International Journal of Advanced Engineering Research and Science (IJAERS) *[Vol-5, Issue-4, Apr- 2018]*
https://dx.doi.org/10.22161/ijaers.5.4.6 *ISSN: 2349-6495(P) | 2456-1908(O)*

Algebraic Learning through Caring Community Based On Lesson Study for Learning Community

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Abstract— *Algebraic material is still considered difficult by many students, especially for those in junior high schools. They still find it difficult to understand and solve algebraiv problems. This happens because their level of understanding for algebraic material is still low, therefore it takes the participation of many parties, including peers and parents, to overcome this problem (caring community based learning). This study aims to improve the students' understanding of the algebraic concept and to minimize the errors that occur in solving algebra problems. The study was conducted in 3 cycles, each cycle consisted of 3 phases, ie plan - do - see, in accordance with the learning cycle in the lesson study. The subjects of this research were 32 students of VII G class of MTs Negeri 2 Jember in the 2017/2018 academic year. Data collection techniques used were observation, tests and documentation. The data were analyzed using descriptive qualitative method through three steps: data reduction, data presentation and conclusion. The results showed that there was a high confidence increase in learning among the students and the "care" occured in the learning process. The students' understanding and mastery of algebraic material were also improved through caring community based lesson study for learning community.*

Keywords— Algebra, lesson study, learning community, and caring community.

I. INTRODUCTION

Mathematics plays an important role in education. Hence, it was given to students since primary school to equip them with logical, analytical and systematic thinking skills. One of the competencies that students must master when learning mathematics is algebra. Algebraic form is one of the mandatory requirements that must be mastered in order to be able to solve math problems. Generally, math problems can not be separated from this particular material. The algebraic form is a mathematical form in which it contains variables or constants.

Whether we realize it or not, everyone must have used the concept of algebra in their lives, especially for those who have gone through education, but the facts on the ground show alarming results in algebra learning. Many students ask their teacher to repeat the explanation in every algebra learning process and many students still often make mistakes in working on issues related to algebra.

Many previous studies have suggested that students find it difficult to understand the concept of algebra that leads to the errors of the basic concept of algebra. Irwitadia Hasibuan (2015), in her journal, mentions that students have not mastered algebraic material since the students who mastered algebraic material only get score below 85% that is only 3.7% and individually, students have not mastered algebraic material because only 19 students (70.4%) who achieved the minimum standard score. Ramadhani (2015) also points out that the most common mistake in the concept of addition and subtraction of algebraic form is 63%. This shows that students' mastery of algebraic material is still low so that the algebra learning strategy that brings the students into more understanding is needed. One of the learning strategy that can be applied in algebraic material is caring community, as it has been applied in Japan.

Caring community is one of the three lessons learnt in lesson study (the two others were collaborative learning and and jump task). The LS was first developed in Japan more than 100 years ago and has been applying it ever since. In Indonesia, Lesson Study activities have been initiated since around 2004/2005 along with IMSTEP program implementation (1998-2005). Based on the survey results of the implementation and impact of Lesson Study in 2012 and BIMTEK outcomes in 2013, it was concluded that the Lesson Study activities in general have been able to increase the quality of lecturing and competence processes.

Caring community based learning is based on the Vygotsky-Bruner theory (meaning of knowledge), active, collaborative, and reflection. High quality learning, namely: (1) authentic learning, (2) collaborative learning

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(listening), Zone of Proximal Development (ZPD) - collaborative - jumping (not a book assignment). In practice, caring communities do not question educational inputs and outputs, but rather the process called illumination models, therefore there is no need to assess the learning outcomes of each learning activity (Hobri: 2016). Caring Community vision are: in learning students should not be left alone or "none of the students are neglected". Teachers should know, care to, and educate the students by facilitating them to learn in collaborative form. Three philosophies of learning community are: (1) public philosophy, meaning that all parties are school reformers; teachers do "open class" more than 1 times a year; (2) democratic philosophy, meaning that the purpose of school education is how students learn and live cooperatively with others, (3) excellent philosophy, that is by doing the best for learning and teaching.

