



Investigating the Role of Traditional Games in Developing Students' Process Skills and Interest in Learning mathematics

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ABSTRACT

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Objectives: This research aims to determine the differences in the interest and process skills of students in the traditional game of marbles towards learning mathematics in elementary schools. In addition, this study was also conducted to determine the relationship between interest and process skills in the traditional game of marbles on learning mathematics. **Methodology:** This study used a mixed method with the type of explanatory method. The sample of this research was carried out in January 2021 in Jambi Province, grade IV elementary school 13/1 Muaro Bulian, and grade IV elementary school 112/1 Muaro Bulian with a total of 60 students. This study used a questionnaire in the form of a questionnaire and a question form for interviews. In the analysis of quantitative data were analyzed using descriptive statistics.

Findings: From the results obtained, student interest influences student skills. This has been explained in the results obtained from hypothesis testing where the resulting significance value is <0.05 . Through this traditional game of marbles, students have a better understanding of the subject matter of mathematics. This is related to the interests and skills of students related to traditional games.

Implications to Research and Practice: With the research findings, education can easily be adapted to the interests and skills of students related to traditional games, so that students can better preserve local wisdom. In addition, students will be able to understand lessons in education and would continue to use the traditional games that already exist in Indonesia.

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Introduction

Traditional games are a culture that belongs to every country. Games that were so popular in the era before the existence of sophisticated technology made children able to play with makeshift tools. Characteristics of traditional games that combine conflict between rivals and collaboration which in the game can lead to interaction between one team and another. Besides, traditional games provide incentives for the growth and development of children in the field of emotions and provide knowledge about the history that lies in the game (Bell, 1979; Handayani & Iswantinaingtyas, 2020). Traditional games train children in social skills compared to modern games which tend to be individualistic so that there is a lack of interaction between children (Lavega et al., 2014; Nørgaard, 2009). Traditional games can be recognized as cultural values in an area (Burgués et al., 2018; Romanvican & Istiyono, 2020).

Marbles are one of the traditional games played by children in the world with different names and playing methods. This marbles game can be played by both boys and girls (Lederman & Stewart, 1987). In the last ten years, the game of marbles played by children in America has been agates or aggies, baits, big rings, burns, commies, creamies, double hand's length, dubs, fudger, fudging, get your initials on it, grab baits and run, and much more (Jones, 1935; Linaza, 1984; Zuger, 1934). The game of marbles is also played by children in Australia and they feel happy when playing it (Howard, 1960; Salavrakos, 2020). Through the game of marbles, children can develop their potential and train their intelligence and emotions (Nørgaard, 2009). This marble-based traditional game-based learning model can integrate students in developing their interests and skills in mathematics (Foster & Shah, 2020; Whitton & Langan, 2018; Yang & Chen, 2021). This game-based learning is very suitable to be applied to students who like to play. Such pedagogy can facilitate a sense of community and competence, both of which are introduced as psychological needs by encouraging students to determine their own solutions to the problems they face. (Hartt et al., 2020; Hung et al., 2019; Williams et al., 2022; Zarrin et al., 2020).

Any kind of games can be used as learning media to introduce mathematical concepts and facilitate children to socialize with their friends (Lavega et al., 2014). Children show an interest in mathematics long before they go to school when they pay attention to basic geometric shapes, compose simple patterns and learn to count (Romanvican & Istiyono, 2020). Providing mathematics learning through the traditional game of marbles is the right thing for teachers to do (Barabadi et al., 2020; Casbergue & Kieff, 1998). Even though we are now in the modern era, traditional games such as gundu still exist with their own advantages compared to digital games (Handayani & Iswantinaingtyas, 2020; Nørgaard, 2009; Pic et al., 2019). Gundu games in education can foster collaboration skills and student interest while playing (Casbergue & Kieff, 1998; Handayani & Iswantinaingtyas, 2020; Howard, 1960). This gundu game also aims to preserve the existing culture, so that it does not sink due to the times. The implementation of gundu games in learning has advantages, namely that it can be applied in villages or places that have not been touched by technology where digital game-based learning cannot be done (Casbergue & Kieff, 1998; Handayani & Iswantinaingtyas, 2020; Linaza, 1984; Rykiel, 2020).

