Improving Students Communication and Collaboration Ability through the POE Model

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Abstract. The 21st century is known as a century of knowledge. This era is marked by the rapid advancement of science and technology that is offset by changes in the learning paradigm. The 21st century learning paradigm emphasizes the ability of students to think critically, connect knowledge with real life, master technology and can communicate and collaborate well. In line with the 21st century paradigm, the Indonesian government carries out the 2013 curriculum which was proclaimed as an effort to improve the quality of education. The 2013 curriculum has not been able to fully facilitate 21st century capabilities, especially communication and collaboration skills. This research discusses about the implementation of the 2013 curriculum with the POE learning model on improving communication and collaboration ability.

Keywords: Communication ability; Collaboration ability; POE model.

1. Introduction

The 21st century is known as a century of knowledge. This era is marked by the rapid advancement of science and technology that is offset by changes in the learning paradigm. The 21st century learning paradigm emphasizes the ability of students to think critically, connect knowledge with real life, master technology and can communicate and collaborate well. In line with the 21st century paradigm, the Indonesian government carries out the 2013 curriculum which was proclaimed as an effort to improve the quality of education. The 2013 curriculum has characteristics in the learning process, the material is taught in an integrated manner. Integrated learning is one of the implementation of the curriculum that is recommended to be applied at all levels of education. Integrated material also allows students to actively search for and find concepts from several fields of study at once [1].

At present, science has been taught in an integrated manner according to the agreed curriculum. Surveys conducted in several Yogyakarta City Middle Schools prove that the implementation of the 2013 Curriculum has not fully realized 21st century skills. Skills that are lacking are communication and collaboration skills. Students still tend to be quiet when given questions, or answer in unison. Some students also often look less active in discussion or group work. Students only remain silent during discussion sessions, or observations without contributing their thoughts in the activity.

This condition requires more attention, in order to create a conducive learning atmosphere. The way that can be done is by applying learning that can provide initiative to ask, answer and collaborate between students through a series of activities [2]. Learning that also emphasizes on giving direct experience to produce knowledge that is easy to remember and can be used as a vehicle for 21st century skills cultivation [3]. The effort that can be done is by applying the Predict, Observe, Exsplain learning model or commonly abbreviated as POE.
The POE learning model comes from constructivism learning theory [4]. The constructivism learning model is a learning model that frees students to construct their own knowledge. Through a series of constructivism activities, it can foster collaboration between students [5]. The POE guides students to carry out three tasks. First, Predict or predict, at this stage students write their predictions about the problem given. Both Observe or observe, at this stage students conduct experiments to prove their predictions. The last stage is Explain or explain, at this stage students make explanations based on their predictions and observations [6]. The stages contained in the POE model can also foster communication skills between students [7].

This paper presents an improving students communication and collaboration ability through the POE model.

The rest of this paper is organized as follow: Section 2 presents rudimentary of POE Model. Section 4 presents the results. Finally Section 5 concludes this work.

2. POE Model

The POE (predict-observe-explain) model is one of the learning models used in learning activities, helping students shape their knowledge through the senses. This learning activity includes seeing, listening, touching, smelling, and feeling about a problem, namely making predictions, making observations, and making explanations. The POE is an efficient learning model to obtain and enhance the concept of science of students [8]. The POE can help students explore and strengthen their ideas, especially in the prediction and reasoning stages [9]. The POE model directs and invites students to discover their own concepts of knowledge from observations through demonstration methods and experiments in the laboratory.

The POE model is constructivist because students are given the freedom to think about the proposed problem and students try to build their own knowledge through thinking, practice, and seeking explanations [7]. Students must be active themselves constructing to be able to know something. Students must be active in processing materials, digesting, thinking, analyzing, and finally the most important thing is summarizing it as a complete understanding in learning activities.

Each learning model has syntax or steps certain implementation. [9] The steps in implementing the POE learning model are shown in Table 1.

| Step Learning | Teacher Activity | Student Activity |
|---------------|------------------|------------------|
| Step 1 Predict | Provide apperception regarding the material to be discussed | Giving hypothesis based on problems taken from students’ experiences, or textbooks that contain a phenomenon related to the material to be discussed |
| Step 2 Observe | As a facilitator and mediator if students experience difficulties in proving | Observing by conducting an experiment or demonstration based on the problems studied and recording the observations to be reflected with each other. |
| Step 3 Explain | Facilitate the course of discussion if students experience difficulties | Discuss the phenomena that have been conceptually observed. |

Referring to the description above, it can be reconstructed that the POE model is a model born of the constructivism theory, in which its implementation frees students to construct their own knowledge. Applying the POE learning model means applying the scientific method. This model guides students to be active in learning both hand on and mind on which is realized through three stages, namely prediction, observation and explanation.
3. Results and Discussion

3.1. Communication Ability

Ability can be interpreted as a trait that is brought from birth but can also be learned, thus enabling a person to be able to complete his obligations. Ability can also be understood as the ability or potential of an individual to master expertise in working on various tasks in a job. Regarding ability, communication ability is the most important ability in human life. This is because communication is an activity that cannot be separated from our daily activities as social beings. Literally the term communication comes from the word communication which means the same in terms of meaning, in other words communication is an activity of equating perception. Communication can also be interpreted as the exchange of messages made by the sender and recipient, both verbally and non-verbally. The communication process that occurs is a reciprocal process because the sender and recipient influence each other.

