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Creative thinking skill with adversity quotient based on lesson study for learning community

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Abstract. This study aims to describe the ability of creative thinking based on Adversity Quotient (AQ) in Lesson Study for Learning Community (LSLC). Data were collected through observation of learning activities, creative test, questionnaire and interviews. The creative thinking skill of the students adapted to the different AQs in each learner is analyzed based on the indicator of creative thinking skill that has been developed. Indicators of creative thinking skill are fluency, flexibility and novelty. The indicator of creative capabilities can be analyzed at the time the learners work on student worksheet. The answer to each question student worksheet describes the ability to think creatively in each group that has been formed. The grouping is based on the credentials of the AQ of the tested learner. This qualitative research applied descriptive method. The results of this research are high AQ students (S1) have medium creative thinking skill, medium AQ students (S2) have medium creative thinking skill, while low AQ students (S3) have low creative thinking skill. All of subject get the best score in novelty indicator within fluency and flexibility. They achieve the novelty indicator because they could provide more than one different answer between the others.

1. Introduction

Now we live in the age of globalization which has changed the way we work and live. We face complex problems whole the world. We need good thinking and creative ideas in solving these complex problems [9]. Creative thinking also could enhance the critical thinking that useful to solve unusual problems [11]. Creative ideas that students have can help students to understand certain subjects, especially subjects of mathematics. Creative thinking ability could help students to look the problems in many different ways and point of views [11]. Creative thinking is used to help students in giving new idea that is used to solving mathematics problems [11]. Creative thinking is generally considered to be involved with the creation or generation of ideas, processes, experiences or objects [11]. Creative habit also can help students to be successful in which they could make reliable decision and understand new knowledge quickly. It can be conclude that creative thinking is needed by students in learning mathematics especially solving the problems and generating ideas. The creative thinking also could help students to achieve the learning objective.

Education sector serves as an area to enhance the students' creative thinking skill. Law of the Republic of Indonesia Number 20 Year 2003 on National Education System states that one of the goals of the National Education System is to form creative human beings. One of the most important functions of education is to train individuals to be creative [5]. In addition, one of the general goals of the current educational system is to educate learners as creative individuals and enable them to gain talent to generate creative ideas in order to be able to solve problems during their life cycle [8].

The research results conclude that 25 students of accelerated classes are 8% creative, 72% less creative, and 20% are not creative [4]. This explains that the level of creative thinking skill of students is still relatively low. Based on the research result and the importance of creative thinking in learning

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mathematics, we need to develop the students' creative thinking skill in order stu-dents' could solve the problems well [11].

In other hand, creative thinking skill is influenced by Adversity Quotient (AQ) in dealing with problems in some learning mod-els. Mathematics relates with problems. AQ is expected to give a strong motivation so it could support his desire in solving the problems [6]. Someone with a high AQ will be more challenged to face the problem. In learning mathematics, students' creative thinking skill can be trained through the learning process because the students are asked to solve mathematics problems during lesson. The suitable learning model is expected to optimize the improvement of creative thinking skill. One of the learning models that can be used to improve creative thinking skill with AQ is Lesson Study for Learning Community (LSLC) that is oriented towards the activities of learners and how learners learn [7]. The implementation of LSLC is how students learn from each other (collaborative learning), caring for each other and nothing neglected [2]. So that it creates a good interaction between students and students with teachers that it could enhance students' creative thinking ability [3]. A further advantage of LS is that it allows teachers to observe students during the teaching of a planned lesson [10]. Based on the problems and the objective of this research is analyze the students' creative thinking skill with adversity quotient based on lesson study for learning community.

2. Literature Review

2.1. Creative Thinking

Creativity is a matter of coming up with new and useful ideas in order to generate alternative possibilities [9]. Creativity could also be defined as divergent activity to explore current experience [14].The creative thinking ability of learners can be seen from several indicators. The creative thinking ability in problem solving focused on three indicators, namely fluency, flexibility, and novelty [14]. The three indicators are then defined as follows [1]:

1. Fluency is the ability to generate / solve problem from the many questions given
2. Flexibility means the ability to generate much thought from different points of view. Individuals are able to move from one type of thinking to another type of thinking from a dif-ferent point of view
3. Novelty means the ability to think in new ways previously unknown to the author, distinct, unique, perhaps unexpected, authentic, and possibly inventive and should be purposeful / effective, useful, practical, feasible/ perhaps socially meaningful

Creative thinking skill level is in Table 1.

Table 1. Creative thinking skill levels.

Level	Category	Characteristics
4	Very Creative	Students are able to show fluency, flexibility, and novelty or flexibility and novelty in solving problems.
3	Creative	Students are able to show fluency and flexibility and novelty in solving problems
2	Enough Creative	Students are able to show flexibility or novelty in solving problems.
1	Less	Students are able to show fluency in solving problems.

