Cooperative Learning Model in Science Online Learning for 9th Grade Students

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Abstract. Many instructional strategies play an important role in science learning, especially for cooperative learning. This research study is to observe and analyze how the student cooperates in teaching and learning of science in online learning. This research used qualitative research methods, and observation and interviews as a tool to collect the data. The observations were conducted at an international junior high school in Kota Bandung, included 15 female students and 1 teacher as participants. Instruments of research that we used are the rubric of the teaching-learning process, the rubric of student activity, and the rubric of the cooperative learning model. From the data analysis, the learning model used in this online class meeting is proper enough for it is fulfilled the syntax of cooperative learning. So Cooperative learning models can be a good way to teach much content at a time effectively. However, managing students to be more active is needed in the learning process.

1. Introduction

The pandemic has changed almost all aspects of life in the world. To reduce the spread of Covid-19, the World Health Organization[1] recommends social and physical distancing; these are pretty difficult to apply, especially in educational activities. Changes in learning systems are forcing schools to implement distance education or online learning, e-learning, distance education, correspondence education, external studies, flexible learning, and massive open online courses (MOOCs) [2].

The pandemic will last a long time until it recovers. Jomo et.al [3] has implemented an online learning system by holding simultaneous online learning exercises to ensure that learning for students is effective and not interrupted. Toquero[4] stated that there is a need for more substantial academic organizations to improve their curriculum, and the use of new instructional methods and strategies should be essential. With the increasing use of online modalities during Covid-19, it is necessary to assess their effectiveness regarding teaching and learning from various stakeholders [5].

As the spearhead of the implementation of online learning, teachers must be able to condition all instructional components. Many instructional strategies are important in science learning, especially for cooperative learning. It involves a group of learners working together as a team to solve a problem, complete a task, or accomplish an objective goal[6]. This can improve student’s learning about the subject matter and improve their attitudes towards academics in general and subject matter[7]. Cooperative learning is not only aimed at instilling students in the material to be studied but more emphasis on training students to have social skills, the ability to cooperate, group and be responsible to fellow group mates to achieve the general goals of the group[11].

Cooperative learning includes students working in fixed organizations, on dependent gaining knowledge of obligations, underneath situations that meet 5 criteria[11]:

1. Positive Interdependence. Group contributors must depend upon every other to accomplish an aim.
2. Character Responsibility. Individuals need to be held personally chargeable for doing their very own task and gaining knowledge of the cloth.

3. Interact by Face-to-Face. The organization individuals ought to do all or some of the work collectively.

4. Appropriate Use of Interpersonal competencies. Institution participants need to exercise and receive guidance in management, decision-making, communique, and battle control.

5. Ordinary Self-evaluation of Group Functioning. corporations must periodically mirror on how they are operating together.

To fully make use of the possibilities supplied through cooperative gaining knowledge of, the gaining knowledge of duties utilized in cooperative getting to know are, in most cases, established otherwise from those within the Socratic model. One difference can be the use of difficult issues that a student working by myself couldn't commonly solve, however that a group of students working collectively could often resolve. However, Toquero[4] implied that most students have doubts about online or digital learning due to the lack of proper interaction and contact with students and have some problems when studying in groups. This research study is to observe and analyze how the student cooperates in teaching-learning of science in online learning.

In this study, we investigated how the cooperative learning model is implemented by observing video records of the teaching-learning process in online situations. The instruments of this qualitative research study used the syntax of cooperative learning models. The purpose was to test if and how to observe and analyze how the student cooperates in teaching-learning of science in online learning, could potentially be applied to the online class.

2. Method

This research used qualitative research as a research method, which focuses on collecting and analyzing non-numerical (written or spoken) and textual data to understand concepts, opinions or experiences. The researcher used several kinds of rubrics for collecting the data which described qualitatively by using narration, observing the participants behavior and interviewing participants to analyze the cooperative learning model in online learning process and this is also the research design used in this research method. The Covid-19 pandemic causes observations and interviews cannot be carried out directly through offline mode (face to face). The research uses naturalistic observation, where the researchers are not as participants, but only watch, pay attention, collect the sample and record the data from science teaching and learning activities, with the limited duration of observation as it was also done by Mcleod et.al [8]. The observations conducted in the 9th grade of an international junior high school in Kota Bandung, included 15 female students and 1 teacher.

