



## Using Job Sheet in Learning Ship Welding Techniques to Increase Learning Achievement of Class X Vocational School Students

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### Abstract

There is a need for media in the learning process to improve student achievement. The purpose of this study was to determine the model of using job sheets in learning welding techniques in class X TPK SMKN 2 Lamongan. And to find out the learning achievement of students after the job sheet model is implemented. The subjects of this study were students of class X TPK SMKN 2 Lamongan. This classroom action research procedure uses 3 (three) cycles. Each cycle consists of 3 (three) stages, namely: (1) planning; (2) action and observation; (3) reflection, according to the model developed by Kemmis and Mc Taggart. The instruments used to collect data are: (1) lesson plans; (2) pretest-posttest question sheets, (3) practice result assessment sheets (4) student practice observation sheets (5) learning management observation sheets; and (6) daily journal. The results showed that an increase in student learning achievement can be seen from the average value of student learning achievement starting from the pretest, cycle I, cycle II and cycle III, respectively 5.35; 6.78; 7.65; 7.92 with Gain (increase) in each successive cycle of 1.43; 0.87 and 0.27. The percentage of the average value of learning management for aspects of teacher activities increased by 13% from 68% in the first cycle to 81% in the second cycle and increased 5% from 81% in the second cycle to 86% in the third cycle.

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## INTRODUCTION

When compared to other nations, the quality of human resources (human resources) in Indonesia remains low (Suyono & Muskhir, 2021). According to Education for All, which was released in the Global Monitoring Report 2008, it gathers education statistics from 129 nations worldwide, the Indonesian Development Index, or EDI (Education Development Index) (Setyawan & Suprianto, 2014). This indicator is calculated using three assessment categories: high, medium, and low. Malaysia's position increased from rank 62 to rank 56, while Indonesia's position decreased from rank 58 to rank 62. Indonesia, Malaysia, the Philippines, Vietnam, Myanmar, and Cambodia are among the Southeast Asian nations with moderate EDI, whereas Brunei Darussalam is among the countries with high EDI. Three nations in the medium category, Malaysia, Myanmar, and Cambodia, have increased year after year, while Indonesia has fallen (retrieved from <http://stembasurabaya.wordpress.com> on October 1, 2019).

Improving the quality of education is one strategy to increase the quality of human resources (HR) in Indonesia. It is intended that students become intelligent is a challenge that

many nations, including Indonesia, encounter (Nuryanto et al., 2020). Previously, the learning process was more centered on the instructor and less on the pupils. In other words, teaching and learning activities place a greater emphasis on teaching than on learning. In a learning environment, the occurrence of a process of reciprocal connections between students and teachers, as well as learning materials (UU No. 20, 2003:5). As a result of experience or instruction, pupils' abilities in the learning process, attitudes, or conduct will change (Kurniawan & Effendi, 2020). The teacher's job is to make the learning process more successful for students.

The Vocational High School is an institution that is directly tied to the learning process and plays a significant part in the advancement of technology today (SMK) (Djarmiko et al., 2020). Vocational High School graduates are anticipated to have high-quality Human Resources (HR) and to develop graduates who are ready to work or establish their own jobs. Improving the quality of education, both in terms of facilities and infrastructure, as well as in the learning process, so that learning objectives may be met appropriately (Griffiths et al., 2021; Setyawan & Suprianto, 2014). The findings of observations and interviews done on instructors and students of class X TPK by researchers at SMKN 2 Lamongan provided an overview of the learning of welding methods carried out. Students are less engaged on carrying out learning during workshop activities, particularly during practical exercises. The teacher just delivers general directions and allows pupils to practice on their own. The teacher has perceived the pupils in the form of incentive and notification about the procedures for working on the exercise immediately orally. To compensate for the lack of space for theory in welding engineering majors' teaching and learning activities, the teacher only introduces theory on the sides of practice.

