




# The Training Effect of Digital Learning Method on Knowledge, Attitudes and Skills in Using Light Fire Extinguisher

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**Abstract.** Fire is a disaster that can cause material, economic, and loss of lives. BPBD data from 2017 to 2022 shows 2,822 cases of fire in school buildings, factories, places of worship, and residents' housing. Handling fires using a light fire extinguisher is an efficient active fire protection system. Training can be provided using the digital learning method via the WhatsApp group which can be accessed anywhere and anytime. The study aimed to determine the effect of light fire extinguisher training of digital learning methods on knowledge, attitudes, and skills in using light fire extinguishers in the Faculty of Sports Science students. This research method is a True Experiment with Pretest-Posttest with a Control Group design. Samples were taken by cluster random sampling of 48 experimental groups and 48 control groups. The intervention was given to the experimental group in the form of posters and videos on the use of light fire extinguishers which were provided via the WhatsApp group. Data analysis used the Mann-Whitney test and it was found that training with digital learning methods affected knowledge, attitudes, and skills in using fire extinguishers (asympt.sig = 0.000). The training provided can significantly influence students' knowledge, attitudes, and skills in using light fire extinguishers. It is hoped that training can be given to all students so that all students have readiness in the event of a fire disaster.

**Keywords:** Training, Digital Learning, Light Fire Extinguisher

## 1 Introduction

Fire is one of the serious disasters that can occur in housing, hotels, offices, vehicles, multi-story buildings, and educational institutions. Fire incidents have the potential to cause material and economic losses and even loss of life [1]. The National Fire Protection Association (NFPA) states that the incidence of fires in high-rise buildings in the United States in 2021 will be 11%, with a loss of \$1.725 million [2]. Fire incidents in East Java, according to data from the Regional Disaster Management Agency (BPBD) from 2017 to 2022, reached 2,822 cases of fire that occurred in school

buildings, factories, places of worship, and residents' housing [3]. BPBD stated that residential building fires, including high-rise buildings and residential houses, occupied the fourth position in 2007–2017 with a total of 2096 incidents, 184 people were declared dead and missing, 608 people were injured, 65,056 people suffered and were displaced, and losses reached Rp. 44,948,088.00. Damage to residential buildings as many as 14,636 were seriously damaged, 232 were moderately damaged, and 1,497 were slightly damaged.

Fire handling is more difficult and has a high risk, making fires that occur in high-rise buildings more deadly and detrimental. Multi-story buildings have a stack effect, which results in the rapid spread of fire and limited access to and from the building in the event of a fire [4]. Inadequate fire prevention and control systems, inadequate occupational safety and health procedures can result in fire incidents. If the fire protection system of a building is complete but the preparedness is lacking, it will affect the fire-fighting. One of the fire hazards that need attention is in educational institutions. The last case of a fire incident in an educational institution occurred at the Islamic University of Malang (UNISMA) in June 2016. The alleged cause of the incident was an electrical short circuit that devoured the 2nd and 3rd-floor buildings, where losses reached 250 million [5]. Therefore, preparedness in preventing fire incidents is needed in educational institutions, one of which is the Faculty of Sports Science at the State University of Malang, which has an 8-story building equipped with active protection facilities including sprinklers, fire alarms, hydrants, smoke detectors, and light fire extinguishers for as many as 32 units, each of which has 4 floors.

A light fire extinguisher is one of the easiest-to-use fire protection tools. However, if the knowledge of how to prevent fires using light fire extinguisher is less controlled, it will slow the process of extinguishing fire. Lack of knowledge will then trigger a negative attitude and affect skills in the use of light firefighters. Skills are among the basic abilities that require training and development to reach their full potential [6]. Increased knowledge, attitudes, and skills can be achieved through training. Training influences knowledge and attitudes, which can increase motivation to be able to do something [7]. The results of research by Lestari & Hartono, (2012) stated that training can enhance knowledge and skills in various educational areas, including the use of light fire extinguisher for fire prevention and control.