2.2. Adversity Quotient

AQ is an ability to change, process a problem or difficulty, and make it a challenge to be solved. One of the intelligence that plays an important role in problem solving abilities is AQ. AQ plays an important role in our life because AQ is needed to solve problems [13]. If people could solve their problem, they could reach their life purpose. A person with low AQ tends to give up easily to the challenges / problems faced. Conversely someone with a high AQ will be more challenged to face the

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problem. Factors that affect AQ are internal factors that include ethics, beliefs, talents, passion, character, performance and health, as well as external factors such as education and environment.

Table 2. AQ category based on ARP.

Value	Category
150-200	High (*Climber*)
78-149	Medium (*Camper*)
0-77	Low (*Quitter*)

2.3. Lesson Study for Learning Community (LSLC)

Lesson Study involves plan, do, see, and evaluation [12]. The Lesson Study approach is a way for teachers to engage in profes-sional development leading to activities that promote instructional change. As teachers observe students, they begin to see teaching from the students' point of view. This new perspective can change deeply the instruction and result in better student learning [10].

The implementation of LSLC is how learners learn from each other (collaborative learning), caring for each other and nothing neglected [2]. The implementation of LSLC in learning mathe mathematics includes: (1) before the learning, the teacher has arranged the seats of learners according to their ability; (2) teach-ers divide learners who sit adjacent (dealing) into several groups; (3) students' seats are formed with the teacher in the center of the room; and (4) learners learn and live collaborate with one another.

3. Method

This research is qualitative research that uses description method. Data were collected through observation of learning activities, creative test, questionnaire and interviews. Twenty-two seventh grader students were asked to complete the *Adversity Response Profile (ARP)* instrument. The ARP scores of each student are summed and sorted in descending order. This classification is used to categorize the students level AQ. After that, the researcher divides the students into some groups that consist five until six students based on AQ level. Then, each group is asked to fulfill the student worksheet. After that, one of student in each AQ level is asked to solve the problems in creative thinking test. The chosen research subject was coded as S1, S2, and S3 respectively for high, medium, and low AQ level. The data is analyzed to find out the creative characters based on Table 3.

Table 3. Creative thinking skill category based on score.

Category	Value
High	$66.8 \leq \text{Score} \leq 100$
Medium	$33.33 \leq \text{Score} < 66.8$
Low	$0 \leq \text{Score} < 33.33$

4. Result and Discussion

In the LSLC based learning, researcher divides the students into some groups based on AQ test results that students have been done. The groups consist of five until six students. Then, groups are asked to solving problems in the student worksheet. Researcher asks the students to discuss and solve the problems with their groups. There are some interaction conditions within each group. The following figure is the LSLC learning illustration.

That diagram shows that there are interactions within member of each group. All of students try to discuss the problems, although they only give question. There are some differences about the intensity interactions between groups. In low AQ group, students try to giving some question and discussing. In

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medium AQ group, there are more students that discuss within group. So, the interac-tion intensity is better than low AQ group. In high AQ group, students are asking and discussing within group. The interaction intensity of high AQ group is the best among the other groups. Creative thinking skills of every AQ groups are described in para-phrase below.

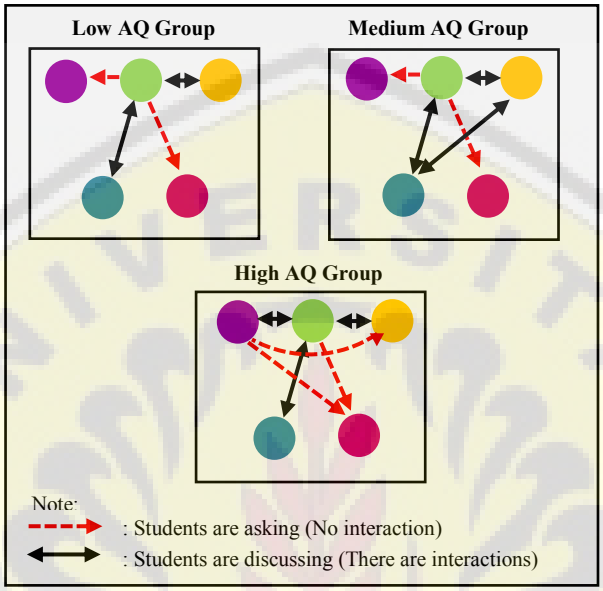

Figure 1. Illustration of LSLC.

4.1. The Creative Thinking Skill of High AQ Group

At the end of the LSLC based learning, the results obtained by student worksheet grouping by high AQ group on each number of questions.

