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**ASSESSING OPERANT CONDITIONING PREFERENCES ON
INSTRUCTIONAL METHODS FOR ROAD SAFETY EDUCATION**

By

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Thesis Submitted to

**School Of Technology Management And Logistics
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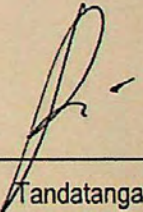
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Abstract

Road crashes represent a significant global issue, particularly in Malaysia, affecting drivers, motorcyclists, pedestrians, and daily commuters. Road crashes are significantly influenced by subjective risks, such as human error, that are external or environmental in nature. These incidents are significantly influenced by human error, which includes driving behaviours such as reckless driving. The costs of medical care are a significant financial burden on the victims and their families, in addition to the suffering that road crashes inflict. Despite these efforts, the incidence of road crashes remains high. Therefore, the objective of this study is to assess preferences for operant conditioning instructional methods in road safety education (RSE), including campaigns, health education, social media, and virtual reality (VR). The study focused on 204 respondents in Seremban, Negeri Sembilan, investigating road users' behaviors and safety knowledge. Quantitative methods were employed for data collection and numerical analysis using closed-ended questionnaires. Statistical Package for Social Science (SPSS) version 29 was used for this study. These findings indicate a positive association between health education and VR, with preferences for instructional methods for road safety education. The data analysis shows that respondents agreed VR can help them in road safety education, as it helps people by allowing them to learn and replicate real-life scenarios, for example, by using video games. In addition, health education also shows a significant relationship with operant conditioning as it enhances people's knowledge regarding the importance of health and road safety. However, these results showed a negative relationship between road users' preferences for instructional methods for road safety education between campaigns and social media. This study suggest that these instructional methods could effectively reduce road crashes and promote safer behaviors among road users.

Keywords: Operant conditioning; Road Safety Education (RSE) programme; Road users; Instructional methods

Abstrak

Kemalangan jalan raya merupakan isu global yang penting, khususnya di Malaysia. Kemalangan jalan raya dipengaruhi dengan ketara oleh risiko subjektif, seperti kesilapan manusia, atau alam sekitar. Insiden ini dipengaruhi dengan ketara oleh kesilapan manusia, termasuk tingkah laku memandu seperti memandu secara melulu. Kos rawatan perubatan merupakan beban kewangan yang besar kepada mangsa dan keluarga mereka, selain penderitaan yang ditimbulkan oleh kemalangan jalan raya. Walau bagaimanapun, insiden kemalangan jalan raya kekal tinggi. Oleh itu, matlamat kajian ini bertujuan untuk menilai keutamaan kaedah pengajaran pelaziman operan dalam pendidikan keselamatan jalan raya, termasuk kempen, pendidikan kesihatan, media sosial, dan realiti maya (VR). Kajian ini memberi tumpuan kepada 204 responden di Seremban, Negeri Sembilan, dengan mengkaji tingkah laku dan pengetahuan keselamatan pengguna jalan raya. Kaedah kuantitatif digunakan untuk pengumpulan data dan analisis berangka menggunakan soal selidik tertutup. Penemuan menunjukkan perkaitan positif antara pendidikan kesihatan dan VR mengenai kaedah pengajaran untuk pendidikan keselamatan jalan raya. Pakej Statistik untuk Sains Sosial (SPSS) versi 29 telah digunakan untuk kajian ini. Analisis data menunjukkan bahawa responden bersetuju VR boleh membantu mereka dalam pendidikan keselamatan jalan raya, kerana ia membantu orang ramai dengan membenarkan mereka belajar dan meniru senario kehidupan sebenar, contohnya, dengan menggunakan permainan video. Di samping itu, pendidikan kesihatan juga menunjukkan hubungan yang signifikan dengan pelaziman operan kerana ia meningkatkan pengetahuan orang ramai mengenai kepentingan kesihatan dan keselamatan jalan raya. Kajian ini mencadangkan bahawa kaedah pembelajaran ini dapat mengurangkan kemalangan jalan raya dengan berkesan dan menggalakkan tingkah laku yang lebih selamat dalam kalangan pengguna jalan raya. Walau bagaimanapun, keputusan ini menunjukkan hubungan negatif antara keutamaan pengguna jalan raya untuk kaedah pendidikan keselamatan jalan raya antara kempen dan media sosial. Kajian ini mencadangkan bahawa kaedah pengajaran ini boleh mengurangkan kemalangan jalan raya dengan berkesan dan menggalakkan tingkah laku yang lebih selamat di kalangan pengguna jalan raya.

Kata kunci: Pelaziman operan; Program Pendidikan Keselamatan Jalan Raya (RSE); Pengguna jalan raya; Kaedah pembelajaran

Declaration

I hereby declare that this thesis titled “Assessing Operant Conditioning Preferences on Instructional Methods for Road Safety Education” has been carried out by me after registration for the Master of Operation Management at Universiti Utara Malaysia (UUM). The information derived from the literature has been duly acknowledged in the text, and a list of references has been provided. This thesis has not been previously presented or submitted to another institution or academic award for a degree, diploma, or other qualification.



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CHAPTER ONE

INTRODUCTION

Introduction

This chapter provides brief information regarding road safety education (RSE). In this section, the researcher describes the background of the study. The problem statement will be explained in (Section 1.1), followed by the research question (Section 1.2) and the research objective (Section 1.3).

