



Implementation of Problem Based Learning Model to Measure Communication Skills and Critical Thinking Skills of Junior High School Students

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Abstract

Learning also needs to be directed to familiarize students to formulate problems, not only solve problems. In addition, the learning done must train critical thinking skills not just thinking mechanically. The US-based Partnership for 21st Century Skills (P21), identifies the competencies needed in the 21st century namely "The 4Cs" - communication, collaboration, critical thinking, and creativity. Science learning was developed as an integrative science subject, namely integrating applicative biology, physics and chemistry to develop thinking skills, expressing skills and developing innovating and collaborating skills. To improve critical thinking skills, creative thinking, communication, and collaboration, of course, the teacher must have the right model or method. PBL is a model that begins with a case and problem that has a goal so that students can solve the problem. This study aims to determine the profile of communication skills and critical thinking skills of students. Research carried out using the type of descriptive research with the method used is a qualitative method to observe critical thinking skills, creative, communication, and collaboration in science learning. The data taken was the result of observation of communication skills, the results of tests of critical thinking questions, and interviews of Muhammadiyah 4 Semarang Junior High School students as many as 9 research subjects. The profile of students' communication skills was assessed from the results of observations during the last six meetings. The scores were averaged 55.56% with very high categories, namely SP1, SP2, SP3, SP5, SP6 and 44.44% of high-category students namely SP4, SP7, SP8, SP9. The results of the observations were also supported by the results of interviews of students from SP1 to SP9 which showed a correspondence with the scores obtained. The profile of students' critical thinking skills is assessed from the results of tests of critical thinking when the final learning material is obtained 11.11% is very high category, namely SP1; 33.33% of high category students, namely SP2, SP3, SP4; and 55.56% in the medium category, namely SP5, SP6, SP7, SP8, SP9. The results of the tests of critical thinking are also supported by the results of interviews of students from SP1 to SP9 which indicate the existence of correspondence with the scores obtained.

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INTRODUCTION

The advancement of technology and information has changed the human perspective both in terms of work, community and even learning. The easier access to obtain information makes students must always improve their knowledge. Today students are faced with the era of industrial revolution 4.0 which is no longer dwelling on reading, writing and arithmetic competencies but students must develop data literacy, technology literacy and human literacy (Suwardana, 2017). In this era the acceleration of technological progress has become shorter, students are required to be able to analyze and make conclusions from the data obtained, apply it in technology and be able to think critically and creatively, and communicate with each other and work together in the use of these technologies. In the perspective of human literacy, the goal is for humans to function properly in an increasingly dynamic human environment. Schools need to find new ways to develop human cognition capacity, namely: higher order mental skills, critical and systemic thinking (Haryono, 2018). The advancement of technology makes human literacy an important thing to survive in the era of the industrial revolution, the goal is that humans can continue to function properly and not be replaced by technology that humans create themselves. 21st century learning encourages students to find out from various sources of observation, not just being told. Learning also needs to be directed to familiarize students to formulate problems, not only solve problems. In addition, the learning done must train critical thinking skills not just thinking mechanically.

The US-based Partnership for 21st Century Skills (P21), identifies the competencies needed in the 21st century namely "The 4Cs" - communication, collaboration, critical thinking, and creativity. The Ministry of Education and Culture of the Republic of Indonesia supports 21st Century learning integrated in the 2013 Curriculum which contains 4C skills, namely critical thinking, creativity, communication, and collaboration (Kemdikbud, 2017). Awang &

Zawawi (2015) expressed critical and creative thinking skills should be balanced with communication skills and collaborate as a provision to face 21st century challenges. Communication skills are a linguistic process that is pursued by learners both individually and when forming a working group. Such communication can be divided into two namely verbally and nonverbal, verbal communication done using speech while nonverbal communication can be done using writing. The US-based partnership for 21st Century Skill (P21) defines collaborative skills as a learner's skill to build a concept together with a group of existing problems. Collaborative skills become a very important skill in learning and are a key skill of the four 21st-century skills.

The results of observations and interviews at Muhammadiyah Junior High School 4 Semarang showed that 4C skills possessed by students were still low. This can be seen when the learning process takes place, the students are still struggling to analyze a problem or the problem given by the teacher. Their thinking is still very simple so that the goals to be achieved in learning still cannot be achieved. When given the task of making a work such as a poster or props, there are still many students who do not understand the purpose of making the tool so that the resulting work is not maximal.

During the learning process, it certainly will not be separated from the group discussion process. So far, what often happens during group discussions is that there are only a few active students from several group members. Not all students are active in the discussion process, most groups are only leaders who are active in expressing opinions or answering questions. When the discussion process the role of the teacher is very important so that the discussion process runs well and all students can actively participate not only as listeners. Of course, these 4C skills must be possessed by students, considering that these skills greatly influence the success of students when they have graduated from school and continue their lives in a society with all the intense competition.

