Increasing HOTS and student belief towards mathematics through learning with a roleplaying method

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Abstract. Belief in mathematics attitude of students towards mathematics, where students can give a positive or negative response to mathematics learning activities. Students are given math problems and when completing them, they will think first, then when finishing them, students are expected to be sure of the answers and the concepts they use are correct. When students experience difficulties in solving problems, negative beliefs appear in students because they feel unsure of the right answer. To help students so that confidence in mathematics (belief in math) becomes better, it is necessary to have an interesting learning method for students, named role-playing. The method of role-playing is a learning method that prioritizes the role of students in the classroom, the teacher just gives the material without giving an explanation, and the rest of the students will deliver the material in a different way so that other students understand. Submission of different material uses a role-playing or role-playing game, where students will play in a social environment and deliver material through previous roles compiled by the teacher using a high order thinking skill (HOTS) system. So, students are free to deliver material in accordance with what they understand and can be connected in a coherent way.

1. Introduction
Beliefs in mathematics can be felt by students and teachers at school, the majority of students’ beliefs in mathematics become an interesting impact on mathematics and motivation in the classroom when learning mathematics [1]. Students give various responses when the mathematics learning process takes place, depending on the belief (belief in math) of each student who gives different meanings such as positive beliefs when attending mathematics lesson. According to Torner [2], beliefs have been and still are related to notions of misconceptions. This further emphasizes belief (belief in math) that students must be cultivated starting from themselves which are then brought into the classroom atmosphere to adapt to the social environment and begin to build their beliefs and can reduce the misconceptions that related to the context of mathematics.

Schoenfeld [3] has conducted research on the relationship between students’ beliefs in learning mathematics in school and their mathematical performance and has produced that students separate mathematics they know and experience in class from material creativity, problem-solving and discovery, and behavior seems to have been controlled by the experience of students whose beliefs have been recognized. Thus, continued according to Ruthven and Coe [4] it has been produced that there is no
simple systematic relationship between beliefs about science and mathematical activities. Therefore, belief in math students is trained to be able to connect with all aspects of learning in school.

Beliefs that students have can come from past student experiences up to now so that it can be said that many factors cause students' beliefs to sometimes be positive or negative beliefs. Student achievement that causes a belief to go up or down can also be due to the student's affective and attitudes itself. According to Goodykoontz in Grootenboer [5], There are five points that related to attitudes towards mathematics, they are (1) teacher characteristics, (2) teaching characteristics, (3) classroom characteristics, (4) assessments and achievement, and (5) individual perceptions and characteristics. According to DeBellis and Goldin [6], the affective domain can be divided into several subdomains, namely: (1) emotions, (2) attitudes, (3) beliefs, (4) values, ethics, and morals. Thus, confidence in students who also come from the realm of attitude / affective can be improved for the better by using several methods that support the learning, especially learning mathematics. The teacher provides knowledge to students and students to receive knowledge from their teacher, students must also be required to be creative, active, critical thinking of a mathematical problem that they have just received. So that a strategy is needed that can simultaneously improve belief in math students in school. Agree with Greer, Verschaffel, and Corte [7] which states that one of the effective ways of growing students' mathematical confidence is through teachers, textbooks, learning strategies, and the main use of the problems in around students for learning activities.

Mathematical learning strategies always need new things so students can accept that mathematics is a science that must be understood meaningfully. One of them is role playing, according to Samalot-Rivera [8] Role-playing activities help introduce the student to real-world interactions and also to teach appropriate behaviors during games and sports. Role-playing has a role in activating all students in a learning group and helping them hone interpersonal skills for the better. According to the author's experience when applying this method role-playing to grade VII students of SMP Negeri 2 Gondangwetan with social arithmetic material, the conclusion obtained is role-playing method can help students interact with their friends more closely in mathematics learning. They discussed each other's roles and worked together to play role-playing games.

