monetary values—was proven to improve autistic students' understanding of the concept of monetary value. The implications of this research reinforce the importance of using learning strategies designed according to the characteristics of students with special needs, especially through familiar, enjoyable, and interactive media. The modified Monopoly game not only facilitated cognitive achievement but also encouraged students' social engagement and interaction.

However, this study is limited by the small number of participants and the specific context of a single special school; thus, the generalization of the results should be approached cautiously. Future research is recommended to (1) conduct transfer tests of learning to real-world purchasing tasks, (2) adapt the developed LT for nonverbal autistic students using Augmentative and Alternative Communication (AAC) support, and (3) explore the integration of this LT into Indonesia's *Merdeka* Curriculum framework for inclusive education. Such

extensions will strengthen the practical relevance and scalability of the learning trajectory, ensuring that it contributes to both mathematical understanding and functional life skills for diverse learners.

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Conflicts of Interest

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Author Contributions

Marhamah: Conceptualization, writing - original draft, editing, and visualization; **Ratu Ilma Indra Putri:** Validation and promoter; **Zulkardi:** Validation and co-promoter; **Yusuf Hartono:** Validation and co-promoter.

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