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THE IMPACT OF THE DRILL METHOD ON CADET'S LEARNING OUTCOME IN THE FIREMANSHIP SUBJECT

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Abstract

Firemanship is one part of a compulsory course designed to prepare cadets to know and understand attitudes, tasks, functions, and organizations, including rescue and firefighting organizations, and it is used in the Palembang Civil Aviation Polytechnic learning process, especially in the Aviation Rescue and Fire Fighting study program. This research aimed to find out (1) whether there was a significant difference in cadets' learning outcomes by applying the drill method and (2) whether there was a significant difference in cadets' learning outcomes by those who were taught using the drill method and those who were not or not. This research used a quasi-experimental design method involving 45 Palembang Civil Aviation Polytechnic cadets as a sample chosen by purposive sampling. The test was used to collect the data, while paired sample t-tests and independent t-tests were used to analyze the data. This research result found a significant difference between the learning outcomes of cadets taught with this method and those who did not. It proved that the result implies that the calculated value of r-obtained (4.256) was higher than r-table 1.681, and the significance level was 0.000 and degrees of freedom equal to 43.

Keywords: *drill method, impact, learning outcome, firemanship, aviation*

Introduction

Aviation Safety is a condition of fulfilling safety requirements in utilizing aircraft, airspace, flight navigation, airports, air transportation, public facilities, and other supporting facilities (Roelen & Klompstra, 2012; Yeun et al., 2014). Research by (Hendra et al., 2023) argued that aviation safety refers to crucial roles in executing the standards and regulations of safety that deal with principal stakeholders, including airlines, airport authorities, air navigation service providers, aircraft maintenance facilities, aircraft manufacturers, and educational institutions. In terms of the airport, every component of aviation service providers conducting its operations must still prioritize aviation security and safety (Graham, 2023; Nang Fong & Law, 2014). Flight accidents, such as aircraft failure during landing or take-off, and fire incidents at the airport must be quickly handled so that the implementation of flight operations at the airport is not disrupted.

To fulfill flight safety requirements, aviation security personnel, especially firefighters, must have qualified skills to carry out their primary duties (Pan et al., 2023). Firefighters are trained to save victims from fires and victims of traffic accidents, building collapses, and others. The duties and functions of firefighters at airports are to provide firefighting services to prevent, control and extinguish fires, safeguard people and goods that are threatened by fire at facilities at the airport, and save lives and property from an aircraft experiencing an incident or accident at the airport and its surroundings (Hutapea & Martanti, 2023).

In their duty to provide firefighting services to save lives and property from an aircraft experiencing an incident or accident, firefighters must have the skills that are qualified to carry out their main duties (Nugraha et al., 2023). One of them is the skills related to Firemanship, which is the basic training for firefighters. The definition of Firemanship, according to book by (Sutiyo et al., 2023) refers to the comprehensive skills, knowledge, and expertise required in the fire service profession. It includes the abilities and training required for individuals who serve as firefighters or who are involved in fire-related emergency response and prevention tasks. Firemanship is also an introductory course in the Palembang Civil Aviation Polytechnic at Fire and Rescue Study Program.

In education, several instructional strategies are used in the learning process. One of them uses the drilling method. The drill method is also one of the methods used in the learning process at the Palembang Aviation Polytechnic, especially in the Fire and Rescue study program. Literally, drill means repetitive. According to (Yusuf et al., 2023) the drill method is a method used by teachers to students by repeating exercises and practices so that students can have accuracy, dexterity, opportunity, and expertise in accordance with what they have learned.

According to (Tambak 2016), the drill method is a method that provides opportunities for students to practice performing certain skills based on the teacher's explanation or instructions. Furthermore, the drill method is one of the learning methods that emphasizes practice to master skills in the learning process (Pujiastuti & Harini, 2017a). It can be concluded that the drill method is a learning method in which students or learners perform repetitive training activities in order to have higher dexterity and skills in the learning process. Meanwhile, learning outcomes are the results of a teacher's assessment of his students after carrying out teaching and learning activities within a certain period, where (Sihotang et al., 2020) proved that learning outcomes are achieved after the learning process.

Based on the elaboration above, this research was implemented to investigate the impact of the drill method on cadets' learning outcomes in the firemanship subject at Palembang Civil Aviation Polytechnic and to assess if this method exhibited a substantial disparity between individuals who received instruction and those who did not. Further, this research is also one of the strategies that can be used effectively as a learning strategy in learning firemanship subject.

Through learning outcomes, teachers can determine the level of ability students achieve after obtaining lessons from school. In the

process of learning activities at school, teachers and students expect the learning outcomes obtained by both always to improve. To improve learning outcomes, researchers maximize the drill method in firemanship courses, suitable for use when acquiring motor skills such as reviewing, memorizing, and writing.

