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Changing in Mathematical Identity of Elementary School Students Through Group Learning Activities

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Abstract

This article aims to describe the mathematical identity of elementary school students during studying mathematics. When studying mathematics, the students often face difficulties in understanding the concepts which results the decrease in their learning motivation. It will lead to the lack of development of their mathematical identity. The students who are able to develop their mathematical identity well are more likely to succeed in learning mathematics. A qualitative approach was employed to trace the students' mathematical identity. Questions and interviews were used to collect the data. The findings indicated during participating in the group learning activities, the students were able to increase their motivation. Therefore, it can improve their mathematical identity.

Keywords: Group Learning, Identity Change, Mathematical Identity, Motivation

Introduction

Several studies concluded that elementary school students consider mathematics only as an arithmetic operation (Abbasi, 2016). This assumption decreases the mathematics learning outcome of the elementary school students, they do not deeply comprehend the concept of mathematics, eventually, they also lack ability to solve the problem. One of the students' poor problem-solving abilities is the understanding concept of geometry.

Geometry is one of the study subjects that has many concepts. From a psychological perspective, geometry is the presentation of abstraction from visual and special experiences, for example, fields, patterns of measurement, and mapping. Whereas from a mathematical perspective, geometry provides approaches to problem-solving such as pictures, diagrams, coordinate systems, vectors, and transformations.

The purpose of geometry learning is gaining the students' confidence in their mathematical identity abilities, having good problem-solving abilities, and able to communicate mathematically and rationalize well (Bobango, 1993). Basically, geometry has a greater opportunity to be understood by the students because its ideas have been widely known by the students even prior to entering formal education. These ideas are lines, fields, and spaces. However, the facts show that students' learning outcome of geometry are still low and need improvement (Bobango, 1993). Even in Indonesia, among various branches of mathematics, geometry is the most concerning subject which has low learning outcomes (Sudarman, 2000). To the present day, the results of this study are still valid in one of the elementary schools in Indonesia, precisely in East Java.

The difficulty of students in understanding the concept of geometry is caused by their inability to receive the abstract concepts in mathematics. Since elementary school students are very young, they do not have the ability to learn mathematical concepts that are mostly abstract (Del Fava, 2005). This inability decreases the students' learning motivation. Whereas, motivation has been proven to improve conceptual understanding and improve learning outcomes (Grolnick & Ryan, 1987). Motivation also affects the formation of students' mathematical identities because motivation is one of the factors that build mathematical identity (Martin, 2000). Then, the students' mathematical identity will be poor if their motivation is low (Crompton, Ford & Grant, 2015).

Mathematical identity is like a construct that describes a person's relationship with mathematics. The students' mathematical identities are formed along with the learning at school. Students learn to understand themselves as students of mathematics through their experiences in math classes; interaction with teachers, parents, and peers; which are related to the future that they will face (Radovic et al., 2017). By knowing the mathematical identity of students, researchers expect to get a better understanding of the relationships that are built between students and mathematics. We utilized the established relationship between students and mathematics as an effort to identify the causes of the difficulties and the decrease in students' motivation in learning mathematics.

Identity research is not only used in the field of psychology but also in the field of education because identity theory is used to help explain the development of mathematics learning in the classroom (Juzwik, 2006; Sfard & Prusak, 2005; Wenger, 1998). The identity revealed in this research was the students' mathematical identity. In general, mathematical identity is expected to be one of the ways to capture students' learning experiences both personally and in groups. The students' mathematical identities described as narratives related to learning experiences, motivation, strategies and other things related to mathematics and student relations. Therefore, the purpose of this research was to reveal the mathematical identity that elementary school students built when learning geometry and examining the mathematical identity that elementary school students built when they were studying in groups. In addition to tracing students' mathematical identities, this study also examined the possibility of changing mathematical identities raised by students when they were studying with their peers. This change is

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expected to be one indicator of the increase in students' motivation and understanding of concepts; of course, it is expected to be able to improve the quality of learning mathematics.

