Models With LKS Jurisprudential Inquiry-Based Multi representasion

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ABSTRACT

This study describes the learning by using the model with LKS jurisprudential inquiry-beside multi-representation. This study aims to determine the Jurisprudential inquiry learning model with LKS multi-representation the kinematics of rectilinear motion of matter in the high school. This research uses a descriptive method of qualitative research. The from data describing critical reviews written by experts from a documentation, interviews, proceedings or reference book and then the data is analysed as a clarification process and data grouping. The results showed that the jurisprudential inquiry learning model with LKS Multipresentasi on the material kinematics of rectilinear motion in high school can make learning more effective because students gain experience learned directly so that students understand the concept easily, it can improve learning outcomes and skills the ability of scientific process skill of the students.

Key Words:
Jurisprudential Inquiry, LKS, Multipresentasi, Physics.

INTRODUCTION

Physics is the study of nature and its symptoms consisting of processes and products. The purpose of physics learning is that students master the various concepts and principles of physics to develop knowledge, skills, and attitudes so that it can be applied in everyday life. Based on limited interviews with physics teachers of class X in some senior high schools in Jember district, in general physics learning is carried out using cooperative learning model which is more emphasized in cooperation with group and tasks. The problem of students is still not maximally included in the learning process and students are still not emphasized to find and build their own knowledge through experiment. Therefore, it is necessary to apply a learning model that generate
direct involvement of students actively to observe and prove a concept of physics through experiment, thereby increasing the curiosity of students in solving a physical problem in everyday life. One of the learning model is inquiry model with multi-representation LKS. The objectives of this research are: (1) to describe the students’ science process skills during the learning process using Jurisprudential Learning Inquiry model with multi-representation LKS, (2) to examine the significant differences in student learning outcomes using Jurisprudential learning model Inquiry with multi-representation LKS By using conventional learning in physics learning in high school.

METHODS
The type of research is experiment, where the research is determined by way of purposive sampling area. The research was conducted in SMA Negeri 4 Jember. Research respondents were determined upon homogeneity test is conducted. Determination of research sample with cluster random sampling technique. The study design used posttest-only control design. Techniques of collecting research data are observation, portfolio, documentation, test, and interview. Data analysis techniques is needed to answer the first problem by presenting the results of LKS assessment based on mutirepresentasi and observation results then determine criteria. Data analysis technique used for student learning result is independent sample t-test. (Arikunto, 2013: 345).

RESULTS AND DISCUSSION
a. Result
The result of science process skill analysis shows that the percentage of average value of process skills of all aspects is 87.28%. The result of physics study result using independent sample t-test obtained test value of 5.33, this result is bigger when compared with table value of 1.66. Based on the guidance of the testing criteria, the null hypothesis (H0) is rejected and the alternative hypothesis (Ha) is accepted, so it can be concluded that there is a significant difference in student learning outcomes using inquiry model and multi-representation LKS using conventional learning in physics learning in SMA.

| No | Aspects of Science Process Skills | Value of Science Process Skills at Each Meeting(%) | Average |
|----|----------------------------------|-----------------------------------------------|---------|
|    |                                  | 1                | 2                | 3                |         |
| 1. | Prepare the hypothesis           | 88.59            | 85.96            | 88.59            | 87.71   |
| 2. | Experiment                       | 95.61            | 97.37            | 86.84            | 93.27   |
| 3. | Make observations                | 92.11            | 89.47            | 87.72            | 89.77   |
| 4. | Record the observations          | 92.11            | 88.59            | 96.49            | 92.39   |
| 5. | Graphics                         | 80.7             | 78.95            | 82.46            | 80.7    |
| 6. | Analyze data                     | 89.47            | 92.98            | 92.98            | 91.81   |
| 7. | Conclude                         | 83.33            | 78.07            | 82.46            | 81.29   |
| 8. | Communicate                      | 78.95            | 80.7             | 84.21            | 81.29   |
|    | Average                          | **87.61**        | **86.51**        | **87.72**        | **87.28** |

Table 1. Data Value of Each Aspect of Student Science Process Skills
Table 2. Data of the students’ learning outcome (score)

| Num. | Students’ Learning Outcome | Num. | Students’ Learning Outcome |
|------|---------------------------|------|---------------------------|
|      | Experimental Class        |      | Control Class             |
|      |                           |      |                           |
| 1.   | 96                        | 20.  | 67                        |
| 2.   | 65                        | 21.  | 82                        |
| 3.   | 80                        | 22.  | 96                        |
| 4.   | 85                        | 23.  | 85                        |
| 5.   | 85                        | 24.  | 96                        |
| 6.   | 79                        | 25.  | 70                        |
| 7.   | 93                        | 26.  | 92                        |
| 8.   | 85                        | 27.  | 85                        |
| 9.   | 88                        | 28.  | 94                        |
| 10.  | 81                        | 29.  | 81                        |
| 11.  | 75                        | 30.  | 94                        |
| 12.  | 87                        | 31.  | 85                        |
| 13.  | 86                        | 32.  | 95                        |
| 14.  | 74                        | 33.  | 85                        |
| 15.  | 78                        | 34.  | 83                        |
| 16.  | 84                        | 35.  | 97                        |
| 17.  | 91                        | 36.  | 89                        |
| 18.  | 94                        | 37.  | 93                        |
| 19.  | 77                        | 38.  | 66                        |

