

Factors Influencing Safety Behavior among Civil Engineering Students in UiTM Jengka, Pahang

Nurfarhana Mohd Ashri, Siti Nor Faisaltulshima Zuraidi, Siti Aishah Muhamad Ramlee, Syazana Atikah Johari, Mohd Zaidi Mat Saat

Faculty of Business and Management at Universiti Teknologi MARA, Pahang Branch, Jengka Campus, Pahang, Malaysia

Corresponding Author Email: mohdzaidi@uitm.edu.my

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Abstract

One of the problems encountered by university students is the increasingly accidents at lab and workshop. Thus, this study specifically aimed to identify the level of safety behavior among Civil Engineering students at UiTM Pahang. This study also examined the relationship between safety awareness and safety behavior. In addition, this study also examined the relationship between safety attitude and safety behavior among 123 students. Quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS) to test the hypotheses of the study. The findings supported the hypothesized of (a) safety awareness and safety behavior and (b) safety attitude and safety behavior. In order to achieve optimal workplace safety, the university management should focus on safety awareness and safety attitude to improve their safety level. Finally, the findings of the study provide theoretical and practical implications. The findings of this study contribute to the extant literature by empirically testing the role of safety awareness and safety attitude on safety behavior. The research of the study is about the requirement of a systematic approach at universities to integrate safety with academic processes through the setting of comprehensive safety education and proactive management practice. These observations are of the essence for universities who want to create a safe environment for their students and lower the accidents in lab settings. Specifically, this study recommends university management to emphasize on continuous improvement programs in safety training and safety awareness to ensure of creating a secure learning environment which is an issue that needs further investigation in the university.

Keywords: Safety Awareness, Safety Attitudes, Safety Behavior, University Students, Higher Learning Institutions.

Introduction

Efficient and effective occupational health and safety management should be prioritized throughout all employment sectors, including universities. This is significant because, as technology advances, it becomes more vulnerable to industry-related disasters. This involves the students indirectly in the usage of the workshop and exposes them to the danger of mishaps. According to Abdullah and Abd Aziz (2020), each country experiences university laboratory incidents that must be addressed. This is because university laboratory accidents are a global issue, with an estimated 49 percent of lab accidents occurring each year (Walters et al., 2017).

In 2013, a fire damaged a chemical lab at Universiti Teknologi MARA, Shah Alam, when students and laboratory staff were doing research (The Edge Malaysia, 2013). In 2019, 13 students at Bayan Lepas were reported to have accidentally swallowed iodine gas due to inadequate air ventilation in the laboratory (Xian & Sekaran, 2019). Due to an increase in incidents, academic institution safety is increasingly garnering attention on a global scale. Knowing how safety awareness university students can be help us understand how they will approach workplace safety in the future as early-career workers.

Nonetheless, despite an increase, the number of safety-related incidents in higher education institutions is still underreported (Gong, 2019). The most significant components of organizational safety culture that affect accident rates are students' safety beliefs, awareness, attitudes, and actions. These factors are linked to accidents in higher education institutions (Hasan and Younos, 2020). Understanding the ideas of safety awareness and safety behavior is essential in the modern world, when safety is of the highest priority. According to Sammer et al. (2010), safety awareness is the knowledge and comprehension of potential risks, hazards, and safety precautions in a particular setting or situation. Meanwhile, safety behavior describes the acts and behaviors people do to make sure they, as well as the safety of others, are safe.

Safety is the practice of minimising the risk of hazardous events that can disrupt physical, mental, and organisational functions (Hasan and Younos, 2020). The number of accidents reported recently in the literature that occurred in laboratories of higher education and research institutions has increased (Salazar-Escoboza et al., 2020). However, despite an increase in safety-related accidents in higher education institutions, the number remains underestimated (Gong, 2019; Khalid et al., 2024). Accidents at universities are closely related to undergraduates' safety behavior, attitude, and awareness, all of which are key components of organisational safety culture. (Gong, 2019; Hasan and Younos, 2020).

