

The Effectiveness of the Model Employability Skills Learning Based on Trainer Simulator Air Conditioner in Vocational High Schools

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 10 May 2021

Abstract: The rate of unemployment growth in the province of Riau Islands is very high. The unemployment rate, particularly for SMK, is 12.98%; about 8,959; for SMA, 10.91% or about 7,530 people. The issues are poor work ethics, insufficient problem-solving strategies, critical thinking skills, the ability to work and the consistency of business performance, just skills which are deemed good enough. This thesis seeks to analyze the efficacy of a Vocational High School Air Conditioner Job Simulator Learning Model. The study design was quasi-experimental, applied to learning in the experimental and control lessons. The study included students taking the Air Conditioner course. The method used was the Efficiency Test. The findings showed that the student performance test results with the Employability skill learning model based on the trainer simulator air conditioner were higher than the results of the work-oriented training performance test. Thus it can be inferred that the use of the Air Conditioner Simulator Employability Skill Learning Model is more efficient than learning on a work basis.

Keywords: Employability Skills Learning Model, Trainer Simulator Air Conditioner, Vocational High Schools

1. Introduction.

The progress and prosperity of a nation, one of the benchmarks that are influenced by the level of development of the workforce in the country. The nations of the world today are racing to improve the quality of their workforce in various ways. Thus it is very important for a country's workforce for the progress of the nation itself. Indonesia, one of the big countries in the world, also experiences problems in terms of the workforce. World meters data, in 2019, Indonesia's population numbered 269 million, equivalent to 3.49% of the world's population. With this data, the availability of labour in our country is very large. However, the quantity of skilled workforce to fill the existing job opportunities is not qualified. This is a problem that must be resolved immediately, in the era of free competition, our country needs skilled and professional human resources in their fields.

Creating a qualified and professional skilled workforce is largely determined by the quality of schools or higher education institutions that are supported by learning patterns or methods that are suitable for the area of expertise [1]. As a more specific channel to create a ready-made and skilled workforce, one of them is by increasing the number of vocational or vocational schools. In this case, it is necessary to develop learning models and methods by the needs of the world of work [2][3][4].

Technological and vocational schools (technical vocational education), as one of the education that leads directly to the world of work, have an important role in preparing the workforce to face globalization and technological changes that have an impact on the behaviour of social, political and economic life in society [5][13][14][15][16][17]. Information technology and technological innovations that are developing in the world of work and industry are always changing all the time [7][8][9][10]. Different types of work require the development of diverse skills for industrial production with new technologies to have economic value for the nation and state. Hayton explains that the competition for components of the industrial world in the 21st century will depend on the ability of the industrial world to innovate its products to compete in the free market[6]. Every innovation in engineering requires employees with an intellectual and intelligent level who can compete with other countries [11].

Law No. 20 of 2003 National Education System No. 20 of 2003 article 2 states: "National education aims to develop the potential of students to become human beings who believe and fear God Almighty, have a noble character, are healthy, knowledgeable, competent, creative, independent, and become democratic and responsible citizens" [12]. Data from the Central Bureau of Statistics for 2017 shows data on the workforce in Indonesia based on the level of education obtained. This data can be described in the table below:

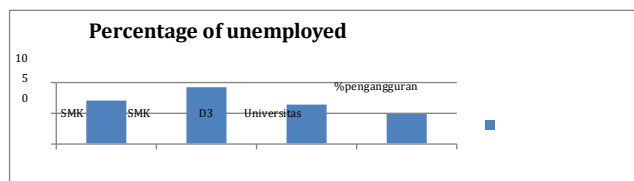


Figure 1. Data from the Central Bureau of Statistics 2017

From Figure 1 above, the SMK unemployment rate is 9.27%. For SMA level 7.03%, Diploma level 6.35%, and University 4.98%. Furthermore, in the Riau Islands Province, the Open Unemployment Rate (TPT) is quite high. BPS Kepri said that in August 2018 there was an unemployment rate of 69,023. The unemployment rate is dominated by SMK graduates as much as 12.98% around 8,959 people, high school unemployment as much as 10.91% or around 7,530 people. The rest are graduates from SD, SMP, to undergraduate. One of the causes of high unemployment in vocational education in this country is the low level of special skills and soft skills. These data reveal that graduates of vocational education, especially vocational schools in Riau Islands Province, especially Batam City, need to do innovations in the development of employability skills required by industrial development. When viewed more deeply, SMKN 3 Batam as one of the schools in the Riau Islands Province also experiences the same thing, according to data from the public relations representative in charge of industrial relations and public relations as well as the schedule of students practising in the industry, the data obtained is as follows:

Table. 1 Data of SMKN 3 Batam Graduates
Data of Students of SMKN 3 Batam who are not Absorbed in the World of Work in the Form of a Percentage (%)

No	Department	2016/2017			2017/2018		
		Number of Graduates	Does not work	Lecture	Number of Graduates	Does not work	Lecture
1	Light Vehicle Engineering (TKR)	39	24 (65,1%)	9 (23%)	37	24 (64,8%)	10 (27%)
2	Motorcycle Business Engineering (TBSM)	49	34 (69,4%)	5 (10,2%)	35	28 (80%)	4 (11,4%)
3	Industrial Electronics Engineering (TEI)	39	14 (36%)	20 (51,3%)	69	34 (49,3%)	29 (42%)
4	Cooling and Air Conditioning Engineering	43	20 (46,5%)	13 (30,2%)	39	20 (51,3%)	10 (25,6%)
5	Computer and Network Engineering (TKJ)	42	22 (52,4%)	13 (30,9%)	69	39 (56,5%)	27 (39,1%)
6	Dressmaking (TB)	14	7 (50%)	3 (21,5%)	0	0	0

Source (PR of SMKN 3 Batam 2019)

Data table 1 above, in 2016-2018 shows that the graduates of SMKN 3 Batam, as a whole, many do not get a job. Especially graduates majoring in Cooling and Air Conditioning Engineering. This is in stark contrast to the growing need for refrigeration engineering technicians according to the Greenhouse Gas Inventory report. From the empirical data above, it is necessary to find the root of the problem, why many SMK graduates do not get jobs. The problems that occur are low work ethic, lack of problem-solving techniques, critical thinking skills, ability to work together and the quality of implementing work results, only skills are deemed good enough.

Specifically for the absorption of the workforce with cooling and air conditioning engineering graduates based on the Greenhouse Gas Inventory report in the Refrigeration and Air Conditioning Sector (RAC). The demand for RAC equipment in Indonesia is growing continuously. The industry as a means of channelling the workforce still considers that SMK graduates do not have the minimum standard requirements to become an employee. The obstacles that most new workers with SMK graduates complain about are employment (employability), ethics and there is no alignment between teaching programs in schools and industrial needs. The competition for vocational school graduates for jobs is also getting tighter because companies are also becoming more selective in choosing prospective employees.

Industry demands for prospective employees must have qualifications and work experience shaped by technical skills, Employability Skills, and personal attributes. The term Employability Skills integrates one's skills to be able to work in a work environment. Employability Skills is the ability to get a job and keep a job [18]. Employability Skills prepare a person for success in getting a job [19]. In industry, from the entry-level to the highest position Employability has become universal [20].

Even though learning is carried out in schools, practical work needs to be done to develop Employability Skills. In terms of developing potential, many problems are addressed in the implementation of industrial work practices, for example increasing competence and skills. Work experience as capital in the work system, communicating, collaborating and behaving with others, as well as how to apply the theory learned in school to the real world. So that we need a learning model that can overcome these problems.

The purpose of this study was to determine the effectiveness of the Employability Skills Learning Model Based on Trainer Simulator Air Conditioner in Vocational High Schools, while the focus of this study is to determine student learning outcomes through Performance using this model.

2. Method

The research method used in this research is an experimental method with quasi-experimental research design (quasi-experimental design), where there are an experimental group and a control group as a comparison. In this quasi-experimental study, it was classified as non-equivalent control groups, pretest and posttest design, namely the control group and the experimental group before and after the pretest and posttest were carried out. This design is depicted:

Table 2. Control group posttest design

Experiment	O1	X1	O3
control	O2	X2	O4

Information :

O1: the initial test (before treatment) of the experimental class group

O2: the final test (after treatment) of the experimental class group

O3: the initial test in the control group.

O4: final test in the control group with a work-based learning model.

X1: Learning treatment with the Employability Skills Learning Model.

X2: learning treatment with Model work-based learning.

The sample in this study were students who took Air Conditioner subjects. The instrument used was the Performance Test. then analyzed the data using the calculation of the SPSS application.

3. Result and Discussion

The purpose of this study was to determine the effectiveness of the Employability Skills Learning Model Based on Trainer Simulator Air Conditioner in Vocational High Schools, while the focus of this study is to determine student learning outcomes through Performance using this model.