Theoretical Framework

Mathematical identity

Identity is related to how someone defines themselves and how others define that person (Martin, 2009; Oppland-Cordell & Martin, 2015; Sfard & Prusak, 2005a). Therefore, a person's identity may include someone's experience and involvement with others. When associated with students, experience, and involvement which shape the identity, they are the experience and involvement of students while participating in the classroom learning activities. In this study, the experience of involvement was limited to the experience and involvement of students in the mathematics class. One of the factors of forming the students' experience comes from their involvement while learning mathematics with teachers and peers. When the students went through the learning experiences that was when their identity was formed.

The description of the learning experience of mathematics is called a mathematical identity. More precisely, there was a research which refers to the definition of mathematical identity presented by Martin (2009)

> *Mathematics identity refers to the dispositions and deeply held beliefs that individuals develop about their ability to participate and perform effectively in mathematical contexts and to use mathematics to change the conditions of their lives. A mathematics identity encompasses a person's self-understanding and how others see him or her in the context of doing mathematics. (pp. 136–137)*

The nature of identity can be categorized as dynamic and sustainable based on one's life experience when dealing with others (Wenger, 1998). While the mathematical identity is unstable, has many changing, constructive, multi-contextual, relational, and emotional natures (Kaasila & Lutovac, 2011).

The dynamic nature of identity allows students to experience changing in mathematical identity. This changing is influenced by many factors. In this study, changes in identity traced through group learning activities, because group learning could improve students' understanding and motivation while learning mathematics (Darinka Radovic, 2017). Therefore, the group learning affected the mathematical identity of the students due to a good understanding of the concept, eventually the students could develop a better mathematical identity (Rosemary Mkhize, 2017).

Besides having several properties, mathematical identity has several components underlying the formation of mathematical identity. The components of mathematical identity delivered by Martin (2000) were the information about (a) the importance of mathematics for someone, (b) motivation to learn mathematics, (c) learning opportunities for mathematics, (d) strategies for learning or participating in the context of formal and informal mathematics, (e) obstacles faced in learning mathematics, and (f) capacity or ability possessed to participate in mathematics learning. Based on the six components, the researchers limit each component so that the description of the mathematical identity that was built did not expand. This limit would be an indicator of mathematical identity used as a reference by the researchers. The development of this indicator is presented in Table 1 and referred to the description as presented by Larnell (2016, p.240).

Identity narrative

Mathematical identity is expressed through narrative (Sfard & Prusak, 2005b). The narrative that described by researchers here was in the form of a person's story while studying mathematics, encompassing past related mathematics, conceptual and pedagogical abilities of mathematics, experience, relationships with others, and students' expectations after learning mathematics. In other words, students' identity narratives are defined as one way of telling themselves or others about themselves as students (Kaasila, Laine, & Pehkonen, 2005). This identity narrative could later be seen as a product of a reflective process because it has been changing over time in the learning process. Narrative changing were triggered by the context of problems, situations, and social relationships (Hannula, 2016). Narratives about identity were expected to be able to answer the question "who you are" in a situation or condition (Juzwik, 2006).

Research Method

This study employed a qualitative approach. The research design included five stages. First is problem identification. This identification had been included in the background. Second and third are collecting and interpreting data. Fourth, intervention or action based on initial data. Interventions in the form of group learning activities could be done by students to solve problems in mathematics and efforts to increase the development of identity. Group learning activities were chosen because the relationships with peers are activities that could be used to develop themselves and students' self-confidence (Marsh, Trautwein, Ludtke & Koller, 2008). Group learning influenced the value and meaning of mathematics learning in students (Francis, Read & Skelton, 2010). Fifth, evaluation and reflection of the results.