Hasan and Younus (2020), also worth noting that individual unsafe behavior is one of the most important factors influencing accident rates. Furthermore, accidents on campus may occur due to the unsafe use of chemicals and electrical equipment, which is triggered by lack of awareness, unsafe handling, and mismanagement (Walters et al., 2017). Panik et al (2024) discovered that, while students had generally positive attitudes towards safety, they still reported risky lab behavior, and many did not consider risk assessments before conducting lab work. A study of chemical laboratory safety attitudes, awareness, and practices among Trinidadian students concluded that more education and training programmes are needed to improve the laboratory safety culture (Hasan and Younus., 2020). Moreira et al (2021) applied

a scale of organisational safety culture maturity to civil engineering laboratories in Brazil and found that the students met the "reactive" level of safety culture in laboratories, which means that they behaved like an organisation that only responds to accidents, rather than those who prevent them. Gong (2019), analyses the safety climate of employees in university and college laboratories, and his findings show that accident experience and safety training have a practical impact on the climate.

In conclusion, the increase in safety-related accidents within higher education and research institutions necessitates a critical reassessment of safety culture and practices. The correlation between accidents and individual behavior, as well as the need for improved safety training and education, is a clear indication of the areas that require immediate attention. Furthermore, the findings regarding the reactive safety culture in laboratories emphasize the urgency for a proactive approach to safety. Addressing these issues demands a comprehensive effort involving enhanced safety education, proactive risk assessment, and a shift towards a preventive safety culture.

Literature Review

Safety Awareness

According to Clarke (2003), safety awareness refers to an organization's underlying ideas and beliefs about safety. This is reflected in the ideas, attitudes, and behavioral standards of its managers, supervisors, and employees, as well as in the company's safety policy, rules, and procedures. This concept emphasises the shared conviction and importance of safety as a top priority. Effective safety requires proper management of the relationship between technology systems and people. Safety awareness can be distinguished from behavioral norms that reflect a commitment to safety (Johari, 2011). In the education sector, improper handling of workshop and laboratory equipment can lead to accidents. Staff and students should not disregard safety rules and regulations in order to avoid accidents and injuries (Zubir et al., 2016). Despite the establishment of occupational safety and health regulations at university laboratories in the 1990s, there have been several reports of unfavourable accidents. The majority of laboratory mishaps can be attributed to inadequate safety management. Academic institutions may not have implemented occupational safety and health requirements to manage risk in experimental activities (Ramli et al., 2020). Laboratory procedures in academic settings are a big concern globally, including Malaysia. Students must exercise caution when working in a research chemical laboratory to avoid potential accidents. To ensure safety while working in laboratories, students must be aware of potential hazards and dangers to avoid mishaps (Kavalela et al., 2019).

Safety Attitude

Safety attitude can be defined as a person's mental tendency to react towards matters that relate to the goals, ideas, plans, preventions, procedures, and situations of safety in the workplace. According to Pickens (2005), a person's mental state about safety is known as their "safety attitude," which is shaped over time by experiences, observations, and learning about safety. It affects how that person perceives safety, acts, and makes decisions in situations relating to safety at work and in other areas of their lives. Students who correctly identify dangers and hazards are more likely to follow safety procedures and take preventative action. The enhancement of safety attitude is based on the alteration of people's behavioral cognition, which has distinct advantages in behavioral decision-making (Calderwood &

Ackerman, 2019). Crase (2022) noted that safety attitudes influence behavioral intentions and actual safety behaviors. Positive safety attitudes are linked to increased desire to follow safety procedures and actual adherence to safety protocols. Actively integrating students in safety teams and acknowledging their safe behaviors can help to foster positive safety attitudes and cultures. This helps to establish safety as an essential component of the laboratory experience. The importance of safety attitudes in reducing accidents has been and will continue to be debated. Safety incidents, according to Gadd and Collins (2002), usually stem from employee-level issues (including personal safety attitudes) as well as at the business level (safety management, for example). This knowledge has led to the execution of safety studies by academics that examined workplace safety attitudes (Gadd and Collins, 2002). Furthermore, Williamson et al. (1997) warn that if worker safety attitudes are not taken into account, safety failures may be expected.