Methods

This research used quantitative research using experimental method. Experimental research is a scientific methodology that systematically alters one or more variables to assess the effect of this alteration on a particular result (or outcomes) of interest (Creswell & Creswell, 2018). This is conducted to ascertain potential causal relationships between independent and dependent variables, to regulate all elements influencing the outcome.

This study involved selecting alternative treatments for two distinct groups of classrooms to assess the impact of the drill method on cadets' learning outcomes. In this research, the researchers administered distinct treatments to the experi mental and control group, evaluating the cadets' learning outcome with pretest and post-test. A pretest was conducted before the treatment and the post-test was conducted subsequent to the treatment. The design is portrayed in Figure 1.

Experimental	O_1	X	O_2
Control	O_3		O_4

Figure 1. Types of Non-Equivalent Group Design (Fraenkel & Wallen, 2009)

Note :
O_1 = Experimental group pre-test
O_2 = Experimental group post-test
X = Experimental group treatment
O_3 = Control group pre-test
O_4 = Control group post-test

Based on the previous elaboration, this research involved two groups: the experimental and control groups. The researchers used drill methods to teach firemanship in the experimental group and direct instruction in the control group. Respondents of this research sample consisted of all 45 third-grade cadets of the aviation rescue and fire fighting study program, divided into 23 cadets as experimental group and 22 cadets as control groups. The sample was chosen using the purposive sampling technique .

This research involves administering a pre-test prior to treatment and post-test subsequent to the completion of treatment. The methodologies employed in this research were as follows: 1) research problem identification; 2) research objectives definition; 3) research strategy formulation; 4) experiment execution and data collection; 5) the gathered data statistic analysis; 6) results in interpretation; and 7) research findings present. Prior to administering the data collection test, the instrument of this research was tried out to ascertain the validity of the test items as a data collection technique. The reliability test results demonstrated that the Guttman-Split-Half coefficient was 0.842, it was deemed reliable for data collection.

The instrument was administered twice during data collection, once prior to the treatment and once subsequent to its implementation. Subsequently, the gathered data was examined with the Paired Sample T-Test to determine if the drill method significantly influenced cadets' learning outcomes and the Independent Sample T-Test to assess whether there was a significant difference between those who were taught with the drill method and those who were not.

Result and Discussion

Pre-test and Post-test for Experimental Group Results

The data was gathered through the test. The test was administered twice to the sample to evaluate cadets' performance before and after the implementation of the treatment phase (Banuwa et al., 2021; Marsden & Torgerson, 2017). The pre-test results for the experimental group indicated a maximum score of 80 and a minimum score of 47. The average score of the pre-test was 61.91, with a standard deviation of 8.691. The post-test results indicated a maximum score of 90 and a minimum score of 57. The mean score of the post-test was 77.83, accompanied by a standard deviation of 7.056.

The statistics of the cadets' pre-test and post-test for the experimental group are shown in Table 1.

Table 1. The Result of Descriptive Analysis of the Experimental Group

	N	Min	Max	Means	Std. Dev
Pre-Exp	23	47	80	61.91	8.691
Post-Exp	23	57	90	77.83	7.056

The descriptive data indicates that following the use of the drill approach, the mean score of the post-test surpassed that of the pre-test. This demonstrated that the cadets' performance utilizing the drill method improved markedly.

Pre-test and Post-test Control Group Results

In this research, The minimum score for the pre-test control group was 43, while the maximum score for the post-test control group was 57. The mean score of the pre-test was 56.50, with a standard deviation of 7.392. The statistics indicated that in the post-test, the maximum score was 83, while the minimum score was 57. The average score was 68.68, accompanied by a standard deviation of 7.357. The statistical data is portrayed in Table 2.

Table 2. The Result of Descriptive Analysis of Control Group

	N	Min	Max	Means	Std. Dev
Pre-Exp	22	43	70	56.50	7.392
Post-Exp	22	57	83	68.68	7.357

The descriptive data revealed that the control group exhibited progress, as the mean score of the post-test surpassed that of the pre-test. The findings indicated a significant enhancement in the cadets' performance.

Paired Sample T-test Result

Following a descriptive analysis of the acquired data, a Paired Sample T-test (Frey, 2023) was conducted to evaluate the improvement in cadets' learning outcomes subsequent to the treatment. The purpose was to determine if the drill method could enhance cadets' learning outcomes. The result of the Paired Sample T-Test is in Table 3.

