

THE EFFECT OF ON-THE-JOB TRAINING ON PROBLEM SOLVING SKILLS AND SELF EFFICACY OF AVIATION POLYTECHNIC CADETS

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Abstract: *Aviation Polytechnic is a vocational education that should follow the global vocational education. The Polytechnic prepares its graduates not only to achieve education but also to develop social attitudes and skills in various fields. On-the-job training (OJT) programs were then conducted to increase some of these skills, namely problem-solving and self-efficacy (confidence in their abilities). This study aimed to determine whether OJT affected problem-solving skills, self-efficacy, and both. It used a quantitative method with a questionnaire as the instrument for data collection. The data were analyzed by a series of tests that examined the instrument, the prerequisite test, and the hypothesis. They were examined using the MANOVA method. The study indicated that OJT affected the problem-solving skills of Palembang Aviation Polytechnic cadets. The study also found the effect of OJT on the cadets' self-efficacy. Finally, it was found that OJT had an effect on both problem-solving skills and self-efficacy.*

Keywords: *On the Job Training, Problem Solving, Self Efficacy, Cadets*

Introduction

Aviation Polytechnic is a vocational college under the Ministry of Transportation. The goal of the Polytechnic is to produce flight safety technicians and operators who are ready to work in the aviation industry and services as mandated by Law No. 12 of 2012. In conventional educational institutions, people who take education are called students. In the aviation polytechnic, these students are called cadets. Cadets are participants who study in transportation training institutions within the transportation human resources development agency (Transportation Human Resource Development Agency, 2018). They must have good behavior during the study so they can be an example for the community (Afifah, 2021).

Technical and vocational education can be understood in many forms. For example, it provides academic education and skill development related to various fields of work, production, services, and livelihoods. In addition, it is considered as part of lifelong learning. It can take place at secondary, post-secondary, and tertiary levels. It includes work-based learning, continuous training, and professional development that can lead to qualifications. Finally, the application of the provisions of this recommendation will depend on the specific conditions, governance structures, and constitutional provisions that exist in the country (UNESCO, 2015).

According to the World Economic Forum (WEF), it is estimated that by 2025, humans will be doing something together to handle available job opportunities. In October 2020, WEF officially issued a paper discussing ten skills needed in the work environment. These skills are

1) the ability to think innovatively and analytically, 2) active learners, 3) complex problem-solving skills, 4) critical analysis and thinking, 5) creative, original, and initiative, 6) leadership and social butterfly skills, 7) proficiency in using technology, 8) programming, 9) strong reasoning and the ability to have many ideas and finding problem solutions, and 10) resilience, stress tolerance, and high flexibility. Of the ten statements above, critical thinking and problem solving top the list of skills that entrepreneurs believe are increasingly necessary in the coming years (The Future of Jobs Report 2020, 2020).

To develop those knowledge and skills, training and improvement are highly important. The training should focus more on developing capacity in an activity. One example is developing soft skills. This relates to interpersonal skills and soft skills of learning in the world of work. On-the-job training (OJT) provides specific skills to perform a particular job and self-development concerning the general improvement and growth of an individual's skills and abilities (Asfaw et al., 2015).

Problem-solving is a matter of reaching a threshold of being organized with initial mental capacities and primary cognitive processes (Bahar & Maker, 2015). This skill is one of the most common ones in higher-order thinking skills (Rustam E. Simamora et al., 2018). It involves developing intelligence and many ways of finding out and learning the real world. A study claimed that problem-solving tends to lead humans to focus on a single hypothesis. In order to shift to an inventive culture, education and training must be paid attention and given to solve problems. They might help a situation that needs improvement, a better way of doing things, close information gaps and understand new phenomena or discoveries (Fitrianawati et al., 2017).