Research on the relationship between traditional games and their effects on learning is not new. Such research has been carried out by Burgués et al. (2018); Chen et al. (2019); Pic et al. (2019), though there are still weaknesses among these studies, including traditional games are associated with students' psychomotor abilities and show how students' attitudes towards learning are delivered through games. Another study conducted by Chen et al. (2019) looked at the influence of games on students' motivation and learning outcomes. However, the study recommended digital games which were not suitable to be applied in Indonesia, especially in areas that are still lacking in technology.

In addition, traditional games certainly have advantages, namely increasing the social value of students and preserving the culture that exists in the region, especially in Indonesia which has many cultures. This research is significant because it plays an active role in the world of education related to traditional games. This traditional game has a positive effect on student learning. Furthermore, this research is expected to help students to be more familiar with traditional games and increase students' understanding of mathematical knowledge. This research is also expected to play an important role in the field of education. It will benefit all practitioners in the field of education in relation to paying attention to student characteristics, student knowledge, and student understanding for assessment and evaluation activities. The purpose of this study was to determine the differences in the interests and process skills of students in the traditional game of marbles for learning mathematics in elementary schools. In addition, this study was also conducted to determine the relationship between interest and process skills in the traditional game of marbles on learning mathematics.

Method

Research Design

This research used the explanatory model research design to prove the relevance of traditional games in mathematics learning (Liem, 2018; Rojas Rojas et al., 2019; TC Lin, 2019). The use of this type of research design helps to analyze the questionnaires supported by the results of the interviews used to see the results of the research. The use of this research design also helps the researcher to know about the respondents' interests and skills in the subject of the research. For this purpose, interviews were conducted based on the traditional marble games, followed by the integration of their findings with the results of the quantitative data processed.

Research Sample

The purposive sampling technique was used in this research to identify the sample. Certain criteria were determined in advance as to who can be taken as a sample based on research objectives. The criteria included community leaders, district education offices, traditional game players, and teachers who can provide accurate information about the research topic. The research setting was Jambi Province, grade IV State Elementary School 13/1 Muaro Bulian, and grade IV State Elementary School 112/1 Muaro Bulian and the total sample size was 60 students (Table 1).

Table 1

Research sample

Variable	Gender	N
State Elementary School 13/1	Female	15
	Male	15
State Elementary School 112/1	Female	15
	Male	15

Data collection Instrument and Procedure

Data collection instruments for qualitative data were interviews and observation. The interview type used was a structured with open-ended questions. The quantitative data was collected through a questionnaire containing statements that showed students' interest in traditional games.

Table 2 presents the grid used for observing students' *process* skills in the mathematics subjects.

Table 2

Student Process Skills Observation Instrument Grid

Variable	Indicator	Statement Item Number
Process skills of students in mathematics	Observation	1,2,3
	Classification	4,5,6,7,8
	Measure	9,10,11
Number of statements		11

The instrument for observation of students' process skills in mathematics subjects used a Likert scale consisting of 4 categories with the number of questions from the student's process skills variable as many as 11 questions. The following 4 categories and intervals were owned by student's process skills variable (Table 3)

Table 3

Category of student process skills

Category	Indicator Interval		
	Observation	Classification	Measure
Not Very Good	3.0-2.25	5.0 -8.75	3.0-2.25
Not good	5.35-7.50	8.85 -12.5	5.35-7.50
Good	7.60-9.75	12.6 -16.25	7.60-9.75
Very good	9.85-12.0	16.35-20.0	9.85-12.0

Table 4 presents the grid used in the instrument to observe student *interest* in the mathematics subjects.:

