PROCEEDING
International Seminar on Science Education

Harmonization of Science, Technology, and Society (STS) in Science Learning to Prepare 21st Century Generation

Graduate School
Yogyakarta State University

October 31st, 2015
PREFACE

Praise be to Allah SWT for all the blessings and guidance given to us all, so that the program book of the International Seminar on Science Education (ISSE) 2015 bringing about Harmonization of Science, Technology, and Society (STS) in Science Learning in the 21st Century held on 31 October 2015 in the Rectorate Hall, Yogyakarta State University can be completed. This book comprises a number of abstracts presented in the seminar, written by lecturers and students from Yogyakarta State University and other universities.

We owe many parties for the success of the seminar. Therefore, we would like to sincerely extend our gratitude to:

1. Rector of Yogyakarta State University, Prof. Dr. Rochmat Wahab, M.Pd., M.A. for facilitating all the activities of the International Seminar on Science Education (ISSE) 2015;

2. Director of Graduate School of Yogyakarta State University, Prof. Dr. Zuhdan Kun Prasetyo, M.Ed. for providing all the facilities of the International Seminar on Science Education (ISSE) 2015;

3. the invited speakers for their willingness to share thoughts and insights on science teaching and learning in the seminar;

4. all committee members for the time, effort, and thoughts for the success of this activity; and

5. all presenters and participants who have come a long way to contribute to the success of the seminar.

However, we realize that there are some imperfections in this book and in the seminar. Thus, suggestions and constructive criticism are very much welcome. Finally, we do hope that this book can bring some contributions to learning of science in the 21st century.

Yogyakarta, 31 October 2015
Chairperson

Dr.rer.nat. Senam
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THE EFFECT OF USING POCKET BOOK INSTRUCTIONAL MEDIA TOWARD THE PROBLEM SOLVING SKILL OF X STUDENTS IN SMA NEGERI 2 BANJARMASIN

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Lambung Mangkurat University Banjarmasin

Abstract

The students of class X in SMA Negeri 2 Banjarmasin still have difficulties to solve a problem in C3, C4 and C5 level in order from indentify the information, apply the strategy to solve the problem and make a result conclusion due to less interesting instructional media that has example of problem with the step. Therefore, the reseacher did a research to know if using instructional media pocket book has an effect toward the students’ problem-solving skill. This research is a quasi-experiment research with nonequivalent group pretest-posttest design. The sample for this research are X MS 1 and X MS 5 that are taken by cluster random sampling from the population of X MS students in SMA Negeri 2 Banjarmasin. Data is obtained from learning result test and students’ individual worksheet. Data that obtained by researcher is analyzed descriptive quantitatively. The result of research show that using instructional media pocket book has an effect toward students’ problem-solving skill with the correlation of 0.98. So, the researcher can conclude that there is an effect of using instructional media pocket book toward the problem solving skill of X MS students in SMA Negeri 2 Banjarmasin.

Keyword: Problem-solving skill, pocket book.

Introduction

One of the physics learning purpose that grafted in minister’s regulation Number 22 Years 2006 for high school is probleme-solving hat including understanding problems, designing physics models, finishing models, and interpretating solution (Depdiknas, 2006). So, in the end of physics learning the students hoped will have a good problem-solving skill.

But, in fact based an observation has been done along PPL activity at August until November in 2014 shown that average from student especially class X SMA Negeri 2 Banjarmasin still have difficulty in solving physic problems start from C3, C4 and C5 of Bloom’s tacsonomi that need step from understanding until conclusion or problem-solving steps. This matter can be an indicator that shown the students still lack in problem-sloving skill. This problem can be caused by lack from instructional media that can help the student to developed their problem-solving skill.

Instructional media that usually used in school is the text book which is thick and heavy. So make them lazy to open even to bring the text book.

Aqib (2013) said that,”Instructional media is anything that can be used to transfer an information or massage and stimulating to occur and study process to students”. Pocket-book can be describing as book with small-size and can put into a pocket so easy to bring
everywhere that containing short-complete-clear lesson subject. In this research pocket-book that given to students in experiment class is a small book with 10 cm x 15 cm of size that assume enough if put into pocket. Pocket-book containing short-subject explanation of Temperature and Heat with example that has an solution with problem-solving steps.