Plus, the significance of the study is mentioned in (Section 1.4), followed by the scope and limitations of the study in (Section 1.5) the definition of key terms. Thus, the definition of key terms is in (Section 1.6). Last but not least, organizations of study were explained in (Section 1.7).

1.0 Background of Study

Road crashes are perhaps one of the major issues facing the world today. Over time, there has been an increase in road crashes worldwide as a result of fast globalisation, population growth, and vehicle ownership. As mentioned in the World Health Organization 2021 reports, there was a slight increase in the overall number of road crashes related to deaths, with 1.3 million deaths reported in 2019. This increase was primarily observed among vulnerable road users such as drivers, cyclists, motorcyclists and pedestrian.

Action must be taken to prevent severe financial losses and preserve lives in this risky situation. The United Nations General Assembly has set a goal to reduce worldwide road traffic fatalities and injuries by at least 50% by 2030, (WHO, 2018). Based on the figure below, Malaysia is ranked third in Asia, involving road crash cases, trailing Thailand and Vietnam.

| | Region Rank | Rate |
|----|-------------|-------|
| 1. | Thailand | 30.48 |
| 2. | Viet Nam | 29.81 |
| 3. | Malaysia | 22.76 |
| 4. | North Korea | 22.21 |

Figure 1.1
Road Traffic Accidents Asia Cause Of Death
(World Health Organization 2020)

Over the years, Malaysia has seen an increase in the frequency of road crashes. The Malaysian Road Safety Department reported 535000 road crashes in 2018, while the number increased to 554000 in 2019 (Mahat et al., 2020) . Additionally, there were 5764 cases of fatal accidents in 2019. According to national statistics provided by the Royal Malaysian Police, motorbike riders are responsible for a significant number of fatal crashes. Additionally, according to Khairul et al. (2018), the crashes resulted in a total loss of 8.85 billion for 2019. Road crashes are typically caused by a combination of environmental, human and motorcycle-related traffic violations (Harith & Mahmud, 2018)

In 2019, 31.2 million automobiles were registered in Malaysia, an incredible number. It then increased by a million each year after that. It was recorded at 33.3 million in 2021. As reported by Chan D. (2022), in 2021 the trend of car numbers surpassed of the human population for the first time ever. Thus, it will even worsen traffic congestion if the annual trend of automobiles increasing to one million continues. People would undoubtedly experience worse traffic jams if the current pattern continued. According to (Syazmin Zuwairy et al., 2020) road traffic crashes have a variety of cause, 94% of these collisions were the result of driver error and careless driving, including recognition errors such as driver inattention, internal and external distraction and inadequate surveillance.

Malaysia has formed and integrated several institutions under several ministries to formulate objectives, goals, tasks and targets for road safety development in response to the concerning rise in deaths (Yusria Darma, 2017). There has been a significant recorded rate of traffic crashes among younger drivers. This is due to the fact that inexperienced drivers are more vulnerable to traffic crashes. Road crashes were also caused by drivers who were not paying attention while driving and were not able to recognise risks. Compared to adults, younger drivers such as students have a greater injury rate, which has resulted in fatalities and serious injuries (Banz et al., 2019). Furthermore, according to the Department of Statistics Malaysia Official Portal (2022), car crashes are now the fifth most common cause of death.

According to the World Health Organisation (2022), 20 to 50 million people get non-fatal injuries, and 1.3 million people worldwide lose their lives in traffic crashes each year. More than half of all traffic-related fatalities and injuries occur to road users, including cyclists, pedestrians, motorcyclists and passengers. The most road crashes happened in developing countries (Jadaan et al., 2018). The increase in population, which directly increased the number of users of vehicles in road traffic also led to road accidents. The number of road accidents is connected with the growth of population, economic development and industrialization. The increase in the population of road users led to a consequent increase in the number of road accidents, especially in Malaysia.

As a developing country, the Malaysian government has acknowledged road crashes as a critical issue that should be addressed immediately. Aware of this situation, the Ministry of Transport came up with the Road Safety Plan in order to alleviate and reduce road crashes, especially among younger drivers. One of Malaysia's road safety plans is Road Safety Education (RSE). In an attempt to lower the number of road crashes, the police and *Jabatan Pengangkutan Jalan* (JPJ) have enforcement drivers drive carefully by organising campaigns like road safety.

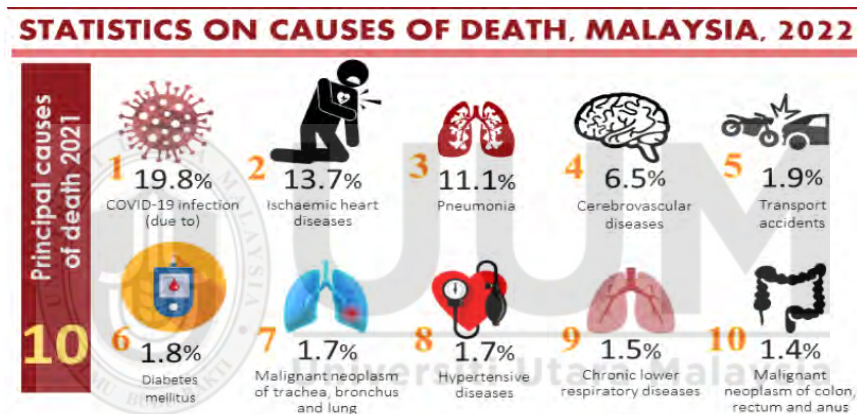


Figure 1.2
Statistics on Causes of Death, Malaysia, 2022
 (Source: Ministry Of Economy department of Statistics Malaysia Official Portal_2022)

Figure 1.2 proven that among Malaysia's top 10 causes of death in 2022 were road crashes. A road crashes is characterised as an unfavourable event that causes property damage, injuries to both the driver and passengers and is also the leading cause of death following a chronic illness. In addition, the Malaysian Road Accident Statistics Report (2017) states that carelessness or lack of awareness of traffic safety was the primary cause of the crashes that occurred on either private or public transportation.