The second concept in this study is self-efficacy. It is a motivational construct that has been shown to influence individual activity choices, goals, perseverance, and work outcomes in a variety of ways (Newman et al., 2019). Like problem-solving, self-efficacy is classified as a soft skill. Soft skills have been long perceived as the main factor influencing success in the workplace since they account for 80% of the total, way higher than hard skills with 20% (Afifah & Panggabean, 2019). Self-efficacy is a matter of knowing whether an attitude is good or bad, right or wrong, and whether or not an individual is possible to do the specified work (Iqbal, 2018). Several studies have found it a better predictor of subsequent performance than past behavior (Pfitzner-Eden, 2016). Others reported that workers with high self-assessments showed greater results in achieving their goals (Nadia Rahman et al., 2019).

Aviation Polytechnic organizes vocational education programs by adjusting the skills acquired during education to the needs of the world of work. The composition of learning is divided into 30% theoretical learning and 70% practical learning. Vocational education at Aviation Polytechnic requires their cadets to achieve competencies in expertise, interpersonal skills, and attitudes. To achieve competence in the field of expertise, apprenticeship activities are carried out with the on-the-job training (OJT) method. This training is typically led by Human Resource (HR) management as they are responsible for providing quality staff. It means that to get strong human resources in each profession, one must receive job training. On-the-job training is a process of developing knowledge and skills. OJT aims to improve work results that are less than optimal due to a lack of training (Rangkuti et al., 2022). The training is intended to obtain human resources who have good skills, knowledge, and behavior to fill existing positions with a considerable level of activity to achieve optimal results (Dhita Adriani Rangkuti et al., 2022).

Self-efficacy also comes along with the mastery of skills that students have. It is a person's belief in themselves about doing a job. Individuals who lack self-efficacy will be confused and desperate when facing problems at work. (Herlina et al., 2022). Self-efficacy means a person's confidence in their abilities so that tasks can be completed and goals can be achieved. This term

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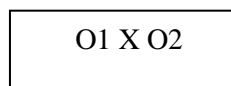
refers to each person's self-generation of skills to regulate enthusiasm, knowledge, and behavior under certain conditions. (UNESCO, 2015).

Until now, research on the relationship between on-the-job training activities and level changes, especially in problem-solving skills and self-efficacy, is very limited. For this reason, the researchers are interested in investigating whether the on-the-job training method implemented by the Aviation Polytechnic can increase problem-solving skills and self-efficacy in cadets so that the Polytechnic is in line with the expectations of vocational education goals that are in accordance with the demands of the world of work as recommended by UNESCO 2015.

Of many pieces sources available in the literature, some have focused on investigating the effects that OJT might bring to employees. For example, research written by Kable et al. (2022) measured the effect of training, skills, and self-confidence on employee performance. They found that both skills and confidence had positive and significant effects on employee performance. They also emphasized that training given to the employees positively and significantly affected their self-confidence. While skills were reported to have an effect on self-confidence, training had a positive effect on employee performance with mediation of self-confidence. Interestingly, other research added that the OJT might particularly lead to employee productivity. In 2022, Sianturi and Fadilah conducted research examining the effect of job training on employees of PT PLN (Persero) Customer Service Implementation Unit (UP3) in Medan. The research found that work productivity in employees who follow job training is better than the results of work productivity results in employees who do not follow job training.

Further, other research delves deeper into variables that might influence the effect of job training. For instance, research by Ilmiah et al. (2021) investigated the effect of job training on employee performance using problem-solving creativity as an intervening variable. Their research indicated that job training on problem-solving creativity did have a positive influence. The research also discovered that job training on employee performance had a positive effect, and problem-solving creativity positively affected employee performance. Another study conducted by Aulia and Setyaningrum (2023) focused on job satisfaction and affective commitment. They examined the effect of job training and self-efficacy on job satisfaction mediated by the role of affective commitment. Their findings showed a positive effect of job training on job satisfaction and the positive role of affective commitment. However, they did not find any influence between self-efficacy and job training on mediated job satisfaction. In addition, Kristanto et al. (2021) argued that self-efficacy, cooperation skills, and creative thinking skills had a positive effect on the ability of post-training employees to solve problems.