Training on the use of light fire extinguishers had never been carried out as long as the Faculty of Sports Science building was standing; this was stated in an interview with the Dean of the Faculty of Sports Science. Good and effective light fire extinguisher training is needed so that the use of light fire extinguishers can be carried out properly. This training activity is very important to be carried out in the Faculty of Sports Science building. Judging from the availability of active hazard protection, which has been properly fulfilled, and the lecture activities that are carried out every day, students need to be equipped with knowledge, attitudes, and skills in using light fire Extinguishers. Along with the development of information technology, the development of learning using the internet is very rapid. The development of simulations using digital learning can support continuous learning and increase knowledge [9]. Based on fire incident data and the rapid development of technology, it is important to carry out training using digital learning methods on the use of light fire extinguishers,

which is expected to be novel in terms of knowledge, attitudes, and skills in using light fire extinguishers for students of the Faculty of Sports Science. With this research, students of the Faculty of Sports Science are expected to have preparedness in the event of a fire in an educational institution environment, as well as increase their understanding and skills in using light fire extinguishers.

## 2 Methods

The research method used in this research is True Experiment research with a Pretest-Posttest and Control Group research design. This experimental research divides the subjects under study into two groups, namely group 1 as the experimental group and group 2 as the control group. This research design is shown in a chart as follows:

**Table 1.** Research Design

Group	Pretest	Treatment	Posttest
1	O1	X	O2
2	O3	-	O4

Description:

1 : Experimental Group

2 : Control Group

O1 : Pretest in the experimental group

O3 : Pretest in the control group

X : Treatment given to the experimental group in the form of posters and videos on the use of fire extinguishers.

O2 : Posttest in the experimental group

O4 : Posttest in the control group

The research was conducted from January to March 2023 at the Faculty of Sports Science Building. The research population amounted to 2968, all students of the Faculty of Sports Science departments of Public Health Science, Physical Education Health and Recreation, Sports Coaching Education, and Sports Science. The sampling technique is Cluster Random Sampling, so that each department has the same opportunity to become a research sample. The number of samples used was 96, consisting of 48 students in the experimental group and 48 students in the control group. Researchers provided interventions to the experimental group in the form of posters and videos on the use of light fire extinguishers provided through WhatsApp groups. Data were collected through observation, a pretest before intervention, and a posttest after intervention. The independent variable in this study is training on the use of fire extinguishers with digital learning methods. The dependent variables in this study were knowledge, attitudes, and skills in the use of fire extinguishers. Knowledge of the use of fire extinguishers was measured using multiple-choice questions; attitudes toward the use of fire extinguishers were measured by questionnaire sheets; and skills in the use of fire extinguishers were measured by direct observation of students. The questionnaire given has

been tested for validity and reliability. This research data is quantitative in the form of knowledge test results, attitude tests, and skills tests for the use of fire extinguishers. The data analysis techniques used are descriptive analysis and the Mann-Whitney Test. Data processing was carried out using SPSS 23 software.

Before the research was conducted, the researcher had submitted an ethical feasibility test to the Ethical Review Institute of the Faculty of Dental Medicine, University of Airlangga, with number 044/HRECC.FODM/I/2023. After ethical testing was carried out, the researcher gave a research consent sheet to the respondent, which was followed by filling out a questionnaire and observation. The primary data that has been obtained is then processed with descriptive analysis, the Mann-Whitney Test, which has been determined, and the interpretation of the results obtained.

### 3 Results

#### 3.1 Descriptive Analysis

This analysis was carried out to determine the descriptive analysis of the knowledge test, attitude test, and skill test for the use of fire extinguishers, which explained the comparison of the average value, standard deviation, minimum, and maximum values.

