The Effectiveness of Guided Inquiry Strategy on Students' Collaborative Skill

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Info Article	Abstract

This research aimed to analyze collaborative skill through guided inquiry strategy on cell bioprocess material and analyzerelationships of collaborative skill with student's cognitive result. Student's collaborative skill which assessed were student's participation in experimental activities, students' participation in discussion activities, adaptation in group and flexible work. This research was one shot case study with the pre-experimental design. The subjects of this study were students of class XI MIPA 1, XI MIPA 2 and XI MIPA 3 with a total of 107 students. The collaborative skill of student's assessed using observation, self-assessment and peer assessment. Then the results of the assessment were correlated with student cognitive study results. A total of 91.6% of students have excellent collaborative skills and 8.4% of students have a good category. The correlation test results showed that there is a positive relationship between collaborative skill and student test result. It can be concluded that guided inquiry strategy is effective toward students' collaborative skill and gives the positive relationship between collaborative skill and student's cognitive result

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INTRODUCTION

Science-based learning has been widely developed to improve the knowledge and skill of students by the characteristics of the material and the curriculum. Permendikbud Number 22 of 2013 on the standard of educational process states the learning process of the educational unit is held interactively, inspiring, fun, motivate learners to participate actively, and provide enough space for students to have initiative, creativity, and independence as their talents, interests, physical and psychological development. To achieve the competence of knowledge and skill, it can be implemented through a discovery/inquiry-based learning process and produce project-based work. Learning in the 21st century develops skills including critical thinking, communicative, collaborative, and creative. Report of National Education Association (2010) to prepare students for 21st-century learning, learning is done by giving cases/problems in teamwork. Students have the opportunity to think, share their interests, experiences, and knowledge through learning in small groups.

Collaborative skill is the skill of students to work together in solving problems. Collaborative skill could train students to contribute individually and to practice an attitude of responsibility and respect with the diversity of other group members. Collaborative skill fosters awareness of social interaction in learning as an effort to realize meaningful learning. Collaborative skill requires students to work in teams with different group member characteristics that students need in the world of work and train students to be responsible with the tasks assigned.

Learning of cell bioprocess materials in SMA has not emphasized the inquiry process. Students have not been directed to prove the concept by providing variable manipulation. Learning activities are conducted in groups, but there are group members who are not actively involved in completing the tasks and argued in groups. This causes the group's task is not being completed within the specified period.

Experimental activities conducted in groups will hone students' collaborative skills. Collaborative skills are importantly owned by students to create good interaction between group members. Cen *et al.* (2009) described the diversity of group members' skill to improve group performance and have a good impact with individual assessments. Collaborative skill is important to be taught to students to prepare students for teamwork in the future world. Collaborative skill is observed on students interest when participating in problem solving / group tasks. Students could adapt to a group environment and can work effectively through inquiry-based learning that will impact students' understanding of the studied material.

Inquiry strategy is a biology learning strategy by proving the concept through giving manipulation variable in the experiment. The first-semester biology material on the level observed is the cells and its bioprocess in the cell. Students would perform microscopic observations of cell bioprocesses including transport substances on cell membranes and mitotic processes on the roots of onions in groups. Inquiry learning is guided in groups to train students to work with group members and to understand the bioprocess by experiment.

RESEARCH METHOD

The research here is pre-experimental design with one shot case study. This research was conducted at SMA Negeri 1 Pekalongan located on Jl. R.A KartiniPekalongan, Central Java. The study was conducted in three classes. The samples of the research were determined by random sampling technique, namely class XI MIPA 1, XI MIPA 2 and XI MIPA 3.

The students' collaborative skill was assessed by observation, self-assessment and peer assessment. Observations were made during the lesson. Self-assessment and peer assessment were done at the end of the lesson. The test is done using the right-wrong problem and the description at the end of the lesson. The correlation test was done to find out the relationship between collaborative

skill and students' cognitive result. Before the correlation test, the collaborative skill data and cognitive values of the students were first tested for normality. The normality test showed that the data was not normally distributed, then its correlation were tested by Spearman. Data were analyzed by SPSS 20 with $\alpha = 5\%$. The learning implementation data was observed by the observation sheet during the lesson.

The data we analyzed descriptively. Students' response data were obtained from the questionnaire and analyzed by descriptive percentage. Data on teacher's and students' interviews were analyzed descriptively using teacher and student interview forms. Learning with guided inquiry strategy is effective if 75% of students are in excellent categories of collaborative skills and there is a positive relationship between collaborative skill and the cognitive result of cell bioprocess concepts.

RESULT AND DISCUSSION

The result of the assessment of collaborative skill was obtained through the calculation of the value of observation, self-value and peer-assessment. The observation has the quality of two, whereas the self and peer assessment, each has the quality of 1. The result of the collaborative skill of the students is presented in Table 1.