According to Comm. Mat Kasim Karim, Director of the Bukit Aman Traffic Investigation and Enforcement Department (JSTP) (2021), the driver's own skidding, followed by reckless driving, was the primary cause of last year's road crashes. Plus, based on traffic reports, the number of road crashes in Malaysia increased from 545,588 in 2022 to 598,635 in 2023. The increase in fatalities, which more than doubled from 6,080 in 2022 to 12,417 in 2023 is concerning (Chia Chu Hang, 2024).

Road safety education should be an important component of any long-term road safety policy, according to the Department of Education and Department of Transport (Alonso et al., 2018). Particularly for younger users, the RSE is a valuable instrument that can reduce the number of road users involved in collisions that result in fatalities or serious injuries. The objectives of the RSE itself are to advance awareness and comprehension of traffic laws and to enhance abilities through education and practices. The number of fatalities in road crashes can be decreased through education. In addition, RSE covers every road safety concern and can be used with any form of road user group or category.

In Malaysia, the RSE was implemented by incorporating modules that include teaching and learning. The Ministry of Education has implemented an RSE module starting in primary school in 2008 and moving forward to secondary school in 2012. The goals of the module were to ensure that students have positive attitudes and better knowledge of road safety issues. The module on RSE was followed by a theme from the road safety curriculum provided by the Road Safety Department.

The Malaysian Government mentioned that RSE is a life-long process that should begin in school and influence adult drivers. In addition, the main function of education for road safety is to train and encourage all road users in the proper and safe use of the roads, which also reduces the number of road accidents.

This is followed by operant conditioning, also known as instrumental conditioning, a type of learning that uses incentives and penalties to influence behaviour. Through operant conditioning, a connection is established between a behaviour and its result. In this study, operant conditioning can ensure that drivers make wiser decisions when faced with challenges on the road. The use of operant conditioning to change human behaviour can be positive or negative, depending on the intention of the person using the techniques. The principles of operant conditioning can be used to shape behaviours that aren't in the best interest of others. Additionally, operant conditioning has a lot of promise to improve both individual and societal health.

Based on this study, operant conditioning can make road users more conscious of how to regulate their own road safety. This can be achieved through road user awareness by providing instructional methods such as road safety campaigns, health education programmes, social media and also virtual reality (VR). For instance, the principles of operant conditioning and road safety instruction can both help young drivers drive more safely and make better decisions.

Education is one of the platforms or activities used to raise knowledge of modifications to driving behaviour, attitude and competence. RSE is significant because it can provide the right education to help equip young people to be safer and more responsible road users. It can also increase understanding and aid in preventing any uncommon situations that they can safely handle. However, there is an argument regarding RSE in the classroom, this is because education in the classroom is focused more on knowledge but lacks practice on practical road safety skills (Alonso et al., 2018). The learning process in the classroom makes it difficult for students to experience the real situations that they will face on the road. To do that, students need to have real-world interaction.

This is one of the factors that this study will focus on as another instructional method to implement in RSE such as campaigns, health education, social media and virtual reality (VR). The RSE tends to be more effective when it starts with outdoor practice and besides classroom learning. Previous research has demonstrated that theory-oriented learning provided through documents and writing materials is less effective at engaging students than experience-oriented education (Oyelere et al., 2020).

Road crashes are one of the most persistent problems in the world and are regarded as one of the leading causes of fatalities and serious injuries to people. Based on the Public Health of Malaysia (2016), it shows that road traffic injuries have been one of the major problems in Malaysia since 2004 and have also been a major cause of death for males and females. According to the Ministry of Transport Malaysia, a total of 1.35 million people die in traffic accidents every year, which equates to 3,700 fatalities every day. Individuals, their families and entire countries suffer significant economic losses as a result of road crashes. The Ministry of Transport (2021), mentioned that it is important to monitor and implement road safety programmes in Malaysia. It is to ensure that safety issues become ingrained and practiced in daily life.



1.1 Problem Statement

The Malaysia Institute of Road Safety Research (MIROS) found that ‘human behaviour’ is the primary cause of road crashes in Malaysia, while The Transport Ministry reported that one accident occurred every minute in 2022. The Department of Statistics Malaysia has announced that statistics of road crashes that caused death in Malaysia were higher than deaths because of other serious illnesses such as diabetes or respiratory diseases (Ministry of Economy Department of Statistics Malaysia, 2022). In addition, the World Health Organization (WHO) stated that, road traffic accidents not only result in human suffering but also place a significant financial burden on victims and their families due to medical expenses for the injured and the lost productivity of the decreased or crippled (World Health Organization, Road traffic injuries 2023). Malaysia recorded 1.2 million road crashes between 2021 until August 2023, of which 13,516 fatalities were caused by carelessness while driving. According to the Police Traffic Investigation and Enforcement Department, tailgating and negligent driving were the main causes of road crashes.