Figure 1 below presents the research design chart employed by the researchers:

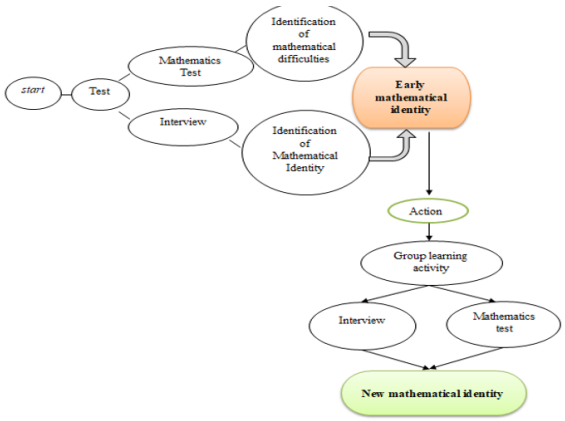

Figure1. Research design

Data collection

To gain knowledge about class conditions and foster students' trust, we visited classes to observe, talk (approach, explore information) with students during break time and participated in math lessons. Table 2 reveals the summary of actions taken to trace students' mathematical identities during self-study and the changes that arise in students' mathematical identities during the group-learning activities.

In the next step after data collection, we made graphic representation of the mathematical identity of the student. The purpose of making this graph was to find out the changes in mathematical identity that occur in students. This changing would show the mathematical identity that

Table 1. *Indicator of Mathematical Identity*

Factor	Description	Indicator	Scale	Information (Example of Statement)
The important of mathematics	About the meaning of mathematic for students, whether it is as a useful effort or mathematics as a scientific discipline (now or later)	Mathematics has no meaning in one's life	1	"I prefer natural science to math"
		Mathematics means as a science that must be taken	2	"yes you have to study math, it is compulsory"
		Mathematics means as knowledge that is useful for everyday life	3	"if we don't study math, then we can't count. If we buy something, we don't know the change "
Motivation	About reasons to be involved in in math activities	Take math class only as the duty	1	"the important thing is listening to the teacher"
		Complete math assignment only because it is assigned by the teacher	2	"it's ok if the one who do the task is my tutor not me, as long as I submit it to the teacher."
		Motivated to prove ability and to be able to compete with peers	3	"I have to get better score than my classmate"
Strategy	About tactics or preferred methods for completing mathematical work	Avoid math	1	"I hope the teacher do not appoint me" (head down)
		Trying to follow the math course	2	"just keep silent, don't talk too much"
		Actively engage during the math course	3	"I like to answer when the teacher asks questions" "I will ask if I don't understand yet."
Opportunity	About the opportunity to participate in the context of mathematics or acquire mathematical knowledge	Learning environment does not support mathematics learning	1	"My school is located near a field, so it's very noisy, I couldn't study well"
		The learning environment strongly supports the process of learning mathematics	2	"my parents want me to get extra tutoring lesson"
		Get support from the learning environment and be able to explore the support so that it's emerging the new knowledge	3	"additional tutoring get me understanding mathematics more "
Obstacles	About the obstacles faced when participating in the context of mathematics	Recognizing the obstacles in learning, but there is no effort to overcome them	1	"It's better to cheat on friends if there is an assignment because usually it is very difficult"
		Realizing that there are some obstacles, but rely on the teacher to overcome these obstacles	2	"if there is a test on whiteboard, it is better to wait until a friend is going to do it first or the teacher explains.."
		Realizing that there are some obstacles, and try to actively explore information and take actions that can be used to overcome these obstacles	3	"make a note on the questions that I have worked on before" "Practices many times at home so that I could do the questions given by the teacher later on."
Capacity to do	About what is known already, a person's ability to take advantage of learning opportunities	Passive in math class	1	"What to ask? I don't understand what to ask"
		Encouraged to try harder in learning math	2	"I also want to be able to do math, just like my friends"
		Other friends also encourage to do better	3	"my friends like to discuss math problem"

Note: Scale 1, 2, 3 show the level of each component based on the student's statement during the interview.

students have developed in a more positive direction. Figure 2 depicts a guide to make a graphic representation of students' mathematical identities.

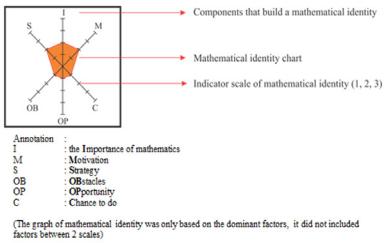

Figure 2. Graphical representation of mathematical identity

Making a graph of mathematical identity was done by: (1) Identifying students' opinions about mathematics learning in accordance with the results of interviews, (2) Students' opinions were sorted and adjusted to the indicators that have been determined by the researcher, (3) Determining the scale that represents the opinions of students and the last (4) Drawing on the fields provided.