Using the correct method, active learning may be generated. The usage of job sheets is a method that can increase student learning results since students are provided job sheets that contain subject knowledge and help in carrying out practice in this strategy (Widyastuti & Utami, 2018). So that if something is unclear, students can read it on their own on the work sheet as well as in the delivery of learning material (Chankseliani et al., 2021). In carrying out activity practice, students should no longer rely solely on teacher explanations, but should be able to understand the learning material and carry out practical activities appropriately and correctly in accordance with the steps outlined in the job sheet. It is hoped that student learning outcomes will improve as a result. The goals of this study are as follows: (1) to determine the efficacy of the model of using job sheets in learning welding methods in class X TPK SMKN 2 Lamongan; and (2) to assess students' ability in learning accomplishment after the model of using work sheets is implemented.

The findings of this classroom action research have several advantages, including: (1) students are more serious about learning welding techniques using job sheets; (2) there are variations in the form of learning in this case regarding how to activate students in learning welding techniques using job sheets; (3) practice is directly involved in the world of education as well as the application of the theory obtained; and (4) input in the determination of education policy, as The subject of welding with the manual arc welding process for class X TPK SMKN 2 Lamongan is confined to the use of task sheets in learning welding procedures.

## METHODS

This research uses the classroom action research model which was first introduced by Lewin in 1944. Classroom action research is a form of research that is carried out reflexively in social situations to improve the reasoning and fairness of their educational and social practices, as well as understanding them to their practice of the situation in the place is done

according to Kemmis and Mc. Taggart (Madya, 2009:9).

Empowering teachers as well as students is part of classroom action research. As well as professional development, while students benefit from the teacher's efforts because they get better services as a result of increase quality the learning. Cooperation can conducted by researchers with other teachers, principals, researchers from universities, and senior teachers.

According to Munandar (Taniredja, et al, 2019:18) Classroom Action Research (CAR) has the following characteristics: (1) On-the-job problems; (2) Problem-solving oriented; (3) Improvement-oriented; (4) Ciclic; (5) Action-oriented; (6) Assessment of impact action; (7) Specifics contextual; (8) Participatory (collaborative); (9) The teacher who conducts the research acts as the practitioner who conducts the research reflection; and (10) It is carried out based on cycles, in one cycle consisting of planning , acting , observing , and reflecting stages and then repeated in several cycle.

This is something that researchers need to pay attention to. According to Hopkins (Taniredja, et al, 2019: 17) some of these important principles can be described as follows: (1) The main task of educators and education personnel is to organize learning; (2) Research is an integral part of learning that does not require a specific time or method of collection. Data; (3) Research activities that are part of learning must be held while still relying on the flow and rules scientific; (4) Existing problems rely on real events that take place in the context of real learning actually; (5) Improvements in learning are carried out periodically; and (6) The scope of action research problems should not be limited to learning problems in the classroom, but can be extended to the level outside the classroom. Kemmis and McTaggart's action research model in 1988. They used a four-component research design in each step, namely (1) planning, (2) acting, (3) observing, and (4) reflection. Kemmis and Mc Taggart make a single component of action (acting) and observation (observing) (Taniredja et al, 2019:24).

Based on the results of observations and discussions, the research subjects were students of class X TPK SMKN 2 Lamongan. Taking into account that the class is still experiencing some problems, the learning process is still experiencing a number of problems, such as the lack of theoretical space so that the theory is not isolated but is inserted with the theory practice.

Information from the teacher to students to do a learning activity in the form of work, practice, or in the form of applying learning outcomes to achieve a goal is called a job sheet . It can also be said as a learning tool, because with job sheets students can carry out learning activities to achieve an ICT. The operational definition of research variables is as follows: (1) The media used in this research is the provision of job sheets , namely the media for providing work instructions to carry out practical activities which contain theory and steps practice; (2) The value of students' practice results in cycles I, II, III as the value of learning achievement

Collection technique data when making observations and continuing during the learning process and the results are used to determine the next step of planning and taking action. Obtaining data in the form of observations on the management of learning and learning achievement of students. Data analysis was carried out in a qualitative descriptive manner. The value gain is analyzed using Absolute Gain with mathematical equations. Management data was analyzed using percentage units, namely the total number of average scores of two observers divided by the maximum score multiplied by 100%.

