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# The Relationship Of Knowledge Of Occupational Safety And Health To The Awareness Of Occupational Safety And Health Behavior In Students In The Laboratory

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## Abstract

**Background:** Awareness of occupational safety and health behavior as a preventive measure aims to reduce and even eliminate the risk of work accidents (zero accidents). Occupational Health and Safety in the Laboratory is very important to implement. Awareness in implementing Occupational Safety and Health is a factor that affects the number of work accidents. This awareness can begin before entering the world of work in the field of construction. Students have not had much knowledge about Occupational Safety and Health in the laboratory and there is still a lack of awareness to behave occupational safety and health.
**Method:** This research is necessary to determine the relationship between Occupational Safety and Health knowledge to the awareness of Occupational Safety and Health behavior in students in the laboratory. This study uses the Pearson Product Moment correlation method or correlation analysis in the form of variable data to determine the relationship of free variables, namely Occupational Safety and Health (X) knowledge, with bound variables, namely awareness of Occupational Safety and Health (Y) behavior. Data collection techniques using questionnaires and populations, in this study were students of the Faculty of Engineering, Medan State University who were practicing in the laboratory totaling 129 respondents.
**Result:** After being tested, there is a relationship between knowledge of Occupational Safety and Health and awareness of Occupational Safety and Health behavior in the laboratory (r = 0.482) which is quite sufficient. The magnitude of the relationship of K3 knowledge to the awareness of Occupational Safety and Health behavior was 23.21% and the remaining 76.79% was determined by other variables. The level of significance (α) of 5% shows that there is a positive influence on the relationship between Occupational Safety and Health knowledge on the awareness of Occupational Safety and Health behavior of students of the Faculty of Engineering, Medan State University in the laboratory as seen from the calculated value of the >t table or 7.25 >1.97.
**Conclusion:** After being tested there is a relationship between knowledge of Occupational Health and Safety on awareness of Occupational Safety and Health behavior in the laboratory which is quite adequate. Then it can be seen that there is an influence between knowledge of Occupational Health and Safety on behavioral awareness of students in the Civil Engineering laboratory, so that knowledge of occupational health and safety and awareness of behavior becomes an important aspect in the application of the learning process of laboratory practicum activities.

**Keywords**: Occupational Safety and Health knowledge; laboratory; Students; Occupational Safety and Health be averted awareness.

## I. INTRODUCTION

The Department of Civil Engineering Education is an area of expertise found at

Medan State University that aims to produce graduates who have skills in their fields. To support this, a learning and training process is needed to improve various skills. The laboratory is a place to conduct experiments and training that require discipline and cultivate safety and security. Security and safety in working in the laboratory are prioritized, this is closely related to comfort when teaching, studying, and working in the laboratory. The management of safety and security in working in the laboratory is the responsibility of everyone involved in it, both lecturers, students, and also laboratory workers. Faithful people involved in the laboratory must have awareness and feel of belonging to the laboratory.

The Laboratory of the Department of Civil Engineering Education is a means of implementing practical activities and scientific research to improve skills, the existence of a laboratory has an important role in equipping students with a variety of skills, in the laboratory majoring in civil engineering education there are several work units such as soil mechanics laboratory, materials, and structure science laboratory, material testing, material testing, soil measuring science and wood workshops, of course, in the process of practical and research activities in the laboratory, of course, will always be threatened by the risks and potential for work accidents due to the interaction between labor, equipment, and the work environment situation in it. Therefore, it is necessary to have an understanding and awareness attitude to anticipate and manage the potential risk of accidents in the laboratory by established standards.

This high accident rate makes the prevention and prevention of work accidents in the construction sector something that needs to be taken seriously. Occupational accidents in the construction sector can be prevented by knowing and adhering to the culture of occupational safety and health. Based on research by Kani (2013) and Atmaja (2018), the culture of occupational safety and health can reduce the possibility of work accidents among construction workers.

When carrying out activities, safe, healthy, and comfortable working conditions are needed, so this kind of work is very necessary to ensure that the work can achieve the desired work results. Occupational Safety and Health, which in English is referred to as Occupational Health and Safety (OHS), is defined as a program system created for workers and employers to prevent the emergence of occupational accidents and occupational diseases in the work environment. Thus, it must recognize things that have the potential to cause work accidents and occupational diseases as well as active measures in the event of an occupational accident (Sucipto, 2014).

