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PRELIMINARY STUDY ON STRESS LEVEL FOR NAVAL CADETS DURING PRACTICING NAVIGATION DUTY AS OFFICER OF THE WATCH AT SHIP BRIDGE SIMULATOR

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Abstract

Ship bridge simulators are the method to increase Naval Cadets performance before they undergo training onboard accurate ships at sea. Stress is believed to be an obstacle for Naval cadets to improve their performance to an optimal level using the ship bridge simulator. This research was conducted to investigate the Naval cadets' stress level during navigation practice at the ship bridge simulator as OOW to find the effect of their performance. This research is essential to ensure their ability to perform their duty as OOW. The human factor is one of the most significant factors that can lead to collision onboard a ship at sea. The qualitative method was used through data collection from experiments in a ship bridge simulator to determine their heart rate and stress level using a calibrated hand strap device. A questionnaire survey was also conducted after completing the second experiment to evaluate the Naval cadet's stress levels based on their perspective and self-assessment for improvement from the first run to the second run experiment. The selected respondents were Naval Bachelor in Maritime Technology cadets who had to undergo navigation training at the ship bridge simulator. This study's results showed that several factors that affected the Naval Cadets performance. It must be considered and adapted to improve their performance when carrying out duty as OOW at the ship bridge simulator.

Keywords: Naval cadets, Officer of the watch, Ship bridge simulator, Stress level.

1. Introduction

A job as a seafarer on a naval ship or a merchant ship is very challenging [1]. This is because high mental strength and working under stress are requirements for seafarers. The task of a seafarer must strive in changing environmental conditions; operations vary, ships may deviate and must always be. Seafarers must prepare for the same challenges that sometimes affect their condition and performance [2]. Challenges like these will indirectly impact their emotional decline and performance. This is due to human factors that will significantly impact human errors, which were shown to be the cause of most maritime accidents [3].

The human factor, which is the cause of marine accidents, encompasses all activities that reflect the relationship between humans and machines [4]. Therefore, it is not surprising that many reports of accidents are caused by human negligence. The stress of seafarers contributes to most accidents that occur at sea seafarer stress Officer of the Watch (OOW) in the ship bridge simulator does not include the stress element can also provide another factor of marine accidents. Therefore, this matter must be addressed to prevent the sea from continuing to occur or weaken Malaysia's naval defence system.

Stress is a normal human reaction that happens to everyone. The human body is designed to experience stress and respond to it. Your body produces physical and mental responses when someone experiences a change or challenge pressure. Stress responses help a person adapt to a new situation [5]. Therefore, this study aims to identify the stress level experienced by seafarers with the title of OOW.

This research aims to identify the level of stress experienced by Naval cadets carrying out their duty as OOW at a ship bridge simulator by identifying indicators of the Naval cadets' stress level during OOW training at a ship navigation simulator, the stress level of the Naval cadets performing OOW duty later measured. Then, the Naval cadet's performance as OOW in navigation training contributes to the stress level identified.

The novelty of this study is that it is a study carried out on Naval Cadet's at the University Pertahanan Nasional Malaysia (UPNM) using the Ship Bridge Simulator facility. This study has never been carried out before and it is very important to assess their current stress level while practicing navigation duty as OOW at Ship Bridge Simulator. The assessment of the level of stress is very important to see the extent of the impact of this stress on the quality of training implementation and the possibility of being a factor in human error [6].

OOW is one of the duties of the executive branch officer on the ship during the voyage [7]. OOW is fully responsible for the movement and navigation of the ship to the designated destination. Various aspects and skills are required to navigate the ship safely in addition to taking into account the following criteria:

- Navigation.
- Maritime Law.
- Marine Science.
- Maritime Communications.
- Surface Warfare.
- Charts and Navigation Speed Limits.

- Rule of The Road (ROR).

As an OOW, all factors that jeopardize the ship's movement need to be considered to guarantee the ship's and other crew's safety and adhere to the ship's movement schedule. Navigation becomes the basis for driving a ship safely. It must be assisted by other navigational devices such as radar and position indicators such as Navigation charts [7]. Charts and speed limit navigation also play an essential role in assisting OOW in driving the direction of the ship in question.