Table 4

Grid of Students' Interest Observing Instruments in Mathematics Subjects

Variable	Indicator	Statement Item Number
Students' interest in Mathematics	Attention in learning	1,2,3,4
	Student engagement	5,6,7,8,9
	Curiosity	10,11,12,13,14
Number of Statements		14

The questionnaire statements were measured on a 5-point Likert scales, namely the categories of choices Not Very Good, not good, Enough, Good and Very good. Table 5 presents the intervals and categories used in the interest variable with their interval indicators:

Table 5

Category of student interest

Category	Interval Indicator		
	Attention in learning	Student engagement	Curiosity
Not Very Good	4.0 – 7.2	5.0 – 9.0	5.0 – 9.0
Not good	7.3-10.4	10.0-13.0	10.0-13.0
Enough	10.5 – 13.6	14.0 – 17.0	14.0 – 17.0
Good	13.7 -16.8	18.0 -21.0	18.0 -21.0
Very good	16.9 – 20.0	22.0 – 25.0	22.0 – 25.0

In the use of qualitative data, this study used interviews and observations to support the data obtained from the results of the questionnaire.

Table 6 presents the grid used in the interview to check students' opinion about various assessment aspects like learning with games, traditional games, and marble games to learn mathematics subjects.

Table 6

Interview grid

NO	Assessment aspects	Statement	Number of questions
1	Learning with games	Integrating games into classroom learning	6
2	Traditional games	Introducing traditional games to students	8
3	Marbles game	Introducing marbles game to students	6
Total			20

From the interview grid used. The total questions given to the respondents were 20 questions.

The research procedure consisted of preparation, collection, and completion of research instruments. The preparation phase involved building the interview instrument, observation and documentation; the next phase involved collecting information from interviews, observation and documentation; while the last phase ended with data analysis of the results of interview, observation and documentation search (Aksakal et al., 2019; Erford et al., 2010; Johns, 2018). The research procedure can be seen in Figure 1:



Figure 1. Research procedure

All data was collected by setting research boundaries and gathering information through structured observation grid and open-ended interviews, documentation research and visual material. Interviews were conducted with community leaders, education and culture offices, and teachers with the aim of gathering information about teachers' knowledge of traditional games and the way they integrated traditional games into learning. Interviews were also used to obtain information related to facts, beliefs, feelings, and desires that were needed to fulfill the research objectives. Observations were made to assess the teacher's knowledge in applying traditional games in learning while the documentation study was to analyze the syllabus, core competencies, basic competencies and learning to determine the learning to be integrated.

Data analysis

The quantitative data was analyzed using descriptive statistics, assumption tests like normality, homogeneity and linearity tests using the SPSS application. If the data being tested was normal, homogeneous, and linear, then hypothesis testing was done. During this study, t-tests were used to see whether there was a difference in the data between students' interest and process skills towards traditional games. After seeing the t-test results, it was linked with a correlation test to see how the relationship between the two types of data. The quantitative data thus obtained was then linked to the qualitative data. The qualitative data was analyzed using the data analysis technique prescribed by Miles and Huberman (1994). Qualitative data analysis was carried out interactively and was continued until the data became saturated. Thus, the data analysis involved data reduction, data presentation, and drawing conclusions/verification (Amaro-Gahete et al., 2019; Kaufmann, 2020; Matteson, 2021).

Results

This section describes the results of descriptive statistics of students' interest and mathematical process skills obtained through the traditional game of marbles. The question items on process skills included indicators like classification, observation, and measurement; while the question items on interest included indicators like attention in learning, student involvement, and curiosity. The results from observations in this study were obtained from two State Elementary Schools namely, State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian.

Table 6 presents the results obtained in descriptive statistical testing with the variables of students' interests and skills using each of the 4 indicators. It also presents the description of students' process skills towards mathematics through the game of marbles in 112/1 Muaro Bulian State Elementary School and 13/1 Muaro Bulian State Elementary School on all classification indicators.