Caring community implementation will bring up and build a *caring* community in a class. Students in one class are divided into several small groups of 3-4 students, where they build a sense of care for other students in the group, and finally for other students in other groups so that there is a sense of *caring* among all students in one class. The teacher also participates in the community so that the care between teachers, teachers with students, and students with students will be intertwined.

Jennifer Stepanek (2000) mentions in her book that there are two ways that the caring concept can be applied to learning. First, there is a sense that students should be noticed, and the second the students' care for each other. This is important in building the trust, security, and collaboration needed to pursue math and science problems. The *caring* also involves relationships between students with the disciplines of mathematics and science. Since the students cares about the content and ideas they are learning, they create an emotional investment that brings energy and joy to pursue a knowledge.

In addition to the formation of *caring* among students and teachers-students, there is also a need for involvement and care of other people such as parents or guardians. According to Sue Bredekamp (2014), caring community is a group or class in which children and adults engage in a positive relationship, treating each other with respect; and learn from and with each other.

In the caring community based learning on the subject of algebraic form, students in a group are required to ask or express opinions in terms of reflecting on their thoughts on the understanding of the concept of variables, constants, and algebraic terms. All students in one group will communicate with each other about the algebraic form and then write them on a piece of paper. The *caring* that are built not only occur among students in one group, but also between one group with another group, so that the so-called "mathematical communication" will also occur among students in one class.

The *caring* built will encourage the communication both students-students and teacher-students, so that the students will be motivated to learn and finally make the learning process more fun. The students will often reveal all their ideas in learning algebra and will interpret them in an answer on the issues of algebraic incomprehension. In addition, the student will often respond to a statement/problem in the form of a convincing argument. Therefore, the research problem of this research is whether there is an increase in the students' achievement in the mathematics lesson of algebra materials in VII class of MTs Negeri 2 Jember through caring community based learning. The objective is to improve understanding of algebra concept and to improve the students' achievement in the basic concept of algebraic form and its operation. In addition, to minimize errors in solving algebra problems..

II. METHODOLOGY

The research was conducted using qualitative approach with classroom action research design. The study was conducted in 3 cycles, each cycle consisted of 3 phases, ie *plan - do - see*, in accordance with the learning cycle in the lesson study. The material in cycle 1 was about the introduction to algebraic forms, cycle 2 was about addition and subtraction operations of algebra, and in cycle 3 the students learnt about multiplication and division operations of algebra. This research was conducted in MTs Negeri 2 Jember in the 2017/2018 academic year, with 32 students of VII G class as the subjects. Data collection methods used were observation, test and documentation. This observation was carried out using direct observation of the teaching and learning activities of the students especially in terms of performing the *plan*, *do* and *see* stages. The activities in the *plan* stage consisted of the making of lesson plan (Indonesian: *Rencana Proses Pembelajaran*, RPP) and Student Worksheet (Indonesian: *Lembar Kerja Siswa*, LKS) with other experienced math teachers. In the *do* stage, learning activities were carried out in accordance with the plan in the *plan* phase. While the *see* phase reflected the learning process that had been implemented related to the students' activities, *caring* among students and learning outcomes. Collection of test data was used to determine the students' achievement, while documentation was used to record all learning processes. Instruments were in the form of observation guidelines and achievement test. The validity of the data was obtained by triangulation of source and method. Data analysis was done descriptive qualitatively through data reduction, data presentation, and conclusion or verification.

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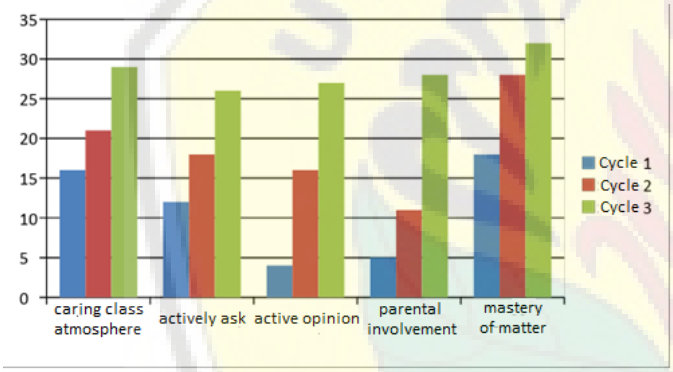
III. RESULTS

The study was conducted in VII G class with 32 students. The result was presented as follows:

