A meta-analysis study of the use of worksheet (LKS) based on research-based learning models

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Abstract. This study aimed to determine the effect of the use (LKS) on the achievement of physical competence of learners. Its influence will be examined from several journals. This study used meta-analysis. Research shows that the use of meta-analysis LKS towards the achievement of more effective learners. The results showed the effect of size on the achievement of students with rigorous of several journals in the effect size obtained is average. It can be proved that the LKS can provide a considerable influence on the achievement of competence of learners.

1. Introduction

Improving the quality of Indonesian human resources globalization continue to be pursued and developed through education. Education spearhead the development of human resources so that education must play an active role in improving the quality and quantity of the mindset of learners. In terms of improving the quality of this mindset needs to be supported with proper teaching process as well so that the students' ability to develop well (Zaka, 2018).

Good teaching process should take into account the student's ability as an object in the teaching process. One of the characteristics that are required in the design of learning is the stage of cognitive development (Nehru, N., & Syarkowi, A. 2017).

Government programs such as SM3T and curricular changes have been trying to reduce the problem of this study (Prastowo, 2011). Some curriculum has been implemented in Indonesia. Currently, Indonesia uses curriculum 2013 in the educational process. In the implementation of this curriculum, has several times held the revision with the aim of achieving competence of attitude, knowledge and skill competencies that are expected to appear for learners.

Learners have been given by the Creator with basic capabilities, such as the ability to think, act, and to do that is in the form of potential from birth. Through learning in school this potential will develop into competence. The quality of learners' competence is highly dependent on their learning experience. The definition of competence have been raised by some experts, like Shah Muhibbin expresses the basic idea of competence together with the ability or skills (Trianto. 2010).

Meaning Usman competence as depicting qualifications or ability of a person, both qualitative and quantitative (Usman, 1994). Robbins called the ability of competence, the capacity of individuals to perform various tasks in a job (Spencer. 1993). Spencer & Spencer said "Competence is the underlying characteristics of an individual that is causally related to the reference criterion-effective and / or superior performance in a job or situation". The bottom line is the basic characteristics of a person's competence relating to the performance criteria or effective air and excel in work and certain situations (Shah, 2000).

Muhaimin also argued that the competence is a set of actions that must be owned by a person of intelligence as a requirement to be considered capable of performing tasks in a specific job. The nature of intelligence is shown as finesse, immortality, and the success of the action. The nature of the responsibility must be shown as a good measure of truth in the light of science, technology, and ethics (Nita, 2018). While the Ministry of Education to formulate the definition of competence as the knowledge, skills, and basic values are reflected in the habit of thinking, doing and acting. Based on
the opinion of the competence defined as knowledge, skills, and attitudes that are controlled and owned by someone who has been a part of him.

Learning is essentially a teacher conscious effort to achieve the desired objectives for direct interaction membelajarkan students and students with other learning resources (Joni, 1984). Science or Natural Sciences (IPA) is a collection of systematic theory, its application is generally limited to a natural phenomenon, was born and developed through scientific method (Chotimah, 2018).

The approach and methods used appear to be less varied, usually only rely on in the form of lectures, but using a variety of tools and how the spirit of (Festiyed, 2009). guru also not optimize the environment as a learning resource to make learning attract attention, fun, and suitable for learners, Concepts learning activities such irrelevant to the demands and challenges of education in the era of globalization (Festiyed, 2008).

All subjects must have all three of these competencies, including the learning of physics. However, the reality of physics learning focused on competence mastery of knowledge. One of the problems in learning physics is the low quality of learning. Learning obstacles encountered in the learning activities, among others: (1) the selection of appropriate tidk learning model, (2) lack of use of instructional media, (3) the condition of the class that tends to be centered on the teacher. This leads to the learning process requires only one direction because the students do not dare express. Students are more geared to rote learning without being required to understand and develop learning and unrelated to everyday life. This gloomy learning process is not relevant to the expected goals, student-centered learning in accordance with the teaching of physics (Usman, 1994).