In addition, many road crashes occur because of external or environmental subjective hazards such as human error, which causes most road crashes. About 1.25 million people worldwide lose their lives to traffic-related injuries each year, while 50 million more are injured. Research indicates that more than 60% of traffic injury causes are related to unsafe driving behaviour (Mekonnen et al., 2019). Unfortunately, most past studies only examined the factors contributing to road crashes, whereas road safety education can be related to operant conditioning, which can help reduce the number of road crashes in Malaysia by modified road users behaviour.



Figure 1.3
Top Accident Causes in Malaysia
(Source:Kurnia Insurans Blog, 2023)

Human error, vehicle malfunction and road conditions were the three most common causes of road crashes. Human error is solely to blame for crashes in between 80 and 90 percent of cases (A. Ismail et al., 2015). These statistics show that reckless driving, has been identified as the top cause of road crashes in most nations included Malaysia. One of the main causes of road crashes is speeding, due to the driver's complete control, it is also one of the most avoidable. Not only does speeding raise the like hood of an accident occurring, but it also intensifies its aftermath. However, road users continue to speed, despite aware of the risk. Speeding makes it harder for a driver to respond to unforeseen circumstances and increases the like hood that the drivers, other occupants or pedestrian will die in a crash.

In addition, other than speeding, using a mobile phone is also negative behaviour for road users. It is risky to use mobile device while driving. It increases the like hood of getting into a traffic collision by up to four times (Warren et al., 2019). According to a case study by Kurnia Insurance 2022, drivers who talk in their phones while driving a vehicle react 18.1% more slow. Mentioned that, through the observational investigation of over 3,000 drivers, the probability of a crash increased by 2 to 6 times when drivers were using a mobile instead of paying attention (Kidd & Chaudhary, 2019). Even devices that are hands-free pose a risk since they can divert attention. Therefore, in the event of a sudden occurrence, they will be less able to handle the vehicle.

Road Transport Department (JPJ) stated, the poor cognitive ability of young drivers affects their ability to identify the hazard during driving or while crossing roads. Malaysian road users are categorized as the worst in Southeast Asia, with 23.8 deaths per a 100,000 population. Also, the behaviourism had become a major force within road safety and driving psychology (Mohamad Ghous et al., 2019). Operant conditioning is essential for instructional road safety education for the use of road user's development toward road safety. It is a method of learning that occurs through reward and punishments for behaviour. This has led to a variety of educational programs in order to deliver better knowledge in RSE.

Based on the Public Health of Malaysia (2016), it shows that road traffic injuries were one of the major problems in Malaysia since 2004. Individual, their families and entire countries suffer significant economic losses as a result of road crashes. Ministry of Transport (2021), mentioned it is important to monitor and implement road safety programmes in Malaysia. It is to ensure that safety issues become ingrained and practised in daily life.

In order to properly address the issue of road safety, any improvement efforts must be represented across all government agencies. The chairman of the Alliance for Safe Communities, Tan Sri Lee Lam Thye, urge that the issue be thoroughly investigated and that the government be given the results and recommendations due to the higher number of death among road users especially young ages drivers. Road safety education is one of the countermeasure with the goal of reducing accidents among Malaysian citizen. In Malaysia, RSE was implemented in ‘Bahasa Melayu’ starting from elementary and continued to elementary school (H. N. Ismail et al., 2019).

Thus, RSE must include the real-life situation as close as possible so it can ensure the younger drivers have positive behaviour towards road safety (H. N. Ismail et al., 2019) . Also, the common instructional method that used in safety education such as books or in classroom learning did not show any proof that they are effective in improving young drivers to face the road (Wijnands et al., 2018). In some points of view, the classroom session was limited and considered ineffective (Al Sandi & Ugalde, 2019).

Another argument is that the learning process in the classroom is difficult to transfer the experience, which the drivers especially need to have real-world interaction so that they are more alert and aware in real road situations (MS Zeedyk, 2017). Due to that, there is suggested that RSE should be included the real-life situation to build positive behaviour toward road safety (H. N. Ismail et al., 2019).

In order to improve road safety education, the researchers proposes implementing operant conditioning. Operant conditioning is method of learning that uses rewards and punishment to modify behaviour. There was several past study that identify the relationship between operant conditioning and individual behaviour such as The Effect of Reinforcement and Punishment on Employee by (Asadullah et al., 2019). However, there is limited past researcher that has been study between operant conditioning and RSE. Therefore, there was limited number of researchers that have studied operant conditioning and road safety education, thus, this study is excited to bridge a gap in the literature about the operant conditioning and road safety education, especially the implementation of operant conditioning on campaigns, health education, social media and virtual reality (VR).



1.3 Research Question

This research attempts to answer the following questions:

- What is the relationship between operant conditioning and instructional methods for road safety education?
- How operant conditioning can influence the preferences on instructional methods for road safety education?
- Why is operant conditioning important to increasing the level of road safety among road users?

1.4 Research Objective

- To determine the relationship between operant conditioning and instructional methods for road safety education.
- To evaluate the functions of operant conditioning in assessing the preferences on instructional methods for road safety education.
- To measure the importance of operant conditioning toward the level of road safety education among all road users.

1.5 Significant of study

Road users

Road users knowledge of road safety management remains poorly understood. In this study, the researcher used operant conditioning as a preference for instructional methods for road safety education that included real-life situations, such as the use of VR, so that road users could have real-life experiences while learning. The findings of this study will help improve road users behaviour and their knowledge while using the road. They would become more responsible road users.