Table 3. Summary of the percentage of each aspect of scientific process skill

| Num. | Scientific process skill aspect   | Percentage of scientific process skill (%) | Criteria   |
|------|----------------------------------|-------------------------------------------|------------|
| 1.   | Formulating hypothesis           | 87.71                                     | Good       |
| 2.   | Conducting experiment            | 93.27                                     | Good       |
| 3.   | Conducting observation           | 89.77                                     | Good       |
| 4.   | Writing the result of observation| 92.39                                     | Good       |
| 5.   | Drawing Graphic                  | 80.7                                      | Good       |
| 6.   | Analyzing Data                   | 91.81                                     | Good       |
| 7.   | Concluding                       | 81.29                                     | Good       |
| 8.   | Communicating                    | 81.29                                     | Good       |
|      | **Average**                     | **87.28**                                 | **Good**   |

Based on table 4.4 we can see that the percentage of the average score of scientific process skill on meeting 1, 2, 3 are unequal by using the uniform criteria of each meeting, that is ‘good’. The sequence of the percentage of the average score of scientific process skill when ranked from the highest to the lowest is: third meeting resulting in 87.72%; first meeting resulting in 87.61%; and second meeting resulting in 86.51%. Overall, the final percentage of average score of scientific process skill generates 87.28% and classified as good.

Based on table 4.2, it is found out that the average post-test score of the experimental class is 84.68 compared to the similar score of the control class which is found at 71.29. This data shows that the average post-test score of the experimental class is higher than the similar score generated by the control class. In analyzing the significance of the difference of the students’ learning outcome of physics lesson, calculation using independent sample t-test is performed as seen on appendix P. The summary is seen on table 4.5 below.
Table 4. Summary of calculation using T-Testing

|                | Experimental Class | Control Class |
|----------------|-------------------|---------------|
| $\Sigma X$     | 3218              | 2709          |
| $\Sigma Y$     | 2709              |               |
| $\Sigma X^2$   | 2840,21           | 6469,82       |
| $\Sigma Y^2$   |                   |               |
| $M_X$          | 84,68             | 71,29         |
| $M_Y$          |                   |               |

Based on the result of the analysis using independent sample t-test, it is found out that the value of $t_{test}$ is at 5.33. The value of $t_{table}$ resulted from $db$ 74 at the significance rate of 5% is 1.66. Because the value of $t_{test}>t_{table}$ (5.33 > 1.33), the null hypothesis ($H_0$) is rejected, while the alternate hypothesis ($H_a$) is accepted. Thus, it can be conclude that there is a significant difference on students’ learning outcome when the inquiry learning model accompanied by the use of multirepresentasi based worksheet is implemented compared to the conventional model of learning process used in physics learning process in Senior High School level.

b. Discussion

1. Scientific Process skills

   Based on the initial problem formulation and the analysis of the students’ scientific process skill when using the inquiry learning model, aided by multirepresentasi –based worksheet, it is found that students’ scientific process skill is classified as good. Of eight aspects to observe, the highest value of the students’ scientific process skill is found at 93.27% on the aspect of performing experiment. This is in line with the goal of inquiry learning model as stated by Dimyati and Mujiono (2002: 173), saying that students are required to play active role in performing experiment in order to discover new physics concept based on the experiment that he conducted. Meanwhile, the lowest value of the students’ scientific process skill is found at 80.7% on the aspect of drawing graphic. This is due to the fact that students are not sufficiently taught to draw graphic by using the data of the experiment. They only manage to read the data and find out the general description of physical graphics. Another factor that account for their inability is the fact that physics learning in the class merely focuses on verbal and mathematic representation that causes certain difficulty for students to draw graphics.

   The results of the analysis on the score of the entire scientific process skill on meeting 1, 2, 3 generate different outcome. On the first meeting, the average score of scientific process skill is gained at 87,61% and classified as good. This figure diminishes on the second meeting to 86,51% and still classified as good. Meanwhile, on the third meeting there is a raise to 87,72% and classified as good. The decrease recorded on second meeting is due to the fact that the material used on the second meeting is more difficult than the one used on the first meeting. The material used on the second meeting involves more mathematical aspect, particularly recording the observation result when compared to the materials on meeting 1 about Uniform Rectilinear Motion. Students’ inaccuracy and poor knowledge of mathematical calculation also cause the score to diminish.