Material about additives and addictive substances is material that is closely related to everyday life. The material can be said to be material that is very often encountered or experienced by students, so students are expected to be able to analyze a problem from the teacher critically and provide solutions to problems correctly. But in reality students are still lacking in exploring their skills in thinking and solving a problem in the material. Understanding of students about addictive substances for example is only limited to dangerous drugs without knowing the reason why it is dangerous, what substances are contained and why the substance is produced, the thinking of students is still not up to that stage.

To improve critical thinking skills, creative thinking, communication, and collaboration, of course, the teacher must have the right model or method. The selection of the right model will certainly make the atmosphere of learning more meaningful so that the material delivered by the teacher can be easily understood by students. The model that can accommodate the increase in 4C skills in students is through the Problem Based Learning (PBL) model. According to Pijl-Zieber (2006) PBL is a model that begins with a case and problem that has a goal so that students can solve the problem.

Problem Based Learning (PBL) is a model that instills learning processes ranging from thinking, collaborating groups, then communicating and building new knowledge in students so that students can provide solutions and solve problems either individually or in group discussions. PBL is one of the recommended lessons to be applied to the 2013 Curriculum. The choice of a learning model must also be in accordance with the material to be taught by the teacher.

Additives and addictive substances are human material that is closely related to the phenomena of everyday life. Many things that we can associate when discussing this material for example can be related to health, environment, and social norms that exist in the community. This raises many problems that

must be sought for the impact and solutions by students. When students want to solve a problem, of course, it begins with the thinking skills of students individually in responding to a problem. The thinking skills of individual students will later be collaborated with communication skills and teamwork skills. Students can elaborate on their individual opinions with the opinions of other group members so that each group can draw a conclusion.

Based on the research of Trilling & Fadel (2009) shows that high school graduates, diplomas and higher education are still less competent in terms of: (1) oral and written communication; (2) critical thinking and problem solving; (3) work ethics and professionalism; (4) work in teams and collaborate; (5) work in different groups; (6) using technology, and (7) project and leadership management. Thus the competencies and abilities that a person must have to face the demands of the 21st century are very complex. According to Bergili's research (2015) problem-based learning can be integrated into the learning process with the aim of improving students' critical thinking and creative thinking skills.

METHODS

Research conducted using descriptive research with the method used is a qualitative method to observe critical thinking skills and communication in science learning. Moleong (2016) defines qualitative research as a research procedure that produces descriptive data in the form of written or oral words from people and observed behavior from the phenomena that occur. Qualitative research methods are research methods that are based on the philosophy of postpositivism, which is used for research on natural object conditions (Sugiyono, 2015). This type of research was taken because this form of research can describe in detail qualitative information. Grade VIII students of Muhammadiyah Junior High School 4 Semarang in 2018/2019 academic year were distributed in five classes namely class VIII A,

VIII B, VIII C, VIII D, and VIII E. Class VIII A and VIII B were classes consisting of female students, class VIII C and VIII D is a class consisting of male students, while class VIII E is a mixed class between male and female students. The class that will be used to apply the Problem Based Learning model is class VIII B, VIII C, VIII D. Class determination is based on purposive sampling technique which is a selection technique with certain considerations. The research subjects were taken from students with upper grades, students with middle grades, and students with lower grades for each class, so that there were nine research subjects that would be discussed in this study.

RESULTS AND DISCUSSION

Profile of Student Communication Skills

The communication skills of value taking is done by observing for six meetings, from the six meetings the communication value of students is averaged then the value is sorted from the highest to the lowest value. The sorted values were chosen by three research subjects for class VIII B, VIII C, and VIII D which consisted of three students with the upper category namely GDP 25 which was then given the name of

research subject one (SP1), PDC 15 which was subsequently named the research subject two (SP2), PDD 23 which is then given the name of research subject three (SP3). Students with a middle category of GDP 18 are then given the name of the research subject four (SP4), PDC 12 which is then given the name of the research subject five (SP5), PDD 8 which is then given the name of the research subject six (SP6). Students with the lower category are GDP 27 which is then given the name of the research subject seven (SP7), PDC 9 which is then given the name of the research subject eight (SP8), PDD 13 which is subsequently named the research subject nine (SP9).

Indicators used to measure the achievement of collaboration skills of research subjects are 1) Convey ideas; 2) Make notes on observations in learning activities; 3) Prepare reports systematically; 4) Explain the results of experiments, research, or discussions in front of the class; 5) Deliver information in the form of graphics, charts, or tables. The results of the analysis of the communication skills of students who have been obtained are then categorized into very high, high, medium, low and very low. The results of observation of the communication skills of students in science learning are shown in Table 1 and Table 2.