Efforts have been made by the government must be supported by the implementation of a good education by physics teachers in learning activities. One of them is the manufacture of LKS. LKS is printed instructional materials in the form of a sheet of paper containing material, summaries, and guide the implementation of learning tasks that must be done learners, both theoretically and practically, which refers to the basic competencies that must be achieved learners in learning. LKS is used as a learning resource for students, in order to achieve competence of learners as expected.

Development of student worksheet (LKS) is to support teaching and learning in the field of education. LKS produced interesting and systematic can help students to learn more active individually or in groups. This is expected to increase the activity and motivation of students in the learning process. (Fannie, 2014).

Furthermore, Prastowo suggest at least four functions worksheets for teaching material should be able to: 1) minimize the role of educator, but rather to enable learners, 2) facilitate learners to understand the material provided, 3) is presented briefly and duties rich to practiced and 4) facilitate the implementation of teaching to learners (Robbins, 2001)

Research Based Learning - RBL is one model of learning developed konstruktivism flow. Research Based Learning (RBL) is a learning model that leads to activity analysis, synthesis, and evaluation, and improve the ability of students and professors in terms of assimilation and application of knowledge (Widyawati, 2010).

Learners have not facilitated thoroughly to prove the suitability of the theory presented by teachers with practical activities. Implementation of practical activities are rare even though the school already has a fairly complete equipment. Whereas through this practicum for learners to develop their thinking with the theory already described. The reason that led to the implementation of practical activities are rarely carried out, including the availability of worksheets learners are lacking. In general, the school only provided a worksheet created by a team MGMPs and only contains a sheet material. Time availability is also often a reason. Pursuing the material for the implementation of the final exam make practical implementation ruled out.

Based on these descriptions, then this paper aims to analyze the effect of the use of learners RBL SMA / MA-based LKS in terms of learning materials, and the media used. Like most similar studies, meta-analyzes are expected to be useful in the field of education, particularly the teaching of physics can select instructional materials, the media used, and measurement skills to the appropriate physics teacher will use tools such as worksheets in learning physics.
Research on the effects of the use of spreadsheet-based RBL SMA / MA has been done. There are many spreadsheet model used in this study. It is important to meta-analysis to gain an understanding of the entity or the general conclusions from the results of similar studies. Thus, meta-analyses were conducted to draw conclusions about the effect of the use of LKS RBL Based on physical competence achievement of learners SMA / MA.

2. Research Methods
This study used meta-analysis by reviewing several articles in national journals. Meta-analysis of quantitative because it uses numerical computation and statistics for all practical purposes, that is to collate and extract information from so much data that is not possible with other methods. The research is a survey research. Survey research is a research method that aims to obtain an overview of the relevant characteristics of a population represented by the sample. By collecting these characteristics researchers trying to find a match from the results of previous studies with results of research conducted at this time. With reference to the original purpose of the meta-analysis, this research can be used to indicate the presence or absence of effect size comparison.

The influence of the use of worksheets for the students' studies conducted by calculating using the formula Cohen'd Effect Size of Cohen'd as follows:

\[ d = \frac{x_k - x_c}{spooted} \]  

Information: \(d\) = size of the rate effects  
\(X_E\) = average value of the experimental class  
\(X_k\) = The average value of control  
\(spooted\) = standard deviation of the combined  
Looking spooted value using the formula:

\[ spooted = \sqrt{\left(\frac{n_1-1}{n_1}\right)s_{d1}^2 + \left(\frac{n_2-1}{n_2}\right)s_{d2}^2} \]  

\(n_1\) = Total grade students experiment  
\(n_2\) = Number of control class  
\(s_{d1}\) = The standard deviation of the experimental class  
\(s_{d2}\) = Standard deviation grade control

Meta-analysis using a number of articles in national journals about the effects of the use of worksheets based RBL Based on physical competence achievement of learners SMA / MA. The population in this study is a national journal that discusses the influence of LKS use RBL Based on physical competence achievement of learners SMA / MA. Samples were taken using purposive sampling technique. This is because the data or information to be obtained from the sample is determined based on their relevance to the theme of this study. Analysis of the data used is the analysis of quantitative data on the percentage.