This graphic representation was presented for each research subject because each person's mathematical identity was different. The presentation of graphical representations was raised at each stage of the research. This was done so that the changes that appear could be seen clearly at each stage of the research.

Participants

The subjects in this study were fifth-grade students from three different elementary schools. The selection of elementary schools was based on the lowest mathematics scores obtained for three consecutive years. This was because schools were identity-forming agents, so schools that had a low reputation for mathematical values resulting in low students' mathematical identities (Rosemary Mkhize, 2017).

Table 2. *Data Collection*

Stage	Description	Instrument	Purpose	Research Data	Results
I	Identifying problems experienced by students (early identification of mathematical identity)	Mathematics test (geometry, algebra, arithmetic, etc.)	Reading on the part where the subject had difficulty in learning mathematics	Students' work results Results of interviewing mathematical difficulties	Students have difficulty understanding the concept of a circle
II	Students were asked to work on geometry problems without help from friends	Geometry test Interview	Reading students' initial mathematical identities	Students' work results Mathematical identity interview results	Students' mathematical identity (initial identity)
III	Asked students to do group learning activities. this activity was used to overcome students' problems	Geometry test Interview	Reading students' mathematical identities while learning in groups	Students' work results Mathematical identity interview results	Students understand the concept of circles Students have a new mathematical identity
IV	Gave similar questions about circles to ensure students' understanding of the concept of a circle	Geometry test Interview	Reading the changing and consistency of mathematical identity	Students' work results Mathematical identity interview results	Students understand the concept of circles Searching for consistency of new mathematical identities

Furthermore, the fifth-grade students were designated as research subjects, because students at the fifth grade were able to reason and think abstractly. Students at this level had obtained sufficient concept knowledge during elementary school, especially since fifth-grade students begin their study for the national exam. Poor understanding and motivation would affect the readiness of students to take national exams. From each school, there was one student chosen as the subject of this research. The student had a history of difficulties in understanding mathematical concepts. This history was supported by data from test results that had been given to students. The three students were obtained as subjects, namely Celsi, Lala and Galuh (pseudonyms).

Results

The first stage

The results in the first stage were the identification of mathematical problems experienced by students. At this stage, researchers had given questions to students to identify where the students have learning difficulties. Next, we identity students' mathematical identities by using interviews. The conclusion of the first stage of identification is explained in Table 3.

Based on the below results, we built the initial assumptions that were used as the basis for identifying students' initial mathematical identities. This assumption was a mathematical identity built by students is less developed because students experienced a failure when trying to solve mathematical problems. These experiences led to negative attitudes and decreased their motivation to learn about mathematics.

At this stage, two students showed a high confidence while learning mathematics. The confidence shown relates to the desire to compete between Celsi and Lala. Unlike the two students, the third student (Galuh) seemed to be less enthusiastic. The questions given in the first stage included arithmetic, algebra, and geometry (according to the curriculum that applies in the third school of students). We did not contribute any intervention in order to identify students' learning difficulties and their initial mathematical identity.

Table 3. *Identification of Learning Difficulties and First Stage Mathematical Identity*

1	Data on students' work results	Students had difficulty understanding geometry, especially about circles The term "diagonal" appeared when studying the concept of circles Resolving a circle problem was only based on the number that "appears" in the problem, not trying to understand the problem to be solved
2	Data on mathematical identity interviews	Students were less motivated Students were lazy to learn mathematics Family background supports student learning progress Students considered mathematics to be a "counting lesson" Students had a negative attitude because they had failed in solving math problems

The second stage

In the second stage, we used the identification of problems that had appeared in the first stage. One of the identifications was students had difficulties in understanding the concept of a circle. The difficulty in understanding concepts makes the mathematical identity to be less developed shown by students (Rosemary Mkhize, 2017).