1. Data on Classification of Employability Skills Experiment

Academic ability group grouping, thinking ability group and Personal quality group. Here are the results.

Table 3. Group Classification of Employability Skills Experiment

NO	Participant's Name	X									Group Results
		Academic ability			Thinking Ability			Personal Qualities			
		Total	TM	TPR	Total	TM	TPR	Total	TM	TPR	
1	Siswa 1	310	400	77	257	355	72	835	1180	71	Akade

											mik
2	Siswa 2	320	400	80	275	355	77	866	1180	73	akademik
3	Siswa 3	305	400	76	258	355	73	890	1180	75	akademik
4	Siswa 4	318	400	80	271	355	76	891	1180	76	akademik
5	Siswa 5	307	400	77	234	355	66	843	1180	71	akademik
6	Siswa 6	321	400	80	268	355	75	956	1180	81	Pribadi
7	Siswa 7	302	400	75	295	355	83	853	1180	72	Berfikir
8	Siswa 8	306	400	76	288	355	81	847	1180	72	Berfikir
9	Siswa 9	319	400	80	237	355	67	903	1180	77	akademik
10	Siswa 10	322	400	81	258	355	73	803	1180	68	akademik
11	Siswa 11	314	400	78	271	355	76	956	1180	81	pribadi
12	Siswa 12	311	400	78	286	355	81	977	1180	83	pribadi
13	Siswa 13	322	400	81	253	355	71	859	1180	73	akademik
14	Siswa 14	341	400	85	268	355	75	866	1180	73	Akademik
15	Siswa 15	312	400	78	309	355	87	879	1180	74	berfikir

From the data above, students in the experimental group totalling 15 students can be in groups based on the employability skills component and seen based on the highest percentage of univarian formulas, three components are obtained, namely the academic ability level group totalling 9 students, the thinking ability level group numbering 3 students and the personal quality level totalling 3 students. So after this grouping, performance test questions are distributed in the form of pre-test and final test.

While the performance test results obtained from the pre-test and post-test results are as follows:

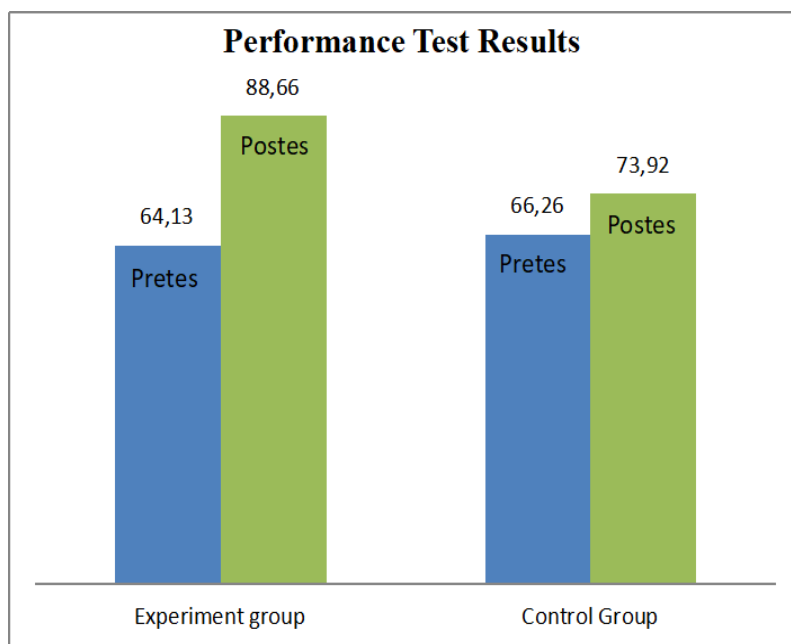


Figure 2. Graph of Performance Test results

From Figure 1, it can be seen that in the experimental class the average pretest value is 64.13 and post-test is 88.66. Whereas in the control class the average pretest score was 66.26 and post-test was 73.92.

2. Normality Test

Normal distribution data is a requirement that must be met before performing parametric analysis. The normality test used the Kolmogorov Smirnov and Shapiro-Wilk statistical test with a significant level of fish $\alpha = 0.05$, tested with SPSS 25. The test results can be described in the SPSS 25 test results table.