Another understanding of communication is an activity that aims to understand something that is conveyed from one person to another. Communication can also be interpreted as a two-way process between individuals and individuals, individuals with groups, groups with groups to achieve mutual understanding or understanding. Summarizing some of the above meanings, it can be concluded that the ability to communicate is a person's ability or ability to convey a message to others, with good acceptance and the same perception. To be able to communicate well, there are aspects that need attention. There are five aspects of communication, namely representation, listening, reading, discussing and writing. However, in the standard of the NCTM mathematics curriculum, representation is no longer included in communication but is one of the standards that also needs to be developed in mathematics learning. In connection with this, it means that aspects of communication no longer contain representations. The aspects of communication are:

3.1.1. Listening

Listening is a very important aspect of communication skills. The expected listening ability in communication is critical listening ability, because this can encourage students to think about answers while listening [10].

3.1.2. Reading

Reading is an active activity to find answers to questions that have been compiled. Active reading means reading focused on paragraphs that are thought to contain answers relevant to the question. Through active reading students will be able to construct their own knowledge.

3.1.3. Discussing

Discussion is an activity of exchanging ideas both in small groups and large groups that aims to get an understanding or agreement. In discussions, it takes listening, reading and courage in a Lisa way to express ideas. This ability can be honed through regular exercises designed by the teacher.

3.1.4. Writing

Writing is an activity that is done consciously to express and reflect on the mind. By writing someone has gone through the stage of the process of thinking hard which is then poured into paper. Another aspect expressed three things that can be measured in the ability to communicate, namely:

1) Knowledge (knowledge) which includes:

   a. Knowing and understanding knowledge in their respective fields concerning their duties and responsibilities in work.
   b. Knowing knowledge related to new rules, procedures, techniques in the company.
   c. Knowing how to use the right and correct information, tools and tactics.

2) Skills (skills) which include:
a. Ability to communicate well in writing.
b. Ability to communicate clearly orally.

3) Attitude which includes:
   a. Choosing abilities in creativity in work.
   b. There is high morale.
   c. Choose ability in planning / organizing

Furthermore, [10] revealed that there are six aspects that can be measured in the ability to communicate. These six aspects are:

   a. Change the form of presentation.
   b. Giving / describing empirical data from experimental results with graphs, tables or diagrams.
   c. Compile and submit reports systematically.
   d. Explain the results of the experiment or research.
   e. Read charts or tables or diagrams.
   f. Discuss the results of the activities of a problem or an event.

Referring to some of the opinions above, it can be concluded that aspects of communication that can be measured are listening, speaking, reading and writing. This aspect was adopted from Baroody, which was taken by considering the learning model used, namely the poe (predict, observe and explain) model which in its entirety is represented by this syntax. The aspect taken is actually an aspect of mathematical communication. The communication ability grid is presented in Table 2.

| No. | Aspect  | Indicator                                      |
|-----|---------|-----------------------------------------------|
| 1.  | Listening| a. Understand the topic of conversation       |
|     |         | b. Answer questions according to the topic    |
| 2.  | Riding  | a. Able to associate read readings with the problems presented |
|     |         | b. able to find important information in reading |
| 3.  | Discussion | a. Present the results of work in front of the class |
|     |         | b. work in groups                             |
| 4.  | Writing | a. Write a prediction of a problem            |
|     |         | b. Write answers (observations made)         |

3.2. Collaboration Ability

The collaboration ability is an important ability that should be familiarized with a person, remembering that humans cannot live alone. Collaboration ability can be defined as a work of small groups with different levels of ability, together working to achieve one goal [13]. Another understanding of collaboration is the interaction of several related elements, both individuals, institutions and or parties that are involved directly and indirectly who receive the consequences and benefits [14]. The values that underlie a collaboration are the same goal, common perception, willingness to process, mutual benefit, honesty, compassion and community-based.

Furthermore, [11] suggests that collaboration is an ability related to physical interaction in groups to express an idea to be able to solve a problem and achieve certain goals. From the above definitions, it can be reconstructed again that the ability to work together is a person’s ability to establish relationships with other people, both individuals and groups to achieve the same goals. One way that can be done to foster the ability of collaboration is through teaching [12]. Learning methods that promote collaboration between students are commonly called cooperative learning. In cooperative learning students are formed in small groups who are guided to collaborate. The cooperation referred to here is for good. This means
that the efforts of teachers in forming groups are intended to equip students to socialize, exchange ideas, help each other and post up their own knowledge through discussions between group members.