In addition, the maritime law to prevent collisions at sea is a guide for all OOW to navigate the ship so that all unwelcome things can be avoided. Maritime communication between ships was also carried out throughout the voyage. This aims to identify ships entering national waters and take data on the movement of those ships to create navigation statistics. All ship data will be recorded for monitoring the movement of the ship.

Communication between Royal Malaysian Navy (RMN) ships is essential during a joint exercise. All movement instructions during training are conveyed through visual communication using light beams, semaphores flag-waving, or radio communication. Communication is also essential during the war, training where OOWs are required to steer a ship to open a firing angle so that firing can be done after obtaining a firing order from another ship.

In addition, the warfare sciences must be considered so that all OOW actions do not endanger the ships and companionships involved in the training or the actual situation. As such, OOW is a very bear task for all ship movements and requires high skill [8].

Navigation is one of the crucial specialties in ship handling. Navigation knowledge allows the ship to be steered well and safely to guarantee the ship's and crew's safety [9]. Navigate includes light and dark navigation, requiring adequate skills and training to operate the ship well. In addition, applying the sciences of Navigation is very important for everything decisions and actions can be made quickly, and the ability to analyse and detect wind and tidal directions is also essential to navigate the ship safely.

In addition, astronomical navigation is also vital if the ship suffers complete damage where all the Navigation aids, such as radar, Global Positioning System (GPS), and so on, cannot operate due to the lack of electricity supply [10]. Astronomical navigation requires the observation of stars, moons and planets at dusk and dawn while using the sun's shortcut during the day. It is used to determine the position of the ship in the middle of the high seas, where it will give the current position of the ship, and further action can be taken to overcome the problem.

The ship bridge simulator is one of the many variations of simulators and is widely used worldwide. The ship bridge simulator system is complex regarding software and equipment [11]. It is used in maritime training, especially for navigation training and how to control ships effectively and safely concerning nautical laws. Various agencies from the maritime field, regardless of defence or commercial agencies, use shipyard simulators to train new and old members [12]. This shows that the simulator is helpful as a preparation platform before facing an actual situation.

The ship bridge simulator is built to resemble the condition of the pavilion to create the atmosphere and environment on the ship. A complete ship bridge simulator has some essential equipment as follows:

- Navigation radar.
- Electronic Chart Display (ECDIS).
- Gyro Compass.
- GPS (Global Positioning System).
- Steering and Engine Control System.
- Echo Recorder.
- Screen.

In addition, there are also other navigation aid devices in the pavilion simulator ships, such as a parallel ruler, marine compass, marine divider, Douglas protector, speed distance ruler and station pointer. The modern and state-of-the-art ship bridge simulator has special effects such as a three-dimensional skin display, sound effects, ship-breaking waves, vibrations from ship engines and rough sea conditions [13]. All of this provides an atmosphere and environment like navigating a real ship. This situation can give the trainee a high level of influence and confidence to steer the ship.

RMN also has its own ship pavilion simulator system. This aims to train officers and cadets to steer the ship safely and as a training platform to strengthen the skills of members in the field of navigation in addition to making evolutionary training of OOW such as formation evolution, people falling into the sea, transfer of personnel and goods, towing and other- others. Thus, armed with highly skilled personnel in the field, the RMN can perfectly maintain peace and security in the country's waters [14].

One of the challenges to military organisations today is the ability to develop and implement rigorous and robust training programs. Various exercises can improve the ability of the fist while organising movements, thinking critically and making the right decisions in a demanding environment. To meet this challenge, UPNM has proposed having its own ship platform simulator system [15].

Proposal after proposal and several working papers have been submitted to the parties involved, such as UPNM Management, the Ministry of Defense and many more. Finally, this dream came true when the application to own a ship system at UPNM for the training of Officer Cadets was approved, and an allocation of more than RM 7.0 million was given [15].

At the end of 2005, this simulator system was completed and started fully operational. Among the benefits that can be utilised through the ship bridge simulator of this ship to the Officer Cadet is:

- Officer Cadets can be trained repeatedly to be proficient in visual navigation and evolution.
- The use of a simulator can save costs if compared to the use of actual ships for training at sea.
- Errors in the ship bridge simulator will not pose a danger compared to a mistake performed on an actual ship, such as a breach, runoff or anxiety at sea.