According to Cheeseman and Mornane [9], the mediating role of beliefs on mathematical activity is crucial in students' learning, because it constrains and enables their development of mathematical knowledge and skills. This relates to the way students think that must be improved again called High Order Thinking Skills (HOTS). According to Nurhadi in Tindangen [10] contextual learning train students to solve problems in real life since they are involved in the practice of problem-solving, thus they are also trained to develop higher order thinking skills. The application of HOTS can use the help of other learning methods so that students do not feel pressured to work on high-level questions. One method of learning that can be used is a role-playing method.

The aim of this paper is to discuss about the impact of a role-playing method for belief in math and high order thinking skills (HOTS) system when it used to students. Although role-playing cannot be used for all subjects in mathematics, but choose only one subject like social arithmetic. This subject is familiar with the student in their daily life and also students like playing very much, so it can be helped them to increase their HOTS with playing the role play and also their belief in math, which students always reject to study mathematics with monotonous way.

2. Methods

2.1. Understanding the Mathematical Belief (belief in math)
Beliefs are shared by all people even students because various forms of beliefs have been known and applied long ago. One belief that can cause students to become confused because sometimes that belief makes them have positive beliefs and sometimes makes them have negative beliefs is a belief in mathematics or belief in math. According to T. Ozturk & B. Guven [11], Confidence is a mental construction that represents the preparation of experience, behavior, comprehension of individuals in the problem-solving process. In this case, problem-solving is taken in mathematics which is a factor of
the emergence of belief in mathematics.

Often in the class, students are given teacher materials through lectures, then students are given questions and asked to do math problems. In the process of understanding the material that students receive when they apply when working on the problem requires coherent and mature thinking when they have finished working on the question, there is a sense of confidence or not about the answers they have obtained. Students become uncertain because it is not necessarily the right answer, so students are sure of the answers they have received. However, this attitude of confidence and whether it has become a habit that has occurred not only in mathematics but also in social life. This is justified by McDonough and Sullivan [12] suggested that it is important to know and understand students' beliefs about mathematics because they influence the nature of their learning in the classroom and the way they engage with the mathematical material of their lessons. So, there is no harm in assuming that the belief can be generated by the person himself and the way to overcome it also depends on how the attitude of the person in overcoming beliefs that have a negative effect on him.

According to Muhtarom, Juniati and Siswono [13], the cognitive structure that deals with hidden mathematical beliefs in the person, but the symptoms can arise when he performs mathematical activities, interacts with the classroom environment or responds to a stimulus. It occurs when students are in class and ongoing mathematics learning activities, there will be a symptom of confidence in mathematics (belief in math). Another factor that is caused by belief in mathematics (belief in math) is that it starts from a positive belief that is built automatically raises a learning motivation for the students themselves so that students become more confident in solving a mathematical problem. this is justified by Abu-Hilal [14] that students' beliefs about the importance of mathematics have a significant impact on achievement and then increase motivation.

At the time of learning mathematics, things that often become the focus of the teacher is the understanding of students' mathematical concepts, critical thinking, and mathematical problem-solving. So, making confidence (belief in math) students will be difficult to be positive because their mindset already burdened with the difficulties that will be experienced when working on math problems. On the other hand, teachers' belief can also be the reason for the success when the teacher teaching the students. According to Chapman [15] stated that the teacher tends to fall into three categories: those who change their teaching in their own, those who change their teaching with external support, and those who do not change their teaching in spite of involvement in professional development programs. So, we can say that the teacher sometimes giving a good effect and bad effect on students depend on their way of teaching in the class. Furthermore, research conducted by Wesson and Derrer-Rendall [16] stated that self-belief or confidence has been shown in some studies to be a determining factor and predictor of academic achievement and success in mathematics. If observed more deeply about mathematical beliefs (belief in math), It can be concluded that there are advantages and disadvantages if students have this attitude. The advantage gained is that students become more confident when working on math problems and will continue to be curious about other math problems. Meanwhile, the shortcomings caused when students have a belief in mathematics (belief in math) is that students become hesitant and unsure of their own answers when working on mathematics so that it will hamper the learning process in the classroom.

Based on the description above, we need a method that can help students control their mathematical beliefs (belief in math) so that they become beliefs that can provide benefits for them during the process of mathematics learning. One method that can be used is role-playing or role-playing.