Cooperative learning is done by forming small groups, which aim to bring interaction and collaboration between students so that they can solve the problems given. Collaborative learning makes it easy for students to learn and cooperate, contribute ideas and are responsible for the achievement of learning outcomes in groups and individuals. To be able to assess the ability of students in collaboration there are several aspects that need to be observed. There are eight aspects of collaboration in learning that can be observed, these aspects are:

- Participation in giving ideas or opinions
- Responding to opinions
- Accepting opinions of others
- Carrying out tasks
- Participation in solving problems
- Concern about the difficulties of fellow group members
- Participation in making reports
- Participating in group presentations
- Concern about helping friends in solving problems.

Slavin in [13] describes several aspects that can be observed in the activities of collaboration conducted by students. These aspects are:

- Receiving the division of group tasks
- Giving and accepting the opinions of other
- Finalizing assignments on time
- Maintaining group cohesiveness
- Receiving and agreeing on the results of the discussion,
- Working on tasks that have been borne the answer.

Not much different from the opinion [14] suggests there are eight aspects that can be observed in students’ cooperative activities. These aspects include:

- Informing each other members,
- Disputes that occur can be resolved,
- Create an atmosphere of close cooperation and good work morale in the group,
- Request / give ideas and opinions to all group members to help make decision,
- Support group decisions,
- Respect the input and expertise of other members,
- Participate in carrying out their duties,
- Respect the results achieved by the group.

Judging from some of the opinions above, the aspects of collaborative ability that will be observed in this study are: 1. Participating in carrying out tasks, 2. Mutually giving information to fellow members, 3. Receiving division of group tasks, 4. Creating a familiar working atmosphere and 5 Appreciate input.

The collaboration skills grid that will be used is presented in Table 3.

| No. | Aspect                                      | Indicator                                               |
|-----|---------------------------------------------|---------------------------------------------------------|
| 1.  | Participate in carrying out tasks           | a. Actively observe and record results                  |
|     |                                             | b. Actively discuss with group members                  |
| 2.  | Give each other members information         | a. help explain activities that will be carried out to  |
|     |                                             | colleagues who do not understand.                      |
|     |                                             | b. express the knowledge / information they have.      |
| 3.  | Receive group assignments                   | a. do the task given seriously                          |
|     |                                             | b. complete the task on time                           |
| 4.  | Created a familiar working atmosphere       | a. discussing in completing the assignment given        |
Learning activities that are carried out in groups both observation, experiment and demonstration are proven to improve student cooperation and communication skills. At the time of observation, students work with friends to gain knowledge. This activity trains students to participate in carrying out tasks. When carrying out observations, students provide information to each other, so as to form a good and compact cooperation so that the task is completed properly and on time. This fact was proven by [15] through the research conducted at Jember 1 Junior High School. The results of the POE learning model were able to improve students' scientific work. When observing and discovering new things, students feel enthusiastic, moreover the activities carried out in groups can increase students' interest in digging deeper. In addition students will be able to form their own knowledge and match it with existing theories through group discussion and collaboration.

In addition to forming collaboration between students, observation activities that ended with presentations were also proven to be able to improve students' communication skills. Through a series of activities carried out, such as discussions during observation, students will be accustomed to listening to other people who are talking, reading and linking information from reading to problems, as well as writing observations and conclusions from the activities that have been done. This fact is evidenced by [15] which proves that the experimental class taught by the POE model gets a better communication score. The research conducted at SMPN 1 shows the activities of students in the experimental class are more active when making observations and explanations, which is when communicating the results of the experiment. This is in accordance with [7] opinion which states that the POE learning model is an efficient step to create student discussion about the concept of science.

Systematically, the relationship between communication skills, collaboration skill and the POE model is presented in the framework framework Table 4.

**Table 4. Relationship Between Communication Skill, Collaboration Skill**

| Communication Ability | POE       | Collaboration Ability |
|-----------------------|-----------|-----------------------|
| Hear, write, discuss  | Predict   | • Give each other information |
| Reading, writing      | Observe   | • participate in carrying out tasks  
|                       |           | • receive division of labor  
|                       |           | • creating a familiar work atmosphere |
| Hearing, writing      | Explain   | • giving each other information  
|                       |           | • appreciate input |

4. Conclusion

From the explanation above, it can be concluded that the POE learning model is one of constructivism learning models that directs students to learn through three processes, namely prediction, observation and explanation. This model is done by forming students in small groups: (1) At the prediction stage is able to shape students' communication skills such as listening, writing and discussing. This stage is also able to improve the ability of students to collaborate with each other by giving information to one another; (2) At the observation stage it is able to form communication skills such as reading and writing. This Thap is also able to improve the ability of students to collaborate in carrying out tasks, accept the division of tasks, and create a familiar working atmosphere; (3) The explanation phase is able to form communication skills in terms of hearing, writing, and discussing. This stage is also able to improve students' ability to collaborate such as appreciating input and giving information to one another.
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