Table 4 Pretest Normality Test for Control and Experimental Class

Tests of Normality							
Class		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
learning outcomes	pre-test experiment	0.154	15	.200*	0.941	15	0.396
	post-test experiment	0.140	15	.200*	0.938	15	0.359
	control pre-test	0.242	15	0.018	0.915	15	0.159
	post-test control	0.174	15	.200*	0.915	15	0.159
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

The results of the pretest normality test in Table 4., there are 2 significance tables, namely the Kolmogorov-Smirnov significance table and the Shapiro-Wilk significance table, because the number of pre-test and post-test items above is less than 50 items, the Shapiro-Wilk table is used. From the Shapiro-Wilk data above, it shows a significance value (2-tailed), for the pre-test experimental class of 0.396, the post-test of 0.396 and the pre-test control class of 0.195 and the post-test of 0.195. Data analysis is said to be normal if the calculation result is greater than the result of the table where all the calculation results, both the control group and the experiment, exceed ($>$) 0.05, it can be stated that the two pretest data are normally distributed.

3. Homogeneous Test

The purpose of the homogeneity test is to clarify the variance (diversity) of test results from two or more groups to be homogeneous or heterogeneous. The homogeneity test was carried out on the test of student learning outcomes using the Levene test with SPSS 25 software with the data criteria being said to be homogeneous if the significance level was greater than 0.05. The test results obtained:

Table 5. POST-TEST Homogeneity Test

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
learning outcomes	Based on Mean	1.921	3	56	0.137
	Based on Median	0.998	3	56	0.400
	Based on Median and with adjusted df	0.998	3	41.249	0.403
	Based on trimmed mean	1.844	3	56	0.150

From Table 5, the homogeneity test shows that the posttest significance value is 0.137. It can be interpreted as being greater than 0.05 and it can be concluded that the control class and experimental class students are homogeneous (the same).

4. t-Test

Problem-solving abilities can be seen from several aspects, including the level of ability to identify components that must be considered from a problem, the ability to formulate problems, the ability to choose strategies or steps in problem-solving, to be able to provide data interpretation, and the ability to solve problems in learning. The results of tests carried out in the control class and experimental class will be analyzed by table 6:

Table 6. The t-test

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The Learning Outcomes of Employability Skills	Equal variances assumed	1.717	0.201	13.704	28	0.000	14.667	1.070	12.474	16.859
	Equal variances not assumed			13.704	24.606	0.000	14.667	1.070	12.461	16.873

The results of the pretest-posttest t-test in table 6 show that the significance level of the two classes is 0.00 and the table value is 0.05, the comparison of t count and t table uses a significance of 5% so H1 is accepted and H0 is rejected. So from the results of the t-test above, there is a difference between student learning outcomes and the Employability Skills Learning learning model compared to the work-based learning method. Where the learning outcomes of the Employability Skills learning model are better than the work-based learning method. So it can be concluded that the Employability Skills Learning learning model is declared effective.

The research model of employability skills learning based on this simulator trainer; the authors use a quasi-experimental method which is a quantitative research model. In this quasi-experimental study, it consisted of a control class and an experimental class in class XII of the Air Conditioning and Air Conditioning Engineering Department at SMKN 3 Batam. There are 2 classes of class XII TPTU 1, totaling 30 as the control class (15 students) and the experimental class (15 students).



Figure 3. The division of the control class and the experimental class

In Figure 3 above, you can see the process of dividing the experimental group class and the control class group, where 15 students of the control class and 15 students of the experimental class were obtained.

1. Learning Syntax

In the Employability Skills Learning model, the learning syntax consists of 4 syntaxes, namely:

a. Orientation I

During the first orientation period, the teacher conducted grouping based on student personality based on employability skills. With the aim: so that we can see students personally based on employability skills and what stimulus will be given to these students.

In the Orientation phase I, students are grouped into desks into group assignments, namely: Academic ability level groups, personal ability level groups and thinking ability groups. where the objectives of this grouping are:

- 1). So that teachers can more easily know students based on student character based on employability skills
- 2). The teacher easily recognizes the character of students in terms of employability skills
- 3). Teachers do not need every study group, do not need to create new groups, just mix existing groups or groups of thinking skills, academic abilities or groups of personal qualities themselves.

b. Orientation II/Identification of Problems

In the phase of describing the problem that will be in the field and students identify the problem. Example:

- 1). The teacher explains the working principles of Air Conditionals and in the field how to identify the working principles of Air conditionals in the field.
- 2). Students will write down what will be seen from the working principle of air conditionals in the field



Figure 4. Orientation Phase II

c. Formulating Problems

During the formulation of the problem:

- 1) The teacher provides a grid of problem formulations by the RPP and Curriculum Standards
- 2) Students Formulate problems encountered in the field

d. Investigation

At this stage, students are given direct learning directed like learning the work-based learning model, where students are stimulated to see or investigate direct problems in the field, especially in learning the refrigeration system with the conditional water circulation system sub-competence.