Table 6

Description of student process skills on classification indicators

Student Response	Interval	F	Percentage	Category	Mean	Median	Min	Max
State Elementary School 112/1 Muaro Bulian	5.0 -8.75	1	3.3%	Not Very Good	12.86	13.00	5.00	17.00
State Elementary School 13/1 Muaro Bulian	8.85 -12.5	9	29.7%	Not good				
State Elementary School 112/1 Muaro Bulian	12.6 -16.25	20	66%	Good				
State Elementary School 13/1 Muaro Bulian	16.35-20.0	0	0%	Very Good				
State Elementary School 112/1 Muaro Bulian	5.0 -8.75	3	9.9%	Not Very Good				
State Elementary School 13/1 Muaro Bulian	8.85 -12.5	3	9.9%	Not good	12.69	13.00	5.00	20.00
State Elementary School 112/1 Muaro Bulian	12.6 -16.25	20	66%	Good				
State Elementary School 13/1 Muaro Bulian	16.35-20.0	4	13.2%	Very Good				

Based on the results in Table 6, it can be concluded that the most dominant category in the classification indicator with variable student process skills was Good with a percentage of 66% each as many as 20 students each at 112/1 Muaro Bulian State Elementary School and 13/1 Muaro Bulian State Elementary School. So, it can be assumed that both elementary schools had the same advantages in student process skills through classification indicators.

Table 7 presents the description of students' process skills towards mathematics through marble games at State Elementary School 112/1 Muaro Bulian and State Elementary School and 13/1 Muaro Bulian on the observation indicators.

Table 7

Description of students' process skills on Observation indicators

Student Response	Interval	F	Percentage	Category	Mean	Median	Min	Max
State Elementary School 112/1 Muaro Bulian	5.0 -8.75	0	0%	Not Very Good				
State Elementary School 13/1 Muaro Bulian	8.85 -12.5	6	19.8%	Not good	12.86	13.00	5.00	20.00
State Elementary School 112/1 Muaro Bulian	12.6 -16.25	18	59.4%	Good				
State Elementary School 13/1 Muaro Bulian	16.35-20.0	6	19.8%	Very Good				
State Elementary School 112/1 Muaro Bulian	5.0 -8.75	2	6.6%	Not Very Good				
State Elementary School 13/1 Muaro Bulian	8.85 -12.5	9	29.7%	Not good	12.69	13.00	5.00	17.00
State Elementary School 112/1 Muaro Bulian	12.6 -16.25	19	62.7%	Good				
State Elementary School 13/1 Muaro Bulian	16.35-20.0	0	0%	Very Good				

Based on the results in Table 7, the most dominant category in the observation indicator with the variable student process skills was Good with a percentage of 59.4% of 18 students at State Elementary School 112/1 Muaro Bulian and Good as well with 62.7% of 19 students in State Elementary School 13/1 Muaro Bulian. So, it can be assumed that of the two Elementary Schools, the State Elementary School 13/1 Muaro Bulian had more advantages in student process skills through observation indicator.

Table 8 presents the description of students' process skills towards mathematics through marble games at State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian on measure indicators.

Table 8

Description of student process skills on Measure Indicators

Student Response	Interval	F	Percentage	Category	Mean	Median	Min	Max
State Elementary School 112/1 Muaro Bulian	4.0-7.0	6	20%	Not Very Good	9.35	9.00	4.00	16.00
	8.0 -10.0	10	35%	Not good				
	11.0 - 13.0	10	35%	Good				
	14.0- 16.0	4	10%	Very Good				
State Elementary School 13/1 Muaro Bulian	4.0-7.0	0	0%	Not Very Good	12.85	12.00	8.00	16.00
	8.0 -10.0	6	16.6%	Not good				
	11.0 - 13.0	20	57.1%	Good				
	14.0- 16.0	4	14.3%	Very Good				

Based on the results in Table 8, the most dominant skill categories among the students at State Elementary School 112/1 Muaro Bulian was Not good and Good with a percentage of 35% each of 10 students. For students in the State Elementary School 13/1 Muaro Bulian, the most dominant skill category was in good category with a percentage of 57.1% with as many as 20 students. In this case, it can be said that the superior interest fell to the students at the State Elementary School 13/1 Muaro Bulian in the measure indicator.