No	Indicators	Number of Students		
		Cycle 1	Cycle 2	Cycle 3
1	Caring to the class situation and condition	16	21	29
2	Actively asking during the teaching and learning process	12	18	26
3	Actively expressing opinions	4	16	27
4	Involving the parents/guardians in the home in learning algebra	5	11	28
5	Mastering algebraic material	18	28	32

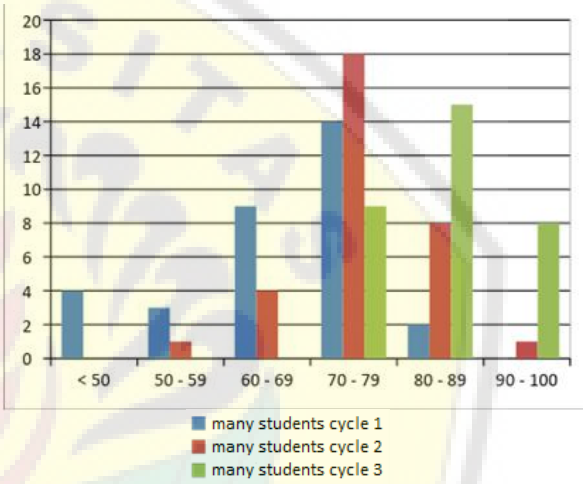


Picture 1. Caring community based learning diagram

The students' sense of careness towards the classroom increased, in cycle 1: 16 students, 2: 21 students, 31.25% and 3: 29 students, increased to 38.09%. The students' level of activeness in asking either to friends in the same group or the others, or ask teachers in cycle 1: 12 students, cycle 2: 18 students increased to 50%, and cycle 3 26 students increased to 44.44%. The students' level of activeness in expressing opinion or helping friends in the group or outside the group who have not understood the material, in cycle 1: 4 students, cycle 2: 16 students increased fourfold or 300%, cycle 3: 11 students rose 68, 75%. Parents / guardians involved in learning their children at home in cycle 1: 5 students cycle, cycle 2: 11 students up 120%, cycle 3: 28 students up 154.5%. Mastery of material achieved in cycle 1: 18 students, cycle 2: 28 students rose 55.56%, and cycle 3: 32 students rose 14.28%.

Meanwhile, the results of achievement test were presented below:

NO	Score Range	Number of Students		
		Cycle 1	Cycle 2	Cycle 3
1	< 50	4	0	0
2	50 – 59	3	1	0
3	60 – 69	9	4	0
4	70 – 79	14	18	9
5	80 – 89	2	8	15
6	90 – 100	0	1	8
TOTAL		32	32	32



Picture 2. The result of achievement test after the implementation of caring community based learning

In cycle 1, the students who achieved score 70 or greater were 16 students and those who did not achieve were 16 students. Therefore, half of the students did not achieve the minimum standard score. The average score in cycle 1 was 65.1. In cycle 2, the students who achieved score 70 or greater were 27 students and those who did not achieve were 5 students. The average score in cycle 2 was 75.1. In cycle 3, the students who achieved score 70 or greater were 32 students and the average score in cycle 3 was 83.5. From cycle 1 to cycle 2 there was an increase by 15.36%, and from cycle 2 to cycle 3 there was an increase by 11.19%.

IV. DISCUSSION

Cycle 1

Cycle 1 began with a *plan* conducted by researchers together with other mathematics teachers, Arif Setyo Purnomo, S.Pd., M.Si. and Rika Nurul Barokah, S.Si. This stage started with the making of Lesson Plan (RPP), Student Worksheet (LKS) and the test. The activities in this stage included the designing of the steps to learn algebra through caring community based learning in accordance with the Curriculum 2013, preparing the