Safety Behavior

The Occupational Safety and Health Act and Regulations define safety behavior as taking reasonable care for safety among all stakeholders to enhance workplace safety (Aziz et al., 2019). According to Abdullah and Aziz (2020), safety behavior in a laboratory suggested that important issues were in line with the shifting attitudes of the students. Safety behavior at work can be defined by an individual's knowledge, abilities, and drive to practise safety (Aziz et al., 2019). Abdullah and Aziz (2020), noted that to improve laboratory safety regarding to student safety behavior university management should implement regulated guidelines and encourage student commitment. Globally, safety climate has been studied as a factor in occupational safety and health management that influences safety behavior (Abd Aziz et al., 2021). Safety behavior plays a crucial role in encouraging compliance and participation (Abdullah and Aziz, 2020). Liu et al., (2023) also described safety behavior is linked to performance and encompasses all activities that impact organisational safety performance, including two types of safety compliance behavior and safety participation behavior. Safety behavior is an individual's response to safety routines that reflects the level of occupational and health achievement, participation, and compliance with safe work practices in an organisation (Aziz et al., 2019).

Hypothesis

H1: There is a relationship between safety awareness and safety behavior.

H2: There is a relationship between safety attitude and safety behavior.

Research Methods

This study uses a quantitative correlational research design. The primary objective of this study is to investigate and comprehend the relationships between safety awareness and safety attitudes towards safety behavior among engineering students at Universiti Teknologi MARA (UiTM) Jengka, Pahang. The purpose of this research is to determine whether there are significant correlations between these variables and how they interact to influence the overall safety culture of the engineering faculty. The Krejcie and Morgan (1970) formula was estimated to achieve an excellent sample size that can represent the students' population. A questionnaire survey was conducted among civil engineering students at UiTM Jengka which utilized an interval scale design on safety awareness, safety attitude and safety behavior. The data was collected using Google Forms, an online survey platform that made data collecting easy to use and efficient to distribute. Initially, the Google form was shared via WhatsApp,

which a platform where the students frequently use for daily communication. The response rate was 100%, which meant no error in receiving the data. Following Van Mol (2017), the minimum response rate of between 30% and 40% meeting the threshold for effective response rate for online student surveys. Items for this study were adopted from Khalid et al. (2024). The instrument used in this questionnaire is an interval scale of 1 to 5 points adopted from Khalid et al. (2024). According to Zikmund et al (2010), the Likert Scale is a tool for measuring attitudes that enables participants to indicate how strongly they agree or disagree with well-crafted statements. The scale spans from extremely positive to very negative views toward a particular object.

Results and Discussion

One of the approaches of checking goodness of fit of data begins with performing normality test. Table 1 shows the results of the normality test of every dimension of variable in finding the relationship between safety awareness and safety attitudes towards safety behavior. In this view, for the establishing of the normality test, the two numerical measures of shape skewness and kurtosis are used. The data must fulfil two conditions before it can be classified as normal. First, the measure of central tendency (mean and median) should be almost similar value. Secondly, the skewness and kurtosis should be zero or close to zero which indicate a perfect normal distribution. However, if both measurements fall within a range of 3, the data is still considered normal.

Table 1

Normality test

	SAFETY AWARENESS	SAFETY ATTITUDES	SAFETY BEHAVIOR
Mean	4.153	4.139	4.219
Median	4.200	4.222	4.167
Skewness	-0.591	-0.594	-0.554
Kurtosis	0.436	0.462	0.048

With reference to Table 1, the result shows that the score for mean and median for each variable (Safety Awareness: Mean= 4.153, Median= 4.200; Safety Attitudes: Mean= 4.139, Median= 4.222; Safety Behavior: Mean= 4.219, Median= 4.167) were almost similar. In addition, the score for kurtosis and skewness for each variable (Safety Awareness: Skewness= -0.591, Kurtosis= 0.436; Safety Attitudes: Skewness= -0.594, Kurtosis= 0.462; Safety Behavior: Skewness= -0.554, Kurtosis= 0.048) were also within the range of ± 2 . Therefore, the sample was considered normal according to Trochim and Donnelly (2006) and Gravetter and Wallnau (2014) since the values of the skewness and kurtosis of each variable are between the range of +2 and -2.