The advantage of pocket-book according to Sulistyani (2013), is (1) uniformly in telling subject can be done, (2) using pocket-book can make learning activity more clear, fun and interesting, (3) using pocket-book that printed in small-size make students easy to bring and using everywhere and everytime so give an efficient in time and energy, (4) subject and formula written short and clearly so can increasing the quality of study result, and (5) pocket-book that has an interest design and full colour can grow a positive attitude of students toward learning activity and the subject.

Problem-solving is an thinking method. According to Faizi (2013) that when doing solving on a problem, can use many method, from search data until make conclusion. According to Wankat and Oreovicz (1993) there is seven steps in problem-solving hat is (1) I can solve a problem, (2) definition, (3) exploration, (4) make a plan, (5) do the plan, (6) looking back, (7) generalitation. According to national Council of teachers of Mathematic or NCTM (in Jainuri, 2014), the indicator of problem solving skill that is: (1) indentification the knowing elements, asking, and the enough information, (2) arrange the mathematics model, (3) applying strategy to solving the problem, (4) explanation and interpretation the result according the starting problem, and (5) use mathemtics wisely. And according to Polya (1973) problem-solving steps can be summary in four steps that is (1) understanding problem, (2) devising a plan, (3) carrying out the plan, and (4) looking back. Jainuri (2014) stated in scoring students’ problem-solving skill can the indicator that can be use are (1) indentification information or elements that knowing, (2) applying strategy to solve the problem and (3) explanation and interpreting the result.

From the explanation above, so the solution that offer from this research is give a printed instructional media that easy to bring with short-read explanation that has interested packaging that called pocket-book (Rahmawati, 2013). Tha pocket-book that want to give to students hopely can give positive effect and helping towards students problem-solving skill progressing. Pocket-book with interesting packaging hope can help students’ willing to study increasing and pocket-book that has example with solving steps can help students’ problem solving better.

Based on explanation above, so researcher doing a research with the title, “The Effect of Using Pocket Book Instructional Media Toward the Problem solving Skill if X Students in SMA Negeri 2 Banjarmasin”. The purpose from this research is to know if using
instructional media pocket-book has an effect toward students’ problem-solving skill.

**Research Method**

This research is quasi experiment research with nonequivalents group pretest-posttest design. The pretest-posttest design for this research is:

<table>
<thead>
<tr>
<th>No.</th>
<th>Class</th>
<th>Pretest</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Eksperiment</td>
<td>O₁</td>
<td>X₁</td>
<td>O₂</td>
</tr>
<tr>
<td>2.</td>
<td>control</td>
<td>O₃</td>
<td>X₂</td>
<td>O₄</td>
</tr>
</tbody>
</table>

(Adaptasi Sugiyono, 2013: 116)

The population in this research is class X MS SMA Negeri 2 Banjarmasin’s student at 2014/2015 academic years with 6 class (MS1, MS 2, MS 3, MS 4, MS 5, MS 6) that has total 214 students. Sampling in this reasearch using cluster random sampling tecnic. The UTS score is analyzed to know the homogeneity of research sample.

<table>
<thead>
<tr>
<th>Class Eksperiment</th>
<th>Class control</th>
<th>Sig</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>X MS 1</td>
<td>X MS 5</td>
<td>0,77</td>
<td>Data homogeneous</td>
</tr>
</tbody>
</table>

Data is obtained by test tecnic to know how far students’ understanding toward temperature and heat subject in essay form. The instrument in this research is Learning Result Test problem (THB) to measure of students’ problem-solving skill which give to students in experiment and control class in essay form that has 8 problems with categories start from C3, C4 and C5 as pretest and posttest. From the pretest and posttest result will see the effetivity value and effects by the treatment to the posttest result. Data is analyzed by descriptive analyze toward students’ problem-solving skill that is measured by students’ worksheet and posttest result.