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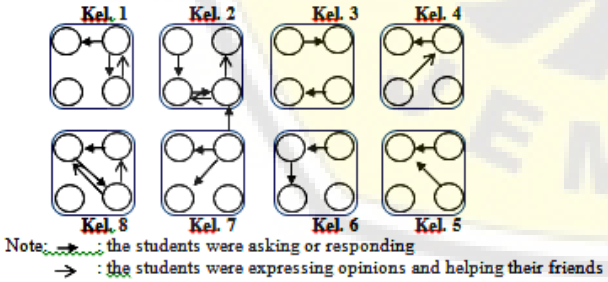
supporting media, and determining the number of possible meetings. After the *plan* was conducted, *do* stage in cycle 1 was held on September 19th, 2017, at 08.50-10.10 WIB in VII G class. As usual, the teacher conditioned the class and conducted pre-learning. The students were divided into 8 groups, each group consisted of 4 students. The teacher provided initial material stimulus for algebra in the form of a sheet containing algebraic table and things that needed to be filled related to learning algebra based on caring community, whether related to group discussion, inter-group, discussion with teacher or stuff related to parent involvement in home learning.

After the *do* was conducted, then the next was the *see*/reflection stage. Some of the results obtained from the discussion of reflection on this cycle were: the learning conducted did not run properly with the plan, for example in the caring community based learning, the students still felt embarrassed in discussing, asking and giving opinions, so that the *caring* did not work optimally.

According to the results of the observations and test results above, the *care* of students towards the classroom atmosphere had not yet emerged. Similarly, the *caring* among students, whether asking or even expressing opinions, was still far from the word *care* itself. When they returned to their homes, the parents/guardians who really *cared* about the lessons their children have learnt in school were few. This resulted in low level of understanding and mastery of algebraic material among these students and many of their scores were under the minimum standard score (70), i.e 16 out of 32 students. The average score obtained from the test result was 65.1, which was below 70 (the minimum standard score).



Picture 3. Illustration chart of learning process in cycle 1

In relation to the problems found in cycle 1, cycle 2 therefore was conducted.

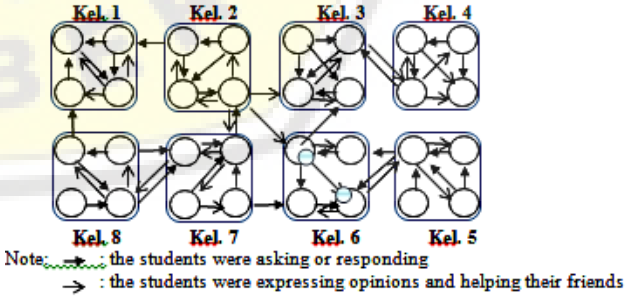
Cycle 2

Cycle 2 began with the plan to solve problems found in cycle 1. This *plan* phase began by revising the RPP that had been made in accordance with the results of cycle 1, as well as the making of RPP and LKS material about algebra addition and subtraction operations through caring community based learning and Curriculum 2013.

Cycle 2's *do* was held on 21th September 2017, at 07.30-08.50 WIB in VII G class. The implementation of the stage did better than the implementation in cycle 1. The *caring* among the students had started to appear although not all of them were affected by it. Group discussions both inside and outside their own groups had begun to appear, they also started to ask or express their opinions.

After *do*, the next stage was the *see*/reflection stage. Some of the things that came out from the discussion of reflection in this cycle are: learning had been carried out in accordance with the plan. The learning done has been executed by the teacher coherently, the organizing time was good, the students' conditioning in the group and in the class was also very good. The improvement plan from cycle 1 for cycle 2 had been implemented. The process of the students' action was better as well, but the students' achievement had not seen optimal results because there were 5 students whose scores were still under the minimum standard score.

The *caring* sense of the students toward the atmosphere of the class had begun to emerge. Similarly, the *caring* among students, either when asking or even expressing an opinion, was already there. Those who actively asked on cycle 2 were 18 students, which saw an increase from cycle 1 (12 students), while those who actively expressed their opinions and helped their friends were 18 students (4 students in cycle 1). The *caring* parents/guardians who paid attention to what their children had done in the school has increased from 5 to 11 students. This resulted in the increase of the number of the students who achieved the minimum standard score (70), which was 27 students. The average score obtained in cycle 2 was 75.1, which was better than cycle 1 that was 65.1. This meant that there was an increase around 15.36% from cycle 1 to cycle 2



Picture 4. Illustration chart of learning process in cycle 2

Since there were some students who still had not achieve the minimum standard score in cycle 2, cycle 3 was badly needed to be applied so that the algebraic teaching and learning process using caring community based learning showed optimal results.