An accident is an unplanned, unpredictable, and undesirable event that results in a loss, damage, and injury Hollnagel (2016). Theory after theory is put forward to analyze the causes of the occurrence of work accidents ranging from the theory of individual causes to the more complex theory of causes Endroyo (2006). The previous theory began with The Accident Proneness Theory. The theory proposed in 1926 states that one or several individuals are more prone to work accidents than other individuals even though they are exposed to the same risk Froggatt (1964). The cause of the accident based on this theory is the wrong act of labor. Accident-related theories

In essence, Occupational Safety and Health is a multidisciplinary field of science that applies efforts to maintain and improve the conditions of the workplace environment, preventing losses and pollution of the work environment (Susanto, 2020). Occupational health can be interpreted as a form of health insurance provided to a person when doing work, including in the laboratory. Thus, people who work in the laboratory are obliged to get health insurance. Work accidents according to Kaming et al (2003) are unexpected and unexpected events, because there is no intentionality but results in losses and suffering. There are a great many occupational health goals aimed at those who work as officers or laboratory users. In general, the purpose of implementing health and work safety in the laboratory according to Destari (2017) is;

1. To protect laboratory personnel and other laboratory users from work risks.
2. To ensure that the entire equipment and materials in the laboratory are in a safe condition for use.
3. To maintain all activities in the laboratory, both practicum, training, and research can be carried out properly.
4. To create a safe and comfortable working environment.

Based on observations of students, Occupational Safety and Health have not

received adequate attention and have not been aware of Occupational Safety and Health behavior, especially when in the laboratory. Students feel that it is not practical to use occupational safety equipment, so they underestimate things related to Occupational Safety and Health. Likewise, the lack of socialization and not fully paying attention to occupational safety and health, and the lack of strictness in following up on students who violate. Awareness of Occupational Safety and Health behavior must be instilled in all students, one way is by providing occupational health and safety education occupational Safety and Health so that they can be positive towards Occupational Safety and Health. For this reason, it can be concluded that Occupational Safety and Health are very important to be applied because they can guarantee security and safety for laboratory workers and students as laboratory users. Also, guarantee the security and safety of important facilities and infrastructure in the laboratory. The goal to be achieved in this study is to determine the relationship of Occupational Safety and Health knowledge to the awareness of Occupational Safety and Health behavior in students in the Civil Engineering laboratory. Occupational Safety and Health has not received adequate attention from all parties, including students who still lack knowledge of Occupational Safety and Health and are not aware of behaving occupational safety and health in the laboratory. So that the application of Occupational Safety and Health in the Laboratory is a form of effort to create a work forging that is safe, healthy, and free from environmental pollution, to reduce and free from work accidents and occupational diseases that are in the end it can affect work efficiency and productivity. Work accidents not only cause casualties or material losses for practical but can also interfere with the overall practicum process.

## II. RESEARCH METHOD

The research method carried out in the study is descriptive with a correlational type. The correlation method is a research method that seeks to connect one element with another to create a new form that is different from before, Sugiyono (2014). The data used in this study was primary data taken directly through a questionnaire distributed to Civil Engineering students of Medan State University. In this study, the data collection technique was taken by distributing a questionnaire containing several statements describing the behavior of Civil Engineering students' awareness of Occupational Health and Safety.

The type of research used is correlational research because it identifies the relationship of one variable to another variable. The method used is Pearson Product Moment (PPM) or correlation analysis of variable data to find out the free variable (X), namely K3 knowledge with bound variable (Y), namely awareness of Occupational Safety and Health behavior. So this study only explains data according to facts based on measurements from respondents. This Pearson correlation is usually used to determine the relationship between two variables, by requiring normally distributed data.

Research Variables are everything that is set by the researcher to be studied so that information about it is obtained, then the conclusion is drawn, Sugiyono (2017). In this case, the free variable is the knowledge of Occupational Safety and Health (X) while the bound variable is the behavioral awareness of Occupational Safety and Health (Y). If the correlation coefficient is squared, it will be the determining coefficient (KP) or the coefficient of determination, which means the cause of the change in variable Y that comes from variable X, as large as the square of the correlation coefficient. This determinant coefficient explains the magnitude of the influence of the value of the variable X on the rise and fall of the variable Y.

The Place and Time of Research, this research was conducted at the Civil Engineering Laboratory, Medan State University. The population that is the object of this study is students of batch 2021 who will take part in the Building Construction practicum. The data collection technique is carried out with a questionnaire, by giving a set of written questions to the respondent for him to answer, Sugiyono (2017). The questionnaire in this study was used to determine the variables of knowledge of Occupational Safety and Health and awareness of Occupational Safety and Health behavior in the laboratory in students of the Faculty of Engineering, Medan State University with a total of 229 respondents. Questions are made based on the indicators

of the variables of this study in several question items.