2.2. Understanding the Role Playing Method

The method of role-playing is one of the interactive methods that attract the attention of students in the classroom because this method uses the main role or is student-centered. Another opinion from Heru [17] also said that role play in the world of education is one model of mastering learning materials through developing the imagination and appreciation of students. Student imagination is not just a playful imagination but still in the context of the material to be played. The teacher has prepared the material for later study by students who will play the role and then start the game with other actors. But
at first, it was not as easy as expected, because students were afraid to play a role in front of their friends. The factor can be because they are embarrassed, afraid of being wrong in the role, afraid of being wrong in the delivery of material. Agreeing with Heinrich [18] Role play does its job in a more direct and conscious way and the aim is unambiguously educational, and facilitators put in the effort in the hope of changing attitudes and behavior. Therefore, it is necessary to practice first to be able to adjust to the actual classroom situation so that they do not feel afraid anymore to play a role in front of their friends.

Steps before implementing the method role-playing taken from Prayitno [19] they are (1) warm the ambiance and motivate learners to draw a problem, (2) the selection of roles, (3) arrange the stages of role play, (4) prepare an observer, (5) the stage of characterization, (6) discussion and evaluation, (7) the characterization, (8) discussion and evaluation of phase two, and (9) as well as to share experiences and draw conclusions. Each step is prepared by the teacher, assisted by discussions with students so that students can take part in the scenario preparation so that they can be comfortable with the scenario they have made. Selected material is not all chapters in mathematics lessons can be used, material that can be used in the application of the role-playing method are social arithmetic, set, equation one variable system, two variable equation system, three variable equation system, flat build, build space, geometry, and others. The results of research conducted by Murtikusuma [20] concluded that the implementation of the role-playing method on social arithmetic material went well and student activity tended to increase, although there were still some students who still had difficulty interacting with group friends. In accordance with the results of the study, it can be said that it needs to be deepened when using role-playing method so that all students who play roles or who do not play roles can still follow the flow of the game, student activities must be monitored and given activities to keep interacting with friends in groups without anyone being silent only.

For example, role-playing used in subject social arithmetic which almost all the activities in this subject students knew it very well, like transaction, discount, profit, and loss. Teacher makes a small group which consists of 5-6 students who will be the player in the role-playing. Teacher arrange the script for the player and student can read it at home, so for the next morning, the player will be ready.

Besides being used in mathematics learning materials, role playing method commonly used in non-science subjects, because more material about social science is related to everyday life. As the results of research conducted by Pertiwi [21] when the partner teacher tried to apply Role Playing method in class VIII-C Muhammadiyah 6 Junior High School Bandung, there are significant changes that are this method is very appropriate to be used in learning social studies to improve cooperation among students. Students seem more interested and enthusiastic to carry out learning and the level of student participation is better and the ability to express opinions and suggestions is also better.

From some of the researchers' opinions above, it can be concluded that role-playing method has both advantages and disadvantages, including this method can make students become more confident in delivering material through role-playing so that it increases confidence in mathematics (belief in math), but has disadvantages such as efficiency the time that results in students' concentration when playing becomes a little rushed so that the delivery of material is slightly disrupted and also makes students less confident in delivering the material to other students.

2.3. Understanding the High Order Thinking Skills (HOTS)

The application of role-playing method can be helped by providing level material high order thinking skills (HOTS). Students are asked to better understand the problem situations contained in the mathematics material and provide opinions or answers according to their understanding. The answers that are asked are not just giving a simple answer, but answers that have concepts that are strongly related to the material. According to the Widana et al [22], HOTS questions in the assessment context measure ability: (1) transfer one concept to another, (2) process and apply information, (3) find links from various different information, (4) use information to solve problems, and (5) critically examine ideas and information. The HOTS type problems can indirectly help students become more creative unlimited thinking.
The application of the HOTS type problem can be made into a narrative such as a story that relates to everyday life that is not familiar to the student's life itself. The narrative that has been made will be given to students so that the students themselves process, understand, and re-convey what they understand to other students. Furthermore, this is in accordance with what was stated by Bakry [23] by using HOTS, the student will be able to acquire a deep understanding of mathematical concepts and can be applied in real life. It is expected that from the making of narratives based on the composition of the context HOTS will make trained students to apply it in their daily lives so as to make it easier for them to better understand a mathematical concept.