This research employed a positivistic approach using an experimental method. It involved concrete data obtained in the form of numbers. According to Sugiyono (2022), the experimental method is used to seek the effect of certain treatments on others in controlled situations. In this experimental research, a one-group pretest and posttest design was employed. Sugiyono (2022) explains that this design consists of several stages, starting with (1) determining participants for the group, (2) conducting a pretest before treatment, and (3) administering a posttest after treatment. The stages are illustrated in Figure 1 below.



O1: pretest value , O2: posttest value , X: treatment

Figure 1. Design one group pretest posttest (Sugiyono, 2022)

The X symbol in Figure 1 is the treatment carried out by researchers. In this study, the treatment involved the implementation of OJT programs. Meanwhile, the O1 was obtained from the implementation of the pretest assessment, and the O2 was taken from the posttest assessment. This study also divided variables into two: independent and dependent. The independent variable was OJT, while the dependent variables were problem-solving skills and self-efficacy. The relation between the influence of the independent variable and the dependent variables is illustrated in Figure 2 below.

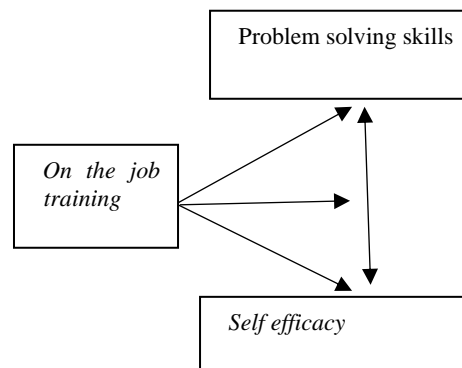


Figure 2. Relation between variables

Based on Figure 2, the following relationship can be described:

1. OJT affects problem-solving skills
2. OJT has an effect on self-efficacy
3. How much does OJT affect problem-solving skills and self-efficacy?

With the relationship described above, it can also be seen that this study has three hypotheses:

1. There is an effect of on-the-job training on cadets' problem-solving skills
2. There is an effect of on-the-job training on cadets' self-efficacy, and
3. There is an effect of on-the-job training on cadets' problem-solving skills and self-efficacy.

The population in this study were Aviation Polytechnic cadets within the Center for Civil Aviation Human Resources Development. They were fifth-semester cadets carrying out OJT distributed in several study programs. For example, 24 cadets studied in the Fire Fighting Rescue and Rescue (PPKP) study program batch I, while 44 were from the Airport Management (MBU) study program batches IA and IB. The study also involved 20 Curug Aviation Polytechnic cadets who studied in the Land Building Engineering (TBL) study program batch 13 and 20 Makassar Aviation Polytechnic cadets from the Air Traffic Management (MLLU) study program batch 14. This study used the consecutive sampling method. All subjects who came and met the selection criteria within a certain period of time were included in the study until the required number of subjects was reached (Sastroasmoro & Ismael, 2014).

Table 1. Research Population

No.	Major	Batch	Total
1.	MBU	1A	24
2.	MBU	1B	20
3.	PPKP	IA	24
4.	TBL	13	20
5.	MLLU	12	20

Method

Data in this study were collected using questionnaires asking about cadets' problem-solving skills and self-efficacy. The questionnaires were made following a four-scale Likert scale (1 = very low; 2 = low; 3 = good; 4 = very good). Table 2 below describes the score distribution of participants' responses.

Table 2. Questionnaire measurement scale

<i>Questionnaire measurement scale</i>		
No.	Answer	Score
1.	Very low	1
2.	low	2
3.	good	3
4.	Very good	4

The data collection activities in this study were conducted in two stages. The first stage is named the experiment preparation stage. Activities in this stage included preparing the design of the OJT programs and preparing supporting tools to conduct pretests. The pretest was conducted before the OJT implementation, and the posttest was given after the OJT. The next stage is the experiment implementation stage. Data collection in this stage went through double steps. First, the study conducted pretests and compiled the results. After that, posttests were given to all research subjects after the treatment was completed, and then the posttest data were compiled. This research was carried out for nine months, from January to September 2023.