Occupational Safety and Health Knowledge is the ability to know and obtain information related to occupational health and safety obtained from the results of vision and hearing. For the grid of making questions from occupational safety and health knowledge, they are given questions about the understanding, understanding, and purpose of Occupational Safety and Health, identifying the factors causing work accidents, and describing how to prevent accidents and the importance of using personal protective equipment (PPE)

while working in the laboratory. Occupational Safety and Health behavior awareness is an awareness from within a person to implement Occupational Safety and Health procedures. For the grid of questions of behavioral awareness Occupational Safety and Health is responsible behavior towards oneself, behavior responsible towards the environment, obeying existing regulations in the laboratory, and behavior towards physical and psychological hazards.

## III. RESULTS AND DISCUSSION

This research discusses the knowledge and awareness of Occupational Safety and Health behavior in the field of construction. The respondents used in this study were civil engineering students of Medan State University. Respondents were asked to fill out the questionnaire form that had been shared regarding knowledge and awareness of Occupational Safety and Health behavior with a total of 16 statements consisting of knowledge of Occupational Safety and Health and Occupational Safety and Health behaviors. These statements are designed based on PP No. 88 of 2019 concerning Occupational Health. This regulation contains efforts that need to be made by stakeholders in the workplace to achieve a healthy life and not be affected by the dangers that can be caused by work. The statements designed are a reflection of the efforts that need to be made to achieve Occupational Safety and Health in the workplace based on the items contained in this government regulation. Some of these items include that before the implementation of work, we need to assess the eligibility of work, carry out standard vigilance, and occupational health surveillance and during the work, must increase knowledge, a culture of clean and healthy living, a culture of Occupational Safety and Health and improve physical health.

**Table 1.** Percentage of Occupational Safety and Health Knowledge

| No. | Disclosure of Occupational Safety and Health Knowledge | Average (%) |
|---|---|---|
| 1 | Knowledge of Occupational Safety and Health is very important to know in the implementation of construction work | 94,9 |
| 2 | Always prioritize Occupational Safety and Health in construction work | 94,3 |
| 3 | The purpose of Occupational Safety and Health is to provide Safety for workers | 95,2 |
| 4 | Accidents in construction work result from a lack of understanding of Occupational Safety and Health by workers | 87,2 |
| 5 | The occurrence of work accidents is caused by negligence of workers not complying with Occupational Safety and Health regulations | 88,9 |
| 6 | Work accidents can be prevented by using Occupational Safety and Health equipment | 87,2 |
| 7 | 7 Prevention of work accidents, namely by using tools properly and correctly | 90,7 |
| 8 | The use of personal protective equipment (PPE) while working is to prevent accidents of workers in construction work | 84,9 |

**Table 2.** Percentage of awareness behaving Occupational Safety and Health

| No. | Disclosure of Occupational Safety and Health Knowledge | Average (%) |
|---|---|---|

| | | |
|---|---|---|
| 1 | When carrying out a job, it isnecessary to follow occupational safety and health regulations to avoid danger | 91,9 |
| 2 | Wearing personal protection when carrying out work to always be safe | 92,8 |
| 3 | Not using and playing gadgets (Mobile) when doing work | 89,5 |
| 4 | Cleaning the place of work after completing a job | 91,7 |
| 5 | The workplace needs to be properly maintained to be safe for workers | 93,2 |
| 6 | Always obey the rules of work | 90,6 |
| 7 | Make the place of work comfortable to make it more comfortable to work | 92,9 |
| 8 | Workers do not force themselves to work if they have problems with themselves | 88,1 |

Work safety is defined as a thought or effort to ensure the integrity and perfection of both physical and spiritual labor in particular and the head of its work and culture. According to Teguh (2020), occupational safety is a science and application related to machines, tools, materials, and work processes to ensure the safety of workers and all production assets to avoid work accidents or other losses. Meanwhile, occupational health is a part of public health related to all work related to potential factors that affect the health of workers. The occupational health program is an important thing and needs to be considered by employers because the existence of a health program will benefit employees materially because employees will be absent less often, work in a more pleasant environment and so overall employees will be able to work longer.

According to Nur Indah (2022), the occupational safety and health system is part of the overall management system which includes the organizational structure, planning activities, responsibilities, implementation, procedures, processes, and resources needed for the development, recitation, and maintenance of occupational safety and health policies to control risks related to working activities to achieve a safe work environment, efficient and productive.

