

Piil Pesenggiri Team Work Learning Model for Collaborative Problem-Solving Skills of Junior High School Students

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Abstract: Collaborative problem-solving is one of the essential concerns in the learning process to prepare human resources who ready to compete in the future. This study is aimed to inspect the impact of the Piil Pesenggiri Team Work Learning (PPTWL) model implementation in Science classes of Junior High schools. This study was a pre-experimental research conducted without involving the control class, namely one-group pretest posttest design. Collaborative problem solving skills are students' abilities to engage in cognitive and social processes effectively, attempting to solve encountered problems, in groups. Collaborative problem solving observation sheet was the instrument used for the study. Study results indicate that PPTWL model is effective to be used in improving collaborative problem-solving skills of students in science-related materials. In-depth studies on learning cultures and materials and repetitive model application are required to obtain more accurate outcomes in future studies.

Keywords: Collaborative; CPS; Model; PPTWL.

Introduction

The creativity of an educator in doing a learning is demanded to be able of achieving learning purposes. Educators are not only obligated to run their duty of delivering knowledge to students, they also contribute as the creator in how the learning process in class can provide direct meanings to students besides the transfer of knowledge. The development of learning models in the classroom is a form of innovation for a teacher. The sequence that is passed from the aspect of preparation before learning, implementation of learning and the evaluation process after learning, so that the teacher directly or indirectly will be involved in preparing the facilities used.

The Piil Pesenggiri Team Work Learning (PPTWL) model is the innovation result of the development of problem-solving learning model and "Piil Pesenggiri" local wisdom (Bakhtiar, 2016; Meliono, 2011; Pormpimon, et.al., 2014; Rosa, et al., 2020). Piil

Pesenggiri itself is a local culture of Lampung natives that regulates their community behaviors (Amaliah, Sariyatun & Musaddad, 2018; Irianto & Margaretha, 2013; Muzakki, 2018). The integration of local wisdom in the way of learning is expected to have a positive effect on students' ability to accept subject matter, because they feel closer to the environment and the habits that exist in their environment.

Facing the rapid progress of era, students are demanded to be prepared with not only the readiness in the field of knowledge, but also the readiness to be present in a team as the form of collaboration (Rosa, et al., 2020; Rosa, et al, 2019 Yanti, et al., 2019) for a pre-determined purpose. In preparing the human resources who can compete in the era of industry 4.0, students have to be prepared with various skills, including scientific creativity, collaboration, innovation, collaborative problem solving, scientific literacy, critical thinking skills, and scientific communication (Astutik & Prahani, 2018; Jatmiko et al., 2016; Jatmiko et al., 2018;

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Griffin & Care, 2015; Pandiangan et al., 2017; Suryanti et al., 2020; Sunarti et al., 2018; Suyidno et al., 2018;).

The effort that can be done in preparing such matters is by accustoming and developing since students are in the school environment. A study entitled advancing the science of CPS by Graesser et.al (2018) illustrates that the learnings with CPS have become the highlight as the step to meet the needs in the modern era, which indicated by numerous complex jobs conducted in teams. It is deemed necessary to further identify and prepare all aspects to improve the attention towards CPS. Students are exercised in a condition or system in groups to seek and establish knowledge while teachers contribute as the facilitator. The PPTWL mode is design for such a purpose, namely building problem-solving skills in a collaborative way by not abandoning elements of the local culture exists within the community. Local wisdom is a special characteristic of a nation that must be preserved and maintained by the nation's young generation itself.

The result of studies regarding student competencies on problem-solving skills still face many difficulties, from the interpretation of questions to giving conclusions (Ardiyanti, Bharata & Yunarti, 2014; Farida, 2015). Some studies indicated that problem-solving and reasoning abilities of students are still in the low category, some in the stage of implementing plan and evaluation (Astuti, et al., 2020; Rosa, et al., 2020; Zakiyah, et al., 2018). These studies suggested teachers to train problem-solving skills of students by giving exercises regarding reasoning and thinking. CPS skills are the ability of students to be able to interact well with other students, teachers, or the people around them, so in social and cognitive processes, a problem can be solved together effectively (Care & Griffin, 2014; Hesse et al., 2015; Harding & Griffin, 2016; OECD, 2015).