**Table 2.** Results of Descriptive Analysis of Knowledge Test

Knowledge Variable	PreTest			PostTest		
	Mean	SD	Min-Max	Mean	SD	Min-Max
Experimental Group	12,50	3,549	5-18	17,33	3,905	4 -20
Control Group	8,92	3,613	3-16	8,85	3,495	1-14

Table 2 shows the average knowledge test of the experimental group at the pretest, which was 12.50, while the posttest was 17.33. The average knowledge in the experimental group increased by 4.83. Whereas the pretest of the control group resulted in an average of 8.92 and a posttest of 8.85, the average knowledge in the control group decreased by 0.07. So that the average of the experimental group is higher than the control group, and the higher average obtained from the posttest results of the experimental group means that the intervention provided can affect student knowledge about fire extinguishers.

**Table 3.** Results of Descriptive Analysis of Attitude Test

Attitude Variable	PreTest			PostTest		
	Mean	SD	Min-Max	Mean	SD	Min-Max
Experimental Group	59,23	4,397	52-66	68,90	8,177	53-80
Control Group	59,33	5,361	49-72	61,52	6,829	35-74

Table 3 shows that the average pretest attitude test in the experimental group was 59.23 and the average posttest attitude test was 68.90, so the average attitude test in the experimental group increased by 9.67. While the average pretest of the attitude test in

the control group was 59.33 and the average posttest of the attitude test was 61.52, the average attitude test in the control group also increased by 2.19. Because the experimental group has a higher average value increase than the control group, the intervention given to the experimental group has an influence on the attitude of students toward the use of fire extinguishers.

**Table 4.** Results of Descriptive Analysis of Skill Test

Skill Variable	PreTest			PostTest		
	Mean	SD	Min-Max	Mean	SD	Min-Max
Experimental Group	1,87	1,552	0-5	3,98	1,744	0-5
Control Group	2,13	1,525	0-4	2,13	1,525	0-4

Table 4 shows the average pretest skill test in the experimental group was 1.87 and the average posttest skill test result was 3.98, so the average skill test in the experimental group had an increase of 2.11. While the average pretest result of the skills test in the control group was 2.13 and the average posttest result of the skills test was 2.13, the average skills test in this control group was fixed, meaning that there was no increase or decrease. So that the experimental group has an increase after getting the intervention, while the control group does not have a significant change in the skills of using fire extinguishers.

Table 5 shows that the experimental group experienced an increase from the results of the posttest and pretest that had been carried out on the variables of knowledge, attitudes, and skills. While the control group has increased, decreased, and remained. So that the intervention provided for the experimental group has an influence on both the knowledge, attitudes, and skills of students in the use of fire extinguishers. The attitude of students toward the use of fire extinguishers has increased faster than their knowledge and skills in using fire extinguishers.

**Table 5.** Mean Difference of Experimental Group and Control Group

Variable	Pretest		Posttest		Difference	
	Control	Experimental	Control	Experimental	Control	Experimental
Knowledge	8,92	12,50	8,85	17,33	-0,07	+4,83
Attitude	59,33	59,23	61,52	68,90	+2,19	+9,67
Skill	2,13	1,87	2,13	3,98	0	+1,85

### 3.2 Normality Test

The normality test was carried out with Kolmogorov-Smirnov and Shapiro-Wilk, and the results obtained a significance value below 0.05 ( $<0.05$ ), so that the knowledge test data, attitude test, and skill test for using fire extinguishers for students of the Faculty of Sport Science are data that are not normally distributed.

### 3.3 Mann-Whitney Test

The Mann-Whitney test was carried out because the data was not normally distributed and to find out whether there were differences in the means of two unpaired samples.

**Table 6.** Mann-Whitney Test Result

Variable	Mann-Whitney U	Z	Asymp.sig. (2-tailed)
Knowledge	171,500	-7,217	,000
Attitude	579,000	-4,208	,000
Skill	415,000	-5,566	,000

### 3.4 The Effect Training of Digital Learning Method on Knowledge

Based on the Mann-Whitney test results table, the knowledge test results produce a significance value ( $\text{sig} < 0.05$  ( $0.000 < 0.05$ )), which indicates that there is a difference between the experimental group and the control group on the average posttest knowledge test results. The level of knowledge of the experimental group was higher than the control group, with a significant difference; this result was obtained after being given training with the digital learning method on knowledge of the use of fire extinguisher in faculty of sport and science students.