- Officer Cadets can be trained in the ship bridge simulator to achieve the required skill level before being sent to train on RMN ships. This ship bridge simulator system is equipped with a variety of the latest shipping simulation equipment among the modern and latest equipment that has been included in this simulator are such as navigation radar, electronic chart (ECDIS), Global Positioning System (GPS), display system and steering control as well as engine control, radio communication set and Plasma LCD system. This simulator uses ANS 5000 (Advance Nautical System) software as a pulse to ship simulations for navigational learning.

Their first and early detection significantly increases the chance of preserving the life of the downed crew. To preserve the life of the individual who went overboard, the following steps for a Man Overboard (MOB) need to be done immediately [16]. When the man fell overboard, the ship must manoeuvre to recover the MOB. Other actions are:

- Bring the stern away from the MOB.
- Sound 6 short blasts.
- Inform the Captain and Executive Officer.
- Make announcements through broadcast.
- Hoist Flag OSCAR.
- Inform ships in the vicinity via Channel 16 and UHF.
- Plot the ship's position when the man fell.
- Put radar on True Motion (TM).
- Write in the OOW Notebook/ Ship's Log.
- Away lifeboat.
- Inform the shipping company of MOD and the method of recovery.
- Away Swimmer of the Watch.
- Ask Lookout to look for MOB.
- Inform Engine room.
- Post shark sentry.

A ship or boat can perform a manoeuvre known as the Williamson Turn to return under control to a location it has already passed across to collect a man who has fallen overboard. John Williamson, who used it in 1943 to rescue Tim Williamson after he had gone overboard, gave it his name. The Williamson turn is the best option when the point may be permitted to disappear from view but is still quite close [17]. Action to be taken when conducting Williamson turn are:

- Set the rudder to its most significant angel.
- If a guy overboard is encountered, steer the boat towards the individual (for example, if the man is on the starboard side, steer full over the starboard).
- Full-shift the rudder to the other side after veering off the initial route by around 60 degrees.
- Place the rudder amidships such that the ship changes to the reciprocal course when heading roughly 20 degrees off the reciprocal.

- Steer the ship upwind of the MOB and halt it in the water beside them, in front of the propellers. Bring the boat upwind of the person if dealing with a guy overboard. With the individual far in front of the propellers, stop the boat in the water.

Stress is a common occurrence in your daily life. If the stress is not manageable and it becomes chronic, it can negatively impact employment, family life, and health. Stress will lead the person to argue with their friends and loved ones, which is caused by physical and emotional problems. Here are just a few examples of many forms of stress. While some of these are short-term or wouldn't last more than the day of work, they might still benefit your health. A person may be experiencing long-term or prolonged stress if this accurately characterises her daily life. It can be detrimental to health if not mitigate or control the effects of these many types of stress.

When a person feels threatened, the nervous system releases a flood of stress hormones, which prepare the body for action. Once the pulse beats quicker, the reaction of muscles will tense up together with an increase in blood pressure, quicker breathing, and sharpened sense [18].

The body's response to any form of demand or threat is stress. When a person feels threatened, whether real or imagined, body's defences go into high gear in a quick, reflexive process known as the "tablet-or-flight" reaction or "stress response." The nervous system doesn’t understand the difference between emotional and physical dangers. Body may respond as powerfully as if you're facing a life-or-death crisis if burdened with a dispute with a buddy or a job deadline. The more the emergency stress system is active, the simpler it is to trigger and the more difficult it is to deactivate [19].

The number of times a person's heart beats each minute is known as their heart rate (bpm). According to the Mayo Clinic, people’s average resting heart rate is 60 to 100 beats per minute [20]. Individuals' resting heart rates differ based on age, body size, heart conditions, medication use, emotions and the air temperature around them. For example, being enthusiastic or terrified might cause one's heart rate to increase. Monitoring your heart rate can assist in maintaining an update on your fitness level. If the person notices an abnormally rapid, slow, or abnormal heartbeat, it may help you identify growing health issues [21], standard and maximum heart rate are shown in Table 1.

Table 1. Standard and maximum heart rate (beats per minute, bpm) [21].