The success of this research is marked by an increase in student learning achievement during the learning process that has been determined by the indicator, namely the fulfillment of the minimum graduation criteria (KKM) applicable in the school. A student is said to have increased learning achievement if he has reached a value of 75%.

## RESULTS AND DISCUSSION

### Results

Implementation in the first cycle with material preparation for welding and K3 as well as welding in the down hand position. Observations were carried out by observers and researchers. Activities carried out by observers and researchers are observing the activities of students in the implementation of learning by using job sheets carried out with observation sheets. The results of the first cycle of action in the form of student achievement scores are presented in Table 1. as follows:

**Table 1** Student Results in Cycle I

No.	Students Presence Number	Early Score	Final Score	Gain
1	01	5.5	6.50	1.00
2	02	3	6.00	3.00
3	03	5	6.75	1.75
4	04	5.5	7.13	1.63
5	05	4	6.75	2.75
6	06	5	7.25	2.25
7	07	6.5	7.50	1.00
8	08	6.5	6.75	0.25
9	09	6	6.38	0.38
10	10	5.5	6.88	1.38
11	11	6.5	5.88	-0.63
12	12	3.5	6.00	2.50
13	13	5	6.38	1.38
14	14	5.5	6.38	0.88
15	15	5	6.88	1.88
16	16	7	7.50	0.50
17	17	9	7.63	-1.38
18	18	5.5	6.88	1.38
19	19	5	7.63	2.63
20	20	4.5	6.38	1.88
21	21	4	6.50	2.50
22	22	5.5	6.88	1.38
23	23	4	6.88	2.88
24	24	5.5	6.50	1.00
25	25	4	6.38	2.38
26	26	4	6.75	2.75
27	27	7	7.75	0.75
28	28	5	6.13	1.13
29	29	5.5	6.88	1.38
30	30	7	7.50	0.50
31	31	4	6.38	2.38
32	32	4	6.75	2.75
33	33	7	7.75	0.75
34	34	5	6.13	1.13

No.	Students Presence Number	Early Score	Final Score	Gain
35	35	5.5	6.88	1.38
36	36	7	7.50	0.50
<b>Average</b>		<b>5.35</b>	<b>6.78</b>	<b>1.43</b>

average pretest score (early score) is 5.35 while the average value at the end of the first cycle is 6.78 so that the gain obtained is 1.43. The increase that occurred but still needs to be increased again because the value of 6.78 does not meet the value of KKM.

Looking at the results in the first cycle, a reflection is carried out to see the weaknesses and success of the implementation of the first cycle of actions. The results of the first cycle reflection include: 1) In order for student learning outcomes to increase, for the next cycle it is hoped that a situation will be created so that students are active and enthusiastic in participating in learning. The method is to invite students in class discussions and ask questions during the learning process. The problem of difficulty in understanding the material for students, the teacher can summarize and insert learning material in the job sheet so that if students are not clear and are reluctant to ask the teacher they can look in the job sheet. Assistance is needed for students in carrying out practical activities so that they can supervise the work of students and provide direct guidance if an error occurs. Participant's work educate already finished live could corrected by supervising teacher and if it's still not good, it can be repaired immediately without having to wait for other friends so that no time is wasted free. 2) Learning management is still not optimal and must be repaired on meeting next. Among other in terms: (a) providing additional materials/experiences/events to strengthen the material, (b) correcting errors, (c) the teacher helping students with difficulties when conducting experiments. Other things that still need improvement are: (a) the teacher reprimands students who do not perform well during practice, (b) the teacher guides students to draw something conclusion.