Table 9 describes students' interest in learning mathematics through playing marbles at State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian with indicators of attention in learning.

Table 9

Description of student interest in the Attention indicator in learning

Student Response	Interval	F	Percentage	Category	Mean	Median	Min	Max
State Elementary School 112/1 Muaro Bulian	4.0 -7.2	1	5%	Not Very Good				
	7.3-10.4	2	10%	Not good				
	10.5-13.6	5	25%	Enough	13.60	14.00	4.00	20.00
	13.7-16.8	8	40%	Good				
	16.9-20.0	4	20%	Very good				
State Elementary School 13/1 Muaro Bulian	4.0 -7.2	1	7.1%	Not Very Good				
	7.3-10.4	5	35.7%	Not good				
	10.5-13.6	2	14.3%	Enough	12.92	13.00	4.00	17.00
	13.7-16.8	6	42.9%	Good				
	16.9-20.0	0	0%	Very good				

Based on the results in Table 9, it can be assumed that the most dominant interest category in State Elementary School 112/1 Muaro Bulian students was Good with a percentage of 40% with as many as 8 students. For students at the State Elementary School 13/1 Muaro Bulian, the most dominant skill category was the good category with a percentage of 42.9% with many as 6 students. In this case, it can be said that the superior interest fell on the students at State Elementary School 112/1 Muaro Bulian with indicators of attention in learning.

Table 10

Description of student interest in the indicator of student engagement

Student Response	Interval	F	Percentage	Category	Mean	Median	Min	Max
State Elementary School 112/1 Muaro Bulian	5.0 - 9.0	0	0%	Not Very Good				
	10.0-13.0	0	0%	Not good	16.35	16.00	5.00	21.00
	14.0-17.0	18	65%	Enough				
	18.0 - 21.0	12	35%	Good				
	22.0-25.0	0	0%	Very good				
State Elementary School 13/1 Muaro Bulian	5.0 - 9.0	0	0%	Not Very Good				
	10.0-13.0	4	7.1%	Not good				
	14.0-17.0	7	28.6%	Enough	17.57	15.00	5.00	21.00
	18.0 - 21.0	13	64.3%	Good				
	22.0-25.0	0	0%	Very good				

Table 10 illustrates students' interest in mathematics through playing marbles at State

Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian with indicators of student engagement.

Based on the results in Table 10, it can be assumed that the most dominant interest category in State Elementary School 112/1 Muaro Bulian students was Enough with a percentage of 65% opted by as many as 18 students. For students at the State Elementary School 13/1 Muaro Bulian, the most dominant was the good category with a percentage of 64.3% as many as 13 students. In this case, it can be said that the top enthusiasts fell among the students at State Elementary School 112/1 Muaro Bulian.

Table 11 presents the overview of students' process skills towards mathematics through playing marbles at State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian with curiosity variable.

Table 11

Description of students' interest in the curiosity indicator

Student Response	Interval	F	Percentage	Category	Mean	Median	Min	Max
State Elementary School 112/1 Muaro Bulian	5.0 - 9.0	0	0%	Not Very Good				
	10.0-13.0	1	2.8%	Not good	2.86	3.00	2.00	5.00
	14.0 - 17.0	17	47.2%	Enough				
	18.0 -21.0	11	30.6%	Good				
	22.0 - 25.0	7	30.6%	Very good				
State Elementary School 13/1 Muaro Bulian	5.0 - 9.0	0	0%	Not Very Good				
	10.0-13.0	0	0%	Not good	3.60	3.50	3.00	5.00
	14.0 - 17.0	18	50%	Enough				
	18.0 -21.0	12	33.3%	Good				
	22.0 - 25.0	6	16.7%	Very good				

Based on the results of Table 11, it can be assumed that the most dominant interest category in State Elementary School 112/1 Muaro Bulian students was Enough with a percentage of 47.2%, with as many as 17 students. For students at the State Elementary School 13/1 Muaro Bulian, the most dominant skills category was also Enough category with a percentage of 50% opted by as many as 18 students. In this case, it can be said that the superior interest fell on 13/1 State Elementary School students in the student curiosity indicator.