Some steps of research were implemented, starting from choosing the school and class to be a sample. The next was asking for the availability of teachers to be observed and interviewed, then collecting the online meeting recording and lesson plan, and learning from it. The last step was analyzing and recording the data to be filled in the rubric that was provided. Observation was done on how the learning process goes, how student activities and learning strategies are implied. At the end of the research, the interview was done to the teacher in the context of the general information about the class and school, the lesson plan (for making comparison with the real condition) and to fulfill the information those could not get from observation.

Instruments of research that we used were rubrics of the teaching-learning process, student activity, and learning strategy. The qualitative data were then analyzed, triangulated and transcribed to obtain a clear picture of how science learning takes place including the strengths, weaknesses and potential for improvement.
Table 1 The Example of Learning Strategies Observation Rubric as an instrument of research.

| Aspect                        | Indicator                                         | Yes | No | Description                                                                 |
|-------------------------------|---------------------------------------------------|-----|----|-----------------------------------------------------------------------------|
| Teacher Activity              | Lecture                                           |     |    |                                                                             |
|                               | Discussion leader                                 |     |    |                                                                             |
|                               | Being role model                                  |     |    |                                                                             |
|                               | Monitoring/adjusting                              |     |    |                                                                             |
|                               | Formal assessment                                 |     |    |                                                                             |
|                               | Informal assessment                               |     |    |                                                                             |
| Authentic problems and questions | Problem solving activities                       |     |    |                                                                             |
|                               | Reflect core content based on curriculum         |     |    |                                                                             |
|                               | Real life connections                             |     |    |                                                                             |
|                               | Student self-assessment                           |     |    |                                                                             |
|                               | Experimental or hand-on learning                 |     |    |                                                                             |
| Instruction                  | Direct instruction                                |     |    |                                                                             |
|                               | Indirect instruction                              |     |    |                                                                             |
|                               | Independent work                                 |     |    |                                                                             |
|                               | Cooperative learning                             |     |    |                                                                             |
| Cooperative learning strategies | Students work together in small groups           |     |    |                                                                             |
|                               | Students are positively interdependent.           |     |    |                                                                             |
|                               | Activities are structured so that students need   |     |    |                                                                             |
|                               | Students masterized their content                |     |    |                                                                             |
|                               | Students give a clear explanation during          |     |    |                                                                             |
|                               | Students explaining correct learning materials   |     |    |                                                                             |
|                               | Students can understand other group topics       |     |    |                                                                             |
|                               | Students get high achievement in assessment      |     |    |                                                                             |

3. Result and Discussion

3.1. Teaching-Learning Process

The observation of the teaching-learning process is aimed to analyze how the teaching-learning activity is going throughout the meeting. Starting from the initial learning activity up to the closing session, there are several indicators observed.

In the initial learning activity, the teacher starts the class by a simple greeting and initiates to recite basmalah and pray together. Teacher informing learning objectives of the meeting. The apperception
activity is done by recalling materials from the previous meeting about renewable energy and previous activity which is a group discussion about several subtopics in the renewable energy chapter (Grup 1: biofuel dan biogas; Grup 2: solar cell dan hydropower; Grup 3: ocean power dan wind power; Grup 4: geothermal dan hydrogen power), after that teacher explaining activity that will be runned in the present meeting. What is missed by the teacher is checking students’ attendance which is changed by reminding the students to fill self-attendance in their Google Classroom. There are also no class rules provided by the teacher, but based on our interview with the teacher that’s not a big deal because she wants her class to be flexible and as long as she runs the class there is no big problem she faces as the results of no rules provided.