The implementation of the second cycle of actions in the form of applying job sheets was carried out in two meetings according to the class X TPK welding engineering lesson schedule. In cycle II, the learning materials are setting up electric current for welding and setting up welding machines, electrode characteristics, and making fillet joints in a horizontal position. Activities carried out by observers and researchers are observing the activities of students in the implementation of learning by using job sheets.

The results of the second cycle of action in the form of recapitulation students' learning achievement scores are described in Table 2.

**Table 2** Student Results in Cycle II

No.	Students Presence Number	Early Score	Final Score	Gain
1	01	6.50	7.63	1.13
2	02	6.00	8.00	2.00
3	03	6.75	7.25	0.50
4	04	7.13	7.13	0.00
5	05	6.75	7.50	0.75
6	06	7.25	7.88	0.63
7	07	7.50	7.38	-0.13
8	08	6.75	7.50	0.75
9	09	6.38	6.88	0.50

No.	Students Presence Number	Early Score	Final Score	Gain
10	10	6.88	7.50	0.63
11	11	5.88	7.25	1.38
12	12	6.00	7.25	1.25
13	13	6.38	7.75	1.38
14	14	6.38	8.13	1.75
15	15	6.88	7.88	1.00
16	16	7.50	8.25	0.75
17	17	7.63	8.50	0.88
18	18	6.88	7.50	0.63
19	19	7.63	7.88	0.25
20	20	6.38	7.25	0.88
21	21	6.50	7.50	1.00
22	22	6.88	7.63	0.75
23	23	6.88	7.25	0.38
24	24	6.50	7.88	1.38
25	25	6.38	7.75	1.38
26	26	6.75	7.75	1.00
27	27	7.75	8.00	0.25
28	28	6.13	7.38	1.25
29	29	6.88	7.63	0.75
30	30	7.50	8.63	1.13
31	31	6.38	7.75	1.38
32	32	6.75	7.75	1.00
33	33	7.75	8.00	0.25
34	34	6.13	7.38	1.25
35	35	6.88	7.63	0.75
36	36	7.50	8.63	1.13
<b>Average</b>		<b>6.78</b>	<b>7.65</b>	<b>0.87</b>

The average value at the end of the second cycle was 7.65, an increase of 0.87 from the early score of the cycle. The increase in the second cycle is less than the increase in the first cycle. This is probably due to the increasingly difficult material. Even though the average final score of cycle II was already above the KKM set, there were still some students whose scores were below the KKM so they still needed to be improved in the next cycle.

Based on the results of the second cycle of observations, it is necessary to reflect on the weaknesses and success of the implementation of the second cycle of actions. The results of cycle II reflections include: 1) When the teacher delivers the material, the students are not busy alone but want to pay attention and listen to the material on the job sheet . Occasionally there are students who immediately ask if there is an explanation from the teacher that is not clear. When working on a job , the time used becomes more effective because students receive direct assistance from the teacher/observer. However, there are still many students who have difficulty in working on the job so that the accompanying teacher/observer always gives almost the same direction to each participant students. 2) The learning management process carried out by the teacher is better than the previous cycle, it's just that there are still some things that still need improvement, among others in terms of: (a) providing additional materials/experiences/events to strengthen the material, (b) the teacher reprimands students who do not perform when practice. 3) At the next meeting, each group should be given a

demonstration by the supervisor / observer so that in working on the job the students do not experience many difficulties so that the teacher does not need to explain to the students one by one. Students will be easier to understand if given a demonstration rather than just direct directions. In addition, so that the material presented can be absorbed properly, after the completion of the practice a review is held for each group led by the teacher/observer. The content of the review is the core of the job sheet material that has been studied and reviewed practical activities that have been implemented and delivered by the teacher/observer. Students and teachers/observers can draw conclusions together from the results learning.

The implementation of cycle III actions in the form of applying job sheets was carried out in two meetings according to the class X TPK welding engineering lesson schedule. The subject matter of cycle III is distortion, welding defects and making fillet joints in a vertical position . Observation of the implementation of the third cycle of action was carried out by observers and researchers. Activities carried out by observers and researchers are observing the activities of students in the implementation of learning by using job sheets.