Table 1 Results of Student Collaborative Skill with Guided Inquiry Strategy

No.	Aspects	Observation Assessment	%	Self Assessment	%	Peer Assessment	%	Average (%)
1.	Active in doing experiment	2444	81.6	1032	87.7	1039	87.0	84.5
2.	Active in group discussion	1004	78.2	185	86.4	175	81.8	81.1
3.	Adaptation	394	92.1	93	86.9	101	94.4	91.4
4.	Work flexibly	402	93.9	101	94.4	102	95.5	94.4

The collaborative skill analysis showed that students had completed four criteria of collaborative skill, i.e., students participating actively in experiments, participating in discussions, adapting in groups, and working flexibly. According to the average of the students' collaborative skill scores (Table 1), active participation in the discussion earned the lowest criteria. It was due to the lack of student participation in the class discussion.

Analysis of the observation, self-assessment and peer assessment indicates the active skill criterion categorize the discussion in the lowest result. Students conducted discussions include class discussions and group discussions. Each discussion activity looks like student activities that could assess collaborative skill. Discussion activities were divided into aspects of a group presentation, group decision making, and inter-group communication.

Classroom discussion activities include class presentations. Classroom presentations appear to have students busy preparing for group presentations, thus paying less attention to the group who was making the presentation. Effective discussion activity in the event of mutual interaction between the presentation group and the audiences. Students are less focused on listening to other groups who make presentations so that students are less able to respond. Teacher assistance to students during the discussion required for teaching and learning activities can run effectively and can understand students on the material. The need for mentoring while learning activities in line with social constructivism theory. The theory of social constructivism (Vygotsky, 1978) stated that students who work with colleagues and the expert accompaniment are deemed to have a deeper understanding.

Based on Lai's research (2011) collaborative skill could be seen from the activities of the discussion, the students' activities while participating by actively providing explanations and provide information indicating the high level of students' collaborative skill. Student collaboration activities could be visible when students respond to questions. According to observations, students had not participated actively in providing queries and responding to questions. It was due to the lack of students' attention to listen to the group presenter and lack of understanding of the students with the material submitted by other groups.

Discussion activities train students to communicate about group experimental results. According to Brook *et al*. (2009), collaborative activities improve students' productivity by increasing the skill to communicate with group members. In the communication aspect among friends, student grades are higher compared to make group decision aspects and group presentations. Classroom and group discussion activities provide students with opportunities to improve students' skill to communicate, share experiences, and abilities. Classroom and group discussion activities provide students with opportunities to improve students' skill to communicate, share experiences, and abilities.

The criteria for actively participating in the experiment are highly visible in the preparation activities, during and after the experiment. The tools used in the experiment were prepared by group members. In the experimental activities, the students jointly completed the experimental activities. The same activity was seen when the students' experiments finished cleaning the practical table and the laboratory room together. Undertaken trial activities to train students to be responsible with the tasks of group members. The division of group tasks has gone well. It is proven by the completion of group tasks on time.

Adaptation criteria with group members showed good results based on an assessment of students' collaborative abilities. Student activities on guided inquiry teach students to work with all group members. Students do not distinguish between group members and do not seem to dominate one of the group members. The results of interviews with students showed work in groups in a learning process to make students more able to recognize the character of working with other friends. Students could better understand their personalities in group work activities. It is in line with Galileo Educational Network (2008) that through collaboration students perceive differences as forces that enable students to exchange information freely and understand the character of each group member to improve group outcomes.

The criteria for flexible work in the group are shown by the students on the experimental activities performed. Based on collaborative skill assessment criteria, flexible work criteria get high grades. Students work together on experiments. Students help each other in completing the assigned task and follow the progress of group work from beginning to end. These activities can show students able to contribute to group work and work with other student members.

Table 2 Percentage of Student Collaborative Skill

No	Collaborative Criteria	Number of students	Percentage (%)
1.	Very Good	98	91,6%
2.	Good	9	8,4%
3.	Less Good	-	-
4.	Bad	-	-
Number of		107	100%

Based on Table 2 the value of collaborative skill of students has completed the research indicator. Collaborative activities are beneficial for students in knowing each other among friends and is very suitable to be done in schools that have students with different backgrounds. It is in line with Tielman *et al*. (2012) that with small group learning, it train students work with friends with different backgrounds.

Good group collaboration activities are shown by the interaction between group members when the activities are in the laboratory or the classroom. Students can exchange information through small groups. Through small group collaboration activities, students learn to think critically to complete assigned tasks in groups. It is in line with Styron (2014) that through small groups, it makes students can work together, train students' responsibilities, and help students to think critically solve problems.

The guided inquiry strategy that has been done can train students to conduct an experiment. Students plan, conduct, analyze, submit, and evaluate experimental activities jointly. This activity can also help students more understand with the material because of learning with the object directly. This is in line with the statement of Sutman *et al*. (2008) that through inquiry activities students gain experience, discussion skills related to daily life implications, the investigation process, and concluding investigation results. Such activities can be used by students to build their knowledge of the concepts.

