Practicality of Physics Through Integrated Science Student Worksheets

Titik Rahayu (1), *Syafrien Syafirli (2), Widya Wati (2), Ismail Suaidi Wekke (3) and Kamisah Bt. Osman (1)

(1) Universiti Kebangsaan Malaysia43600 UKM Bangi, Selangor, Malaysia.
(2) Universitas Islam Negeri Raden Intan Lampung, Indonesia, Jl. Letkol Hendro Suratmin, Sukarame, Bandar Lampung 35131, Indonesia.
(3) Sekolah Tinggi Agama Islam Negeri(STAIN) of Sorong, West Papua 95761, Indonesia.

*Universitas Islam Negeri Raden Intan Lampung, Indonesia. syafrien@radenintan.ac.id

Abstract

Cooperative learning type STAD belongs to a method that could be implemented in science studies worksheet especially in Physics. This research is aimed at finding out the respond of experts, practitioners, and students toward science studies worksheet in Physics in high schools. This research is termed as Research and Development. There are nine subjects (three material experts, three people of media experts and three practitioners) involved in assessing the appropriateness of the materials, design, and usability of the students worksheet. Seventy students (20 students are tested in small groups and 50 students are assessed in large groups) are involved to find out the effectively of the integrated science studies worksheets. Validation sheets are intended to find out the respond of the experts and the practitioners. Mean while, students’ respond is collected through a questionnaire. The data is analyzed through descriptive statistic using Statistics Package For Social Science software (SPSS version 22.0). The findings show that the respond of the material experts is high (70%) and respond of the practitioners is also high (79%) as well as the respond of the media experts is very high (80%). Moreover, the students’ respond is very high (85.30% for small groups and 87.86% for large groups). These findings indicate that the integrated science worksheet is this research is meaningful and effective.

Key Words: Practicality, student worksheet, integrated science.
1. Introduction

Education refers to guided process in changing behavior and attitude of a person or a particular groups purposefully conducted. It is also aimed at building characters of human beings as well as independent personality. Education is the main setting of cooperative learning. In this case it is recognized that the goal of education is to facilitate students to maximize their own particular potentials. Thus, teachers are viewed as the most prominent figures responsible in teaching and learning process. In teaching and learning activities, it is expected that teachers are able to differentiate their learning process whether it is passive teaching and learning process or the active and interactive one, teachers are also either expected to facilitate the students to build and obtain their own knowledge. Further, Panina (2008) states that students must learn ad re-produce knowledge transferred to them by the teachers or other learning resources. Another research proves that teachers need to motivate and stimulate students’ interest. Students’ involvement in learning process is able to improve their achievement and create enjoyable learning environment. It is emphasized that students have to be actively involved in learning process.

Students’ worksheet is defined as printed teaching materials prepared and used to help students to gain knowledge, skills, and shared social values by giving useful and encouraging comments in the worksheet that students can actively and efficiently participate in the class. The prior statement is supported by...

---

Kosa (2008) that the students’ worksheet is regarded as an important printed visual media created pursuant to constructivism approach. Besides, the worksheet becomes the crucial component of the curriculum in some countries. According to, that method that enables active and mutual interaction between students and teachers are required. The method can be cooperative learning, group discussion, debate, games, simulation, business, case study, projects, social-psychological training, moderation and computerized simulation.

In this study, the developed students’ worksheet is created based on STAD of cooperative learning method as itenable students to be individually active in the classroom. In a research conducted by, it is found that learning content can be mastered by the students through STAD of cooperative learning method. Besides in STAD, teachers are able to transferred the content in a small group work through the following steps, namely introduction, developing activities and guided practice. Cooperative learning helps the students to be more cooperative in an effective group working. Besides, it refers to a teaching strategy in which the students have to work together in a small group and help each other to gain targeted academic content. In the implementation of

14IsiakaAmosA Gambhari,Op Cit
15IsiakaAmosA Gambhari, M. O. Y., David Akpa Thomas, Op. Cit
20Serafin, Op. Cit
this method, students are actively involved in communicating their ideas, share their thought, giving feedback, problem solving and assess their own learning objectives and outcomes\textsuperscript{22,23,24}. Moreover, cooperative learning enable students to develop their oral and social skills\textsuperscript{25}. It is found out that the interest of cooperative learning is getting bigger in the forthcoming years\textsuperscript{26}.

There are some issues detected in teaching and learning process in Science class. Some students are lack of capabilities to independently understand the concept and content of Physics, some teachers implement inappropriate method and lack of ability in problem solving\textsuperscript{27, 28}. Teachers still used some didactic traditional method in which memorizing factual information in the main activity that students’ contribution in class discussion is low\textsuperscript{29}. Mostly teachers are acted as active givers while students are becoming passive recipient during the learning process in the classroom\textsuperscript{30}. Consequently, the learning process is colored with boredom, anxiety, and less students’ curiosity and imagination\textsuperscript{31}. It is identified that teacher-centered learning process and inappropriate teaching method becomes the main cause of students bad performance in science class\textsuperscript{32}. Thus, cooperative learning method is used to overcome the issues, however based on some studies teachers are lack of capability to implement the method that they have problem in grouping the students. One of the main constraints in the method is that it is quite difficult to find out the blueprint of cooperative learning and common group working\textsuperscript{33}.