The results of the third cycle of action in the form of recapitulation student learning outcomes are described in Table 3. as follows:

**Table 3** Student Results in Cycle III

No.	Students Presence Number	Early Score	Final Score	Gain
1	01	7.63	7.88	0.25
2	02	8.00	7.88	-0.13
3	03	7.25	7.75	0.50
4	04	7.13	7.63	0.50
5	05	7.50	7.88	0.38
6	06	7.88	8.25	0.38
7	07	7.38	8.25	0.88
8	08	7.50	7.63	0.13
9	09	6.88	7.63	0.75
10	10	7.50	8.25	0.75
11	11	7.25	7.88	0.63
12	12	7.25	7.25	0.00
13	13	7.75	7.63	-0.13
14	14	8.13	8.13	0.00
15	15	7.88	7.75	-0.13
16	16	8.25	8.38	0.13
17	17	8.50	8.63	0.13
18	18	7.50	7.75	0.25
19	19	7.88	8.00	0.13
20	20	7.25	7.50	0.25
21	21	7.50	7.88	0.38
22	22	7.63	8.13	0.50
23	23	7.25	8.00	0.75
24	24	7.88	7.50	-0.38
25	25	7.75	7.75	0.00
26	26	7.75	8.13	0.38
27	27	8.00	8.75	0.75

No.	Students Presence Number	Early Score	Final Score	Gain
28	28	7.38	7.50	0.13
29	29	7.63	7.63	0.00
30	30	8.63	8.50	-0.13
31	31	7.75	7.75	0.00
32	32	7.75	8.13	0.38
33	33	8.00	8.75	0.75
34	34	7.38	7.50	0.13
35	35	7.63	7.63	0.00
36	36	8.63	8.50	-0.13
<b>Average</b>		<b>7.65</b>	<b>7.92</b>	<b>0.27</b>

The average value at the end of the third cycle was 7.92, an increase of 0.27 from the initial value. The increase in cycle III is much less than the increase in cycle II. This is because the material is getting harder. However, the final score of each student in cycle III is already above the KKM set.

Based on the results of the third cycle of observations, it is necessary to reflect on the weaknesses and success of the implementation of the third cycle of actions. The results of cycle III reflection on the achievement of increasing student learning achievement, it can be concluded that the learning or actions that have been taken can improve student learning achievement, and these results prove that the application of *job sheets* can improve student learning achievement. The increase experienced in the third cycle tends to decrease when compared to the increase in the second cycle. It can be said that the increase in learning achievement is already saturated. The management of learning carried out by the teacher is also good.

## Discussion

The learning achievement of students can be known by using pretest-posttest questions, the assessment sheet for the practice results assessed by the teacher and the observation sheet for the practical learning process of the students observed by the observer. Based on the results of the assessment, the average pretest score was 5.35. This value is still very low because the questions given have not been taught. Learning achievement in the first cycle obtained an average value of 6.78 with an increase (Gain) of 1.43. This significant increase indicates that the use of job sheets in learning is quite effective in improving student achievement. Students are greatly helped by the job sheets given to students. Nevertheless, the achievements have not met the KKM so that it still needs to be improved again in the cycle II.

In this second cycle, the existing job sheets were refined again by adding learning materials so that students better understand what the teacher is saying and make it easier when doing the job. In addition, teachers and observers also accompany students when doing work. With the assistance of teachers and observers, students are more focused in completing their respective jobs. The average learning achievement in the second cycle is 7.65 with a Gain of 0.87 from the first cycle. This value is quite good considering the KKM set at 75. However, there are still 8 students whose scores are still below the KKM. set.