Analyze tecnic that is used in data pre-condition testing including normality and homogeneity test. After the pre-condition is fulled, so can do hypothesis test. Analyzing of problem-solving skill divide to three aspec that is indentification the elements (write the know information and problem), solve the problem (write he formula and finishing the problem answer) and conclude the result.
Result and Discussion

From the pretest is obtained the result like in the table below:

Table 1.3 Experiment and control class’ pretest result

<table>
<thead>
<tr>
<th>No.</th>
<th>Class</th>
<th>Score</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Average</td>
</tr>
<tr>
<td>1</td>
<td>Eksperiment</td>
<td>529</td>
<td>14,69</td>
</tr>
<tr>
<td>2</td>
<td>Control</td>
<td>383</td>
<td>10,64</td>
</tr>
</tbody>
</table>

The result of posttest can be seen in the table below:

Table 1.4 Experiment and control class’s posttest result

<table>
<thead>
<tr>
<th>No.</th>
<th>Class</th>
<th>Score</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Average</td>
</tr>
<tr>
<td>1</td>
<td>Eksperiment</td>
<td>2181</td>
<td>60,58</td>
</tr>
<tr>
<td>2</td>
<td>Control</td>
<td>908</td>
<td>25,22</td>
</tr>
</tbody>
</table>

After obtain the pretest and posttest score then do calculation to n-gain score to know the effect that occur at experiment and control class after is given the treatment. The n-gain score can be seen in the table below:

Table 1.5 N-gain score to experiment and control class

<table>
<thead>
<tr>
<th>No.</th>
<th>Class</th>
<th>N-Gain value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Average</td>
</tr>
<tr>
<td>1</td>
<td>Eksperiment</td>
<td>0,59</td>
</tr>
<tr>
<td>2</td>
<td>Control</td>
<td>0,18</td>
</tr>
</tbody>
</table>

The pre-condition test that has been done is normality and homogeneity test. Pre-condition test is done o pretest score before the sample is given the treatment.

Table 1.6 Normality test result by One-Sample Kolmogorov-Smirnov Test

<table>
<thead>
<tr>
<th>Class</th>
<th>Kolmogorov-</th>
<th>Asymp. Sig</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>326</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smirnov Z (2-tailed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eksperiment</td>
<td>0,85</td>
<td>0,46</td>
<td>Normal distribution of data</td>
</tr>
<tr>
<td>control</td>
<td>0,73</td>
<td>0,67</td>
<td>Normal distribution of data</td>
</tr>
</tbody>
</table>

After the normality test result is obtained, do the homogeneity test by One-Way ANOVA with computer program, so obtain the pretest homogeneity as:

<table>
<thead>
<tr>
<th>Data</th>
<th>Class</th>
<th>N</th>
<th>Sig</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eksperiment</td>
<td>36</td>
<td>0,85</td>
<td>Data Homogeneous</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After doing normality and homogeneity test toward the data then do the t-test to know if there is a difference n-gain score between experiment and control class. The sample amount is same and homogenous then the formula which can use is Separated Varian t-test. Hypothesize for t-test in this research is:

H₀: There is no difference problem solving skill to class X SMA Negeri 2 banjarmasin students with pocket book instructional media and without it.

Hₐ: There is any difference problem solving skill to class X SMA Negeri 2 banjarmasin students with pocket book instructional media and without it.

T-test result for n-gain from problem solving skill test can be seen in table below:

<table>
<thead>
<tr>
<th>Data</th>
<th>Class</th>
<th>t arithmetic</th>
<th>t table</th>
<th>conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-gain</td>
<td>Eksperiment</td>
<td>10,76</td>
<td>1,67</td>
<td>Ho rejected</td>
</tr>
<tr>
<td></td>
<td>control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the table above, that stated H₀ decline, so can conclude that there is any difference to n-gain score between two class. After that knowing there is any difference, then do next test that is correlation test to know if there is an effect from treatment toward experiment class posttest result. Hypothesis for correlation test in this research is:

H₀: There is no effect using instructional media pocket book toward problem
solving skill class X SMA Negeri 2 Banjarmasin students.

H<sub>a</sub>: There is an effect using instructional media pocket book toward problem solving skill class X SMA Negeri 2 Banjarmasin students.