Age	Target Heart-Rate Zone	Max Heart Rate (Average)
20	100 to 170 bpm	200 bpm
25	98 to 166 bpm	195 bpm
30	95 to 162 bpm	190 bpm
35	93 to 157 bpm	185 bpm
40	90 to 153 bpm	180 bpm
45	88 to 149 bpm	175 bpm
50	85 to 145 bpm	170 bpm
55	83 to 140 bpm	165 bpm
60	80 to 136 bpm	160 bpm
65	78 to 132 bpm	155 bpm
70	75 to 128 bpm	150 bpm

The autonomic nervous system regulates heart rate, respiration, eyesight, and other bodily functions. The body's built-in stress reaction, known as the "fight-or-flight response," assists it in dealing with stressful conditions. When a person is stressed, the stress response is activated repeatedly, causing wear and tear on the body. Symptoms appear in physical, emotional, and behavioural manifestations [22]. Stress can cause a variety of emotional and mental symptoms, including:

- Anxiety or irritability.
- Depression.
- Panic attacks.
- Sadness.

Stress is something that affects us mentally and physically. It can be detected by looking at the variability of our heart rate. Heart rate variability looks at how our heart beats to show how our body responds to stress, either for good or bad. Experiencing emotional or physical stress causes increased heart rate, blood pressure, and the release of stress hormones. All this results in a more significant workload for the heart, which can be dangerous for individual health [23]. Effects of stress on the heart:

- Increase heart rate.
- Increased blood pressure
- Adrenal glands release catecholamines
- The body needs a high rate of increase in oxygen.

2. Research Method

At the stage of data formation, all the questions, objectives, and scope of the study will be highlighted. This enables the initial step of the research process to guide the writing of the thesis according to the requirements set. This study is needed to see how much stress Naval Cadets will experience.

Primary data were collected through studies to be conducted on the ship bridge simulator. The source of the primary data is data or factual data taken from individuals. Therefore, the representatives following this study are made up of maritime technology Naval cadets who aim to find out the results of this study in more detail. Primary data were obtained from the results of a study during training on a bridge ship simulator, such as data on stress levels, heart rate and observation of Naval Cadets reactions while playing the role of OOW in a ship bridge simulator.

- Measuring stress. This method uses the hand strap’s Stress Monitor for Watch app (Apple Watch Series 7). This app can calculate heart data and indicate an individual’s stress level. Apple Watch was chosen because it is proven by Shcherbina et al. [24] in both Heart Rates, the Apple Watch had the lowest total error. According to that research, the error allowed for the heart rate measurement device is below 5%.
- Measuring heartbeat. This method uses an app called Heartbeat App on the hand strap device. This app can measure an individual heartbeat.
- Questionnaire method. Questionnaires are given after the second experiment. Respondents were made up of maritime technology Naval cadets. It aims to

find out in detail what Naval Cadets think about the level of stress they experience. In addition, the presented questions focus more on the symptoms that lead them to stress.

The source of secondary data is taken from individuals or other institutions. Secondary data is obtained because various materials such as books, articles, papers, documents, internet databases, and recent studies have been conducted.

After all the information in the collection and analysed, the summary of everything and the issues that arise can be resolved. Responding to all the research objectives put forward at the beginning of the issue is essential. It is essential to determine all the follow-up actions that need to be taken for the process improvement of something. A comprehensive summary will be released once all data, information, and observations are analysed, and results are obtained by comparing data and information from respondents. This final analysis will be created after reviewing all the data obtained from the literature review, experiment and survey. The main flowcharts for this study are depicted in Fig. 1.

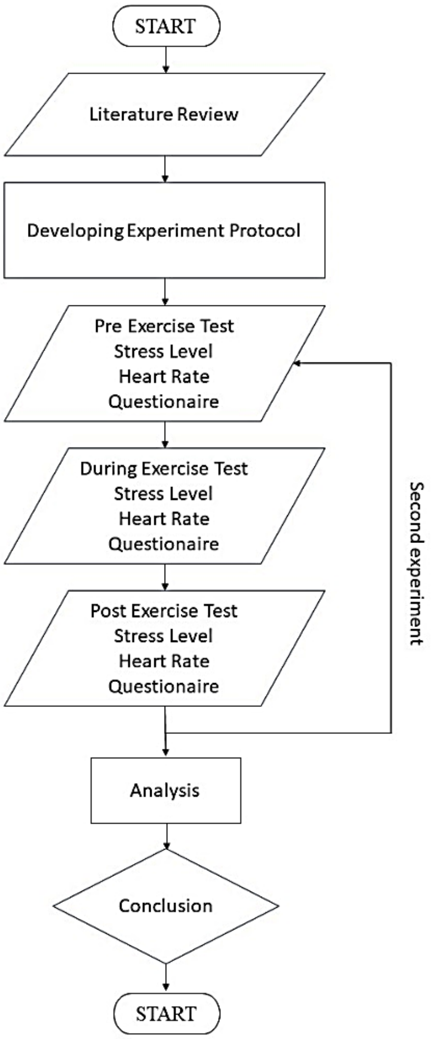

Fig. 1. Main flowchart for the methodology used in this study.