Government agencies

This study makes some important contributions to transportation agencies in Malaysia, such as Ministry of Transport Malaysia (MOT), *Majlis Keselamatan Jalan Raya* (MKJR), and Malaysian Institute of Road Safety Research (MIROS). The result of this study could help them implement a plan to reduce the number of road crashes in Malaysia. Besides, they can also use the results of this study to identify key factors that led to road crashes.

Future researcher

The conducted studies will further open doors for future researchers to refine and expand studies in relation to road safety education. This may serve as a source of information related to road safety education or road crashes in Malaysia.

1.6 Scope of the Study

The independent variables in this study are campaigns, health education, social media, and virtual reality (VR). The use of campaigns in this study was meant to be road safety campaigns. The purpose of road safety campaigns is to share knowledge regarding the importance of road safety. Plus, health education is to give road users awareness regarding the importance of road safety. Individuals who have the necessary health education can help themselves or others live more comfortably (Pueyo-Garrigues et al., 2019). Nowadays, social media has become a popular method for education. This is why the researcher used social media as an independent variable in order to identify the effectiveness of social media and road safety education, especially for young road users. Not to forget, the use of the latest technology, such as virtual reality, can also lead to effective methods for road safety education as the users are able to face real-life situations while using it. Thus, road safety education for children is one of the many uses of VR as a tool to help people by allowing them to learn and replicate scenarios that are too risky and harmful to practices in real life (Khan et al., 2021).

This study, “Assessing operant conditioning on instructional methods for road safety education,” aims to assessing operant conditioning preferences on instructional methods for safety education methods such as campaigns, health education, social media, and virtual reality.

The researcher chose Seremban, Negeri Sembilan, because this study was conducted during pandemic COVID-19, which made the researcher unable to go to any other state due to movement control orders. Plus, there are no past researchers that have done this topic on Seremban, Negeri Sembilan. The researchers focused on the road users in Seremban, Negeri Sembilan, as the subject of the study.



1.7 Definition of key terms

For better clarification and understanding of the terms related in this study, the following term are defined conceptually and operationally.

Operant Conditioning

A process of behaviour modification in which a subject is encouraged to behave in a desired manner through positive or negative reinforcement, so that the subject comes to associate the pleasure or displeasure of the reinforcement with the behaviour. (B. F. Skinner in 1937)

Campaign

The short term campaigning consists of marketing campaigns in different media, direct marketing campaigns, promotions and sales events, and different handouts and releases. (Haukijarvi, T.J, 2020)

Health

As a state of complete physical, mental and social well-being.

(The Constitution of the World Health Organization, April 7, 1948)

Education

Education is a combination of growth and human development with social legacy. (Kohnstamm and Gunning, 1995).

Social Media

Social media are defined as “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content” (Kaplan and Haenlein 2010, p.)

Virtual reality

Virtual reality (VR), the use of computer modeling and simulation that enables a person to interact with an artificial three-dimensional (3-D) visual or other sensory environment. (Henry E Lowood, 2024)

Road Safety

Road safety can be defined as the absence of risk of harm to road users in the road transportation system, including sidewalks and pathways. (CARSP, ACPSER, 2023)



1.8 Organization of study

Organization of study is consisting of any actions or steps of carry out this study in effectively and ensure the better progress by follow these steps. The chart below represents an organization of study.

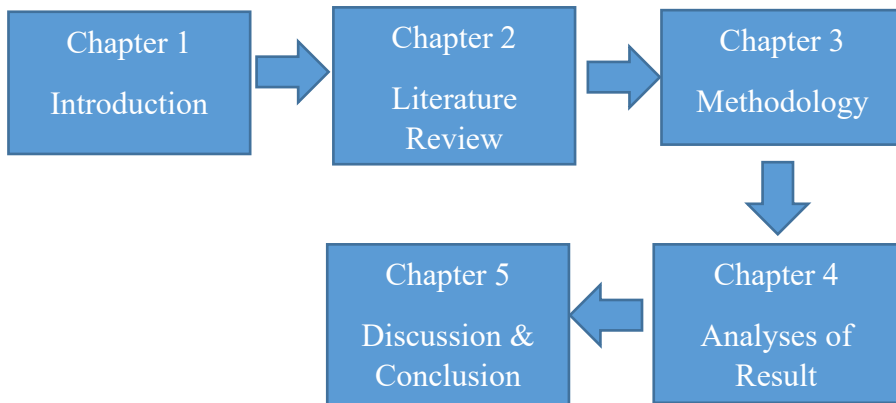


Chart figure 1.1:
Organization of study

Brief description of the steps are as follows:

Chapter 1

This chapter will provide the introduction for the general explanation of this paper, research background, problem statement, research question, research objectives, significance of study, scope and limitation of study, definition of key terms, and organisation of study.

Chapter 2

Chapter 2 will be covered for the literature review. The purpose of this literature review is to prove that all the topics and information used in this study are right and valid. This chapter also showed how previous research suggests that this study is important to be done. The gap in this study will also be mentioned in this chapter.