- 1) The teacher orders the existing groups to go directly to the field and the teacher gives direct explanations in the field about the conditional water circulation system.
- 2) Students see and investigate directly to the Air conditional itself.

e. Exploration

After the teacher provides a direct explanation and asks the existing groups to investigate, the students immediately see the working principle of the air conditional itself by using conditional water repair and maintenance tools.

In this condition:

- 1) The teacher completes the assessment form for the daily development of students using the employability skills method, namely: the level of academic ability, the level of thinking ability, the level of personal ability and the skills about learning itself.
- 2) Students: by using the cooling technique in groups look for and discover how the working principles of the air conditional itself. And students make preliminary predictions about the air conditional work system.



Figure 5. Investigation phase

f. Reflection

After seeing and investigating the conditions and making field predictions, the teacher directs the students to the air conditional simulator trainer. Trainer simulators are used to prove whether the air conditional working principle in the field is by the learning theory given by the teacher.

After seeing the spaciousness, the constraints faced will be discussed in the conditional air simulator trainer to better describe what conditions occur in the field. This is done over and over again every problem that occurs in the field specifically on the Conditional water circulation system. As shown below:



Figure 6. Reflection Phase

During this Reflection:

- a) The teacher will pay attention to student work after the teacher provides an explanation of the procedure for using a learning trainer (manual for using a simulator trainer) and the teacher continues to provide daily assessments of students. based on the 4-point above
- b) Students prove what has been done or happened in the field by using a conditional air simulator trainer. Without neglecting the procedure for using the simulator trainer

g. Evaluation.

In this phase, the teacher evaluates the results of practical work carried out using conditional air simulator trainers. In this study, an evaluation was carried out by providing a performance test, which was carried out by pre-test and post-test. The pre-test was carried out after the division of the employability skills group. This was done to 3 students in a single test, namely students in the academic ability level group 1 student, the thinking

ability level group 1 person and the personal quality group 1 person. Due to the uneven distribution of groups, only two of my test groups were of three groups. The pre-test testing was carried out directly by the researcher.



Figure 7. The phase of the Evaluation Process

In Figure 7 above, the implementation is carried out at different times based on the given learning schedule. Where each test group was carried out by three students 1 student from the academic ability group, one student from the thinking ability group and one person from the personal strength group, specifically for the experimental class, while for the control class, three students were taken randomly. Direct testing is carried out by researchers.

Furthermore, Post-test which is the final process in this research which is carried out after the learning process is completed according to the learning syntax. The post-test process was also carried out by 3 students as did the students in the pre-test process, while for the control class it was carried out with the same students during the pre-test. To maintain the accuracy of student learning outcomes, the test was carried out by 2 people.

Especially for the control class, learning only uses stimulus 1, namely learning using the work-based learning method. For the question of this performance test between the pretest and post-test the same for both classes (control and experiment). In the implementation of the employability skills learning model, students are described the industrial work atmosphere that is applied in the form of learning with the expectation that the competencies that must be possessed. Thus competency attainment should not occur and there is no gap between industry needs and the model developed. So it can be explained that the employability skills learning model is a learning model that develops the quality of work principles in the industry. The working principles referred to are improving skills, academic abilities, thinking skills and improving personal qualities. In Employability skills, it means that a person's ability to get a job, keep a job and develop the job itself. If it is interpreted as education, students can get good learning outcomes, maintain learning outcomes and develop learning outcomes by existing needs in the industry.

4. Conclusion.

Based on the results of the research on the development of the Employability skills learning model based on the conditional air simulator trainer, it can show a significant increase in student learning outcomes. The Employability Skills Learning model is concluded to be more effective than the work-based learning model. The impact of the Employability Skills Learning model can show the level of skills development, the level of academic ability, the level of thinking skills and personal qualities. The employability skills learning model produces a learning model that requires the activeness of teachers and students in learning and teaching and develops their competencies and also improves teachers' understanding of student and student personality in the technical field in particular. The employability skills learning model is a learning model that develops the quality of work principles in the industry. Where the working principles referred to are improving skills, academic abilities, thinking skills and improving personal quality.

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