Knowledge, Attitude, and Readiness to Practise among Malaysian Undergraduate Engineering Students Towards Disaster Management Preparedness

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Faris Tarlochan[a,b*], Mohamed Izham Mohamed Ibrahim[b], Mohd Faris Khamidi[d], Asan G.A. Muthalif[a]

[a]Department of Mechanical and Industrial Engineering , Qatar University, Qatar

[b]Technology Innovation and Engineering Education, Qatar University, Qatar

[c]College of Pharmacy, QU Health, Qatar University, Qatar

[d]Department of Architecture and Urban Planning, Qatar University, Qatar

**faris.tarlochan@qu.edu.qa*

Abstract

Malaysian National Security Council (MNSC) defines disaster as an incident that occurs unexpectedly, resulting in the loss of lives and damage to properties, environment and daily activities of the local community. Disastrous events such as floods, earthquakes, terrorism, increase in population, cyber-attacks, pandemics, rising sea levels, economic recessions, urbanization, etc., have been increasing globally and also in Malaysia. The wellbeing of our Malaysian communities depends on a complex web of institutions, infrastructure and information. To reduce the disaster risk and impact, various efforts have to be in place to prepare and empower the community. As such, this paper is positioned at understanding this preparedness level among undergraduate engineering students in Malaysia. During emergencies, such undergraduate students should be able to rise and assist in national development from a disaster. In this study, we are focused to evaluate the engineering students in Malaysia in particular for knowledge (K), attitude (A) and readiness to practice (rP) regarding disaster preparedness. This is an exploratory study done through a questionnaire distributed among engineering undergraduate students in some selected public (one) and private universities (two) in Malaysia. Almost half of the participants understood that Malaysia is at risk of disasters and that these disasters come in many size and shapes. These participants also significantly understand the potential of risk of emergencies in Malaysia. However, the respondents indicated that they have not had real exposure or handling experience on this topic. There was a huge agreement that there is a lack of support from local officials in terms of organizational logistics and roles among local and national agencies in disaster response. This study has shown that the literature is scarce in terms of understanding the student agency for disaster preparedness. There is a need for relevant stakeholders like the Board of Engineers Malaysia to prepare engineering undergraduates for disaster management to strengthen the social fabric towards such risks.

Keywords: Attitude, Disaster management, Knowledge, Readiness to practice, Engineering students.

Introduction

Lately in the 20th and early in 21st century, disruptive events (disasters) such as floods, earthquakes, terrorism, political sanctions, increase in population, cyber-attacks, pandemics, rising sea levels, economic recessions, urbanization, etc., have been increasing globally. Beside this, there are Black Swan events, which are extremely rare but have severe impacts. Malaysian National Security Council (MNSC) defines disaster as an incident that occurs unexpectedly, resulting in the loss of lives and damage to properties, environment and daily activities of the local community. The wellbeing of our communities depends on a complex web of institutions, infrastructure and information. This wellbeing, however, is under a constant threat from such external or internal stresses and shocks. The COVID-19 pandemic and the 2008 global financial crisis are examples of Black Swan events that had taken the globe by surprise with catastrophic outcomes. Today, a great amount of risk also emerge in the digital sector. The cyber infrastructure has increased the connectivity and interdependencies between systems. All economic, environmental and social systems are interconnected through cyber infrastructure. Any cyber-attacks could bring devastation to a country due to the inter-connectivity of systems through the cyber infrastructures. Such stresses / shocks (internal or external) can result in significant damage to communities in terms of its environment (buildings, infrastructure systems, land, vegetation, etc.), economy, health and social fabrics. As such, understanding the multiple stress and shocks and their

impacts on the social, economic and environmental systems is important for sustainability and human well-being (Berkes, 2013), (May, 2022), (Jinglu, 2022), (Birchall, 2022), (Melika, 2021). Besides understanding these stress and shocks, it is vitally important to understand the preparedness level of all residents in a geographic location. Disaster preparedness are measures put in place by authorities at various community scales to better respond and cope with the immediate aftermath of a disaster. This is important to predict the resilience level of a community to bounce back from the disaster. To reduce the disaster risk and impact, various efforts have to be in place to prepare and empower the community (Noraini, 2018). As such, this paper is positioned at understanding this preparedness level among undergraduate engineering students in Malaysia. During emergencies, such undergraduate students should be able to rise and assist in national development from a disaster (P Van, 2019).