The issue is believed can be overcome by using students’ worksheet and STAD cooperative learning method as some conducted studies reveal that students taught by using STAD of cooperative learning method and computer gain better
performance in their Physics class than those taught with other methods\(^{34}\). The involvement of the students in learning process can be obtained through integrated activities and the students worksheet\(^{35,36}\). The use of students’ worksheet help students to simplify and find the solution for the problems they are facing\(^ {37}\). During their group work, the objectives of the group and individual accountability is prominent to improve students’ learning outcome\(^ {38}\). Besides, the cooperative learning is a student-centered method\(^ {39}\).

2. Research Tools

This study belongs to Research and Development (R & D). The rationale is that the method is appropriate with the purposes of the research namely to develop a product and to find out the practicality response of the product\(^ {40}\). The total numbers of the subjectis 79 people, consisted of 3 people material experts, 3 people media experts, 3 practitioners and 70 students (20 students for smallgroups and 50 students for biggroup) involved to determine thequality of the worksheets. Data was collected through validating sheets for experts while students’ respond was obtained through questionnaire. The data then is analyzed by software Statistics Package For Social Science (SPSS version 22.0).

3. Findings

The students worksheet is developed based on the School-based curriculum (standard of competence, basic competence and syllabus). The Worksheet is printed on A4 paper-size, 1,5 space, *font* 12 pt; fonts used are Times New Roman, Bauhaus 93, Monotype Corsiva, BlackoakStd, Comic Sans MS, Vijaya, and the verse of Qur’an is written through Add-Ins program. The design consists of front cover and back cover, acknowledgement, page of writer team, conceptual map, procedures of the worksheet and table of content. The worksheet consist of Content Standard, pre-activities, basic quiz, summary, sample of problems, group activities, individual quiz, scoring rubric, and references. Besides there is quotation of Quran verses related to the materials in the worksheets, Muslim scholars and proverbs to motivate student in learning process.

---


\(^{35}\) Alanazy, S. M., Saudi students' attitudes, beliefs, and preferences toward coeducational online cooperative learning. *Wayne State University*. 187 pages; AAT 3445199 2011.


\(^{40}\) Johnson, D.W., & Johnson; Isiaka Amosa Gambari, M.O.Y., David Akpa Thomas, Op. Cit
Respond classification of experts, practitioners and students are divided into four categories, namely: (i) very high and high that small revision needed yet the validation re-test is not any more required; (ii) average, a quite massive revision is needed yet the validation re-test is not at all suggested; (iii) low and very low, both revision and validation re-test is highly recommended\textsuperscript{41}. Further, in Arikunto\textsuperscript{42}, it is stated that criteria of respond assessment toward the students worksheet is categorized as 81% - 100 % (highly applicable); 61% - 80% (applicable); 41% - 60% (sufficiently applicable); 21% - 40% (less applicable); < 21 % (not at all applicable). The respond of the experts and the practitioners is described in the following table 1:

<table>
<thead>
<tr>
<th>No</th>
<th>Respond</th>
<th>Percentage</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Material Experts</td>
<td>70%</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>Media Experts</td>
<td>80%</td>
<td>Very High</td>
</tr>
<tr>
<td>3</td>
<td>Praktisi</td>
<td>79%</td>
<td>High</td>
</tr>
</tbody>
</table>

Table 1 clearly shows that the respond from the material experts is high (70%). The respond of the practitioners are also high (79%), and very high respond (80%) is obtained from the media experts. The finding implies that small revision for the worksheet is required yet the validation re-test is not anymore recommended\textsuperscript{43}. The three validation can be implemented and distributed to the students\textsuperscript{44}. Meanwhile, the students’ respond can be observed in the following table 2:

<table>
<thead>
<tr>
<th>No</th>
<th>Students’ respond</th>
<th>Percentage</th>
<th>Ket.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small group experiment</td>
<td>85%</td>
<td>Very high</td>
</tr>
<tr>
<td>2</td>
<td>Big group experiment</td>
<td>88%</td>
<td>Very high</td>
</tr>
</tbody>
</table>

Table 2 shows that students respond of small group experiment is 85%, and big group experiment is 88%. Thus, only small revision is required for the students’ work sheet and re-experimented application is not necessarily conducted. The students’ worksheet can be used as a teaching material in class of Physics\textsuperscript{45}.