At this stage, we gave several questions that were only related to the concept of a circle. After that, we conducted a mathematical identity interview. This interview was conducted after we examined the results of students' mathematics tests. The following Table 4 describes the identification of students' mathematical identities based on the results of interviews that had been sorted according to mathematical identity indicators.

Furthermore, the findings above were represented using a diagram. This representation referred to the results of interviews that were adjusted to the indicators which had been determined in theoretical studies. Figure 3 shows the graphic representation of mathematical identity on the second stage.

Table 4. *Second Stage Mathematical Identity Identification*

Name	Components of Mathematical Identity	Interview Result	Scale
Celsi	The importance of mathematics	"Mathematics= number and formula" "Mathematics= counting" Love math because mathematics is a lesson that has many numbers, it's simpler than having to write a story or playing with words	2
	Motivation	"I like to get good grades on math"	3
	Strategy	"My friend always answers the questions from teacher, meanwhile, I rarely do that." (I answer only if the teacher asks me)	2
	Opportunity	Celsi's parents said, "she (Celsi) refused to get additional tutoring, because studying alone at home was enough"	2
	Obstacle	"I can't do circle problems, I will just wait for friends to come forward "(waiting for friends to work first)	2
	Opportunity to do	"I like to make notes for myself, to study at home and ask material which I have not been mastered yet to friends ."	2
Lala	The importance of mathematics	"The lesson is boring."	1
	Motivation	"If I have additional tutoring, I usually works on my assignment too. So I let my tutor help me."	2
	Strategy	"I don't like to ask"	2
	Opportunity	"I was told by my mother to take additional math tutoring."	2
	Obstacle	"Understand the diameter of the circle as "diagonal"." "If I forget to do my homework with my tutor, and I couldn't do it alone, I usually copy my friends' work."	1
	Opportunity to do	"I use the "practical formula" that I got at the tutoring to work on the questions given by the teacher in the classroom."	2
Galuh	The importance of mathematics	"I like natural science than mathematic."	1
	Motivation	"I rarely "speak" in math class."	1
	Strategy	(On the mathematics problem that she couldn't solve, she directly wrote "I can't do it, Mam" or "give up") by saying " I can't, Maaaaam..." without trying to do it first.	1
	Opportunity	"Hopefully, the teacher doesn't appointed me to do the task." (head down)	1
	Obstacle	"My school is located near a field, so it's very noisy. I couldn't concentrate to study well." (depends on the gadget to solve math problem)	1
	Opportunity to do	"I called a private tutor to teach me at home."	2

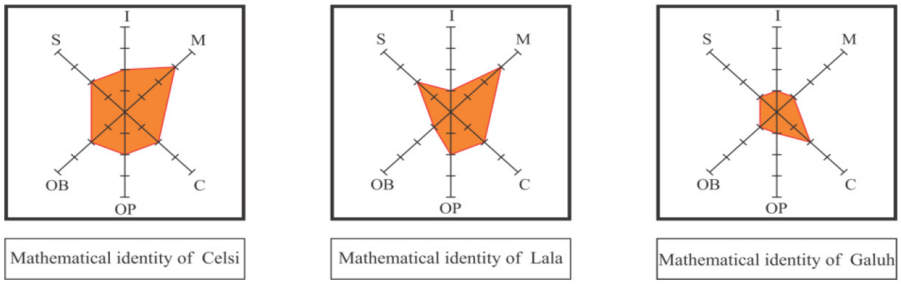

Figure 3. Students' Mathematical Identity When Learning Independently

The Third Stage

In the third stage, we gave limited intervention in the form of direction to overcome learning difficulties with group learning. We had given a "clue" so that students could be led to problem-solving. One of the "clues" given by researchers was asking students to look for real examples of circular objects around them. After getting the object, we asked the students to identify the location of the center point, radius, and diameter.

Initially, the three students had difficulty in finding the locations of the center point, radius, and diameter. For this reason, the researcher gave a little information regarding the understanding of the center point, radius, and diameter. Based on this information, all three students looked for the locations in question. As a result, the three students managed to find the location of the center point, radius, and diameter. The next step after successfully identifying the center point, radius, and diameter, the students were asked to understand how to find the area and circumference of the circle. Students managed to search broadly and around the circle based on information they had understood.