Hypothesis testing

A *t*-test was carried out to determine the differences in variables in mathematics subjects. The condition in this test was that if the significance value was > 0.05, it can be said that the variable had no difference. If the significance value < 0.05, then the variable had a significant difference. The results obtained are shown in Table 12.

Table 12 and Table 13 present the *t*-test results of students' process skills and students' interests at State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian

Table 12

T-Test Student Process Skill

		Independent Sample t-test				
		Levene's Test for Equality of Variances				
		F	Sig.	T	Df	Sig. (2-tailed)
SDN 13/1 Muaro Bulian*	Equal variances assumed	.658	.601	20.750	53	.000
SDN 112/1 Muaro Bulian	Equal variances not assumed			20.750	42.881	.000

Table 13

T-Test Student Interest

		Independent Sample t-test				
		Levene's Test for Equality of Variances				
		F	Sig.	T	Df	Sig. (2-tailed)
SDN 13/1 Muaro Bulian*	Equal variances assumed	.689	.621	20.750	53	.000
SDN 112/1 Muaro Bulian	Equal variances not assumed			20.750	42.881	.000

Table 12 and Table 13 reveal that there are differences in both students' process skills and student interests at State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian. This is evident by the value of sig (2-tailed) 0.000 < 0.05. In this way, both students' interests and skills are assumed to have a significant influence on mathematics subjects with flat-sided geometry.

Table 14 presents the results of the correlation test of interest and process skills of students at State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian.

Table 14

Correlation test results of Interest and Process skills

		Correlation		
			INTEREST	PROCESS SKILLS
State Elementary School 112/1 Muaro Bulian	INTEREST	Pearson Correlation	1	.711
		Sig. (2-tailed)		.025
		N	30	30
State Elementary School 13/1 Muaro Bulian	PROCESS SKILLS	Pearson Correlation	.711	1
		Sig. (2-tailed)	.025	
		N	30	30
State Elementary School 112/1 Muaro Bulian	INTEREST	Pearson Correlation	1	.648
		Sig. (2-tailed)		.035
		N	30	30
State Elementary School 13/1 Muaro Bulian	PROCESS SKILLS	Pearson Correlation	.648	1
		Sig. (2-tailed)	.035	
		N	30	30

From Table 14 it becomes evident that there exists a relationship between students'

interest and process skills of State Elementary School 112/1 Muaro Bulian and State Elementary School 13/1 Muaro Bulian This is evident in the value of sig (2-tailed) in accordance with the provisions that have been set.

Results of Interviews with Community Leaders of Customary Leaders

Q : How important are traditional games to play? What is the function of traditional games?

A: For children's entertainment it is important to develop traditional games because they foster many forgotten values of life, particularly at a time when the world has undergone many changes, with the emergence of new technology that allows children to play alone. In this way, the level of togetherness will increase, and family values would be more effective if traditional games are redeveloped

Q : How did this traditional game come about?

S : The history of traditional games is known because it has existed since ancient times and was introduced from generation to generation.

The informants thus stated that traditional games were important to be played and re-introduced to children because they can develop the feeling of togetherness and values like honesty and family values more effectively. The informants revealed that the origin of traditional games is unknown because they have existed since ancient times. and passed on through ancestors.