The developed students’ worksheet is suitable and valid yet with small revision that it can be used as a learning instruction and material. Moreover, the finding reveals that the students worksheet belongs to proper criteria one that the it can be further published after a small revision. Further, students are interested and they address positive comments and feedback toward the worksheet. This will


\textsuperscript{43}Khasan, D., Hobri, Op. Cit

\textsuperscript{44}Arikunto, S. Op. Cit

\textsuperscript{45}Ibid
make further interaction between students and teacher possible to occur.\textsuperscript{46} Similarly, the positive feedback regarding to the worksheet is also obtained from the material experts and practitioners, namely “high and “very high” that they suggest small revision for the students’ worksheets should be conducted before they are re-distributed to the students. The study regarding to the attractiveness of the worksheet is also checked that it is stated that the content and the layout of the worksheet are interesting. It is believed that learning process can be effectively and actively conducted.

Pursuant to the students’ respond previously quoted, students worksheet which is based on cooperative technique possess interesting writing style, appropriate figures, and attractive colors. Further the evaluation system in the worksheet is clear and easy to be understood by the students. Standardized language style, layout of the figures and funny symbols and expressions stimulate students’ learning interest and motivation. The finding is also supported by research conducted by Burhan\textsuperscript{47} that students worksheet supported and enriched by interesting figures (cartoon) gain more students’ interest. Several researches also focus on the design of the students’ worksheet\textsuperscript{48}.

According to Krombab\textsuperscript{49}, the students’ worksheet is effective to help 11-15 years old students. Accordingly, the selection of cooperative learning method of STAD in this study related to the age of high school students (12-15) is appropriate as the method stimulate students to develop their motoric skills and help them to be a creative thinker\textsuperscript{50}. Cooperative learning method is found based on learning theory of behaviourism and cognitivism\textsuperscript{51}. Thus, based on social constructivism learning theory, learning process occur when the students are actively involved in learning activities and working together with other students to achieve their shared goals\textsuperscript{52}.

Cooperative learning is an prominent method in science class in Turkey\textsuperscript{53}. The ultimate reason is that the method is emphasized on how individuals respect others in their group or other groups as the success of learning is based on individual respect and learning outcomes\textsuperscript{54}. Further, the statement is supported

\textsuperscript{46} Johnson, D.W., & Johnson, Op. Cit
\textsuperscript{47} Burhan, Y., Developing worksheets enriched by concept cartoons concerning the acid-base concepts. 2008, Karadeniz Technical University Graduate School of Natural and Applied Sciences.
\textsuperscript{48} Rimma A. Kuthbidinova, A. A. E., Marina A. Romanova, Op. cit
\textsuperscript{51} Alanazy, S.M., Saudi students’ attitudes, beliefs, and preferences toward coeducational online cooperative learning. Wayne State University. 187 pages; AAT 3445199, 2011.
\textsuperscript{52} Ibid
\textsuperscript{54} Jacobs, G., Cooperative Learning and Second Language Teaching. Cambridge University Press, 2006
by the findings of a research conducted by 55, that the idea of the cooperative learning method of STAD enables students to improve their social skills is appropriate. Based on the study it is revealed that students intolerant behavior can be minimized because of cooperative learning as they are positively independent for each other 56. The findings of the research is regarded appropriately support the statement of this study.

In addition, many researches reveal that the implementation of cooperative learning of STAD teaching technique succeed in various science projects like in chemistry 57 dan Physics 58. It is found that the STAD method is more effective than individual learning, discussion method or conventional class instruction. The finding is also supported by 59, 60 states that cooperative learning method is more effective that traditional teaching method. According to other findings 61 students taught by cooperative learning method is showing better learning outcomes than those taught through individual instruction and traditional teaching method. Gillies (2008) states that the cooperative learning method promotes better learning process and outcomes. Those findings are in line with the result of this research that students respond toward the worksheet and STAD method of cooperative learning is very high in Physics.

Research by 62, states that students taught by cooperative learning method possess better skills than those taught by traditional approach. Some steps in implementing cooperative method of STAD in experiment class 63, has been modified related to procedures of quiz, assessing, correcting students’ work, creating groups and students recognizing. Meanwhile, there are some procedures stated in the students worksheet in this research, namely: (i) giving motivation and appreciation, (ii) building team work, (iii) teacher presentation, (iv) heterogeneous learning activities in team, (v) individual quizz, (vi) and rewarding.

55 Rianawati, Implementation Strategy Cooperative Learning Type of Student Achievement Division Team (STAD) to Improve Social Skills Students on Learning Morals in Man 2 Pontianak Learning the Year 2016/2017. Journal of Education and Practice, 2017. 8(3).
61 Podolak Ken, J. D, Op. Cit
62 IsiakaAmosaGambhari, M. O. Y., David Akpa Thomas, Op. Cit
63 Karacop, Op. Cit
4. Conclusion

Students worksheets are believed to make the learning process impressive and interesting for the students. This research gives positive contribution for teachers in developing the worksheet as teaching materials. However, it is suggested that the teachers have to pay high attention on issues faced by the students during their learning process that appropriate teaching materials can help students to boost their learning outcomes.

References


[47] Mei-Yao Huang, H.-Y.T., Wen-Yi Wangc, Jui-Fu Chend, Ya-Ting Yua,Chien-Chih Chouc, Effects of cooperative learning and concept mapping intervention on critical thinking and basketball