3. Results and Discussion
The data obtained in this study a Physics student competence in learning outcomes with the expectation value physical competence learning outcomes of students in the experimental class is better than the control class. Learning outcomes data is a combination of cognitive values, attitudes and skills of students with the weight of each 5: 3: 2.

From this research we took one of the data results of the national journal as follows:
The value of data normality test results of student learning outcomes experimental class and control class can be seen in Table 1 and 2.

**Table 1.** Normality test results student results value.

| Class      | $X^2$ calculation | Df | $X^2$ Table | Decision |
|------------|-------------------|----|-------------|----------|
| Experiment | 100.086           | 5  | 11,070      | Normal   |
| Control    | 4.833             | 4  | 9,488       | Normal   |

**Table 2.** Homogeneity values learning outcomes.

| Class       | N  | $S^2$ | $F_{\text{arithmetic}}$ | $F_{\text{table}}$ | Decision |
|-------------|----|------|-------------------------|---------------------|----------|
| Experiment  | 35 | 48.39| 1.39                    | 2.28                | Homogeny |
| Control     | 36 | 67.60|                        |                     |          |

**Table 3.** National journals category size effect to influence learning outcomes

| No | Journal code | Effect size | Category |
|----|--------------|-------------|----------|
| 1  | IL           | 2.40        | high     |
| 2  | AH           | 0.82        |          |
| 3  | ZP           | 0.80        |          |
| 4  | TI           | 0.72        | medium   |
| 5  | VS           | 0.73        |          |
| 6  | TH           | 0.55        |          |
| 7  | RK           | 0.54        | process  |
| 8  | MN           | 0.65        |          |
| 9  | CC           | 0.52        | low      |
| 10 | AR           | 0.12        |          |

|                |      |
|----------------|------|
| **Total ES**   | 7.85 |
| **Average ES** | 78.5 |
| **Deviation standard** | 2.751 |

From the above it appears from the data in Tables 1 and 2 on the value of the learning outcomes of the experimental and control classes the sample has good data. Produce data that is homogeneous and normally distributed.

In Table 3, effect size category thesis to the effect of learning outcomes performed on ten samples of student thesis Department of Physics, who obtained three categories, namely 3 in the high category in the medium category 3 and 4 in the low category. category size effect to effect learning results obtained by calculating the effect size with an average of 77.7, standard deviation of 181.11. This means that the effect of the use of LKS can improve student learning outcomes amounted to 32.73%. The resulting effect size average price.
4. Discussion

Student Worksheet is a learning resource that supports to enhance students' understanding of the material that must be mastered. LKS is a tool to convey messages to students that are used by teachers in delivering learning materials and time effective, and will lead to interaction between teachers and students in the learning process. Based on research data from 10 international journals and data analysis, it was found that the effect of the use of LKS positive impact on student learning outcomes. Learning outcomes of students in the experimental class using a worksheet that is better than the conventional LKS.

After being treated differently between the two classes, classroom experiments using worksheets, and grade control using conventional LKS school. Statistical analysis showed that the learning outcomes in the experimental class is better than learning outcomes in the control class.

In Table 3 Securities Journal size category for effects of study results conducted on ten samples of student journals, obtained two categories, namely 3 in the high category, 3 in the normal category 2 in the process 2 in the low category and the total of this analysis there are 10 journals. This means that the effect of worksheets that can help improve student learning outcomes measure the resulting effect on average prices. Table 3 on the size of the Exchange proved that LKS can provide considerable influence on student learning outcomes. It is shown from the value of the effect size varies from ten national journals. One example of the first data has a value large enough effect size, which reached 2.4.

5. Conclusion

Based on the results of a meta-analysis has been done then put forward some conclusions as follows: (1) Effect of average size affect the use of worksheets to improving the learning outcomes of physics SMA is equal to 7.85 (sd = 2.751). That means that the application of LKS is in great demand by students in improve learning outcomes High School Physics. (2) worksheets that generate the greatest impact among the 10 journals that exist, namely LKS on student learning outcomes.

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