Knowledge of the application of Occupational Safety and Health is highly dependent on the level of education, position on the project, participation factors in safety training, and the application of safety morning and the application of safety rewards (Susanto. 2020). Supporting this statement, the level of education has a relationship with the knowledge of the application of Occupational Safety and Health, based on the respondent data obtained, almost most Civil Engineering students have realized and understood the importance of Occupational Safety and Health in the construction sector. This is indicated by the total percentage of all respondents' results reaching more than 85%. Students respond well in their level of understanding of the importance of Occupational Safety and Health in the world of work. This is due to the demographics of students at Medan State University who have mostly worked including students in the Civil Engineering Study Program.

This factor can be the cause of students responding quite well and having an awareness of the importance of Occupational Safety and Health. So even though students have not yet obtained construction management courses in their education, students already have the knowledge and awareness of Occupational Safety and Health. Students' Occupational Safety and Health knowledge will be enriched again when students get construction management courses. Another factor that becomes an indicator is the provision of occupational safety and health training and certification to each student during lecture time. Medan State University routinely provides occupational safety and health training and certification every year. This training and certification is a form of university concern, especially for the managers of the Civil Engineering study program, for the readiness of prospective graduates in the world of work later.

**Table 3.** Variable results of Occupational Safety and Health (X) knowledge and awareness of Occupational Safety and Health (Y) behavior

| n | ∑X | ∑Y | $\sum X^2$ | $\sum Y^2$ | ∑XY |
|---|---|---|---|---|---|
| 22 | 101 | 104 | 4548 | 4766 | 4643 |
| 9 | 85 | 16 | 63 | 88 | 89 |

Before testing the data, it is assumed that this data meets the requirements, namely, normal distribution, the data is randomly selected, and the data has the same pairs. To get the value of the correlation coefficient (r) is:

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{\left(n\sum (X)^2 - (\sum X)^2\right)\left(n\sum (Y)^2 - (\sum Y)^2\right)}}$$

r = 0.482

So, there is a relationship between knowledge of Occupational Safety and Health and awareness of Occupational Safety and Health behavior in the laboratory, where the results of the interpretation of the correlation coefficient (r = 0.482) are quite strong. As for the values ranging from - 1≤ r ≤ +1, the value of r = ± 1 is said to be a perfect correlation while r = 0 means the absence of a correlation between the two variables. The positive and negative signs of a correlation value indicate the direction of the correlation, If the value of r is marked positive it is said that the relationship between the two variables is unidirectional or positive, while if the value of r is negative it is said that the relationship between the two variables is in the opposite direction or negative, and can be seen in figure 1.

After the value of the correlation coefficient is obtained, the value of the coefficient of determination can also be obtained by the equation
KP = r2 x 100 % = 23.210%.

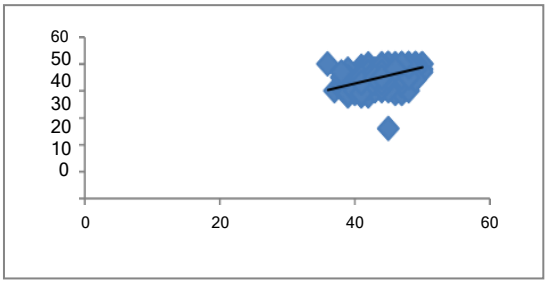


**Figure 1.** The relationship of Occupational Safety and Health knowledge to the awareness of Occupational Safety and Health behavior, namely a positive correlation

The positive correlation value (KP) in the equation above shows how much the value of the free variable, namely knowledge of Occupational Safety and Health, affects the value of the bound variable, namely the awareness of occupational safety and health behavior in students in the laboratory. The value (1-KP) will indicate the percentage of the magnitude of the influence of other factors beyond the factors present in the free variable, in influencing the bound variable. This means that the influence of the relationship between Occupational Safety and Health knowledge on the awareness of Occupational Safety and Health behavior is 23,210% and the remaining 76,790% is determined by other variables. To find out whether there is a significant relationship between Occupational Safety and Health knowledge and the awareness of occupational safety and health behavior of students in the laboratory with the following testing steps, namely determining the hypothesis, where:
Ha: There is a relationship between knowledge of Occupational Safety and Health and awareness of Occupational Safety and Health behavior
Ho: There is no relationship between knowledge of Occupational Safety and Health and Awareness of Occupational Safety and Health Behavior

Or Ha: $r \neq 0$ and Ho: $r = 0$ Then determine the significance level of the test using a double-sided test with a significance level of $\alpha = 5\%$. The degree of significance, in this case, means that we risk being wrong in deciding to reject the correct hypothesis as much as 5 % or 0.05 is a standard measure that is often used in research.
Determining t calculate based on the above formula obtained the value is 7.25 and with

the condition that the error rate α = 0.05, with a degree of freedom (dB) n - 2 or 229 - 2 = 227. So that (0.05, 227) is obtained for t the table by 1.97 (on table t) or can be searched in Ms. Excel by typing = tinv (0.05, 227) then enter. From this test, Ho is rejected if t count < t table or t count > t table, therefore the value of t count > t table or 7.25 > 1.97 means that the correlation of variable X with Y or the relationship of knowledge of Occupational Safety and Health with the awareness of Occupational Safety and Health behavior in students in civil Engineering laboratories is significant.