Table 3. Paired Sample T-test Experiment and Control Group Results

	Paired Differences							
				95% Confidence Interval of Difference				
	Mean	Std. Dev.	Std. Error Mean	Lower	Uper	t	df	Sig. (2-tailed)
Pre Exp. & Post. Exp.	15.913	6.543	1.364	18.742	13.084	11.664	22	.000
Pre Con & Post Con	12.182	9.708	2.070	16.486	7.877	5.885	21	.000

Paired Sample T-test Experiment Group Result

According to Table 3, the paired sample t-test yielded a t-obtained value of 11.664 at a significance level of 0.000, with 22 degrees of freedom. Given that the t-obtained (11.664) exceeded the t-table (1.717) and the significance level was below 0.05, with a two-tailed significance of 0.000. There was a notable enhancement in cadets' learning outcomes following instruction through the drill technique in the firemanship subject. The drill method can affect the learning outcomes of cadets at Palembang Civil Aviation Polytechnic. It can be a good strategic tool for lecturers to implement in learning.

Paired Sample T-test Control Group Result

The paired sample t-test for the control group yielded a t-obtained value of 5.885 at a significance level of 0.000, with 21 degrees of freedom. Given that the t-obtained above the t-table value of 1.720 and the significance level was below the alpha value of 0.05, it was proved that there was a significant improvement in cadets' learning outcomes at Palembang Civil Aviation Polytechnic.

Independent Sample T-test Result

The independent sample t-test for post-test results indicated an achieved t-value of 4.256, a significance level of 0.000, and 43 degrees of freedom. The t-table was 1.681, lower than the t-obtained (4.256) and with a significance level lower than the alpha value

(0.05); it can be concluded that there was also a significant difference in cadets' learning outcomes at Palembang Civil Aviation Polytechnic using the drill method between those who were taught and those who were not (Gerald, 2018).

Based on the research result, we know that learning outcomes occur from the interplay between student learning activities and the instructional actions of educators. Educators execute teaching actions that conclude with an evaluation procedure, whereas learning actions represent the culmination of the learning process (Amalia et al., 2024). The evaluation process culminates in learning actions, which reflect the progression of student competencies throughout the learning process. Learning outcomes are the results of an educator's evaluation of students following instructional activities, which can be affected by various circumstances, including the influence of the Drill Method on student learning outcomes.

Meanwhile, the drill method is an instructional approach educators employ to assess student learning outcomes, facilitating active student participation in the educational process. This enables students to engage actively in the learning process by completing activities assigned by the teacher to develop a particular ability in learning. The positive effect of employing the drill method with a pragmatic approach in descriptive statistics education is the enhancement of student engagement, evidenced by behavioral changes and improved learning outcomes resulting from the skills learned during the educational process (Dewi et al., 2020).

Based on the results and discussion of research about the impact of the drill method can improve cadets' learning outcomes in the firemanship subject, actively engaging students in the learning process enhances the significance of their educational experiences. Through this encounter, students can acquire knowledge and skills. Refined attitudes that effectively address problems to enhance learning outcomes. It is anticipated that the competencies acquired through higher education will enable students to become proficient and valuable contributors to society.

In this research, the findings demonstrated that cadets in the experimental group significantly improved their learning outcomes. In specifics, most cadets performed at a very good level. There was only one cadet at an enough level. The drill method was used as a learning method in the firemanship subject. Further, the drill method could also significantly improve cadets' learning outcomes. (Yusuf et al. 2023) confirmed that using the drill method affects student learning outcomes in the English subject at elementary school. Moreover, the findings of their study indicate that employing the drill method in mathematics instruction can enhance students' learning outcomes (Pujiastuti & Harini, 2017b). In line with the study conducted by (Dewi et al. 2020) applying the drill method with a realistic approach can improve students' learning outcomes in the descriptive statistics course.

In addition, applying the drill method may affect the learning outcomes of students in the firemanship subject, suggesting a significant difference in post-test results between cadets at Palembang Civil Aviation Polytechnic taught using the drill method and those who were not. This signifies that the utilization of the drill method significantly impacts the learning outcomes of cadets studying firemanship. It may have occurred due to the learning methodologies. The research findings yield some recommendations for future researchers and instructors.

It is advantageous for cadets' comprehensive education, as well as the educational results of teachers who specialize in instructing firemanship subjects, enabling educators to utilize suitable pedagogical methods for the material being taught, hence enhancing student motivation and engagement in both theoretical and practical. Further, the drill method as a reference for researchers performing studies and can be leveraged to develop drills that enhance cadets' comprehension and skills.

Conclusion

The research indicates considerable improvement among Palembang Civil Aviation Polytechnic cadets. Firstly, there was

a significant improvement in cadets' learning outcomes by using the drill method at Palembang Civil Aviation Polytechnic. This could be seen in the cadets' learning outcome progress after the post-test was given. Secondly, a notable distinction existed between cadets instructed through the drill method and those who were not. The experimental group had superior performance compared to the control group. In this research, the drill method can be one of the learning methods that can improve cadets' learning outcomes.

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