Malaysia is a country with a relatively large population and is vulnerable to climate change- related disasters especially floods, landslides, and droughts (Alam, 2020). When comparing two period times (Period 1: 1985-1999; and Period 2: 2000-2014), the occurrence of natural disasters in Malaysia has risen close to 65% with an increase of death by 85% (Zairol, 2018). The reported economic damages also saw a rise of close to 120%. Such disasters in Malaysia, affected not only individuals, but also various economic sectors. For example, in Malaysia small medium enterprises (SMEs) contribute close to 37% to Malaysia's GDP and employment of 48% (https://www.dosm.gov.my/). Such SMEs take a heavy toll during disasters (Zairol, 2018). From an engineering perspective, critical engineering infrastructures (CEI) such as electricity, water supply and access to road transportation networks are crucial to be functioning to support disaster management and recovery. For example, the literature (Kirsch, 2010), (Rimfiel, 2017) has cited some examples on the failure of CEI and the consequences on hospitals. Kirsch et. al reported that due to loss of power and insufficiency of backup power, a hospital was inoperable of medical services. Some hospitals faced water contamination causing the cessation of activities.

The community in general is always the first layer to be affected by disasters. Rescue and support, in forms of job requirements and volunteering are important in forming the first defence line (Hoi, 2020). Engineering professionals are one of the key players in disaster risk management and relief (Cruz, 2007). In view of this, disaster engineering preparedness education and training should be integral parts of public awareness competencies development for undergraduate engineering students, such as training and education provided by Federal Emergency management Agency of USA (FEMA). Such modules from FEMA can be customized to create 1st year disaster management course to undergraduate students. Unlike the health education sector (Zhou, 2019), engineering education in general lacks such preparedness education. These undergraduate students are the future engineers and as such adequate knowledge, positive attitudes and readiness to practice must be acquired at the university level to enhance their skills. To date, scholarly work that focuses on the preparedness of undergraduate engineering students to handle disaster management is scarce. *The research question is the following: Are Malaysian engineering graduates prepared to respond to disasters?* There is almost no comprehensive reporting on engineering students in terms of their knowledge, attitudes and readiness to support the engineering fraternity in an event of a disaster. In this study, we are focused to evaluate the engineering students in Malaysia in particular for knowledge (K), attitude (A) and readiness to practice (rP) regarding disaster preparedness.

Materials and Methods

Study Design

This exploratory study was carried out in a Malaysian university among undergraduate engineering students. Selected students who completed the online survey were considered to have informed consent to participate in the study. The survey was distributed online, filled out by the respondents and returned to the research team. The data were collected electronically using Google Forms. Ethical approval for this study was obtained from Qatar University IRB (Approval Number: QU-IRB 1344-EA/20).

Population and sampling

The target population in the study was undergraduate engineering students. Students from postgraduate levels and non-engineering were excluded from the study. The sample size was calculated using a margin of error of 5%, a confidence level of 95%, and a response distribution of 50%. A minimum sample size of 373 students was required. The calculation was performed using Raosoft® online calculator http://www.raosoft.com/samplesize.html. Convenience non-probability sampling was applied to reach the respondents. Selected engineering institutions in Malaysia were invited to participate and were requested to share the online survey tool with their students. The approach was convenience sampling.