Hand strap device calibration: The calibration compares the Hand Strap Device heart rate reading with the Ministry of Health Approved A300 Heart Rate Meter medical heart rate device before every run starts. Each Naval cadet gets a heart rate reading with a difference below 5% from the control device.

3. Results and Discussion

The analysis is conducted from the results from the Naval Cadets during the navigation exercise in the simulator. The data compared to the first trial and second trial. The Naval Cadets in this data collection are Naval cadets with bachelor's degrees in maritime technology from National Defence University Malaysia.

The Naval cadets are using Ship Bridge Simulator as a simulation at open sea for the MOB exercise. Due to the limited crew available for MOB training and the limited time available to collect the data for each trial of Naval Cadets, the researcher chose only two Naval cadets to perform the MOB exercise. The stress level and heart rate of each Naval Cadet were measured using an Apple smartwatch, Naval cadets 1 and Naval cadets 2 profile are shown in Table 2.

Table 2. Naval cadets 1 and Naval cadets 2 profile.

Naval cadets 1	Naval cadets 2
Age: 21	Age: 21
Class: 3TMT1	Class: 3TMT2
Faculty: Faculty of Defence Science and Technology	Faculty: Faculty of Defence Science and Technology
Gender: Male	Gender: Male

3.1. First trial of mob exercise

Before starting the exercise, stress level and heart rate readings for the two Naval Cadets were recorded to know whether a change in stress level and heart rate when doing the exercise. During the first 5 minutes of the exercise, the stress level and heart rate reading increased and had a difference in stress level and heart rate. This is because in the first exercise trial, the data for a wind speed of 30 knots. It is shown that the Naval Cadets were anxious and panicked while conducting the MOB exercise, stress level and heart rate during first experiment MOB exercise as shown in Tables 3 and 4.

Heart rate before the first experiment (as shown in Fig. 2) was conducted showed no significant difference between Naval Cadets 1 and 2 as they are in resting heart rate. However, it increases to above 80 bpm during the exercise depicting that the experiment conducted is affecting their heart rate. After the completion of the experiment, Naval Cadet 1 reduced to below 80 bpm, but Naval Cadet 2 remained above 80 bpm (82 bpm). These results show that the experiment conducted influenced the naval Cadet’s heart rate and it will investigate further in second experiment.

Table 3. Stress level during first experiment MOB exercise.

Naval cadets	Stress level before exercise	Stress level during exercise	Stress level after exercise
Naval Cadets 1	Normal	Overload	Pay Attention
Naval Cadets 2	Normal	Overload	Overload

Table 4. Heart rate during first experiment MOB exercise.

Naval Cadets	Heart rate before exercise (bpm)	Heart rate during exercise (bpm)	Heart rate after exercise (bpm)
Naval Cadets 1	64	85	79
Naval Cadets 2	66	88	82

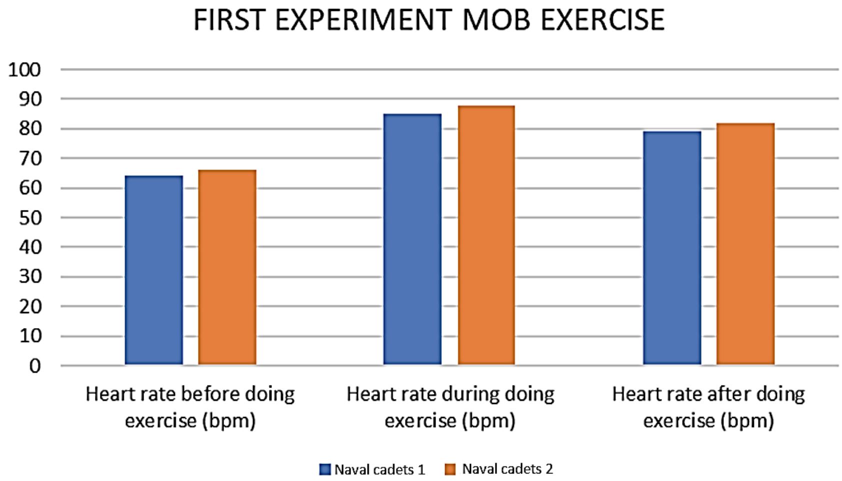

Fig. 2. Heart rate during first experiment MOB exercise.