Cultural values such as polite governance, self-development, moral values, or customs can also be developed through traditional games. Traditional games have educational values, namely moral values that make these children respect friends, the value of togetherness because children can always meet friends; and social values to communicate with fellow friends. They get the advantage of sharpening the child's brain from an early age, as these games can even be played by other parents.

Results of Interviews with the Education Officials

Two interviews were conducted with a male educational officer with the initial K from the Tebo Regency Education and Culture Office and a female official with the initial N as a representative of the Muaro Jambi Regency Education and Culture Office.

Q : What are the advantages of playing this traditional game?

K : One advantage is that besides just playing with children, it can also preserve and pass on culture from one generation to the other.

Q : Is it important to preserve this traditional game?

K : Yes, it is very important because games are the pride of a region; which none will lose to today's modern games.

N : I agree, because like the uniqueness of each region, traditional games must also be preserved as a unique element of each region.

Both the informants thus conveyed the importance of playing traditional games with the aim of preserving them since they are the pride and uniqueness of a region. Traditional games must also be preserved so that future generations remain aware of them. Additionally, traditional games provide values that are in accordance with moral values like honesty, and educational values so that children could learn about these values. In the Tebo area, there is already an integration between several other local wisdoms such as

dance, sloko and other cultural elements, but traditional games have not been integrated, though the interview findings suggest that traditional games are good for learning.

Results of Observations and Interviews

The results of the interview were conducted with a male informant carrying the initial T who was a teacher at the 13/1 Muaro Bulian public elementary school and a female informant with initial P who was also a teacher at the 112/1 Muaro Bulian public elementary school.

Q : what is the state of the students' interest and process skills after the implementation of the traditional game of marbles in learning mathematics?

T : After the implementation of the traditional game of marbles in learning mathematics, students looked more enthusiastic, active, and happy to participate in learning. From the manner they play marbles, the process skills possessed by them have really developed and are in good category.

P : After the implementation of the traditional game of marbles, students became more active in learning mathematics. The students' process skills seemed elevated to the good category.

Q : Are traditional game materials now included in the curriculum?

T : Not many, only a few traditional games are included in the curriculum. Teachers also do not often use traditional games in learning.

P : Only a few teachers use traditional games in their learning. Therefore, this traditional game is rarely found in the curriculum.

The feedback from the teachers, who teach in grade IV of State Elementary School 13/1 and State Elementary School 112/1 Muaro Bulian, also revealed that there are many traditional games that can be taken for educational value, such as hide and seek, marbles, congklak, jumping rope, catfish pegs, ankles, broken plates, and many more. However, very few traditional games are integrated in learning. The teachers also concluded that in the absence of their integration in the curriculum, a strategy can be developed by introducing these traditional games according to students' convenience, both indoor and outdoor.

Discussion

The results of the study suggest that some of the students have superior interest and process skills in playing traditional games, which is used as a technique to teach the mathematics subject. This traditional game forms a mindset and hones students' abilities so that they can easily understand the learning provided by the teacher (Hendrickson, 2021; Tatiana et al., 2021). Students also feel comfortable and relaxed when the teacher provides learning through traditional games so that students do not feel pressured in participating in math lessons. It can be seen that the existence of this traditional game has a positive impact on students' mathematics learning outcomes (Kwarikunda et al., 2020; Walan & Gericke, 2021).

This study was based on variables used for students' process skills and interest by

asking questions on three indicators of classification, observation, and measurement. All three indicators were found being advantageous and falling in good category in the State Elementary School 13/1 Muaro Bulian. In this case, it is explained that the students at the State Elementary School 13/1 Muaro Bulian have good skills in the traditional game of marbles. The interest variable included 3 indicators: attention in learning, student engagement and student curiosity. The results obtained explained that of the three indicators used, two of them have a high interest in the State Elementary School 13/1 Muaro Bulian. In this case, students at the State Elementary School 13/1 Muaro Bulian have a higher sense of interest than the State Elementary School 112/1 Muaro Bulian. Likewise, the results of the interviews also suggested that the interest and process skills of students at State Elementary School 13/1 were far superior to those at State Elementary School 112/1. From the overall results, the State Elementary School 13/1 Muaro Bulian had high interest and process skills in the traditional game of marbles in learning mathematics. The results of interviews also suggest that the implementation of traditional marble games in learning mathematics can foster students' interest in learning as well as preserving the culture that is characteristic of the region. This is consistent with research on process skill (Gegenfurtner et al., 2020; Solé-Llussà et al., 2020; Strawitz, 1993), though it did not use the traditional game of marbles in its research.