Study tool development and validation

The tool (KArP) was developed and adapted based on the previous studies (Li, 2022), (Rajaa, 2022), and changes were made according to the engineering discipline. Then a pretesting was done among four

faculty members for face validity measure who are experts in engineering, health and disaster aspects. This was followed by a pilot study carried out among Qatar University College Engineering students for tool reliability measure using Cronbach's alpha. Forty-six students responded. A few minor changes were made to the items and the Cronbach's alpha measures are as the following: Knowledge (K) factor (21 items) = 0.620 (moderate – good), Attitude (A) factor (17 items) = 0.561 (moderate – good) and Readiness to practice (rP) factor (11 items) = 0.566 (moderate – good). The knowledge factor has 22 items (response: Yes or No) and the score ranged from 0 to 22; while the attitude factor has 17 Likert's scale items (5 response options: Strongly agree to Strongly disagree) and has a min-max score of 17 to 85; and the readiness to practice factor has 11 Likert's scale items (5 response options: Strongly agree to Strongly disagree) and has a min-max score of 11 to 55.

Data Analysis

Prior to conducting the survey, the tool had a page that explained disaster and relevant terms to support the understanding while answering the questions. The data collected for this research were compiled in Excel program and analysed using the Statistical Package for the Social Sciences v28. (Armonk, NY: IBM Corp.). The normality of the results was checked using the Kolmogorov–Smirnov test. Descriptive analysis, frequency (%) for non-continuous variables, and mean (SD) or median (IQR) for continuous variables were used. Because the data were not normally distributed, nonparametric tests (i.e., Chi-Square, Kruskal–Wallis, and Mann–Whitney) were used. Spearman rho's correlation test examined the correlation among the three parameters (K, A, and rP). Multiple linear regression was performed to predict the readiness to practice (dependent variable) from knowledge and attitude (independent variables). All tests were carried out at a priori alpha level of 0.05.

Results

The Cronbach's alpha i.e. internal consistency for the tool for the major study is reported as below (Table 1). High Cronbach's alpha values show consistency of response values for each respondent across a set of questions. The values are considered under moderate/acceptable level (Taber, 2018). Majority of the respondents indicated a moderate level of knowledge (56.4%), a moderate level of positive attitude (54.3%), and a moderate level of readiness to practice (64.3%). Less than one-forth of the respondents who showed a high level in all the three domains.

The profiles of the participants are shown in Table 2. The mean age (sd) was 21.5 (1.9) and ranged from 18 to 28 years. There were more male respondents than female respondents. The majority were from Mechanical Engineering. There is a fair distribution between the academic level 2-4 (years). All the respondents are undergraduate students working towards their bachelor's degree.

Table 1. Cronbach's alpha and average score for the KAPr tool

Factor	Cronbach's Alpha	Mean (SD)	Median (IQR)
Knowledge (K)	0.637	12.85 (3.35)	13.00 (10.00-15.00)
Attitude (A)	0.691	58.39 (7.26)	58.50 (53.00-63.00)
Readiness to practice (rP)	0.540	37.28 (4.40)	37.00 (34.00–41.00)

Table 2. Demographic profiles of the respondents

Profiles	Statistics
Gender	Female (n=14, 10.0%) Male (n=126, 90.0%)
Age (years): mean (sd)	21.5 (1.9) Range: 18 to 28
Engineering degree major	Civil/Architecture (n=8, 5.7%) Mechanical (n=115, 82.1%) Electrical/Electronics (n=17, 12.1%)
Academic level (year)	1st (n=7, 5.0%) 2nd (n=51, 36.4%) 3rd (n=47, 33.6%) 4th (n=31, 22.1%) 5th (n=4, 2.9%)
Degree conferred upon graduation	Bachelor (n=140, 100%)

Table 3 depicts the knowledge of the respondent regarding disaster preparedness. Majority (≥ 60%) of the respondents said "No" to 4 out of the 22 items. These items related to the following statements: *as an engineering student, I have previous exposure to this topic (64.3%); I read journal articles related to disaster preparedness (62.9%); Finding relevant information about disaster preparedness related to this country's needs is an obstacle to my level of preparedness (67.9%); I am unfamiliar with the organizational logistics and roles among local and national agencies in disaster response (i.e. taking decisions and measures) situations (62.1%)*.