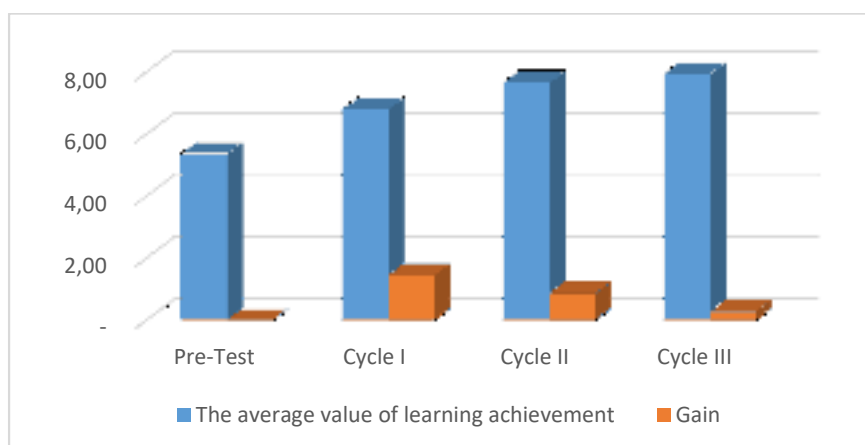
In cycle III, in addition to using the job sheet, the teacher/observer of each group gave demonstrations to students to make it easier to understand and do the job. In addition, at the end of the lesson, a review of each group is held guided by the teacher/observer who briefly discusses the lessons that have been learned during the first cycle and the



reinforcement of the material that has been studied. In addition, to reach a common conclusion. The average value of learning achievement in the third cycle is 7.92 with a gain (increase) over the previous cycle of 0.27. This value is quite good, it is proven that all students get scores above the KKM. Therefore, it can be concluded that the application of job sheets in learning welding techniques can improve student achievement educate. It can be described in Table 4 below:

**Table 4** Data on the Average Value of Student Learning Achievements

	Pre-Test	Cycle I	Cycle II	Cycle III
The average value of learning achievement	5.35	6.78	7.65	7.92
Gain		1.43	0.86	0.27



**Figure 1** Data on the Average Value of Students' Learning Achievements

## CONCLUSION

Based on the research objectives, research results, and discussion, the research that has been carried out in class X TL SMKN 2 Lamongan can be concluded as follows: (1) The learning model uses a job sheet, a job sheet is given at the beginning of the lesson, then the teacher explains the learning material and the contents of the job sheet, then before the practice is carried out, the teacher and observers conduct demonstrations in each group that is accompanied. Students practice with their respective teachers/observers. After doing the practice, the teacher/observer and the students in each group conduct a review of the learning that has been done. (2) The use of job sheets in learning welding techniques can

improve student learning achievement. The increase in student learning achievement can be seen from the average value of student learning achievement starting from the pretest, cycle I, cycle II and cycle III, respectively 5.35; 6.78; 7.65; 7.92 with Gain (increase) in each successive cycle of 1.43; 0.87 and 0.27. The percentage of the average value of learning management for aspects of teacher activities increased by 12% from 69% in the first cycle to 81% in the second cycle and increased by 5% from 81% in the second cycle to 86% in the second cycle. III.

The perceived limitations of this study are: (1) The material used in this study is only material about manual arc welding so that the effectiveness of using this job sheet is not yet known if it is applied to the other subject matter; (2) The tools used for practical activities in the workshop are very limited so that students have to take turns in learning use it; and (3) The tests carried out can interfere with the practice and psychological time of students.

### SUGGESTION

After conducting this classroom action research, the following suggestions can be made: (1) The use of job sheets in learning is relevant to be applied in the classroom so as to create active and effective learning meaning; (2) Similar research can be done, but it is necessary to pay attention to the availability of practical tools with the number of participants educate; (3) The test for achieving theoretical learning outcomes does not need to be carried out because it interferes with activities practice; (4) Presenting gains in the initial cycle does not need to be done because there is no good learning model yet found; (5) For other research using job sheets, it is not necessary to do a test in the form of giving question.

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