Improving the students’ skills in developing geometry learning by building the character of academic atmosphere in Study Program of Elementary School Teacher of Universitas Negeri Semarang

N Nugraheni1* and Wahyuningsih1
1Study Program of Elementary School Teacher, Faculty of Education, Semarang State University, Indonesia

*Corresponding author: nursiwi@mail.unnes.ac.id

Abstract. The purposes of this study for knowing how to improve the character of academic atmosphere to improve the ability in designing geometry learning on Study Program of Elementary School Teacher Universitas Negeri Semarang students. This research is a classroom action research conducted in two cycles and each cycle consists of two meetings. Each cycle consists of planning, execution, observation, and evaluation. The subjects of this study are lecturers of geometry and students who take geometry course. The technique in collecting data is using test and non-test techniques. The data analysis is done in quantitative and qualitative descriptive analysis. The result of research shows that the lecturers’ activity is in good category and student activity is on very good category. While the students’ learning outcomes are in good category. From the field notes, students are able to perform independent and structured tasks with their full responsibility, hard work, and diligence. It shows that the character of academic atmosphere has increased. It is suggested that a set of task bills so that prerequisites have been owned by the students. Structured tasks should be given to see the students’ ability.

1. Introduction

The act of National Education System No. 20 Year 2003 about national education system article states that education is basically a conscious effort to improve the students’ competences by supporting and facilitating their learning activities. This effort to improve the students’ competences includes some factors such as the curriculum and the learning method which becomes an important thing to make the learning activity effective and is done according to the planned purposes.

The students of study program of elementary school teacher are the future teachers of elementary schools who have obligations which one of them is to teach mathematics to the students of elementary schools. Teaching mathematics to the students of elementary schools, teachers or future teachers should have the ability to improve the learning method they will use. Accordingly, the students of study program of elementary school teacher should have the ability to improve mathematics learning method.

Geometry as one of the branches of mathematics has an important role in the study of mathematics [1]. The role of geometry in education and daily life is tremendous [2]. The study of geometry is among the most challenging subjects in the field of mathematics [3]. Geometry is a basic and important subject area of school mathematics and conceptually, the basis [4]. Geometry is one of the
material that is taught to students at all levels of education [5]. Geometry is a branch of mathematics which is taught in every level of education, from elementary level to higher education level. Geometry is a branch of mathematics which is very near to students’ daily life since almost every single visual object around them is geometrical object. Studying geometry is an important component of learning mathematics because it allows students to analyse and interpret the world they live in as well as equip them with tools they can apply in other areas of mathematics [6]. In that room, kids should learn to know, explore, conquer, plan and manage in order to live, breathe, and do something better. The study of geometry is very important because it has everyday application and can help students in the development of aesthetics and inductive skill [7]. The first reason is geometry is the only branch of mathematics which relates mathematics to physical form in the real world. The second, geometry is the only branch of mathematics which is possible to visualize the mathematical ideas. The third, geometry can provide a non-singular example of a mathematical system. Teachers have a crucial role in leading students to achieve such high level of work competencies in a knowledge-based economy and society [8].

Based on the researcher’s second observation, the students of study program of elementary school teacher have an inclination not to study if they do not get any assignment from their lecturers. In doing the assignments, the students do not refer to the curriculum and related literature also based on their own idea. Moreover, in group discussion, they do not tend to give their opinion. It can be concluded that the students have less effort, less sturdy, and less hard work. This problem affects to their learning method development of geometry which has low quality. Accordingly, it is important to build the character of academic atmosphere to improve the competence in developing geometry learning.

The education of academic atmosphere character is an effort to build the values and norms which show the academic atmosphere, that is the atmosphere where the things based on the scientific values and norms apply in an effort to gain and develop knowledge and search for scientific truth. That atmosphere is a must to be done, maintained, and cultivated in university, so called the education of academic atmosphere character in university [9]. The education of academic atmosphere character contains the implementation of moral values, character, nature, truth, honesty, that can help making the atmosphere and educators who have moral values, character, nature, truth, honesty in thoughts and actions.