Looking at the "Yes" response, majority (≥ 60%) of the respondents said "Yes" to 11 out of the 22 items: *Disasters come in many shapes and sizes (type of disasters, intensity, effects, etc.)(91.4%); In general, I find that the research literature on disaster preparedness and management is easily accessible (63.3%); I find that the research literature on disaster preparedness is understandable (68.6%); I am aware of the potential risks of emergencies in this country (e.g: natural disaster, embargo, terror, war…etc.)(74.3%); I*

know how such emergencies or disasters can affect the engineering sector (power supply, water supply, transportation, manufacturing, etc.)(86.4%); I know the limits of my knowledge, skills, and readiness as a university student to act in disaster situations, and I would know when I exceed them (79.3%); In case of a disaster/crisis, I know how to overcome the situation by applying related engineering skills to benefit my society (63.6%); I am familiar with the accepted process of examining problems to decide which ones are the most serious and must be dealt with first in disaster situations (63.6%); Realistic on-scene training is vital to an efficient and effective disaster plan (84.3%); Disaster management is truly a systems-oriented specialty and involves multiple responding agencies (83.6%).

Table 3. Knowledge assessment on disaster among respondents

Questions	Yes (1), n (%)	No (0) n (%)
As an engineering student, I have previous exposure to this topic (Disaster Preparedness).	50 (35.7)	90 (64.3)
	Average = 0.36	
As an engineering student, I have previous experience in dealing with disasters.	58 (41.4)	82 (58.6)
	Average = 0.41	
I think my country of residence (where you are studying currently) is at risk due to disasters (natural or human made).	76 (54.3)	64 (45.7)
	Average = 0.54	
Disasters come in many shapes and sizes (type of disasters, intensity, effects, etc.).	128 (91.4)	12 (8.6)
	Average = 0.91	
Is Engineering related disaster the sole responsibility of an engineering organization?	60 (42.9)	80 (57.1)
	Average = 0.43	
I read journal articles related to disaster preparedness	52 (37.1)	88 (62.9)
	Average = 0.37	
I am unaware of classes about disaster preparedness and management that are offered, for example, at either my college or community.	67 (47.9)	73 (52.1)
	Average = 0.48	
In general, I find that the research literature on disaster preparedness and management is easily accessible.	89 (63.6)	51 (36.4)
	Average = 0.64	
I find that the research literature on disaster preparedness is understandable.	96 (68.6)	44 (31.4)
	Average = 0.69	
Finding relevant information about disaster preparedness related to this country's needs is an obstacle to my level of preparedness.	45 (32.1)	95 (67.9)
	Average = 0.32	
I know where to find relevant research or information related to disaster preparedness and management to fill in gaps in my knowledge.	84 (60.0)	56 (40.0)
	Average = 0.60	
I know referral contacts in a disaster situation (e.g. public works authority department).	58 (41.4)	82 (58.6)
	Average = 0.41	
In a disaster situation, I think there is no sufficient support from local officials at the governance level.	77 (55.0)	63 (45.0)
	Average = 0.55	
I am aware of the potential risks of emergencies in this country (e.g: natural disaster, embargo, terror, war…etc).	104 (74.3)	36 (25.7)
	Average = 0.74	
I know how such emergencies or disasters can affect the engineering sector (power supply, water supply, transportation, manufacturing, etc.).	121 (86.4)	19 (13.6)
	Average = 0.86	
I know the limits of my knowledge, skills, and readiness as a university student to act in disaster situations, and I would know when I exceed them.	111 (79.3)	29 (20.7)
	Average = 0.79	
In case of a disaster/crisis, I know how to overcome the situation by applying related engineering skills to benefit my society.	89 (63.6)	51 (36.4)
	Average = 0.64	
I am familiar with the local emergency response system to initiate engineering procedures/solutions.	57 (40.7)	83 (59.3)
	Average = 0.41	
I am familiar with the accepted process of examining problems to decide which ones are the most serious and must be dealt with first in disaster situations.	89 (63.6)	51 (36.4)
	Average = 0.64	
I am unfamiliar with the organizational logistics and roles among local and national agencies in disaster response (i.e. taking decisions and measures) situations.	53 (37.9)	87 (62.1)
	Average = 0.38	
Realistic on-scene training is vital to an efficient and effective disaster plan.	118 (84.3)	22 (15.7)
	Average = 0.84	
Disaster management is truly a systems-oriented specialty and involves multiple responding agencies.	117 (83.6)	23 (16.4)
	Average = 0.84	