The experiments in group learning activities made the students begin to like mathematics. This was because mathematics was learned by using objects that are around them.

Table 5. *Identification of The Third Stage of Mathematical Identity (Group Learning)*

Name	Components of Mathematical Identity	Interview Result	Scale
Celsi	The importance of mathematics	If there's example (with object around them) I think it will be easier to learn math	3
	Motivation	If there is a math test, I think my grade would be higher than them (the others two students, Lala and Galuh)	3
	Strategy	I think, I will not be ashamed to ask if I don't understand. Because I know a little more than yesterday (last week)	3
	Opportunity	Studying in groups with them (Lala and Galuh) is fun, although Galuh is a bit annoying The three of us did not understand circle material, but group learning made me understand	3
	Obstacle	The three of us did not understand circle material, but group learning made me understand	3
	Opportunity to do	I summarize the group learning results so that it is easy to learn They don't seem to do it (summarize) (take a note of important things needed for independent learning)	2
Lala	The importance of mathematics	I like math a little more I realize that math (circle representation) could be useful for anything other than selling and buying thing	3
	Motivation	Not bad, if there is a circle problem, I think I can do it	3
	Strategy	Even though I don't understand, I still don't dare to ask if I don't understand, I'm afraid.	2
	Opportunity	It seems, besides tutoring I can understand mathematics by learning in groups	2
	Obstacle	I just found out that the circle doesn't have a diagonal (with a smile) Group learning made me understand that.	3
	Opportunity to do	My friends aren't used to learning together like this even though it's fun.	2
Galuh	The importance of mathematics	Math is fun too.	2
	Motivation	It's good if you study in groups like this, you can do the questions together	2
	Strategy	I'd better if I asked a friend if I don't understand (Researchers asked Galuh to reduce gadget usage)	2
	Opportunity	Later when I was studying at home, I would study group with my tutor	2
	Obstacle	Usually I am embarrassed, but I will try not to be ashamed to ask if I can't	3
	Opportunity to do	(During the discussion, Galuh dared to express her opinion, even just a little) I think ...	2

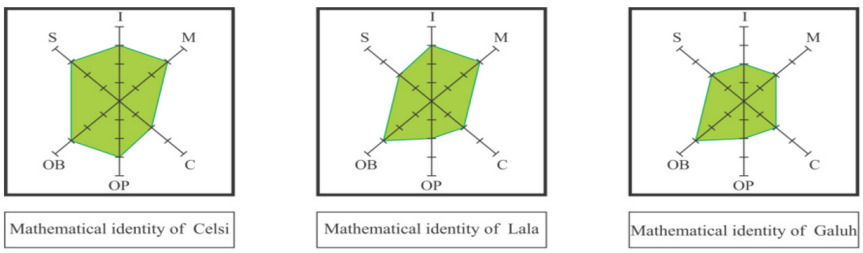

Figure 4. Students' Mathematical Identity When Learning in A Group

In this third stage, the mathematical identity of the three students was developed into a positive identity. These three students' perception towards mathematics had changed when they knew that in mathematics there were not only numbers and formulas. Students started to like mathematics when they understood that something abstract could be represented through examples of objects around them. Table 5 explains the mathematical identity of students in the third stage:

Based on the results of the interview, a graphical representation of the three mathematical identities of the students when learning groups is shown in Figure 4 above.

The Fourth Stage

The fourth stage was the final stage in researching this mathematical identity. At this stage, we examined the consistency of the new mathematical identity built by students. At this stage, the three students had an agreement and understanding related to the circle material they had discussed during group learning. Therefore, we also asked the students to make problems accompanied by answering the test related to the concept of circles to measure their level of understanding. The results showed that the three mathematical identities of students tended to be the same as the mathematical identities that were built in the third stage.