Findings and Discussion

This section provides key findings that the researchers collected from the previous stage. The researcher used the quantitative method with the help of the SPSS version 25 to process the data. Further, this research performed multiple tests to analyze the data, such as validity, reliability, normality, homogeneity, and hypothesis tests. The following are the results of the data processing test from each test section. The first shows the validity test, which measures whether a questionnaire is valid or not. As the basis of decision making, (1) If $r_{\text{count}} > r_{\text{table}}$, then it is declared valid. (2) If $r_{\text{count}} < r_{\text{table}}$, then it is declared invalid.

Table 3. Validity Test Results Y1

Y1	r_{count}	Y1	r_{count}
1	0.361	10	0.556
2	0.440	11	0.463
3	0.292	12	0.492
4	0.478	13	0.537
5	0.397	14	0.427
6	0.527	15	0.474
7	0.421	16	0.372
8	0.398	17	1
9	0.321		

Based on the results in Table 3, it can be stated that questions from 1-9 in variable Y1 are declared valid according to the basic decision of $r_{\text{count}} > r_{\text{table}}$ (0.159).

Table 4. Validity Test Results Y2

Y2	r _{count}	Y2	r _{count}
1	0.433	10	0.306
2	0.398	11	0.252
3	0.473	12	0.370
4	0.439	13	0.468
5	0.456	14	0.363
6	0.408	15	0.498
7	0.347	16	0.446
8	0.326	17	0.177
9	0.424	18	0.661
10	0.306	19	1

After that, Figure 4 presents the validity test results for variable Y2. The table shows that all questions in the Y2 variable are declared valid according to the basic decision of $r_{count} > r_{table}$ (0.159). After identifying the instrument's validity, it is necessary to conduct a reliability test to determine the extent to which the measurement results with the same object will produce the same data. These results are interpreted on the basis of making the resulting Cronbach's Alpha decision exceed 0.6.

Table 5. Reliability Test Results

	Cronbach's Alpha	Total item
Y1	0.766	18
Y2	0.744	20

As shown in Table 5, the results of Cronbach's Alpha exceed 0.6 sig, which means that the research instrument items are reliable and can be used as data collection tools. After obtaining the reliability results, a prerequisite test was done called the normality test. The test employed Kolmogorov-Smirnov aiming to know whether the distribution of data or variables was normally distributed. If it was normally distributed, then the research would continue. The test usually makes a decision based on the following rules. (1) If Sig > 0.05, then the data is normally distributed, but (2) If Sig < 0.05, then the data is not normal.

Table 6. Normality Test Results

Normality Test		
	OJT	Sig.
Problem-solving	MBU A	.051
	MBU B	.681
	MLLU	.593
	PPKP	.744
	TBL	.072
Self-efficacy	MBU A	.102
	MBU B	.055
	MLLU	.075
	PPKP	.633
	TBL	.111

Table 6 indicates whether the data are normally distributed. It can be seen that each indicator results on the problem-solving variables show a Significance value > 0.05. The self-efficacy table also shows a Sig value > 0.05, which proves that the two variables are normally distributed. Furthermore, this test was followed by the homogeneity test, aiming to determine

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whether the data was homogeneous. A data is considered homogeneous if the significance level is > 0.05 . Meanwhile, if the significance level is < 0.05 , the data variant is considered to be inhomogeneous.

Table 7. Homogeneity Test Results

Homogeneity Test			
		Levene	Sig.
Y1	Based on	.163	.956
Y2	mean	1.860	.123

As provided in Table 7 above, two dependent variables are homogeneous because Y1, or the problem-solving variable, has Sig (.956) > 0.05 , which means that the data is homogeneous. Then, variable Y2 or self-efficacy has Sig (.123) > 0.05 , indicating that it has homogeneous properties.