Table 1.9 Correlation test result

<table>
<thead>
<tr>
<th>Class</th>
<th>r arithmetic</th>
<th>r table</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eksperiment</td>
<td>0.98</td>
<td>0.39</td>
<td>Ho rejected</td>
</tr>
</tbody>
</table>

Based on correlation test result that has been done toward student’s worksheet average score and posttest experiment class is obtained result like Table 1.9 where is the value of r calculation as big as 0.98 and r table as big as 0.39 so r table > r calculation then H<sub>0</sub> is declined that means there in an effect of using pocket book instructional media toward class X students’ problem solving skill in SMA Negeri 2 Banjarmasin and the positive r value its means that the treatment has positive effect toward students’ problem-solving skill. R value as big as 0.98 has a very high correlation. That fact shown that the treatmeant with using pocket book that has given to sample has a good effect toward students’ problem solving skill. The more in good quality of pocket book that give to students and the more the positive correlation value, then the more of increasing students’ problem solving skill. That means, the progressing is supporting each other where if the quality of pocket book is increased then students’ problem skill will be increasing too.

Problem solving skill can be observed from student’s test-answer sheet study result. Study result test is made based on problem solving skill aspects that is indentification of knowing elements (aspec 1), applying strategies aspec to solved the problem (aspec 2), and explanation and interpretation result aspec (aspec 3). The pretest and posttest result according the aspecs view is:

Table 1.10 The average of pretest-posttest result for each aspec of problem solving

<table>
<thead>
<tr>
<th>Class</th>
<th>Test</th>
<th>Aspect 1</th>
<th>Aspect 2</th>
<th>Aspect 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eksperiment class</td>
<td>Pretest</td>
<td>10,25</td>
<td>4,14</td>
<td>0,28</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>28,22</td>
<td>18,83</td>
<td>13,53</td>
</tr>
<tr>
<td>Control class</td>
<td>Pretest</td>
<td>5,25</td>
<td>5,39</td>
<td>0,00</td>
</tr>
<tr>
<td></td>
<td>Posttest</td>
<td>13,08</td>
<td>12,14</td>
<td>0,00</td>
</tr>
</tbody>
</table>

The table above shown that for the two class for the aspec 1 has a progressing because they are given an exercise about how to answering the problem with the same method that is start from write the knowing elements. But, because the experiment class has a pocket book that comprehensive by example problem with solution that use problem
solving steps, so the students’ can re-study individually, while control class’ student has a difficulty in answering problem exercise with the same method if their note is not complete and they don’t have pocket book.

From the table above also can be seen that the aspec 2 has progress like the aspec 1. Same with he aspec 1, aspec 2 has progress in the two class. Because the two class has be exercised answering the problem with problem solving method. But, experiment is facilitated by pocketbook with problem solving method to answering the example problem then the progress in experiment class is more than control class.

For the aspec 3, in the control class doesn’t has any changes that is still in zero. This matter can be caused although the student has been taught about problem solving steps until make an conclusion, the students can forget because they don’t have a note. Fot the experiment class student even they don’t have a note, the example problem with problem solving skill to found in their pocket book.

The research that has been done with give pocket book instructional media toward experiment class and without instructional media pocket book toward control clas obtained result that there in a big enough difference to problem solving posttest score between experiment class that study with pocket book and without pocketbook to control class. This matter shown that instructional media pocket book has positive effect toward student problem solving skill. Pocket book that is arranged by researcher and is given to experiment class student beside contain the extract subject of temperature and heat aslo contain examples of problem that completed by solution with problem solving skill step that has been exercised in every meet and divided to three aspecs that include in scoring, so easier to student to individually study to solving problem with problem solving steps and with h small size of pocket book and practically to bring it everywhere to enable to student bring that pocket book where is they go so can be often to read and to learn individually and not just a school only.

Like the research that has been done by Sulistyani, that using media pocket book give different result toward the class who using it and not use it. The research also prove, beside has different study result, usingang media pocket book also can give effect toward student’s problem solving skill positively.

**Conclusion and suggestion**

According the result of research ment can be concluded that using pocket book as instructional media has an effect toward students’ problem solving skill in class X SMA Negeri 2 Banjarmasin with correlaiotn amount as big as 0.98.

For the other researcher that want to using instructional media pocket book or the
other form of instructional media in order to make better instructional media and more interesting from subject side and the media packaging. So can more attract the student attention.

Acknowledgment

The first of all, thanks to Allah SWT for all the bless that always give to authors. And then thanks to SMA Negeri 2 Banjarmasin, especially to students in class X MS 1 and X MS 5 for all help and support along this research. And thanks to all whoever hepl and support this research.

References