The next step is the main learning activity. The teacher persuades the students to connect the concept with real life phenomena and clarify it by giving examples in real life situations. The approach that she used is cognitive approach which means in the teaching-learning activity the focus is on the understanding of information and concepts received by the students. This approach is however still relevant with the learning objectives since it is only around C1-C2 (remembering and understanding). Regarding the learning strategy, based on our interview with the teacher she has already considered students’ characteristics. The next indicator observed is about the learning models and learning methods, we can say teachers use effective and efficient learning models which is cooperative learning. This model is good to discuss a lot of subtopics at a time. For the learning method she used student-centered learning which may facilitate students to masterize learning materials better. The meeting is run on time, as it is already planned in the lesson plan. The next indicator related to the teaching media, for the learning sources teacher provides ebooks and other media such as ppt slides and modules for teaching and learning activity. During the meeting, the media used is the ppt slide which is made by students so the students are obviously involved in the use of media. One indicator missed in the main activity is there is no concept connected to other relevant topics, however this gave no big impact to students' understanding because the materials presented were still in line with the learning objectives.

Last but not least is the closing session. All of the indicators present in this session which are students are asked to give a conclusion, teacher evaluate and give clarification to avoid misconceptions. Teachers give further information about midterm tests and how they should prepare it. Teacher led the prayer and closed the session by greeting.

Several indicators are not present in the teaching-learning process. However, that does not give a big impact to the teaching-learning process itself. The teaching-learning process is still in line with the lesson plan and still helps students to reach the learning objectives, so that we can say teaching-learning activity in this online meeting is runned as well systematically.

3.2. Student Activity

The next thing we observed is student activity. It is related to the aspects of students’ attitude, active involvement, responsibility, teamwork, and student performance during the meeting session.

From aspect attitudes, there are two indicators. The first one is a student speaking politely, from the observation they implemented it, because the students are speaking politely at the right time and didn’t interrupt the teacher. The second indicator is students are able to respect the teacher and others, but the student didn’t fulfill this aspect because they rarely answer teacher questions and remain silent even though the teacher is trying to be interactive.

The second aspect is active involvement. There are several indicators regarding students' ability to give their opinion during a learning activity, to respond to questions about concepts being learned, to be active in the learning process by giving a reaction, to raise HOTS questions and the last one is the ability to raise a mutual question. Unfortunately, from five indicators, only the last indicator is fulfilled, which is that students are able to raise mutual questions related to the topic presented. The other indicators are not fulfilled because the student seems passive and they didn’t give their opinion even though the teacher let them to.

The next aspect is student responsibility that has three indicators. The first indicator is that students can utilize time effectively and they implemented it during the presentation. The second indicator is students are able to make preparations before teaching and learning activities. This indicator is also fulfilled because students are well prepared for the presentation session by preparing the presentation
slides. The last indicator is students finish their individual assignments responsibly, but this indicator can’t be observed since the assignment given is in a group.

The next aspect is about teamwork which has three indicators. The first indicator is students are able to respect others’ opinions assertively but it can’t be observed since there is no interaction between each student regarding giving their opinion. The second indicator is students are able to work with their group, this indicator is fulfilled because the students are discussing and making a presentation slide for their subtopic. The last indicator is students are able to lend help to others, but this can’t be fulfilled because when the other student has difficulties in pronouncing a word in English the others remain silent and wait for the teacher to help.

The last aspect is about performance based on two indicators. The first indicator is students are able to do a related performance test or demonstration and the second indicator is students are able to gather and analyze data from experiments or demonstrations. Both of them are not fulfilled because there is no performance test, experiment, or demonstration during the class session.

The online meeting observed is filled with students’ presentations only. However, students are passively involved in the teaching-learning activity. We believe there are some barriers students face that can’t be overcome which probably personal such as anxiety associated with using technology; being out of one’s comfort zone; (perception of) inequity in assessment, particularly in “group” assignments; and, the (perceived) inability or difficulty in peer interaction, particularly in presentations[8]. Other than that, there are problems with online facilities such as bad internet connection and running out of internet data.

Based on our interview with the teacher, students become more passive in online learning indeed. So the strategy used to overcome this is by always asking about their understanding and giving a clarification to avoid misconceptions. More than that, the teacher believes that students are given more chances to speak and express their opinion through presentation and group discussion.