Character is the complex set of psychological characteristics that enable an individual to act as a moral agent [10]. Good character is not formed automatically; it is developed over time through a sustained process of teaching, example, learning and practice. It is developed through character education [11]. Character education is both a rooted and developing discipline [12]. Character education will be more meaningful if carried out since early childhood [13]. When we think about the kind of character we want for our children, it is clear that we want them to be able to judge what is right, care deeply about what is right, and then do what they believe to be right, even in the face of pressure from without and temptation from within.

Character education should be an integral part of education over the generations [14]. The character education is an effort which is intended to develop good characters based on the main good characters for individual or public. Character building is an important part of education performance [15]. One of institutions which has a role in character education is university. At the level of college, character education can take the role of strengthening the character of students [16]. Thus, in the educational environment, university which provides moral environment which plans the good values and implement them to people’s consciousness. An environment that can change a value to be a goodness and improve the intellectual consciousness to be personal habit in mind, feeling, and action. Besides having the ideal characters mentioned before, character is also a big and complex challenge for educators. However, surely central of conception of character education is implicit pedagogical content, which character developing is not only seen from the results, but also the process [17]. The outcome of character education has always been encouraging, solidly, and continually preparing the leaders of tomorrow [18]. The result of character education which is taught also contains soft skills and ideal life education. In other words, soft skill education as a part of character education for
students, has a very important role. Hard skill-based education, nowadays, starts to be changed. Today, soft skill-based education (social interaction) starts to change the hard skill-based education’s position because in building people’s character, they must be able to compete, be ethical, have good moral, be polite, and interact with the community in the nation. Soft skill education is based on mental development so that the children of the nation can adjust to the reality of life. In short, today in the world of education, an awareness has arisen that someone's success is not only determined solely by the knowledge and technical skills (hard skills), but also the self-managing skills and other people.

The educational academic atmosphere character contains the implementation of several values such as moral values, morals, manners, truth, honesty, and build an atmosphere and academic actors who are moral, moral, virtuous, honesty, truth in mind and action. In the realm of thought (cognitive), the academic atmosphere describes things such as thoughts, analysis, and moral judgments. In the realm of moral feeling, appearing moral feelings, the willingness of putting others first, and both (moral reasoning and moral feeling) embodied in the behavior or actions (moral behavior) goodness. Building moral reasoning, moral feeling, and moral behavior are mostly discussed in psychology and education approaches. The education of academic atmosphere character in the university is based on the national character building theme, which is to build honest, intelligent, tough, and caring generations [19]. A research conducted by Muhassanah et al [20] that found every student in a class has different levels of thinking and needs geometrical ability to solve geometrical problems.

Based on the background above, the researchers formulate the general problem of the research. It is “How to build the character of academic atmosphere to enhance the ability to develop geometry learning?” The general objective this research is to know how to improve the character of academic atmosphere to improve the ability in designing geometry learning on study program of elementary school teacher Universitas Negeri Semarang students.

2. Methods
The subjects of this research are lecturers of mathematics and students who take a geometry learning and measurement course of one class with 27 students. This research was conducted at study program of elementary school teacher Universitas Negeri Semarang. The procedure in this research is classroom action research. Each cycle consists of action planning, action implementation, observation and evaluation of action results, and reflection.

3. Result and Discussion
The research was done in 2 cycles which each of them consists of 2 meetings. Each cycle consists of preparation phase, implementation phase, observation phase, and reflection phase. Table 1 shows the results of the research including lecturers’ activity, students’ activity, and also the students’ learning outcomes in developing geometry learning.

| Table 1. The description of observation results of lecturers’ activities |
|-------------------------------------------------------------|
| Aspects Observed                                           | Cycle 1 | Cycle 2 |
| Preparing the learning media and materials and              | 3       | 4       |
| improving students’ learning motivation                     |         |         |
| Teaching in class                                          | 3       | 4       |
| Performing assessment                                      | 3       | 4       |
| Learning Materials Quality                                 | 4       | 4       |
| Learning Media Quality                                     | 2       | 3       |

The lecturers' activity at the preparation phase are preparing the structured tasks that students must complete before the class, preparing examples of Van Hiele’s implementation of geometry learning, preparing evaluation tools in the form of written tests and worksheets, preparing observation sheets to
observe lecturers’ activities, students’ activities, and making field notes. Students are divided into 6 groups.