### 3.5 The Effect Training of Digital Learning Method on Attitude

Based on the Mann-Whitney test results table, the attitude test results produce a significance value ( $\text{sig} < 0.05$  ( $0.000 < 0.05$ )), which indicates that there is a difference between the experimental group and the control group on the average posttest results of the attitude test. The results obtained after providing training with digital learning methods on the attitude of using fire extinguishers for students of the faculty of sports science show that the attitude of the experimental group is better than that of the control group.

### 3.6 The Effect Training of Digital Learning Method on Skill

Based on the Mann-Whitney test results table, the skill test results produce a significance value ( $\text{sig}$ ) of  $0.05$  ( $0.000 < 0.05$ ), which indicates that there is an average difference between the posttest scores of the experimental group and the control group. The results obtained after the provision of digital learning method training on the skills of using fire extinguishers by sports science faculty students show that there is a significant difference, so that the skill level of the experimental group is better than the control group.

## 4 Discussion

Based on the research findings that have been described, the experimental group data obtained with the average posttest results is better than the pretest. In addition, the average results of the experimental group were significantly better than those of the control group. Due to the intervention in the form of posters and videos on the use of fire extinguishers, the findings of the two groups differ from each other. The results of Mann-Whitney data analysis of all variables, including knowledge, attitudes, and skills, resulted in significance ( $\text{sig} < 0.05$  ( $0.000 < 0.05$ ), so that the effect of providing training through the digital learning method influences increasing the knowledge, attitudes, and skills of students of the Faculty of Sport Science towards the use of fire extinguishers.

### 4.1 The Effect Training of Digital Learning Method on Knowledge

The results of the Mann-Whitney Test show that there is an increase in knowledge among sports science faculty students related to fire extinguishers after providing fire extinguisher education using poster and video media. Education is training on the knowledge and skills of using fire extinguishers; a high level of knowledge will increase a person's compliance and ability [10]. Providing this training can increase student knowledge and provide a solution to fire management problems in the event of a fire incident [11]. In line with the research of Hillah et al., (2022) that socialization and training on the use of fire extinguishers can increase public knowledge about fire extinguishers. Educational factors, age factors, and environmental factors are some of the factors that can influence knowledge. The higher the quality of an individual's education, the easier it is for that individual to understand and receive information. Individuals who have information are better able to use and apply learned knowledge than those who do not receive information [13].

The delivery of training through digital learning methods, namely providing information through WhatsApp groups, is in line with the study of Aisyah et al., (2020) which revealed that social media provides positive benefits. The advantage of providing material through social media is the ease of access in time and place, which allows people to access it anytime and anywhere. WhatsApp group users have a positive effect on obtaining fire extinguisher knowledge through online social support. Through online social support, it can complement the support obtained offline, so that the information obtained can be accessed at any time and complement the knowledge they have. Utilizing information and communication technology to increase one's knowledge makes the use of technology more appropriate and useful [15]. This training uses the Technological Pedagogical Content Knowledge (TPACK) approach, which combines three aspects including pedagogy, technology, and knowledge content [16]. Providing training through WhatsApp groups and conducting questionnaires through Google Forms supports the current technological developments to increase student knowledge, so this training can increase knowledge and good utilization of information technology.

## 4.2 The Effect Training of Digital Learning Method on Attitude

The increase in attitude variables can also be seen from the average results of respondents after the intervention with the digital learning method through WhatsApp groups. This is reinforced by the results of the Mann-Whitney test, which has a significance value ( $\text{sig} < 0.05$  ( $0.000 < 0.05$ ). This significant value means that the average attitude score of the experimental group is significantly different. So it can be concluded that there is an effect of intervention through digital learning methods on changes in respondents' positive attitudes about the use of fire extinguishers. Although increased information does not always result in behavior change, it is important to provide knowledge before acting. Behavior based on knowledge generally has a longer lifespan than behavior based on ignorance [17]. Attitudes can indicate the suitability of a person's reaction to stimulation. Attitudes consist of three main elements, namely beliefs, emotional life or object assessments, and behavioral tendencies. So that someone who already has a belief in something, the tendency to respond to something will also change. Someone who has good information tends to have a positive attitude to achieve something [18]. Increasing knowledge about fire extinguishers can also improve students' attitudes to act when there is a fire incident, and the use of APAR is good and correct.