   The overall score of the students’ scientific process skill is classified as good since
the implementation of inquiry learning model, aided by multirepresentasi-based worksheet may help the learning process into a more effective way. On each stage of the learning process, there is a chance to train students’ scientific process skill, including the stage of raising questions or problems when students are presented with problems as seen on the pictures in the worksheet that attracts students to prove the predictions of each picture at the stage of formulating the hypothesis. Thus, students are trained at the aspect of formulating the hypothesis. Regarding the designing and conducting research, students are required to cooperate with their groups. This helps them develop the skill of performing experiment and observation, as well as recording the result of the observation and drawing graphic. At the stage of analyzing the data and concluding the result of the experiment, students also develop their skill in analyzing the data, as well as concluding the result and communicating it. The result of the analysis of the scientific process skill of the students in this research is in line with the similar finding suggested by Ambarsari (2013) in the previous research which says that the skill of students’ scientific process by using inquiry model is classified as good.

The result of the answers found in the multirepresentasi-based worksheet which lead to 4 abilities of students’ representation like verbal, mathematical, drawing, and graphical aspects also help students develop their scientific process skill in the learning process, thus their scientific process skill is classified as good. This agrees to Piaget’s constructivism theory as stated by Dahar (2011:152), suggesting that learning is a reconstruction of knowledge. Therefore, student worksheet is presented to help ease the students in building new knowledge according to their creative ideas. This is in line with Widodo (2013) who suggested that the use of student laboratory-work-based worksheet helps majority of the students develop their skill of scientific process better.

2. **Students’ Learning Outcome**

Based on the second problem formulation and the analysis of the students’ learning outcome, it is found that the average score of physics learning outcome of the experimental class is 84.68 as opposed to the score generated by the control class at 71.29. This finding suggests that the inquiry learning model, aided by student multirepresentasi-based worksheet shows better result than the learning model implemented at SMAN 4 Jember. To examine the significance gap of the data regarding students’ physics learning, analysis is conducted using *independent sample t-test* that results in the $t_{\text{test}}$ at 5.33. This value is higher than the value of $t_{\text{table}}$ of 1.66. Based on the testing guideline criteria, the null hypothesis (H$_0$) is rejected while alternate hypothesis (H$_a$) is accepted. Thus, it can be concluded that there is a significant gap/difference on the students’ learning outcome by using inquiry learning model, aided by multirepresentasi-based student worksheet compared to the conventional learning model that is implemented at Senior High School. The result of the analysis on students’ physics learning outcome in this research is in line with the similar result suggested by Purwanto (2013) who suggests that physics learning outcome of the students by using inquiry learning model is better than the outcome of the conventional learning model.

The gap of physics learning outcome of experimental and control class is affected by several factors, one of which is the learning model used. This is also suggested by Slameto (1995:64) saying that school affects students’ learning outcome through the learning model used. The inquiry learning model, aided by multirepresentasi-based
student worksheet offers the opportunity to the students in playing active role in generating concepts. In each stage, this learning model also displays parts of the sequential process that help students learn from their own experiments. This may help students to get more interested because learning process is more connected to the natural phenomenon in day-to-day life. This, in turn, generates longer term of memory regarding students’ knowledge. In the conventional learning, students are only given tasks in groups. This may guide them in a way less helpful than expected regarding how to discover a concept of the experiment. The gap on students’ learning outcome between experimental and control class is not entirely affected by the different learning model used. Another factor that may contribute is an internal factor, one of which is the psychological factor. This is in line with Slameto (1995:55) who suggests that there is a psychological factor that affects students’ learning outcome, for example intelligence, interest, talent, and readiness.

Physics learning through the use of inquiry learning model, aided by multirepresentasi-based worksheet is classified as moderately successful, although there are several problems to address. One of the problems to address is the lengthy time need to conduct the stages at optimum state. This causes not all of the stages are conducted optimally. However, if all factors listed in the inquiry learning are well-managed, there is a big possibility that the learning outcomes are achieved optimally. The above discussion demonstrates that physics learning by using inquiry model, aided by multirepresentasi-based student worksheet may be used as information and an alternative choice for physics teaching intended for improving the students’ learning outcome as well as their scientific process skill, respectively.

CONCLUSION

Based on data analysis, the conclusion of this research are: (1) high school students' science skill during learning by using Jurisprudential Learning Inquiry model with multi-presentation LKS for percentage of average of 87.28% overall aspect so that it can be classified in criteria Good, (2) there is a significant difference in student learning outcomes using inquiry model and multi-representation LKS using conventional learning in physics learning in SMA.

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