3.2. Second trial of MOB exercise

For the second trial, heart rate readings for two Naval Cadets were collected to see if there was a change in heart rate when doing the exercise (as shown in Fig. 3). During the first 5 minutes of the exercise, the heart rate reading increased but was not significant with the heart rate before starting the simulation. This is because, in the second trial, the data for wind speed is 3 knots. This means that the Naval Cadets face less pressure during the second trial of the exercise, stress level and heart rate during second experiment MOB exercise as shown in Tables 5 and 6.

Table 5. Stress level during second experiment MOB exercise.

Naval cadets	Stress level before exercise	Stress level during exercise	Stress level after exercise
Naval cadets 1	Pay Attention	Overload	Pay Attention
Naval cadets 2	Overload	Overload	Pay Attention

Table 6. Heart rate during second experiment MOB exercise.

Naval cadets	Heart rate before exercise (bpm)	Heart rate during exercise (bpm)	Heart rate after exercise (bpm)
Naval Cadet 1	71	81	73
Naval Cadet 2	81	82	75

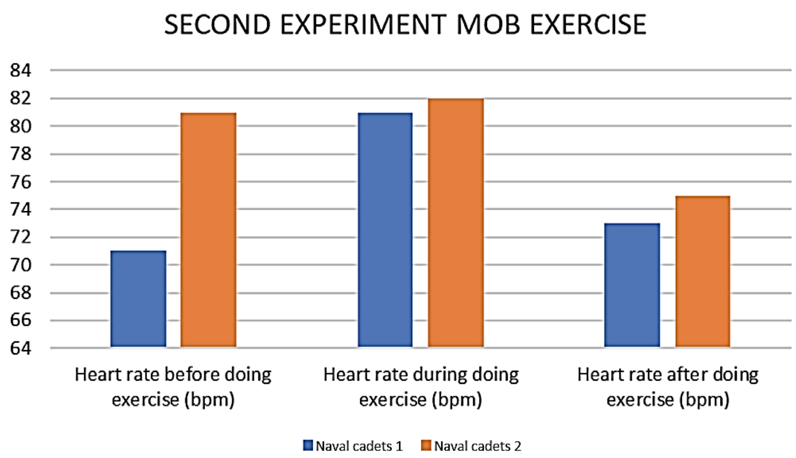

Fig. 3. Heart rate during second MOB exercise.

After the first experiment, Naval Cadet 2 shows a slower decrement in the heart rate depicted that he had a problem to back to the resting state after the exercise. Before starting the second experiment, Naval Cadet 2 still had a heart rate above 80 bpm depicting that he still had not recovered and still in the experience effect from the first experiment. During the exercise, Naval Cadet 2 shows the increment of the heart rate to 82 bpm reduces to 75 bpm after the experiment is complete. His heart rate reduced to below 80 bpm after the completion of the experiment may influenced by the fact that the experiment was completed, and he will not endure the exercise again after that, Naval cadets 1 and Naval cadets 2 survey form after second exercise as shown in Tables 7 and 8.

Table 7. Naval cadets 1 survey form after second exercise.

Name Class	Naval cadets 1 3TMT1				
Question	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
Do you feel stressed?				√	
Do you feel anxious while doing the MOB exercise?					√
Do you have difficulty doing MOB exercises for the first time?					√
Did you feel calmer when doing the MOB exercise for the second time?					√

Table 8. Naval cadets 2 survey form after second exercise.

Name Class	Naval cadets 2 3TMT2				
Question	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
Do you feel stressed?				√	√
Do you feel anxious while doing the MOB exercise?					√
Do you have difficulty doing MOB exercises for the first time?					√
Did you feel calmer when doing the MOB exercise for the second time?				√	

Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was used for qualitative analysis by analysing questionnaires, journals, and articles from the internet to strengthen further the data obtained from the primary data. Naval cadets can adapt to the situation while carrying out the navigation task. This study shows that exercise can often train people to control their stress levels.