The second analysis is a reliability test. This test evaluates the internal consistency of variables measured using subjective measurements. The variables of this study are safety awareness, safety attitudes and safety behavior. Table 2 presents the results of reliability test. From the table, the Cronbach's alpha for the safety awareness is 0.810, safety attitudes are 0.863 and safety behavior is 0.835 which indicates very good reliability (Zikmund et al., 2010). Therefore, the items used to measure the variables were considered reliable.

Table 2

Reliability test

Variable	Cronbach's Alpha	Number of Items
Safety Awareness	0.810	5
Safety Attitudes	0.863	9
Safety Behavior	0.835	6

Considering the safety awareness, safety attitudes and safety behavior are of high internal consistency, none of the items were deleted. All items were used to compute the variable.

Table 3

Mean of Safety Behavior

		Statistic	Std. Error
Behavior	Mean	4.2195	.04738

Table 3 shows the level safety behavior among Civil Engineering students at UiTM Jengka, Pahang. The analysis of the mean of safety behavior is 4.2195. This represents the average score of the behavior variable across all observations. Mean value indicates that on average students exhibit a relatively high level of safety behavior, since 4.2195 is closer to the upper end of the scale. According to Nunnally and Berstein (1994), mean scale 1.00 to 2.00 (low), 2.01 to 3.00 (Medium low), 3.02 to 4.00 (Medium High) and 4.01 to 5.00 (High).

Table 4

Correlation

		Behavior
Awareness	Pearson Correlation	0.551**
Attitudes	Pearson Correlation	0.773**

** . Correlation is significant at the 0.01 level (1-tailed).

The results of correlation of the relationship between three variables. It shows that there is correlation coefficient between Safety Awareness and Safety Behavior which 0.551 (moderate correlation) and Safety Attitudes and Safety Behavior which 0.773 (strong correlation) (Schober et al., 2018). A correlation coefficient is a statistical measure of covariation, or association between two variables which the closer the correlation is to 0, the weaker it is while the closer it is to ± 1 , the stronger it is (Zikmund et al., 2010).

Table 5

Model Summary

Model	R	R Square
1	0.802	0.644

Table 6
Coefficients

Variable	Unstandardized Coefficients B	Standardized Coefficients Beta	Sig.
Safety Awareness	.230	.242	<.001
Safety Attitudes	.637	.660	<.001

Table 5 and 6 shows all the independent variable (safety awareness and safety attitudes) together to explain 64.4 the percent of the variance (R Square = 0.644) on dependent variable. This is highly significant, and the model is fit as the F statistic is 108.537 ($F > 1$). Means that, independent variables (Safety Awareness and Safety Attitudes) give an effect to dependent variable (Safety Behavior).

Table 6 shows the largest beta coefficients is safety attitudes (B .660 $p < .001$, $p < 0.05$). This concludes that this variable (safety attitudes) makes the strongest unique contribution to explaining the dependent variable when the variants explain by other variables in the model is controlled for. This is followed by safety awareness (B .242 $p < .001$, $p < 0.05$). The results depict that safety awareness and safety attitudes made a unique, and statistically significance, contribution to the safety behavior. Hence, the regression model is significant. It means that there is a relationship between independent variables and dependent variable (Uzuntarla et al., 2020).

This study shows that there is a positive correlation between safety awareness and safety behavior among the civil engineering students of UiTM Jengka. This correlates with Sammer et al (2010), who asserted that safety awareness was the understanding of possible dangers and safety measures. From the analysis of hypotheses above, it is obvious that the safety awareness has a positive influence on safety behavior as influence coefficient is 0.23 (Wang et al., 2018). Besides, according to findings of the regression model, statically relationships were found between safety behaviors and safety awareness ($F: 108.537$; $P = <.001$). It has been concluded that an increase in safety awareness leads to an increase in safety behavior levels (Uzuntarla et al., 2020).

Prasetiawan et al (2024), also show that safety awareness has a positive and significant effect on safety behavior. This indicates that safety awareness is an important tendency for the safety behavior. Therefore, improving safety awareness can help the process of improving safety behavior. If safety awareness is adequate, it can encourage better safety behavior, especially those related to safety compliance and participation. This finding is in line with and affirms previous studies claiming that safety awareness has influence on safety behavior (Osman et al., 2015; Wang et al., 2018; Uzuntarla et al., 2020; Hussain et al., 2019; Seo et al., 2015; Li et al., 2021; Saetrevik & Hystad, 2021).