Table 1. Percentage of Student Communication Skills

| No | Category | Value Range | Many Students | Percentage (%) |
|----|-----------|---------------------------|---------------|----------------|
| 1 | Very high | Test score \geq 80 | 5 | 55.56 |
| 2 | High | 60 \geq test score < 80 | 4 | 44.44 |
| 3 | Is being | 40 \geq test score < 60 | - | |
| 4 | Low | 20 \geq test score < 40 | - | |
| 5 | Very Low | < 20 | - | |
| | Total | | 9 | 100 |

Table 2 Results of Observation of Student Communication Skills

| Research Subject | Indicator | | | | | Total Value | Category |
|------------------|-----------|---|---|---|---|-------------|-----------|
| | 1 | 2 | 3 | 4 | 5 | | |
| SP1 | 3 | 3 | 4 | 4 | 4 | 90 | Very High |
| SP2 | 3 | 4 | 4 | 3 | 4 | 90 | Very High |
| SP3 | 2 | 4 | 4 | 4 | 4 | 90 | Very High |
| SP4 | 2 | 3 | 3 | 3 | 4 | 75 | High |
| SP5 | 3 | 2 | 3 | 3 | 3 | 80 | Very High |
| SP6 | 2 | 2 | 4 | 4 | 4 | 80 | Very High |
| SP7 | 2 | 3 | 2 | 4 | 4 | 70 | High |
| SP8 | 2 | 3 | 3 | 3 | 3 | 70 | High |
| SP9 | 2 | 3 | 3 | 3 | 3 | 75 | High |

From the results of data analysis in Table 1 if referring to the completeness criteria achieved by students, which are in the very high category there are five students with a percentage of 55.56% and in the high category there are four students with a percentage of 44.44%. The research results of each indicator on collaboration skills as in Table 2 obtained the highest score of 90 and the lowest score of 70. The following is the description of the subject of the study of communication skills based on indicators of communication skills.

Overall the scores obtained by the research subjects on communication skills are in the category of very high and high balanced. The learning model used during the learning process influences the communication skills of students (Sari et al., 2019). The application of the PBL model certainly influences the process of learning activities, problem-based learning raises many questions arise in each student, thus stimulating students to ask questions or respond by answering questions that exist when learning activities take place. Group discussion activities can facilitate students to interact, express ideas and exchange opinions, so that students' communication skills can improve (Dipalaya et al., 2016). The process of asking, answering, and responding more and making students not shy to express opinions, students can not only apply problem-based learning but also get motivation from the teacher so that self-confidence in students emerges. The communication process is not only verbal but also written, the results of the

discussion to solve the problems noted by the students and together look for conclusions from the learning process that has been done.

The communication skills of students play an important role in science learning because it can change the learning situation in a better direction with the emergence of social interactions between students and students and students with teachers (Wangsa et al., 2017). Science learning so as not to feel boring of course must apply a model, method, and learning media that are packaged in a learning process in the classroom. Implication of the PBL model not only in learning situations but also in LKS and media used by teachers. Showing video-based problems regarding additives and addictive substances can certainly attract the attention of students to be more active in communicating by asking questions, answering questions or responding to a problem. In the context of learning communication skills can be interpreted as skills that must be owned and mastered by a student because these skills aim to explore as much knowledge as possible and to convey information both orally and in writing (Marfuah, 2017)

Profile of Students' Critical Thinking Skills

The critical thinking skills of students are assessed by means of test questions at the last meeting. There are 10 critical thinking questions from the results of the test questions. The value obtained is sorted from the highest value to the

lowest value. The sorted values were chosen by three research subjects for class VIII B, VIII C, and VIII D consisting of three students with the upper category, namely GDP 12, which was then named the research subject one (SP1), PDC 3 which was then given the name of the research subject two (SP2), PDD 10, hereinafter given the name of research subject three (SP3). Students with the middle category are GDP 7 which is then given the name of the research subject four (SP4), PDC 5 which is then given the name of the research subject five (SP5), PDD 4 which is then given the name of the research subject six (SP6). Students with the lower category are GDP 17 which is then given the name of the research subject seven (SP7), PDC 20 which is

subsequently given the name of the research subject eight (SP8), PDD 5 which is subsequently named the research subject nine (SP9).

Indicators used to measure the achievement of collaboration skills of research subjects are 1) Analyzing arguments; 2) Consider the source credibility 3) Determine the results of consideration; 4) Defining a term 5) Determining an action. The results of the analysis of the critical thinking skills of students who have been obtained are then categorized into very high, high, medium, low and very low. The results of observation of students' critical thinking skills in science learning are shown in Table 3 and Table 4.