This strength proves that many accidents can be avoided through this training because the crew is allowed to train themselves before the actual situation. It is depicted in this study when both Naval Cadets get the overload stress level during the first and second experiments. It changes until the experiments end and both Naval Cadets pay attention to stress levels.

It was supported by the trend of heart rate and the questionnaire that functioned to validate the results and identify whether the Naval Cadets were aware of their stress condition during the experiment. Awareness of own stress level is also an important aspect that makes the training more effective and avoids accidents caused by human error while onboarding a real ship at sea.

This also will allow the crew to reach the appropriate potential in their work. In addition, this exercise can build Naval cadets' confidence to handle MOB. This is because continuous training can improve the Naval Cadets skill level in carrying out navigation tasks. High skill can indirectly protect the ship's crew from unwanted things such as death, injury and disability. In turn, this can train Naval Cadets to make decisions quickly. This can produce a potential officer skilled in determining the direction of the navigation duty. This can also increase the crew's confidence level in the instructions given during navigation tasks.

However, this study also has some areas for improvement from the analysis of the data that has been collected. The first weakness identified is the level of readiness before starting the exercise. This is because the data collection process shows a high stress level for Naval Cadets not ready to carry out the MOB exercise.

The following identified area for improvement is the level of knowledge regarding navigation. This can lead to severe consequences, such as human error and ship damage. This can be proven by the fact that some ship's crew sometimes need clarification with their actual task while carrying out tasks during navigation exercises. Next, the weakness found is the need for more training regarding MOB training. With less of this practice, Naval cadets will be clumsy and take a long time to figure out each procedure to do this exercise. Therefore, this will cause MOB training to find a failed end.

Various opportunities will be available to reduce the stress level. One of them is to increase the level of effectiveness of the learning process. This is because the ship's crew can give more in-depth exposure to Naval Cadets in navigation. This is because each navigation task can be carried out smoothly with sufficient knowledge. In addition, the opportunity to be achieved to reduce stress levels by conducting MOB training efficiently. This will ensure that the Naval Cadets perform the assigned task without problems and succeed in the MOB exercise. Continuous training can make Naval cadets efficient in this MOB exercise.

Human error is among the threats faced in ensuring the pressure on the ship is in the best condition. This is because it can run smoothly if each crew gives the proper focus. According to the study, Naval Cadets are often disturbed when every piece of information presented by the crew has errors due to the crew themselves.

This is one factor contributing to the ship's crew becoming anxious and putting pressure on them while on duty.

In addition, the threat faced needs to be present during training. This will make the Naval Cadets stay caught up in the lessons that the Naval Cadets should know to carry out the navigation task. This will lead to errors during training and indirectly lead to accidents. Next, the Naval Cadets attitude during training is also a threat to the level of stress on the ship. This is because if the Naval Cadets attend the class but ignore and take for granted the exercises carried out. This will lead to mistakes that ultimately fail to implement the exercise.

4. Conclusion

According to the research, two signals indicating the occurrence of stress to OOW have been identified: an increase in heart rate and the Naval Cadets reaction while carrying out navigation tasks. Conducting an experiment and answering the provided survey can lead to these two signals.

The world is progressing with sophistication and rapidly developing modernity in this era. This has indirectly helped us a lot to do work, such as a smartwatch as a device that can detect data on our heart rate, pressure level, oxygen level in our blood and body composition. The accuracy of this stress level has been proven by the change in heart rate and the reaction shown by Naval Cadets while conducting experiments in the ship bridge simulator.

In identifying navigation training conditions that contribute to the OOW stress level. This condition is determined based on twice the chance to experiment. The first attempt is where Naval Cadets need more time to be ready to carry out the navigation task. While for the second attempt, the Naval Cadets were ready to carry out the navigation task. Each condition gives a heart rate reading while running the simulator.

However, based on the study of this experiment, the reading of the high-stress level from these two conditions is during the first experimental condition. This is because, in this condition, Naval cadets are kept from the navigation task they will carry out. From this condition, the Naval Cadets heart rate is the highest reading compared to other conditions. The generalisation from this research result is not applicable because the number of Naval Cadets involved in this research needs to be more significant.

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