Based on Li et al. (2019), the correlation between safety attitude and safety behavior is gradually being recognized which explored the relationship between safety attitude and safety behavior and found that safety attitude is positively correlated with safety behavior. The research revealed the fact that safety attitudes do play an important role and do give an indication to the safety behaviors and those are very much crucial in preventing accidents. People with good attitude towards safety will minimize on the unsafe actions hence avoiding

accidents that could have otherwise happened through negligence and all this will be done without supervision (Eid et al., 2012). In line with the studies done by Zhang et al. (2017), safety attitude had direct and positive influence on safety behaviors.

Recommendations

Integration of Safety Education into The Curriculum

The objective of this recommendation is to reinforce the importance of safety in both academic and practical settings. In order to implement this recommendation, UiTM may introduce compulsory safety courses as part of the civil engineering curriculum. These courses should cover the theoretical aspects of safety management, risk assessment and legal regulations related to the workplace safety as for their mandatory safety courses. Implement continuous assessment method such as quizzes assignment and projects also among the ways that can be taken to focus on safety topics. This will ensure that students regularly engage with and reflect on safety issues. Incorporation in practical labs also should be taken to make sure that the safety procedures are integrated into laboratory and workshop sessions. Before starting any practical work, students should be required to conduct risk assessments and develop safety plans.

Fostering a Proactive Safety Culture

As for second recommendations, the objective is to encourage students to actively participate in maintaining a safe environment. UiTM may implement hazard reporting system by establishing an easy-to-use system for students to report potential hazards and unsafe conditions anonymously. This could be an online platform or a suggestion box. Plus, by forming a student safety committee also can work alongside the faculty to monitor safety practices, conduct safety inspections, and organize safety-related events and campaigns. UiTM also may recognize and reward the students who consistently demonstrate excellent safety practices. This could be through awards, certificates, or other incentives.

Establishment of a Dedicated Safety Committee

Meanwhile, for the last recommendations, UiTM can promote in establishment of a dedicated safety committee to oversee the implementation of safety measures and provide ongoing support and resources. Practice some safety audit such as conduct regular safety audits and inspections to identify areas of improvement can be made. The committee should develop action plans based on the findings and ensure timely implementation of corrective measures. Allocate resources such as safety equipment, educational materials, and funding for safety-related activities also play a role in ensuring safety environment. Ensure that all laboratories and workshops are well-equipped with necessary safety tools and protective gear. Besides, UiTM may also provide some ongoing training and support for both students and staff. The committee should organize refresher courses and stay updated with the latest safety standards and regulations.

Significance of Study

The findings of this study are to observe the level of awareness and the behaviour of students. It is important to understand that safety is not something that need to be put lightly. This is because the high number of accidents can be attributed to a lack of safety knowledge. It seems that students are generally ignorant about safety concerns and the safety services offered by their campus security offices, despite the widespread concerns about campus

safety. Every year, the number of incidents rises, most likely as a result of employees' and students' lack of knowledge at work.

Understanding the contributions of specific elements or factors to campus safety awareness is of essential consideration and analysis in this study, given the significance of safety and safety awareness for university students. With the help of this study, which analyzed how the student behaves and their understanding regarding the safety measure and take preventive measures to lessen them, all these features can be reduced. It is imperative that all students are aware of the many safety elements at the university so they can plan ahead and know what to do in an emergency. In term of practical, it is advisable for the university to make sure that the students understand the importance in following the right procedures and understand the rights steps for their safety measures. In order to guarantee that students' safety is assured, it is a must to always follows the highest standards of safety in all areas and raises the awareness of those standards.

Conclusion

In conclusion, by implementing all these recommendations, universities can significantly improve the safety awareness, safety attitudes and safety behavior of its students. Comprehensive training programs will equip students with necessary knowledge and skills, while integrating safety education into the curriculum will ensure continuous engagement with safety issues. Fostering a proactive safety culture and establishing safety committee will create an environment where safety is prioritized and actively managed, ultimately reducing the risk of accidents and enhancing overall campus safety.

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