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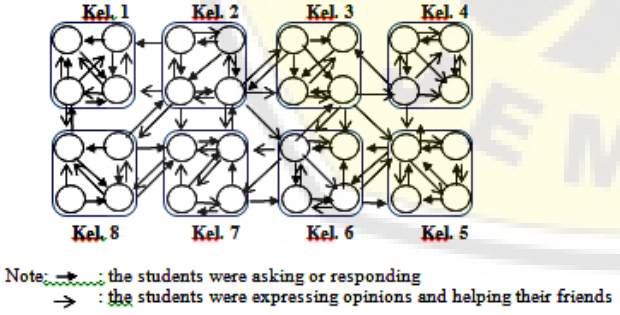
Cycle 3

Similar to previous cycles, cycle 3 began with a plan conducted by researchers and other mathematics teacher to solve any problems found in cycle 2. This *plan* phase began by revising the previous RPP, and made RPP and LKS for algebra multiplication and division which was adjusted to the results of reflection in cycle 2. Preparation of RPP included the steps for applying the caring community based learning through the Curriculum 2013.

After the *do* was conducted, the next step was the *see* / reflection stage. Some of the things obtained from the results of reflection discussion on this cycle were: In this third cycle, the students' self-confidence increased which resulted in the positive communication among the students. A total of 32 students in the class also understood and mastered the algebraic material. In addition, the learning achievement had increased compared to before the caring community based learning action was applied. This is in accordance with the results of the observations and the tests above, there were 29 students who showed the *caring* sense for the classroom atmosphere and 26 students who actively asked among students either in one group or another group. There were a total of 27 students who had the confidence to express ideas and opinions in the process of learning algebra. When the students returned home, there were 28 *caring* parents/guardians who cared what their child had done at school. This resulted in the good mastery of the algebraic learning among the students and all of them achieved 70 (the minimum standard score) or greater. The average score obtained from the test result was 83.5, which saw an increase from the previous cycles (from cycle 2 to 11.19% and from cycle 1 of 28.26%).



Picture 5. Illustration chart of learning process in cycle 3

Based on the results in cycle 3, the algebra learning using the caring community based learning showed satisfactory results. A learning that emphasizes the careness between the students is badly needed, because the careness among the students and the careness from the teachers and parents/guardians will trigger the enthusiasm of learning and communication so that the students have a sense of empathy, care and confidence in asking and learning algebra in particular, and learning mathematics in general.

A groups that actively asked questions, expressed opinions, responded to opinions of other students were Group 2 (Kel. 2 in the pictures). There was one particular student who *cared* very much about his friends either the same group or friends in other groups. In Group 8 (Kel. 8 in the pictures), there was one particular student who did not *care* about the learning. After his house was surveyed, it was found out that the parents of the student have been divorced, the father married again and the mother work abroad. He is now living with his grandmother. Maybe that is one of the reasons why the student did not *care* in the process of learning algebra.

The uniqueness of caring community based learning is shown in Picture 5. The careness was not dominated only between the members of the same group, but also between the closest groups. In one group, the students ask other students who have understood and mastered the material; the students guided other students who did not understand and then expressed their opinions. There were also students who responded to opinions that had been expressed. So there was a discussion among students in one group by promoting the *careness*. Similarly, the interaction between groups caused a sense of *careness* while asking, guiding, and responding. This is why the algebra learning became more active and the students' understanding of algebra also increased, the communication between them related to algebra during the teaching learning process also increased.

V. CONCLUSION AND SUGGESTIONS

The conclusion of this research is that caring community based learning is very effective, not only it can improve students' understanding and achievement, but also improve their confidence in communicating. Viewed from the observation about the learning process that had been done, there was always an improvement from cycle 1 to cycle 2, and from cycle 2 to cycle 3. Meanwhile, the results of the students' achievement also increased, from cycle 1 to cycle 2 it increased by 15.36%, while in cycle 2 to cycle 3 it increased by 11.19%.

The implementation of caring community based learning research can be continued with different material, or the same material (about algebra) but with different subjects, so that the sense of *careness*, self-confidence and the students' communication appear in the learning.

ACKNOWLEDGEMENTS

The author would like to thank the Faculty of Teacher Training and Education (FKIP) of Jember University which had provided support in writing this journal.

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