Knowledge of occupational health and safety Knowledge is the process of sensing a certain object through the five human senses, namely sight, hearing, smell, taste, and taste by itself. At the time of sensing to produce knowledge, it is greatly influenced by the intensity of perceptual attention to objects. Most human knowledge is acquired through the eyes and ears Awal (2017). The purpose of occupational health and safety as for occupational health and safety itself according to Masanori (2021), namely: 1) So that every employee gets a guarantee of occupational health and safety both physically, socially, and psychologically. 2) For every work equipment and equipment to be used as well as possible, as effectively as possible. 3) So that all production products are maintained safely. 4) So that there is a guarantee for the maintenance and improvement of nutritional health. 5) To increase excitement, work harmony, and work participation. 6) To avoid health problems caused by the environment and working conditions. 7) So that every employee feels safe and secure at work. Benefits of implementing occupational health and safety.

According to Nur Indah (2022), there are several important benefits in the process of implementing Occupational Safety and Health, namely: 1) Employee protection The core purpose of implementing an Occupational Safety and Health management system is to protect workers. how un workers are company assets that must be maintained and maintained their safety 2) Reduce costs By implementing an Occupational Safety and Health management system can prevent accidents, damage, or illness due to work so that there is no need to incur costs incurred as a result of such accidents Risk of work accidents Risk is an opportunity for accidents or losses, as well as the possibility of certain hazards, of course, in carrying out work there are risks that may be experienced by workers, including damage, eligibility or disability and death. Consciousness is a part of the psyche that contains things that it is aware of and knows. Consciousness is the attitude of a person who voluntarily obeys all the rules and is aware of his duties and responsibilities. So it can be concluded that consciousness is a condition in which a person understands the rights and obligations that must be carried out (Hudiro. 2021).

Exposure to the research conducted by Ariyanto (2012), that this researcher and has similarities with the results of previous studies using different methods, the equation obtained a positive influence or relationship of occupational health and safety knowledge with a correlation coefficient rxy 2 of 0.757 or 57.30%. The equation is expected to then foster a sense of enthusiasm to increase insight into occupational health and safety knowledge, thus it can be concluded that the attitude of awareness of Occupational Safety and Health behavior is a factor that still needs to be improved to add insight into the attitude of caring for Occupational Safety and Health or improving behavior in complying with Occupational Safety and Health regulations.

A laboratory is a place where students, lecturers, and researchers conduct experiments. Working in a Civil Engineering laboratory will not be separated from the possible dangers of the equipment in it. Therefore, it is necessary to understand and be aware of the dangers in the laboratory. There have been many accidents or suffered injuries and damage to very expensive work facilities. All incidents or accidents in the laboratory can be avoided if they always follow safe work procedures in the laboratory. Furthermore, it is necessary to immediately make improvements to improve student professionalism. The corrective steps that can be taken include a) increasing knowledge of occupational safety in student laboratories through learning, and b) students show maximum performance as a form of achieving their learning achievements. In addition, it is necessary to have a role for lecturers in the development of practicum programs that emphasize occupational health and safety in the laboratory through practicum modules and

practicum activities themselves. In addition, it is also necessary to systematically compile materials and curricula to increase knowledge of occupational health and safety in the laboratory.

## IV. CONCLUSION

After being tested, there is a relationship between Occupational Safety and Health knowledge and the awareness of Occupational Safety and Health behavior in the laboratory (r = 0.482) which is quite sufficient. The magnitude of the relationship between Occupational Safety and Health knowledge to the awareness of Occupational Safety and Health behavior was 23.21% and the remaining 76.79% was determined by other variables. The level of significance (α) of 5% shows that there is a positive influence of the relationship between Occupational Safety and Health knowledge on the awareness of occupational safety and health behavior of students in civil engineering laboratories, judging from the calculated value of >t table or 7.25 >1.97 so that knowledge of occupational health and safety and awareness of occupational safety and health behavior are the most important aspects in its application either in the industrial field and in the field of education enter the learning process of practicum activities in the laboratory.

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