Table 4 depicts the attitudinal levels of the participants towards disaster preparedness. In terms of agreement, more than 50% of the respondents agreed (total of "strongly agree" AND "agree") that: *I would feel confident in my abilities as an engineering student in disaster situation (54.3%); I would be interested in educational classes on disaster preparedness that relate specifically to the country situation (85%); I would be willing to be a future member of an engineering facility/team in case of a disaster (81.4%); I would feel confident in providing engineering-related education in a disaster or emergency (59.3%); I need more workshops and simulated training to prepare for disaster situations (92.9%); Disasters can disrupt progress made towards achieving the sustainable development goals (SDGs) (89.3%). In terms of disagreement, (total of "strongly disagree" AND "disagree") there were no significant items to be reported*.

Table 4. Attitude assessment on disaster among respondents

Questions	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
I consider myself prepared for the management of disasters.	16 (11.4)	43 (30.7)	49 (35.0)	26 (18.6)	6 (4.3)

	Average score: 3.26				
I would feel confident in my abilities as an engineering student in disaster situation.	19 (13.6)	57 (40.7)	46 (32.9)	14 (10.0)	4 (2.9)
	Average score: 3.52				
I would be interested in educational classes on disaster preparedness that relate specifically to the country situation	47 (33.6)	72 (51.4)	16 (11.4)	5 (3.6)	0
	Average score: 4.15				
In a disaster, I would be considered a key leadership figure in my community.	20 (14.3)	47 (33.6)	44 (31.4)	16 (11.4)	13 (9.3)
	Average score: 3.32				
I have personal/family emergency engineering plans for disaster situations (e.g. power supply, water supply, sanitary, food supply, etc.)	16 (11.4)	35 (25.0)	29 (20.7)	47 (33.6)	13 (9.3)
	Average score: 2.96				
I have an agreement with loved ones and family members on how to execute our personal/family emergency and disaster plans.	17 (12.1)	33 (23.6)	29 (20.7)	42 (30.0)	19 (13.6)
	Average score: 2.91				
I am able to describe my role in the response phase of a disaster in the context of my college, the general public, media, and personal contacts.	26 (18.6)	35 (25.0)	50 (35.7)	22 (15.7)	7 (5.0)
	Average score: 3.36				
I would not feel confident as a future manager or coordinator of an emergency engineering support facility.	13 (9.3)	40 (28.6)	34 (24.3)	42 (30.0)	11 (7.9)
	Average score: 3.01				
I would be willing to be a future member of an engineering facility/team in case of a disaster.	49 (35.0)	65 (46.4)	20 (14.3)	4 (2.9)	2 (1.4)
	Average score: 4.11				
I feel reasonably confident I can handle engineering-related problems independently without the supervision of an engineer in a disaster situation.	21 (15.0)	49 (35.0)	53 (37.9)	8 (5.7)	9 (6.4)
	Average score: 3.46				
I would not feel confident implementing emergency and disaster engineering plans and procedures.	5 (3.6)	37 (26.4)	42 (30.0)	36 (25.7)	20 (14.3)
	Average score: 2.79				
I would feel confident in providing engineering-related education in a disaster or emergency.	26 (18.6)	57 (40.7)	45 (32.1)	10 (7.1)	2 (1.4)
	Average score: 3.68				
As an engineering student, I consider myself prepared to manage disasters	16 (11.4)	45 (32.1)	42 (30.0)	29 (20.7)	8 (5.7)
	Average score: 3.23				
As an engineering student, I would not feel confident in my abilities as a future engineer and first responder in engineering-related disaster situation.	12 (8.6)	34 (24.3)	43 (30.7)	36 (25.7)	15 (10.7)
	Average score: 2.94				
There's enough awareness on “ways to stand wars and other humanity and natural emergencies among undergraduate students in my university	11 (7.9)	40 (28.6)	32 (22.9)	42 (30.0)	15 (10.7)
	Average score: 2.93				
I need more workshops and simulated training to prepare for disaster situations.	67 (47.9)	63 (45.0)	10 (7.1)	0	0
	Average score: 4.41				
Disasters can disrupt progress made towards achieving the sustainable development goals (SDGs)	64 (45.7)	61 (43.6)	13 (9.3)	2 (1.4)	0
	Average score: 4.34				