In problem number 1, S1 achieves the "fluency" indicator by giving three answers but one of them is less precise, that is the third answer. For the "flexibility" indicator, the S1 subject group gave two correct answers but all the same answers were using a coin experimental object. Finally, the subject of S1 and its group could not achieve the "novelty" indicator because it gave two correct answers that were same with the other group's answers.

In problem number 2, there were two problems. In both cases, the subject S1 could not achieve "fluency", "novelty", and "flexibility" indicators. The reasons for the inconsistency of the indicator are: (1) S1 subject group gives less than three answers to problem number 2b, (2) S1 subject group only gives 1 answer on problem number 2b, and (3) gives one correct answer but same with the other groups. The following figure is S1 answer of problem number 2.

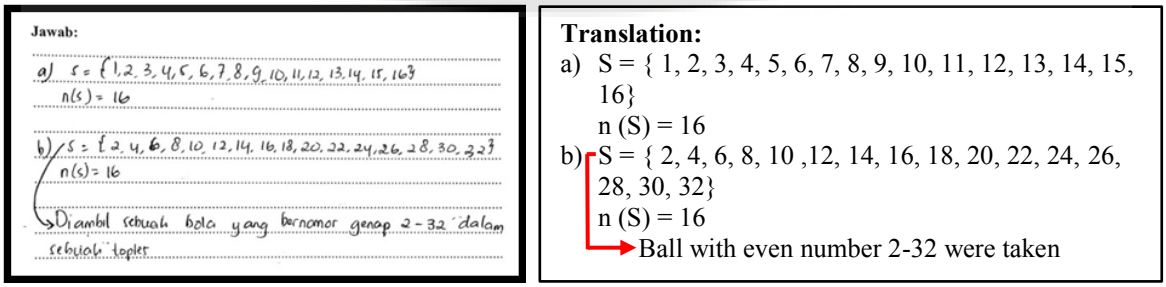

Figure 2. S1 answer of problem number 2.

In problem number 3, subject S1 and its group could not achieve the "fluency" indicator. They only give two answers to get score 0. But they could achieve "flexibility" and "novelty" indicators. In

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the "flexibility" indicator, subject S1 provides two different correct answers. The "novelty" indicator, subject S1 provides different answer. The indicator of creative thinking score is presented in Table 4 as follow.

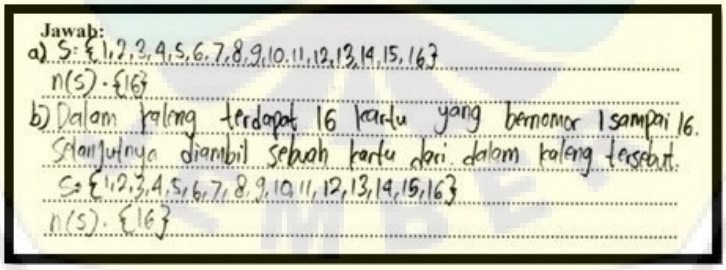
Table 4. Indicator creative thinking score S1.

Problem	Fluency	Flexibility	Novelty
1	75	60	50
2	20	0	25
3	0	60	100
Average	31.67	40	58.33

4.2. The Creative Thinking Skills of Medium AQ Group

At the end of LSLC-based learning, the results of student work-sheet work were grouped by subject S2. On problem number 1, the subject could achieve "eloquence" indicator. The subject and his group were able to provide three answers correctly. Based on the assessment guidelines, the S2 subject group scores 100. In the "flexibility" indicator, the S2 subject group gives three correct answers and all the answers are different to 100. Finally, the S2 subject group also could achieve the "novelty" indicator because it gives two same answers given with the other groups, the first and third answers to get a value of 100.

In problem number 2, there were two problems. The subject of S2 and his group was able to solve problem 2a well but on problem 2b, they could not achieve the "fluency" indicator. S2 subject group gave less than three answers to problem number 2b so as to score 20. The subject of S2 and his group also could not achieve the "flexibility" indicator because it only gives 1 answer on problem number 2b so it received a value of 0. In addition, the subject and his group also could not achieve the "novelty" indicator because it gave one correct answer but same with another group and get score of 25. The following figure is S2 answer of problem number 2.



Translation:
a) S = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}
n (S) = 16
b) There are 16 cards with number 1-16 in the tin, then a card is taken.
S = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}
n (S) = 16

Figure 3. S2 answer of problem number 2.

In problem number 3, the subject of S2 and its group could not achieve the "fluency" indicator. They only give one correct answer to score 0. The subject group of S2 also could not achieve the "flexibility" indicator because it only gives one correct answer so it gets score 0. Finally, the subject of

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S2 and its group also could not reach the "novelty" indicator because it gives same answer with another group to get score 25. The indicator creative thinking score is presented in Table 5 as follow.