Chapter 3

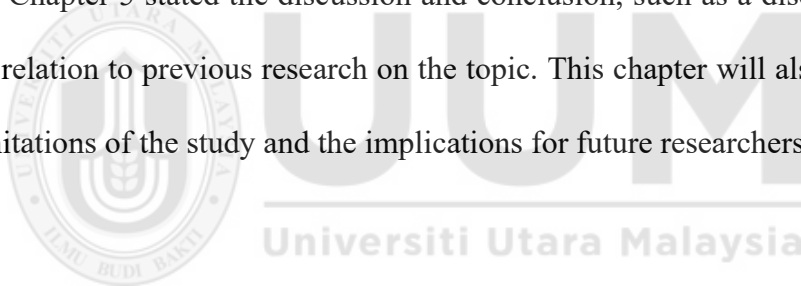
In Chapter 3, the researcher will focus on the method that she used in order to collect data and information for this study. It also explains who, how, when, and why with the description of the setting and participants. The methodology will discuss the tools that are suitable to use in this study.

Chapter 4

Data analysis will be discussing in this chapter together with the finding of this study.

Chapter 5

Chapter 5 stated the discussion and conclusion, such as a discussion on the relation to previous research on the topic. This chapter will also state the limitations of the study and the implications for future researchers.



CHAPTER TWO

LITERATURE REVIEW

Introduction

The definition of road safety education will be explained in (Section 2.1), followed by (Section 2.2) on the operant conditioning method. Besides, the campaigns on road safety education will be explained in (Section 2.3) and (Section 2.4) will discuss health education on road safety education. Thus, the role of social media in road safety education will be explained in (Section 2.5) followed by (Section 2.6) for the virtual reality function of road safety education.



2.1 Road Safety Education

Road safety education (RSE) was one of the strategies introduced at school. According to H.N. Ismail et al., (2019), the RSE is also treated as a lifelong learning process and must be started at the elementary level. As stated by H.N. Ismail et al., (2019), the main goal of RSE is to minimise the rate of road crashes and fatalities. The RSE programmes can be categorised into two broad categories, such as fear-appeal and cognitive (Twisk et al., 2014). Cognitive programmes are aimed at enhancing students' knowledge and understanding regarding their risk-taking behaviour (H. N. Ismail et al., 2019). As a result, activities such as discussions and demonstrations on road user safety are major agenda items in cognitive programmes. Meanwhile, the other programme is fear-appeal. These programmes educate students about the dangers of driving by instilling fear in them. This is frequently accomplished by instilling caution in children, particularly through the instillation of fear and the negative repercussions of risky behaviour (García Ramírez et al., 2020). It can also be accomplished by using testimony from victims of a road crash or by displaying the effects of the crash. The RSE in Malaysia fits within the cognitive category, according to the preceding description.

Furthermore, road safety is a major global health concern since traffic-related crashes contribute to a significant portion of unintended injuries and fatalities (Danchevska et al., 2019). It is mentioned by the Ministry of Education that the RSE in Malaysia was implemented through the RSE module into the teaching and learning implemented in all primary schools starting from the year 2008 and the year 2012 for secondary schools. As discussed by the Ministry of Education (2016), the RSE module aimed to inculcate positive attitudes towards road safety practices.

It has been recognised that RSE is an instrument for reducing road crashes, which is also based on three main pillars such as improving skills through training, increasing knowledge and understanding of traffic rules and situations, and not forgetting to increase the positive attitude towards risk awareness, safety, and safety of other road users (Shell et al., 2015). The road safety instruction should be adapted to the learners' age group and prior experience (Pé et al., 2017). These programmes primarily centre on classroom education covering themes such as vehicle operation, road traffic rules, factors that affect driving (i.e., driving while intoxicated and distractions such as cell phone use), and driving practices with instruction, or a combination of both for the pre-drivers. It was mentioned that globally, road safety education programmes are beneficial in raising participant knowledge and encouraging safer behaviour. Programmes aimed at vulnerable road users, such as cyclists' safety programmes, are effective in transmitting knowledge about safe cycling to road users. Besides that, the RSE programmes targeted young drivers or adult drivers in their respective content and style (Riaz et al., 2019).

Two of the most important elements affecting road safety globally are acknowledged to be driver inattention and distraction (Oviedo-Trespalacios et al., 2019). Thus, the RSE programmes target specific road users' bad habits, such as driving while intoxicated. These programmes have been successful in achieving their main goal, which is increasing young drivers' knowledge and abilities to protect themselves. Not to forget, these programmes also involve lessons and exercise in the classroom, to educate about the dangers of driving while under the influence. Studies by (Riaz et al., 2019), prove that RSE programmes that focus on lowering risk-taking delivered through seminars and workshops have been shown to reduce the relative chance of a crash involving participants by 44 percent.

However, it has also been suggested that pre-driver education programmes help young adults become more aware of the importance of safe driving and some modifications are needed to increase driver safety and minimise the number of young drivers involved in road crashes (Paz et al., 2015). RSE has claimed that boosting early licensure can put young adults at risk due to their maturity. Plus, based on Ismail et al., (2019), the classroom-based technique was more focused on knowledge and a lacked practical road safety skills. The findings confirm the effectiveness of education and enforcement as a strategy for reform, as well as the requirement to instill in lawbreakers a sense of assurance that they will be found and punished (Ray Shuey, 2019).

2.2 Operant Conditioning Model

The operant conditioning hypothesis, devised by psychologist B.F. Skinner in 1937, said that behaviour may be influenced by consequences and that the goal of reinforcing behaviour modification is to replace unwanted behaviour. Besides, the idea of operant conditioning is also known as instrumental conditioning. Plus, operant conditioning is involved in a two-way process, which is action or behaviour. The positive reinforcement was able to shape efficient behaviour, while the negative consequences resulted in a decrease in individual behaviour. Mentioned that attitude and motivational factors affect driving behaviour (Batool & Carsten, 2018). Operant conditioning is a type of learning that uses rewards and punishments to change behaviour. Through operant conditioning, it can link a behaviour to its results (whether favourable or unfavourable). Positive in operant conditioning refers to the addition of something, and negative to the removal of something.