Table 5 illustrates the readiness to practice among the participants. More than 50% of the respondents agreed (total of "strongly agree" AND "agree") that*: I am willing to attend the emergency education incorporated in the undergraduate coursework (83.5%); Other extracurricular resources (e.g.: internet, TV, radio and newspapers) enable me with a sufficient degree of readiness to practice under disaster (59.3%); I'm ready to practice under disaster, knowing that some basic engineering tools may not be available because of the disaster situation (69.3%); I need to be more trained for disaster situations (91.4%); time and effort are barriers towards readiness to practice (86.4%). In terms of disagreement, (total of "strongly disagree" AND "disagree") the following statements are not barriers towards readiness to practice: Lack of knowledge about disaster (83.5%); engineering related disaster are unlikely to occur in my country (51.5%)*.

Table 5. Readiness to practice assessment on disaster among respondents

Questions	Strongly Agree *n* (%)	Agree *n* (%)	Neutral *n* (%)	Disagree *n* (%)	Strongly Disagree *n* (%)
My role in disaster situations is clear.	19 (13.6)	34 (24.3)	59 (42.1)	20 (14.3)	8 (5.7)
	Average score: 3.26				
I am not ready to handle whatever potential risks of emergencies exist in the community.	11 (7.9)	33 (23.6)	38 (27.1)	52 (37.1)	6 (4.3)
	Average score: 2.94				
I am willing to attend the emergency education incorporated in the undergraduate coursework.	51 (36.4)	66 (47.1)	23 (16.4)	0	0
	Average score: 4.20				
I attended workshops/seminars about disaster, which is enough for me to practice in real situations.	16 (11.4)	34 (24.3)	30 (21.4)	42 (30.0)	18 (12.9)
	Average score: 2.91				
My undergraduate coursework enables me to be ready to practice in the settings of disaster (natural: eg- earthquakes and floods; or human-made: eg- embargo or wars)	16 (11.4)	46 (32.9)	42 (30.0)	27 (19.3)	9 (6.4)
	Average score: 3.24				
Other extracurricular resources (eg: internet, TV, radio and newspapers) enable me with a sufficient degree of readiness to practice under disaster.	21 (15.0)	62 (44.3)	47 (33.6)	9 (6.4)	1 (0.7)
	Average score: 3.66				
I'm ready to practice under disaster, knowing that some basic engineering tools may not be available because of the disaster situation.	20 (14.3)	77 (55.0)	32 (22.9)	7 (5.0)	4 (2.9)
	Average score: 3.73				
I need to be more trained for disaster situations.	79 (56.4)	49 (35.0)	12 (8.6)	0	0
	Average score: 4.48				
The following are barriers that reduce my readiness to practice:					
Lack of knowledge about disaster	0	7 (5.0)	16 (11.4)	79 (56.4)	38 (27.1)
	Average score: 1.94				
Engineering related disaster are unlikely to occur in my country	13 (9.3)	24 (17.1)	31 (22.1)	46 (32.9)	26 (18.6)
	Average score: 2.66				
It requires effort and time to be prepared.	65 (46.4)	56 (40.0)	12 (8.6)	5 (3.6)	2 (1.4)
	Average score: 4.26				

Mann-Whitney test was applied to find any significant difference between male and female respondents in terms of the total knowledge, attitude and readiness to practice scores; none was significant ($p > 0.05$). Further, Chi-square analysis was carried out to search for any significant association between gender and knowledge, attitude and readiness to practice categories; no significant difference was found ($p > 0.05$). Age was correlated with total knowledge, attitude and readiness to practice scores. Spearman rho correlation indicated only total knowledge score was significantly associated with age ($p = 0.008$, $r = 0.224$). The study also is interested to find for any significant differences of age of the respondents in terms of the knowledge, attitude and readiness to practice categories; no significant difference was found ($p > 0.05$). Both the covariates, age and gender did not influence the three main factors.