In accordance with the module by Widana et al [22] Creativity resolves problems in HOTS, including (1) the ability to solve unfamiliar problems, (2) the ability to evaluate strategies used to solve problems from different perspectives, and (3) find new completion models that are different from previous methods. Based on various kinds of creativity in the application of HOTS, it can be concluded that the application of role-playing method used as a means of delivering material, while the narration derived from HOTS indicator structure is used as the basis for students’ initial thinking which will lead to high-level thinking.

From some research results on students' thinking ability using HOTS, it was concluded that the thinking ability of students with high mathematical abilities, medium mathematical abilities, and low mathematical abilities in HOTS problem solving had differences. Students who have high mathematical abilities can understand the meaning, make opinions and can conclude, while students who have mathematical abilities are able to understand the meaning, make opinions but cannot conclude, and students who have low mathematical abilities cannot understand the meaning and cannot conclude [2].

It can be concluded from several research results along with the explanation of high order thinking skills (HOTS) that the application of HOTS-based questions can make students more broad-minded and high-level in solving problems. Not only HOTS-based questions, but the making of narratives or materials using HOTS can help students understand new material, for example, applied during role-playing. This will also have an effect on mathematical beliefs students’ to increase because students understand HOTS-based material in accordance with their understanding and creativity without having to be forced to conform to the book.

Continued from subject social arithmetic that used in role-playing, while teacher arranges the script they must apply HOTS in their script. So, not only social arithmetic in role-playing but also in HOTS can be used for increasing belief in math all students.

3. Result and Discussion

3.1. Application of HOTS and Belief in Math on Role Playing Method
The use of methods role-playing and high order thinking skills have been used for many types of research and various fields as described above. Likewise with the discussion of belief in math students who often emphasize the problem-solving process. The combination of the application of HOTS and role-playing in improving belief in math has a long stage. The first stage, measuring mathematical beliefs (beliefs in math) students' by using a confidence questionnaire; the second stage, determine the material that will be used as high order thinking skills and as narration of role playing; the third stage, determine the cast and give instructions about the contents of the narrative and the material to be delivered; the fourth stage, giving the players time to practice with their friends so that when they appear in front of the class, they become more mature in appearance and presentation of the material; the fifth stage starts the role-playing game and the other students become observers of the game flow and the material implicit in the game; the sixth stage, evaluating the game of the cast and playing again for more effective results; seventh stage, discuss with students about the material which basically comes from high order thinking skills and provide an evaluation of the material that has been delivered through a short test.
The application of belief in math on 2nd step and 3rd step of the role-playing method from Fischer Jane and Sarah Vander [15] about students prepare the scenario briefly and trained by their self because the teacher gives guidance on their role and gives motivation to students to be bolder when they appear later. The application of High Order Thinking Skills on Roleplaying method on 4th step and 5th step of the role-playing method about students make their own creativity about the dialogue and the teacher needed to choose the material of mathematics that related to daily life and arrange them into the script that make students thinking creatively.

The teacher arranged the script which consists of HOTS with the subject "social arithmetic" by using a role-playing method and the students are the player, students received the script and read it at home. the role-playing showcase will be held in the next session after they studied the script, they will start the stage and they have a good feeling to feel comfortable and making the role-playing stage is theirs. If students feel so fun, it can be concluded that their belief in mathematics is increased.

4. Conclusion
A role-playing method used with the aim of helping students improve their confidence in mathematics (belief in math) by playing roles based on their daily lives. The drafting of roleplay in this game is based on the formulation of high order thinking skills (HOTS), in which the script is formatted into material that will make students think creatively, think high, think broadly according to what they understand and then conveyed in the form of a game to his friends. The combination of role-playing and HOTS is expected to be able to assist students in increasing their confidence in mathematics (belief in math), which previously students were not sure when working on or understanding mathematics material to be convinced of their own answers without fear of feeling wrong answering. This is a good thing for the teacher to make another subject in mathematics which can be used in HOTS and of course in the role-playing method.

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