In this study, the researcher expected to change the behaviour of drivers from a negative to a positive state using operant conditioning. It was conceivable that people might modify their behaviour in response to rewards or penalties. Operant conditioning is therefore a useful tool for raising road users' awareness and changing their driving behaviour.

Operant conditioning is usually used in training and reducing human error, especially human behaviour on the road (Reisner, 2016). B.F. Skinner, who was designed to be the most influential psychologist of the twentieth century, established operant conditioning (Cherry, 2023). Operant conditioning is also used to investigate the development of children's learning processes, which is suitable for a young age to explain road safety (Schlinger, 2021). The operant conditioning theory was based on the idea that learning processes are a function of changes in human behaviour (Al Sandi & Ugalde, 2019). In this era of technology, the educational method can be used in new ways to achieve the goals of the learning process. Operant conditioning is a suitable method for the learning process in the classroom because it uses both positive and negative reinforcement (Al Sandi & Ugalde, 2019). Based on operant conditioning, the positive impact of the education method is now widely accepted, especially in the education of road safety.

Furthermore, antecedent stimuli are those that occur before the behaviour in operant conditioning. Operant conditioning functions as a signal that creates reacting reinforcement, for example, a car stopping at a red light to avoid an accident or a fine (Nsiah-Achampong et al., 2018). Overspeeding, the use of drugs, alcohol and the use of cell phones while walking for pedestrians are all examples of behaviours that need to be modified. Also, (Nsiah-Achampong et al., 2018), mentioned that operant conditioning is suitable for observing road user actions and how they conduct themselves in traffic. In addition, respondents are impacted more by what happens after than by what happens before.

Operant conditioning is a two-way process in which action or behaviour affects the modifies behaviour at the same time. As positive reinforcement shapes behaviour effectively, it follows that the if a behaviour result in negative consequence, that behaviour will decrease. Skinner's operative conditioning is a very effective instructional theory that has clearly explained the procedures and concepts that allow for learning behaviour to be conducted (Teston Franco, 2020). In addition, punishment can result of lowering or removing the chances of a negative behaviour such as low number of road traffic crash. In other words, as a result of the consequences, punishment will help to educate road user's to create positive behaviour (Arifin & Humaedah, 2021).

For the education in road safety, there is a continual relationship between the reaction generated and the stimulus delivered in the learning process (Hoirirah,2020). Explains a learning process that involves using rewards or punishments to change the strength of a behaviour. For instance, drivers can decide to drive cautiously rather than speeding, which increases the risk of collision (McLeod, 2015). A link is established between an activity and its resulting consequences (Nsiah-Achampong et al., 2018). According to Skinner's, operant conditioning theory is behaviour can be influenced by the environment or culture.

To reduce the number of deaths and serious injuries caused by road traffic crashes, numerous road safety systems have been implemented in various countries. These techniques attempt to avoid, reduce and improve road safety management. Therefore, this paper's gap is to study the applications of operant conditioning especially to campaigns, health education, social media and virtual reality in relation to road safety education.

Table 2.1:
Example of operant conditioning from past studies

| Title / Researchers | Literature Review |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Using Classical and Operant Conditioning to Train a Shifting Behavior in Juvenile False Water Cobras (<i>Hydrodynastes gigas</i>) <i>Williams, Michelle L. Torrini, Lori A. Nolan, E. Joseph, Loughman, Zachary J. 2022</i> | Positive reinforcement training, a form of operant conditioning that rewards learners for specific behaviors to increase the frequency of that behaviour. Positive reinforcement is a form of operant conditioning, where a reinforcing stimulus is added to the training environment following a behavior to increase future frequency of the behavior. |
| Social Networking Sites Classroom Framework using Operant Conditioning Learning <i>Al Sandi, Yousuf Anwar Ugalde, Bernard Haber, 2020</i> | It is a learning process that uses both positive and negative reinforcements to encourage good and wanted behavior while deterring bad and unwanted behavior |
| The operating conditioning applied to the teaching of tourism <i>Nancy Testón Franco a, 2020</i> | Skinner's operating conditioning is a very effective theory in education that has very clearly described its procedures and principles that make it possible to conduct the behavior of learning. |
| The Effect of Reinforcement and Punishment on Employee Performance <i>Asadullah, ABM, Juhdi, Nurita Binti Islam, Md Nazrul, Ahmed, Alim Al Ayub Abdullah, ABM, 2019</i> | All behavior starts as oblivious conduct. Positive means expansion of an improvement. Negative means the expulsion of an upgrade. As per this hypothesis, natural outcomes are intense instruments that supervisors and can use to shape behavior. |

2.3 Campaigns on Road Safety Education

Malaysia has one of the highest rates of death in the world—24 fatalities per 100,000 people—compared to a regional average of 17.9 deaths per 100,000 people. Road safety education can be done through advertising that can be defined in different ways such as campaigns. Studies have found that a combination of education and enforcement, such as operant conditioning, increases the success of a campaign. The reinforcing strategy uses road safety advertising to emphasise the potential harm connected to certain illegal, risky behaviours (e.g., driving while intoxicated, speeding, and failing to use a seatbelt), as well as the prospect of police identification and punishment for engaging in these activities (Lewis et al., 2019). The designers of road safety campaigns must be aware of the myriad of influences on individuals' behaviour, as well as broader ecological frameworks that recognise that individual behaviour exists within a complex system of varying layers of influence, to achieve social behavioural change (Lewis et al., 2019).