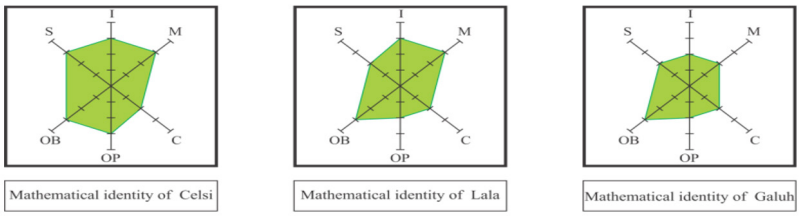

Figure 5. The Consistency of New Mathematical Identity

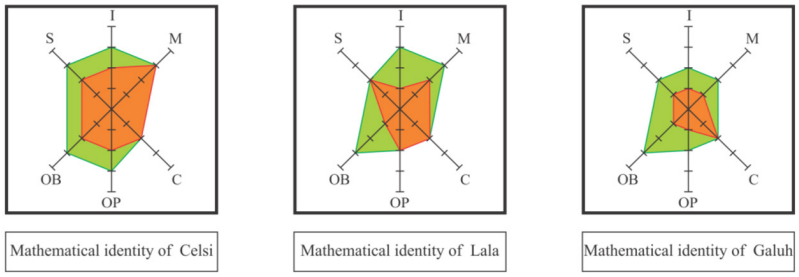

Figure 6. Changing From The Initial Identity (Independent Learning) to The New Identity (Group Learning)

Table 6. *The Changing in Students' Mathematical Identity*

Name	Mathematical Identity
Celsi	Celsi's new mathematical identity showed the development of motivation and strategies used to actively participate in mathematics learning. This made Celsi realized the meaning of mathematics more deeply, not just subjects that she must learn. Celsi was getting better at utilizing opportunities provided by the surrounding environment to explore mathematical abilities to minimize learning barriers experienced. There was one less developed factor, it was the lack of opportunities for Celsi to play an active role with friends in learning mathematics.
Lala	The new mathematical identity shown by Lala was an increasing in motivation. Lala was increasingly aware of the importance of learning mathematics, not just limited to buying and selling activities. The obstacles faced by Lala was gradually diminished, dued to high learning motivation and support from around. Lala had not experienced development in the aspects of strategy and opportunities because Lala chose n to not take the initiative too much to develop strategies to take advantage of opportunities in learning mathematics.
Galuh	The new mathematical identity shown by Galuh was a fairly good development in terms of solving the obstacles experienced while studying. In addition to the ability to solve obstacles, Galuh experienced quite good development in all aspects of mathematical identity. This development was strongly supported by researchers, considering Galuh was a subject who was very dependent on "gadgets". The development of Galuh's mathematical identity was an achievement that was expected to be further developed in the future.

Figure 5 shows the graphical representations of the consistency of students' mathematical identities in the fourth stage:

The Changes in Students' Mathematical Identity

The changes in students' mathematical identities arisen from the initial identities are shown by students when participating in learning activities in the first and second stages into a new identity when students learned in groups in the third stage. The mathematical identity shown by students changed as they participate in group learning to solve the difficulties of understanding the concept of the circle they were facing. In addition to group learning, students also used the objects around them to understand the concept of a circle that cannot be understood. The consistency of students' mathematical identities in the third stage was traced to the fourth stage.

Knowing the existence of change could be a discourse for the teacher to be able to see the "other side" of how students view mathematics. Various opinions were a good reference when determining a student's mathematical identity. By knowing the mathematical identity of students, a teacher or parent was expected to pay more attention to the development of learning that students have taken. Figure 6 shows the graphical representation of changes in mathematical identity shown by students during self-study and group learning:

Based on the graphical representations, it was clearly visible that there were changes in students' mathematical identities. This change was perceived to be a development of a mathematical identity that led to a better direction. Table 6 above briefly describes the changes in the mathematical identity of the three students:

Discussion

In each component, there were similarities in identity shown by Celsi, Lala and Galuh. In the first component of mathematical identity, all three students assumed that the role of mathematics in everyday life was limited to arithmetic and calculation. This was proven when the three were asked to give examples of the use of mathematics in their daily lives, all three of them gave solid examples of the processes of buying and selling.