After conducting the instrument and prerequisite tests, the next stage was administering the hypothesis test. The test was carried out using the MANOVA test (multivariate analysis of variance), which was carried out to test the three hypotheses. The Manova test was used to measure the effect of more than one independent variable on the dependent variable. It was carried out by giving a pretest and a posttest to participants. The basis for decision-making is presented as follows. (1) If the Sig value < 0.05 , the hypothesis is accepted. On the other hand, (2) if the Sig value > 0.05 , the hypothesis is rejected. The following are the results of the pretest and posttest.

Table 8. Pretest Results

	Mean	N
Pretest Y1	25.73	105
Posttest Y1	36.96	105

Table 8 shows that the average pretest score of problem-solving ability (Y1) is 25.73. The average score increases in the posttest to 36.96, with a sample size of 105.

Table 9. Posttest Results

	Mean	N
Pretest Y2	63.48	105
Posttest Y2	85.29	105

As illustrated in Table 9, in self-efficacy (Y2), the mean score of the pretest was 63.48. On the other hand, the posttest for self-efficacy (Y2) obtained an average of 85.29 with a sample size of 105. In short, the pretest and posttest data for variables Y1 and Y2 show an increase from the pretest to the posttest.

Table 10. Hypothesis no.1 and no.2 results

Test of Between-Subject Effects			
		F	Sig.
X	Y1	3.011	.022
	Y2	5.556	.000

Table 10 above shows that the relationship between X and Y1 produces Sig (.022) < 0.05 , which means that H0 is rejected. In other words, this study emphasized that OJT has an effect on improving cadets' problem-solving skills.

This research summarizes that cadets' problem-solving skills increase. One of the reasons is that they are trained to solve simple problems to difficult ones through exercise. This is so during the implementation of OJT problem-solving exercises and training development guided by supervisors. This is in line with Ilmiah (2021), who found that job training on problem-solving creativity has a positive influence.

Furthermore, this research also discovers that a relationship between X and Y2 produces Sig (.000) < 0.05, which means that OJT influences the self-efficacy of the cadets. OJT is intended to obtain human resources with good knowledge, expertise, and behavior to improve work results that are less optimal due to a lack of job training (Andayani et al., 2022). Self-efficacy also comes along with the mastery of skills possessed by cadets. Someone with less self-efficacy will be confused and desperate when facing problems in the workplace (Herlina et al., 2022).

In this case, cadets who organize OJT activities interact in the real world of work so that they make cadets' self-efficacy increase. This is in line with previous research by Kable (2022), which suggests that training might have a positive and significant effect on self-confidence.

Table 11. Hypotesist test result no.3

		Multivariate Test	
		Value	Sig.
X	Pillai's	.220	.003
	Trace		
	Wilk's	.782	.002
Lambda			

Table 11 shows the results of the third hypothesis testing. It was revealed that the Sig value (.002) < 0.05 which means H0 is rejected. It indicates that OJT has an effect on improving both problem-solving skills and self-efficacy in cadets. Interestingly, when given this training, cadets' skills increase, too. During OJT programs, cadets were taught knowledge and skills. They were encouraged to interact so that their problem-solving skills and self-efficacy could be shaped and nurtured. This is in line with research by Kristanto and Sudibjo (2021), showing that self-efficacy, cooperation skills, and creative thinking skills positively affect problem-solving ability.

Conclusion

In conclusion, this research examines whether on-the-job training can affect problem-solving skills and self-efficacy among students or cadets in the Aviation polytechnics. Based on the statistical calculations, the research revealed that OJT had an effect on improving problem-solving skills in Aviation Polytechnic cadets. OJT was also reported to increase their self-efficacy. When measured collectively, OJT was claimed to improve problem-solving skills and increase self-efficacy in Aviation Polytechnic cadets.

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