By seeing the result of lecturers’ activity observation, it is shown that learning media quality needs to be improved. The aspects that need to be improved are preparing learning media and materials, improving students’ learning motivation, teaching in class, and performing assessment. An aspect that needs to be maintained is creating supportive class atmosphere and learning materials quality. In the second cycle, the quality aspect of the media is good, the aspect of the learning media and materials and improving students’ learning motivation, teaching in class, performing assessment, creating supportive class atmosphere, and learning materials quality are very good.

**Table 2. The description of observation results of students’ activity**

| Aspects                            | O1  | O2  | O3  | O4  | O5  | O6  | AC1 | AC2 |
|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Students’ participation            | 3   | 4   | 3   | 4   | 3   | 4   | 3   | 3   |
| Students’ learning motivation      | 2   | 4   | 2   | 3   | 2   | 3   | 3   | 3   |
| Students’ confidence               | 2   | 2   | 3   | 2   | 4   | 2   | 3   | 3   |
| Students’ interaction during class | 3   | 4   | 3   | 4   | 2   | 4   | 3   | 3   |
| Students’ mathematical communication | 3   | 4   | 3   | 2   | 3   | 2   | 3   | 2   |

Note
- O1: Observers 1
- C1: Cycle 1
- AC1 = cycle 1 average
- O2: Observers 2
- C2: Cycle 2
- AC2 = cycle 2 average
- O3: Observers 3
- O4: Observers 4
- O5: Observers 5
- O6: Observers 6

By seeing the result of observation toward the students’ activity that is shown in Table 2, it can be seen that from six observers, the average score for the students’ learning motivation and courage are still in medium category with score of 2, while the students’ participation, interaction during the class, and mathematical communication are in good category. By seeing the results of observation, it can be seen that there is one aspect which is still in medium category, that is the quality of learning media with score of 2. While teaching in class and performing assessment are in good category with score of 3. The aspect of creating supportive class atmosphere is in very good category with score of 4. It can be seen from the result of last evaluation of cycle 1 that five students can reach the learning completeness with score of 75, and 22 other students have not done so with score less than 75.

The research team held a reflection and find that students’ activities aspects that still need to be improved is the students’ learning motivation and courage. The aspects that still need to be improved are students’ participation, students’ interaction, and students’ mathematical communication.

From the observation result of cycle 2, it can be seen from the average score given by six observers that the students’ participation aspect is in very good category (scale 4), the students’ interaction
during learning, the students’ mathematical communication, students’ motivation, and students’ courage are in good category.

As the advantages of the learning done, the characters that appear prominently are mentioned as follows.

a. Discipline, that can be seen from the students’ activity of completing the task on time with full effort.

b. Creative, that can be seen from the students’ activity of developing new indicators and making new learning methods.

c. Curious, that can be seen from the students’ activity of seeking various references as materials to understand and materials that have not been known. Also looking for proof for every statement.

d. Responsible, that can be seen from the students’ activity of carrying out duties and obligations that should be done

e. Caring, that can be seen from the students’ activity of giving assistance to their friends who need it.

f. Self-confidence, that can be seen from the students’ activity of believing in their own ability in performing the activities.

From the field note, the result of students’ work in developing the geometry learning by implementing Van Hiele's theory begun by analyzing the basic competence. According Crowly [21], from the result of basic competence analysis for the geometry materials in elementary schools is at level 1 (introduction), 2 (analysis), and 3 (sorting) Van Hiele theory. Furthermore, the learning process was developed based on the phases of Van Hiele’s theory.

4. Conclusion

From the results of the research, conclusions are drawn as follows: (a) The lecturers’ activities that foster the character of academic atmosphere can improve the students’ ability in designing geometry learning of Study Program of Elementary School Teacher Universitas Negeri Semarang, (b) The students’ activities that foster the character of academic atmosphere can improve the ability in design geometry learning on Study Program of Elementary School Teacher Universitas Negeri Semarang students, (c) The students’ learning outcomes in developing learning activities of elementary schools’ geometry materials can be seen increasing.

The suggestions are mentioned as follows: in teaching geometry learning, before the class, lecturers need give structured tasks about the materials to be studied in groups. During the class, the students should be given the opportunity to have interaction each other. This is meant to build the character of academic atmosphere. The character formed through group assignment is expected to improve the students’ skills in developing geometry learning.

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