Students' views on mathematics related to difficulties when understanding the concept of circles in mathematics learning revealed a less developed identity. This was shown by some students' opinions, such as "mathematics is difficult", "mathematics is only = numbers + formulas" and "I like math only if I was told to count" reflected a less developed mathematical identity when students learned mathematics. This certainly affected the performance of students in learning mathematics, resulting in decreasing of learning motivation, and low learning outcomes.

However, it was different when the students were given the opportunity to learn and understand mathematics by doing group learning. The description given by students was different from the initial description they built about mathematics, for example, "it is nice to learn mathematics like this", "It is easier for me to remember the material circle", "if it is exemplified like this, and it is easier to under-

stand". All narratives conveyed by students created new mathematical identities that reflected beliefs that were contrary to dominant beliefs which stated that "mathematics is difficult".

Learning in groups had succeeded in creating new mathematical identities and forming positive student identities. This could be seen from their expressions of interest when learning the concept of circles. Confusion and difficulties at the beginning of learning were not visible. Now students could confidently deal with the questions given to them. Group learning created effective mathematics learning, such as increasing problem-solving which is the core of mathematics learning (Francis, B., Read B & Skelton, C., 2010). But more importantly, it increased the students' motivation to learn mathematics. This was expected to affect the development of mathematical identity in a better direction.

Findings

Based on the four stages that students have passed, we found a mathematical identity that was inherent with the three students. This mathematical identity was obtained by researchers when students learned by themselves or when students learned groups. The following was a narrative of the three students' mathematical identities:

Celsi "self-confident"

From the first stage, Celsi had shown that she had no difficulty in learning mathematics at all. This attitude was reinforced by his parents' statement which stated that Celsi had never complained about mathematics to parents. This attitude was shown by achievements or good results related to the grade obtained by Celsi in mathematics. In group learning activities, Celsi did not hesitate to give opinions. Helping other friends to solve the problems was also done. Celsi was a student who has a good confidence in mathematics. Celsi's mathematical identity had not changed much, almost to say stable from the beginning of group learning.

Lala "survival"

Lala has chosen to be in a "safe" position. The opinions expressed during the discussion did not show input or denial. Lala was a type of student who only did the task if it is given; she was passive and has not too high motivation to learn better. But Lala realized her weakness and tried to find a solution by taking additional lessons. In the circle material discussed in the study group, Lala only expressed things that were general. She did not give any solutions to the problems faced together.

Galuh "surrender"

Galuh's mathematical identity has increased in the third stage. Group learning activities motivated Galuh to learn and find out about circles. This increase in identity needs to be commended because her previous mathematical identity showed that Galuh has a negative attitude toward mathematics. Her habit of directly taking "shortcuts" to solve math problems made her weak in the concept deepening. Galuh's main focus was to finish, whether it's right or not. Reliance on friends is also a factor that made her cannot work well in mathematics. Low motivation to learn plus the excessive use of gadgets made the mathematical identity built by Galuh less developed.

Conclusions

Group learning activities proved that there was a room for increasing understanding of mathematical concepts, learning motivation, developing a mathematical identity and improving achievement for students in elementary school. Although in general mathematics is a "scary" lesson, when students were given the opportunity to solve problems with other strategies, they were able to call mathematics into something positive, for example, "it turns out that mathematics is fun", or "it turns out learning mathematics is not difficult". This designation reflected confidence in mathematics when students do group learning. Therefore, the results of the research at the final stage showed that there was a significant increase in understanding the mathematical concepts that directly affected the improvement of problem-solving skills and the motivation to learn mathematics. The increasing of these two components indirectly affected the development of the mathematical identity that students have.

In this study, it can be said that students did not have deficiencies in the cognitive domain related to mathematics learning. Yet, what they need was recognition, exploration or development of ways of learning according to their abilities and interests. The recommendation that could be given for further research is to use the design of this study on a larger scale with a variety of strategies. This was done, of course, to eliminate the scourge of the lack of motivation to learn mathematics and more importantly to improve understanding and performance of mathematics.

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