The hypothesis testing carried out in this study included a t- test and a correlation test. From the results of the t-test analysis, it was found that the student process skills variable was significantly different from the process skills of students at State Elementary School 13/1 and process skills of students at State Elementary School 112/1 Muaro Bulian. In addition to the students' process skills, on the variable of students' interest, there is a difference between students' interest in State Elementary School 13/1 and student interest in State Elementary School 112/1 Muaro Bulian. In addition to the t-test analysis, a correlation test analysis was also carried out which found that there was a relationship between interest and student learning process skills at State Elementary School 13/1 Muaro Bulian and State Elementary School 112/1 Muaro Bulian. It can be concluded that students' interest affects students' process skills in the traditional game of marbles. The higher the interest of students, the greater are the process skills of students in learning mathematics (Dou et al., 2018; Engeroff et al., 2021; Guo et al., 2020).

There is a dearth of research on traditional game of marbles in previous literature, except (Pic et al., 2019) and (Chivandikwa et al., 2019), which also study traditional games in general, and not on any specific type of games. A few other research on traditional games (Akben, 2019; Cain, 2020; Chivandikwa et al., 2019) had a few drawbacks. Cain (2020) discussed how a learning model based on traditional games could act as a distraction for students since students would not be interested in learning through traditional games. Similarly, Chivandikwa et al. (2019) research discusses how traditional games could affect problem solving skills. Another variable which they studied was the effect of traditional games on gender equality on students' self-efficacy. The current research is quite different from previous research studies as it focuses on the effect of traditional games of marbles for teaching elementary school mathematics with the variables of students' interest and process skills. This makes the current research study the latest research discussing the traditional game.

Conclusion, Recommendations, and implications

Traditional games are a culture that must be preserved and proud of every region (Farias et al., 2019; Garcia-Puchades & Chiva-Bartoll, 2020; Williams et al., 2022). This game not only has its own characteristics but also has enormous benefits in the field of education. This is the reason why this research was significant to be carried out. Besides its educational value, it is very important to integrate traditional games into learning, to preserve and protect them as they signify the local wisdom (Furman, 2018; Hong et al., 2019). The game of marbles can be used to teach learning mathematical concepts related to flat shapes, while the game of breaking plates can be used to teach math concepts to grade IV elementary school students (Sar et al., 2015; Wulfekühler & Rhodes, 2018).

Based on the results of the study, it can be concluded that students gain sufficient knowledge about the traditional game of marbles, which makes a positive influence on students learning mathematics. The game contains elements of mathematical concepts, namely about building up a space, buying a flat or a house, and measure lengths used in various tasks encountered in life (Louth & Jamieson-Proctor, 2019). The high interest and process skills of students in traditional marble games would also improve students' mathematics learning outcomes (Çakir-Atabek et al., 2020). The existence of this positive relationship shows how important traditional games are to be preserved. In addition to having characteristics in their respective regions, this traditional game is a cultural factor that distinguishes Indonesia from other countries.

Such innovative research would have several implications in many fields. For instance, in the field of education, its findings could be a useful reference for educators to find out how to measure students' learning outcomes when the traditional game of marbles is used as a teaching technique to teach mathematics. In addition, this research can also be used as a reference for other studies and as a comparison for results in further research. This research could also make a positive influence on students' interest and process skills in mathematics. This research shall also act as a breakthrough to inspire other researchers.

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