3.3. Cooperative Learning Model
Observing how effective cooperative learning models are in science online meeting classrooms, there are several aspects we observed through the rubric which has been determined.

In the aspects of teacher activity, the teacher acts as a discussion leader during the meeting. Teacher became a good role model by being interactive and opening the discussion with a good spirit. Other than that, the teacher monitors the group’s presentation and gives lectures in order to clarify the misconceptions. There is no assessment nor evaluation given in the meeting we observed, but based on our interview there are one assessment and one evaluation given on the other meeting related to the topic of renewable energy.

In the aspects of instruction, the teacher gives direct instruction such as for raising questions, giving opinions, state conclusions, and reading again the materials after the class finished. Students work independently during their preparation and presentation sessions, also work cooperatively to discuss and prepare their materials for presentation.

In the aspects of cooperative learning models, we observed whether the syntax is completely done. Based on Arends (2012) in Susantini [9] stated the syntax of the cooperative learning model which consists of six phases. Phase 1: clarify goals and establish set, in which we observed that teacher explains goals of the lesson and establishes learning set through the lesson plans; Phase 2: present information, in which teacher presents information regarding the materials of renewable source to the students either verbally in previous meeting and by giving another sources from slides and ebook; Phase 3: organize students into learning teams, in which we observed teacher divide the group based on some subtopics; Phase 4: assist teamwork and study, in which based on our interview teacher helps learning teams as they do their work; Phase 5: test on the materials, in which teacher made the groups present results of their work in front of the class through online meeting; Phase 6: provide recognition, in which teacher finds ways to recognize individual achievement and participations, as well as group achievement through presentation and discussion by giving them appreciation in form of additional score.
Table 2 Rubric on Six Phase of Cooperative Learning

| Phase | Objective                             | Checklist | Details                                                                 |
|-------|---------------------------------------|-----------|-------------------------------------------------------------------------|
| 1     | Clarify goals and establish set       | Present   | We observed that teacher explains goals of the lesson and establishes learning set through the lesson plans |
| 2     | Present information                   | Present   | Teacher presents information regarding the materials of renewable source to the students either verbally in previous meeting and by giving another sources from slides and ebook |
| 3     | Organize students into learning teams | Present   | We observed teacher divide the group based on some subtopics            |
| 4     | Assist teamwork and study             | Present   | Based on our interview teacher helps learning teams as they do their work |
| 5     | Test on the materials                 | Present   | Teacher made the groups present results of their work in front of the class through online meeting |
| 6     | Provide recognition                   | Present   | Teacher finds ways to recognize individual achievement and participations, as well as group achievement through presentation and discussion by giving them appreciation in form of additional score |

Other indicators we observed in the cooperative learning aspect, students work together in small groups which consist of three to four students in a group, the activities are structured to make students have to discuss and prepare the presentation independently with their group so that students need each other to accomplish their learning activities. Because of that, they are positively interdependent by trusting each other to do their part in the presentation session. All of the group explanations are correct, even though there is a group explaining their materials incompletely, the teacher helps them to complete it and give further explanation. Not as it is stated by Gillet[10] that there is a communication barrier in online learning, students did the communication well, and understood the other group topics through a presentation session. Along with the presentation, student’s tend to not ask questions even though they are given a chance to ask in the discussion, but based on our interview students get high achievement in assessment and evaluation regarding this topic.

By the research it is shown that the learning models used in this online class meeting is proper enough. Cooperative learning models can be a good way to teach many contents at a time effectively.

4. Conclusion

Based on the result from this research, we can conclude that teaching-learning activity is still in line with the lesson plan and still helps students to reach the learning objectives. So that teaching-learning activity in this online meeting is runned as well systematically. In students' activities, the meeting is filled with students' presentations only. Because of some problems, students are passively involved in the teaching-learning activity. The model that was implemented in this online class meeting is proper enough. Cooperative learning models can be a good way to teach much content at a time effectively.

For further improvement on the use of cooperative learning models in online class meeting, we recommend you to manage the students to become more active in the learning process. Good mastery of concept and high achievement are great, but student activeness should also be considered.

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