Table 3 Percentage of Students' Critical Thinking Skills

| No | Category | Value Range | Many Students | Percentage (%) |
|----|-----------|---------------------------|---------------|----------------|
| 1 | Very High | Test score \geq 80 | 1 | 11.11 |
| 2 | High | 60 \geq test score < 80 | 3 | 33.33 |
| 3 | Is Being | 40 \geq test score < 60 | 5 | 55.56 |
| 4 | Low | 20 \geq test score < 40 | - | |
| 5 | Very Low | < 20 | - | |
| | Total | | 9 | 100 |

Table 4 Student Critical Thinking Skills Test Results

| Research Subject | Indicator | | | | | Total Value | Category |
|------------------|-----------|---|---|---|---|-------------|-----------|
| | 1 | 2 | 3 | 4 | 5 | | |
| SP1 | 8 | 6 | 6 | 7 | 5 | 80 | Very High |
| SP2 | 6 | 5 | 7 | 6 | 6 | 75 | High |
| SP3 | 7 | 6 | 5 | 6 | 7 | 77.5 | High |
| SP4 | 7 | 4 | 5 | 4 | 4 | 60 | High |
| SP5 | 5 | 4 | 5 | 4 | 5 | 57.5 | Is Being |
| SP6 | 5 | 4 | 5 | 5 | 4 | 57.5 | Is Being |
| SP7 | 4 | 3 | 4 | 5 | 3 | 47.5 | Is Being |
| SP8 | 4 | 5 | 3 | 2 | 4 | 45 | Is Being |
| SP9 | 3 | 3 | 5 | 4 | 5 | 50 | Is Being |

From the results of data analysis in Table 3 if referring to the completeness criteria achieved by students, which are in the very high category there is one student with a percentage of 11.11%, in the high category there are three students with a percentage of 33.33% and in the category while there are five students with a percentage of 55.56%. The research results of each indicator in critical thinking skills as in Table 4 obtained the highest value of 80 and the lowest value of 47.5.

The following is a description of the research subject's critical thinking skills based on indicators of critical thinking skills.

The results of the test for students' critical thinking questions obtained a high category score of 11.11%, a high category of 33.33%, and a moderate category of 55.56%. Through the PBL model students are trained to develop their skills in solving problems by being faced with several problems related to the material in learning

(Hastuti et al., 2018). The problems given by the teacher stimulate students to be able to think critically, be sensitive to existing problems and find ways to solve them. In this model, students can develop problem solving skills, act as problem solvers and in learning processes are thought, group work, communication, and giving information to each other. PBL models can provide opportunities for students to explore and collect and analyze data to solve problems, so students are able to think critically, analytically, systematically and logically in finding alternative solutions to problems (Susilo et al., 2012). PBL has the advantage of developing students' critical thinking skills and adjusting to new knowledge because it helps transfer their knowledge to understand problems in the real world (Nugraha et al., 2017).

Test questions given to students are problem-based questions, students analyze questions then answer with the results of their own thoughts to foster critical thinking skills. Before working on the problem students must read and understand the problem first. When the process of reading someone will experience a thought process to understand ideas and ideas broadly divergent thinking (Ramadhan et al., 2016). The skills of students to think critically arise when solving questions made based on contextual problems or problems that are very easy to find by students in the surrounding environment. Chiras (2015) in his research stated that individuals who have a high level of critical thinking skills, will be able to formulate problems clearly, collect and assess relevant information, use abstract ideas, have open thoughts, and are able to communicate effectively with other individuals. In this study, there are still many students who get a moderate category score, from the values in the very high and high categories. Many students get the moderate category because of time constraints in research, of course, to change the habits of students who are used to passivity and then more likely to give teachers one-way learning only makes the value obtained by students is not maximal.

Critical thinking skills certainly cannot be applied if they are not routinely trained and continuously. A teacher of course must be able to stimulate students to be critical of the problems

that are around and guide students to be able to solve these problems. If the application of learning models that can stimulate critical thinking skills these students are trained continuously, of course the ability to analyze students will be more developed and more ideas are offered to answer a problem. Students are still accustomed to facing or answering simple questions and the question is certainly not able to measure critical thinking skills. Students must have a high analysis of critical thinking test questions and those skills can increase if they are used to being trained continuously. In essence, changing the habits of learning in students can foster critical thinking skills to be even better.

CONCLUSION

Communication skills of students from the results of conservation for 6 meetings if referring to the completeness criteria achieved by students, which are in the very high category there are five students with a percentage of 55.56% and in the high category there are four students with a percentage of 44.44%. The results of each indicator on communication skills obtained the highest score of 90 and the lowest value of 70.

Students' critical thinking skills from the results of the test questions if they refer to the completeness criteria achieved by students, which are in the very high category there is one student with a percentage of 11.11%, in the high category there are three students with a percentage of 33.33% and in the medium category there were five students with a percentage of 55.56%. The results of each indicator in critical thinking skills obtained the highest value of 80 and the lowest value of 47.5.

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