Good response from students on guided inquiry learning and collaborative skill because students are invited to be able to do different learning from learning that students often do. Learning done by presenting the object directly makes students interested in learning and understand the material. Collaborative abilities are trained through guided inquiry strategy to help students socialize with friends in meaningful learning. Students actively participate in experiments, discussions, adapt and work to enhance the skill to work together and create positive interdependence among friends. Safufia *et al*. (2016) through a strategy of promoting savings while not only building their knowledge, students can interact with other students through groups. Students are motivated to provide ideas and help them to gain meaningful learning.

Table 3 Recapitulation of Students' Cognitive Test

Criteria	XI MIPA 1	XI MIPA 2	XI MIPA 3
The highest grade	86	89	91
The lowest grade	66	57	55
Grade average	78	76	78
Passed Students	28	30	28
Failed Students	7	6	8
Clasical Completeness in each class (%)	80	83,3	77,8
Clasical Completeness of all (%)	80,4		

The results of the cellular bioprocess cognitive tests in table 3 show that 81% of students passed the test. It indicates that most students did the test well. Part of the test questions related to the results of cell bioprocess experiments conducted so that students can answer the test questions. The students' collaborative grades and students' cognitive value, it obtained not normally distributed data, it is caused by randomly data collection and not tested the homogeneity of the sample. The correlation test between the collaborative skill of the students and the cognitive outcomes of students is 0.367 indicates a positive but low relation.

The low correlation values can be influenced by several aspects such as differences in attitudes, students' views, work experience, language skills and student self-confidence. This factor can cause differences in students' understanding of the given task. Leeder & Shah (2016) stated that the attitudes and experiences of working in groups lead to differences in students' capture on the given project. The students' experience for inquiry activities is still small, so it takes a long time to understand the concept of matter. Also, the collaborative skill of the students is only assessed from three meetings; it is less able to describe the collaborative skill of students. Skill should repeatedly be trained so that students are more accustomed to collaborating with friends.

Based on the observation of the implementation of guided inquiry learning strategy conducted by two observers showed that the steps of overall inquiry strategy had been done well.

Steps by the lesson plan that has been prepared. The teacher executes a complete step of guided inquiry strategy. Based on the observation, the teacher has implemented all the syntax, but it is still not perfect, there is still a step component of guided inquiry strategy that missed. Teachers are ready to carry out activities with guided inquiry strategies, but in practice, there are some obstacles. Obstacles include lack of evaluation of group development at the end of the meeting so that students are less able to reflect on the activities that have been done.

The guided inquiry strategy that has been done can train students to experiment. Students plan, conduct, analyze, submit, and evaluate experimental activities jointly. This activity can also help students more understand with the material because of learning with the object directly. This is in line with the statement of Sutman *et al*. (2008) that through inquiry activities students gain experience, discussion skills related to daily life implications, the investigation process, and concluding investigation results. Such activities could shape students' knowledge.

Good response from students on guided inquiry learning and collaborative skill is due to students are invited to be able to do different learning from the learning that students often do. Learning done by presenting the object directly makes students interested in learning and understand the material. Collaborative abilities are trained through guided inquiry strategy to help students socialize with friends in meaningful learning. Students actively participate in experiments, discussions, adapt and work to improve the skill to work together and create a positive dependence among friends. The classroom method and situation in the classroom also affects the students so that the learning can run well. It affects the students' emotions to follow the lesson. It is in line with the opinion of Arfani & Alimah (2015) that the method used by teachers when biology learning contributes to students' emotions when the atmosphere is conducive and supported by good learning hence create a stable emotional condition of students which is essential in biology learning process to achieve learning achievement.

Student involvement in social interaction allows students to shape knowledge, skills, and attitudes. Bandura's basic assumption in social learning theory suggests that behavior and the environment can both be altered and none of these are the determinants of the major changes in one's behavior (Alimah & Hadiyati, 2017). Collaborative skill as a change in student behavior is influenced by student learning environments and student behavior during the learning process. The learning environment in student discussion activities and student behavior while attending these activities affect the skill of students to collaborate. Although both can affect none of the main determinants of the change in the skill of collaborative students.

This study still has shortcomings, lack of evaluation of group development at each end of the meeting to be able to find out how far is responsible for group work. To better know the relationship between collaborative skill with students' cognitive learning outcomes on the material need to be validated the problem empirically. The questions should be considered to more precisely describe the collaborative skill with student cognitive results.

CONCLUSSION

According to finding and discussion, it can be concluded that guided inquiry-based learning strategy is effective for students' collaborative skill. There are 91,6% students have the excellent collaborative skill and 8,4% of students have good criteria. There is a low correlation between collaborative skill and students' cognitive result on cell bioprocess material with low interpretation.

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