Method

This study was conducted towards Junior High School students in VIII classes in East Lampung Regency. Students were observed and guided by the teacher during the learning. The research design used without using a control class in it, namely using a one-group pretest posttest design (Kirk, 2013). Problem-solving skills are one’s capability or capacity to engage effectively in social and cognitive processes conducted in groups (two or more students) as an attempt to solve the encountered problem (Care & Griffin, 2014; Hesse, et al., 2015; OECD, 2015). The instrument for collaborative problem-solving skills was adopted from the instrument of Hesse et al. (2015). The instrument was started by formulating the blueprint, creating question items, validating to experts and practitioners, empirical testing,

analyzing the trial result, and obtaining the final result of a valid and reliable instrument. The detail blueprint of CPS skills is presented in Table 1.

Table 1. Indicators of CPS Skill

Indicator	Type of question
Participation	Problem identification
Perspective Taking	Creating conceptual ideas
Social regulation	Self-evaluation
Learning and Knowledge Building	Confirmation Strategy formulation
Task regulation	Strategy implementation

Result and Discussion

Results of the conducted initial observation and analysis indicated that in Junior High School, the ability of students in collaborative problem-solving showed less optimal results due to the lack of intensity of learnings that use group-based learning and problem-solving models. There are many factors affecting this condition, one of which is the absence of proper task distribution and comprehension of the learning process itself during the group learning. Science learning is closely related to the environment and daily life, however, there are many students who find difficulties in following the science subjects. The result of National Exam in the 2018/2019 school year on science subjects in Junior High Schools and Islamic Junior High Schools showed an average score of 46.7, which is categorized as poor. This is the average score of the national achievement of students at Junior High Schools and Islamic Junior High Schools throughout Indonesia, through (Pencil and Paper-Based National Exam) and UNBK (Computer-Based National Exam). The science average was ranked 3rd of the four subjects that were tested.

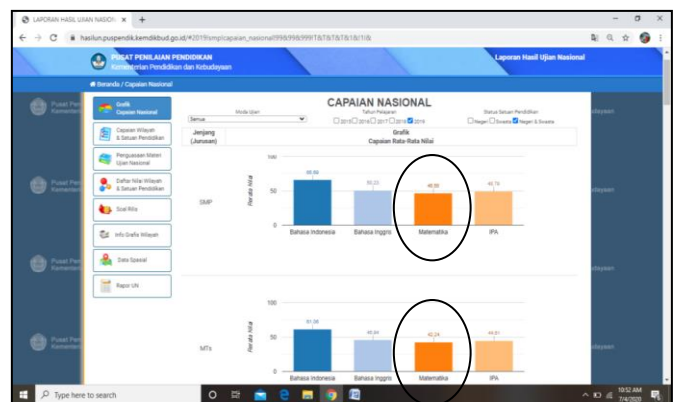


Figure 1. The average score of Science National Exam in the 2018/2019 school year

The results in Figure 1 show the necessity of re-evaluating the science learning. Factors that can improve the exam result. There are lots of research results which showed that the development of learning materials by referring to local wisdom provides a quite effective impact on the student's output in the learning process. This condition indicates positive impacts generated in the learning process integrated with culture. Learning materials felt real and closer to students, therefore, they provide the easiness and direct meanings to students.

The underlying theories in the development of Piil Pesenggiri Team Work (PPTWL) model encompassed the constructivism theory that emphasizes on the construction of knowledge through student experience; Vygotsky's theory which views that human development is inseparable from social and cultural activities. Besides constructivism and Vygotsky theories, the development of PPTWL model was also supported by other learning theories, including positive-social dependency theory, cognitive theory, behavioral learning theory, and motivation theory. The PPTWL model has five phases, namely orientation, relating, exploration, transferring, and evaluation.

Table 2. The Syntax of PPTWL Model

Phase	Activity
Orientation	Motivation, the delivery of learning purposes, group distribution, delivering the information regarding activities to do
Relating	Integrating local wisdom with learning materials
Exploration	Identifying problems, planning and implementing problem-solving strategies, analyzing and arranging solutions
Transferring	A discussion about presenting problem-solving measures in each group and among groups
Evaluation	Evaluating the process and outcome in the learning, giving rewards to students

The supporting instruments of the learning with this PPTWL model consist of RPP (lesson plan), LKS (student worksheets), Teaching Materials, and the observation sheet of collaborative problem-solving skills. RPP is the signs that become the guideline for teachers in implementing the learning process in class. RPP is the activity plan prepared by teachers to manage learnings in accordance with the goal to be achieved. RPP (lesson plan) itself consists of components: the identity of RPP; core competencies and basic competencies; indicators and purposes of learning; materials; learning methods and approaches; learning instrument, media, and source; learning activity and assessment.