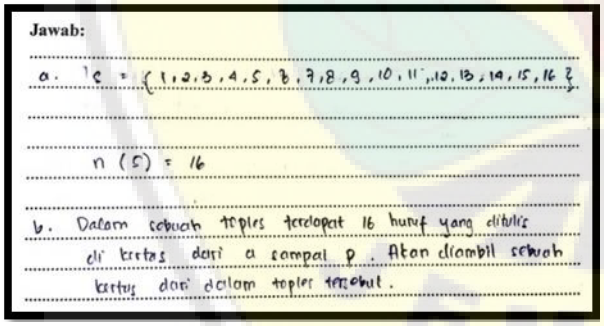
Table 5. Indicator creative thinking score S2.

Problem	Fluency	Flexibility	Novelty
1	100	100	100
2	20	0	25
3	0	0	25
Average	40	33.33	50

4.3. The Creative Thinking Skills of Low AQ Group

At the end of LSLC-based learning, the results of the student worksheet work were grouped by subject S3. On the number 1 issue, the S3 subject and his group gave less than three answers. Based on the guidance on the assessment of the "creative" fluency thinking indicator, the S3 subject group score 0. On the "flexibil-ity" indicator, the S3 subject group gives two correct answers and all the answers are different then get score 60. Finally, the S3 subject and the group could achieve the "novelty" indicator because they gave different answer with another group, then they get score 100.

In problem number 2, there were two problems. Subject S3 and his group were able to solve problem 2a well but on problem number 2b, they could not achieve the "fluency" indicator. Subject group of S3 gave less than three answers for problem number 2b so it received score 20. Subject S3 and its group also could not achieve "flexibility" indicator because they only gave 1 answer for problem number 2b so get value 0. The subject and also group could not reach the "novelty" indicator because they gave one same answer with another group so they get score 25. The following figure is S3 answer of problem number 2.



Translation:
a) S = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16}
n (S) = 16
b) There are 16 alphabets (a until p) that are written on paper in jar. Then, will be taken a paper in jar.

Figure 4. S3 answer of problem number 2.

In problem number 3, subject S3 and his group could not achieve the "fluency" indicator. They gave less than three answers to score 0. The S3 subject group also failed to meet the "flexibility" indicator because he only gave one less accurate answer. Less precisely here because the subject group S3 gave an ambiguous answer. This can be seen at the end of the written event, they did not mention which events were worth the opportunity. According to the assessment guidelines, the S3 subject group scores 0 on the "flexibility" indicator. Finally, the subject of S3 and his group also did not reach the "novelty" indicator because they provide wrong answer so they get score 0. The indicator of creative thinking score is presented in Table 6 as follow.

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Table 6. Indicator creative thinking score S3.

Problem	Fluency	Flexibility	Novelty
1	0	60	100
2	20	0	25
3	0	0	0
Average	6.67	20	41.6

Based on the analysis of the answer in three problems, it shows that the groups could achieve the third creative indicator from three problems. But, the low AQ group could not achieve the third creative indicator from one problem. The students could achieve the fluency indicator when they could provide many correct answers. It shows that they could produce many ideas [11]. The students could achieve the flexibility indicator when they could provide many correct answers and different within the answer. It shows that they look the problem in many different ways and point of views [11]. The students achieve the lower score in fluency and flexibility indicator than novelty indicator. All of subjects get the best score in novelty indicator within fluency and flexibility. They achieve the novelty indicator because they could provide more than one different solution between the others. They give correct unique solution each other. It shows that they could elaborate new ideas in finding the different solution [11]. The level of creative thinking skill is presented on the Table 7 below.

Table 7. The Level of creative thinking skill.

AQ Group	Score	Level Creative
High	43.33	Medium
Medium	41.11	Medium
Low	22.77	Low

Based on the data analysis above, it shows that each subject has different score in achieving three creative indicator such that fluency, flexibility and novelty. It shows that the students have different abilities. They possess different potential in thinking, imagination, fantasy and performance. Therefore, students have a different level of creative thinking [15], especially for three subjects with different AQ level. The high AQ student could improve the creative thinking skill more than the medium and low AQ students. The low AQ student meets difficulties in reaching creative indicator especially fluency indicator. S3 with low AQ level achieves the lowest score between two subjects others. It means that type of AQ affected the improvement of students' mathematical creative ability [6].

5. Conclusion

Based on the above explanations, the conclusion obtained as follows. The students with high AQ (S1) achieve the medium creative thinking ability. The students with medium AQ (S2) also show achieve creative thinking ability. The students with low AQ (S3) achieve low creative ability. The students could not achieve the high creative thinking skill because they could not reach the score more than equal 66.8. In other hand, all of subject get the best score in novelty indicator within fluency and flexibility.

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