Spearman rho correlation indicated that there are significant associations between knowledge factor and attitude factor ($p<0.001$, $r=0.403$), knowledge factor and readiness to practice factor ($p<0.001$, $r=0.374$), and between attitude factor and readiness to practice factor ($p<0.001$, $r=0.648$). Further causality analysis was carried out using linear regression. It is shown that knowledge is a good predictor of attitude ($R^2 = 0.130$, $p<0.001$), and readiness to practice ($R^2 =$

0.1160, p<0.001) and attitude is a good predictor of readiness to practice (R^2 = 0.418, p<0.001).

Discussion

This study assessed the Malaysian engineering undergraduate students' knowledge (K), attitude (A), and level of readiness to practice (rP) regarding disaster preparedness. An overall summary would be that the participants had moderate levels of knowledge, attitude, and readiness to practice. The study goes to show that there are significant associations between knowledge factor and attitude factor, knowledge factor and readiness to practice factor, and between attitude factor and readiness to practice factor.

Almost half of the participants understood that Malaysia is at risk of disasters and that these disasters come in many size and shapes. These participants also significantly understand the potential of risk of emergencies in Malaysia (e.g.: natural disaster, embargo, terror, war…etc.). A huge percentage of them also acknowledge that disasters can affect the engineering sectors (power supply, water supply, transportation, manufacturing, etc.). The students also showed positive competencies (lifelong learning) in terms of identifying information sources and availability for materials related to disaster management and preparedness. However, the respondents indicated that they have not had real exposure or handling experience on this topic. There was a huge agreement that there is lack of support from local officials in terms of organizational logistics and roles among local and national agencies in disaster response (i.e. taking decisions and measures) situations. The study shows that the engineering students have a moderate knowledge in terms of disaster preparedness.

In terms of attitude, there was a moderate indication towards a positive attitude towards disaster preparedness. They feel confident in their abilities as an engineering student to assist in disaster situation and are willing to be a future member of an engineering facility/team in case of a disaster. They are also interested in educational classes on disaster preparedness that relate specifically to the country's situation. However, the students feel they are not well prepared for the management of disasters and would be happy to receive workshops and simulated training to prepare for disaster situations. Most of the participants are interested to practice and are willing to attend education and training programs. They have indicate this because they are not certain of their roles in such situation and do not have the required skills to handle the emergencies. The respondents also identified that the barrier for them in readiness is the effort and time for preparation.

What are the practical implication of this study? This study has shown that the literature is scarce in terms of understanding the student agency for disaster preparedness. This is a good prompt to support such studies, especially for ASEAN countries who are exposure to high risks. There is an urgent need to prepare engineering undergraduates on disaster preparedness. These students will be holding positions in the professional and community levels. As such, preparing undergraduates for disaster management will strengthen the social fabric towards such risks.

Limitation of Study

This study is an exploratory in nature, as such the sample size is not representative of the population. The other point is on social desirability bias i.e. the possibility of tendency of students to respond in a way that will be viewed favourably by others, rather than reply truthfully. The future step is to have more participants in this study and to conduct a mixed research method involving faculty members and stakeholders. The outcome of this study will then pave the way for proposing minor changes in the engineering education within the Malaysian context.

Conclusion

This study is to investigate the attitude, knowledge and readiness to practice among undergraduate engineering students in Malaysia during an event of a disaster. The survey was conducted among some private and public universities in Malaysia. In summary, it can be concluded that most engineering undergraduate have moderate level of knowledge and attitude. When it comes to readiness to practice, these students are ready and eager however state that they lack training and education on the "know-how". There was a huge agreement that there is lack of support from local officials in terms of organizational logistics and roles among local and national agencies in disaster response.

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