Student worksheets (LKS) was designed to guide students in doing discussions to solve the given

problems in groups. The developed LKS also referred to the PPTWL model, in which the stages are expected to establish collaborative problem-solving skills in facing an issue. Student worksheets consist of some parts, namely articles or reading materials, problem identification, creating conceptual ideas, strategy formulation, strategy implementation, confirmation, and self-evaluation.



Figure 2. Discussion process of students in small groups

Articles or reading materials are one of the relating measures in the learning process, in which students are given with a knowledge regarding local wisdom as the context to understand science materials. Problem identification is the stage where students analyze the problem based on the presented article. Creating conceptual ideas is the stage where students analyze theories that substantiate the result of problem identification they found from articles. Strategy formulation is conducted as the measure that will be done to be able of solving the given problem. Strategy implementation is the implementation of formulated measures in the previous stages. Confirmation is the outcome acquired after discussing with friends within the group. Self-evaluation is the reflection process of each student in the learning process. The problem-solving assessment is conducted during the learning process by using the observation sheet.

This study was conducted towards 30 students in the VIII class in one of the Junior High Schools in East Lampung. The data obtained in this study were collaborative problem-solving skills of students to inspect the effectiveness of the PPTWL model that was applied. The conducted analysis in this study was aimed to describe the mean value (M), standard deviation, and the similarity of mean scores regarding collaborative problem-solving skills in before and after the implementation of PPTWL model.

Collaborative problem-solving skills of students were acquired based on the observation results. The initial CPS skills of students were obtained based on the

observation during the previous learning, and the final CPS skills were acquired during the learning that applied the PPTWL model. Table 3 explains that the mean value of students' CPS before using the learning with PPTWL model is categorized as fair, while after the implementation, the mean value of students' CPS improves to a good category.

Table 3. The Mean values (M) and Standard Deviation (SD) of Students' CPS

		Before		After	
M	SD	Criteria	M	SD	Criteria
64.06	11.73	Fair	74.53	10.34	Good

The t-test was conducted next to examine the significance of the improvement of students' CPS skills before and after the implementation of the PPTWL model with a significance level of 5%. However,

Table 5. Results of the T-Test on Students' CPS Skills

Pair Mean	Paired Differences			Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	
Final CPS - initial CPS	10.46	12.33	2.181	0.000

The output of the t-test in Table 5 shows a significance value that is less than 0.05, which means that it can be concluded the disparity of CPS's final and initial values occurs. This result shows that the implementation of the PPTWL model can improve the collaborative problem-solving skills of students. This study also observed the implementation of the PPTWL model in the learning process, in which the observation results indicate that all activities or measures of PPTWL model were implemented properly. Students were also given with the response questionnaire regarding the learning with the PPTWL model in which the result showed an average score of 3.67 or was categorized as very good. The result of this study showed that the PPTWL model is feasible and can be used in a broader learning.

Conclusion

The PPTWL learning model is effective to improve collaborative problem-solving skills simultaneously. More in-depth studies can be done regarding theories underlying the development of this PPTWL model, thus, a new and better learning model can be produced. In addition, this study can be developed more broadly and in-depth through the implementation in other regions by using variables undiscovered in the study but relevant with the developed PPTWL model.

assumption tests were conducted in prior. The normality test was performed by using the Kolmogorov-Smirnov statistics (Table 4). The data of students' CPS skills were distributed normally if the acquired significance value is greater than 0.05.

Table 4. Results of the Normality Test on CPS by Using the Kolmogorov-Smirnov Statistics

Data	Kolmogorov-Smirnov			
	Statistic	N	Sig.	
CPS	Initial	0.887	30	0.411
	Final	0.786	30	0.567

The variable significance variable shows a value greater than 0.05. This result explains that the data of students' CPS were distributed normally. Then, continued with the t-test, conducted to inspect the disparity of CPS's initial and final values (Table 5).

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