Social communication in the form of information received by individuals is one of the factors that can change a person's attitude [19]. Increased knowledge can affect behavior change in a person [20]. Providing information to increase knowledge can foster self-awareness so that people can respond to things according to the information obtained, which is one of the strategies for bringing about changes in a person [21]. In line with Sudjana et al., (2021) research it is stated that if a person can increase knowledge about fire, his preparedness when facing a fire will also be better prepared. Based on the results of this study, students who received interventions in the form of posters and videos had a high attitude toward using fire extinguishers. The development of habits of thought, behavior, and ideal attitudes can be done with training to make work more effective [23]. So that with this training, students can have the willingness to act in the event of a fire in the Faculty of Sports Science building. A person's attitude can be influenced by three aspects, including adjusting how attitudes change when seeing new objects, identifying something pleasant so that someone is motivated to change their attitude, and internalizing new things [24]. The provision of interventions in the form of posters and videos regarding the use of fire extinguishers is well received by students, to stimulate them to make changes to positive attitudes toward preventing fire incidents in the Faculty of Sport Science building. The increase in student attitudes regarding the use of fire extinguishers is based on a positive response to the information received, so readiness during a fire incident is better after the intervention.

## 4.3 The Effect Training of Digital Learning Method on Skill

The Mann-Whitney test results show that there is an increase in the skills of students of the faculty of sports science related to the use of fire extinguishers after providing fire extinguisher education using posters and video media. This is evidenced by the



results of the mann-whitney test, which obtained a significant value (sig)  $<0.05$  (0.000  $<0.05$ ). This significant value means that there is a difference in the average skill score of the experimental group compared to the control group. The conclusion that can be drawn is that the intervention of digital learning methods has an effect on changes in the skills of using fire extinguishers. In line with Saputri, (2019) research obtained a significant result of 0.000 on the skills of using fire extinguishers for employees of GRAPARI Telkomsel Purwokerto headquarters after being given an intervention in the form of a leaflet. To be able to do something well and correctly, the basic abilities of individuals need to be honed, trained, and continuously developed so that skills will adapt according to the development of thoughts and problems around [6]. The skills of the experimental group only increased by 1.98, this can be influenced by the limitations of providing interventions only through whatsapp groups in the form of posters and videos.

Training for skill improvement can increase safety awareness so that it helps identify dangerous behaviors around them [26]. A person's skills and abilities can be improved through training by adding theoretical knowledge, concepts, and techniques for using APAR that are good and correct [23]. One of the important elements in fire management with training, humans play an important role in fire management efforts [27]. Success in dealing with emergencies depends on the training system provided, so that countermeasures play a very important role in the event of a fire [28]. Knowledge includes the skills needed to recall factors that have been learned. So that with the training in the use of fire extinguishers, the respondents will have good knowledge to recall what has been learned, if later faced with a fire emergency, they are ready to participate in tackling the fire.

## **5 Conclusion**

The training provided by the digital learning method through the WhatsApp group which provides interventions in the form of posters and videos, has a significant effect on the changes in knowledge, attitudes, and skills of students of the Faculty of Sport Sciences. The results of this study indicate that attitude is the aspect that has experienced the most significant changes compared to aspects of knowledge and skills. Researchers hope that intensive training on fire extinguishers will be carried out for students of the faculty of sports science, so that if faced with an emergency, they can deal with fires properly and correctly. This digital learning method can provide good utilization of information and communication technology to increase the use of fire extinguishers and prevent fire incidents.

## **Author's Contribution**

Authors contribution of this research was separated in some parts. The first author as the person in charge, wrote introduction, carried out data collection and compiler parts of this article. The second author give the main idea for this research. The third and fourth author was the evaluator and reviewer this article.

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