In addition, the campaign's goal was for participants to be emotionally affected by such realistically depicted raw and unadorned stimuli, prompting them to think about their behaviour and duty as traffic participants (Huang et al., 2020). Plus, according to them, the campaign was meant to direct the reduction of serious road crashes that can result in serious injuries and fatalities. Wrote by (Riaz et al., 2019), even while the basic style of campaign is the same, there are variations in terms of which populations are targeted as programme participants and how such testimony is conducted.

Research founded that traffic education and road safety were combined, road crashes would be decreased by 8.5%, and if a subsequent campaign was conducted, this number would have increased to 15% (Lewis et al., 2019). Road safety campaign are still a useful strategy for encouraging drivers to drive safely, especially when they value these communication activities (Alonso et al., 2021). Plus, road safety campaign establishes and implemented, has shown improvement toward drivers' behaviour on the roads (Babić et al., 2020). Found that campaign in Nigeria is aimed at lowering the impact of road crashes by instilling a positive attitude shift in the drivers as a result, they have better knowledge and positive response toward the campaign (Babić et al., 2020). The significance of road safety education, as well as the perceived effectiveness and utility of road safety campaigns, are assessed (Alonso et al., 2021).

Road safety campaigns that demonstrate the real situation and intensify road traffic risks and their possible result or consequences can reduce the negative behaviour among road users (Freeman et al., 2017). However, based on B.F Skinner's theory which is punishment for behaviour, the effective road safety campaign that shows the negative emotional messages may lead to successfully reducing risky behaviour. Over the last few decades, a variety of campaigns has been established. Most current advertising campaigns focus on the harmful impacts on drivers. However, the use of positive messages under a certain group of road users can be more persuasive compared to the use of negative messages.



Figure 2.2: Negative framed advertising campaign
Source: (Sadeghi-Bazargani et al., 2015)

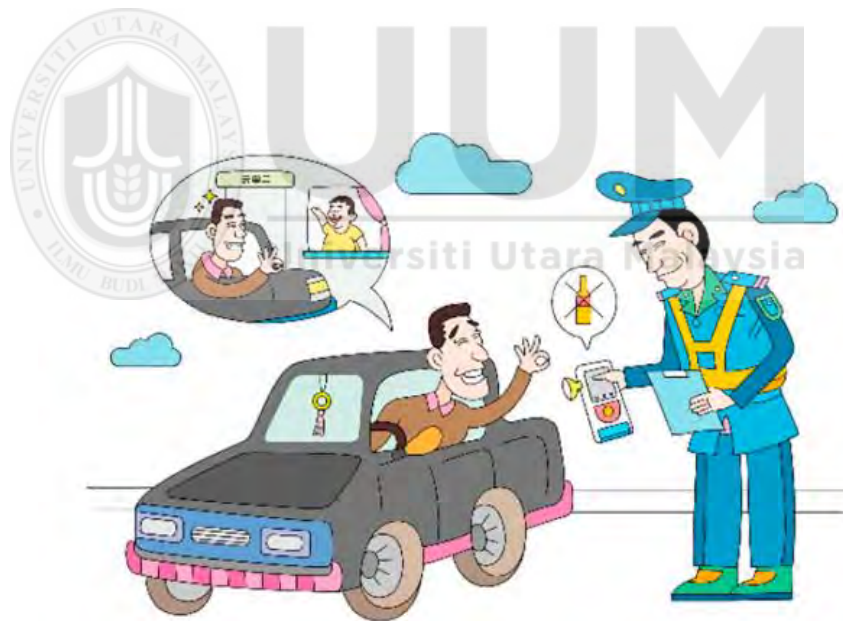


Figure 2.3: Positively framed advertising campaign
Source: (Sadeghi-Bazargani et al., 2015)

Furthermore, found that the campaign strategy illustrated the importance of understanding the social and psychological background of the participant especially on their behavioural (Stojanová & Blašková, 2018). Results show that the campaign had a significant positive effect in changing drivers' behaviours (Rejali et al., 2022). In addition, followed by Adamos, G., & Nathanail, E. (2016), RSE campaigns aim to alter the factors that influence road users' behaviour, change risky behaviour (unsafe acts), and promote road safety. Thus, all of which result in a reduction in the number of road traffic crashes and a reduction in the severity of their consequences. In addition, the road safety campaign has some jurisdictions in improving intersection safety especially in influencing road user behaviour (Rejali et al., 2022).

In road safety management, communication campaigns are frequently used to enhance public awareness of the importance of avoiding unsafe road user behaviour and attitudes. Surprisingly, few of these communication campaigns show their effectiveness formally and comprehensively (Faus et al., 2021). The objective of road safety campaigns has been to enhance public awareness about the dangers of bad driving, to reduce traffic crashes that caused deaths and serious injuries (OM Aldwsari, 2018).

In addition, more emotive campaigns began to be used from the 1990s onwards. The use of higher visual effects, using harsh and realistic imagery of images of road crashes have been convinced the road user to remember the importance of road safety (Faus et al., 2021). The theme of road safety campaigns has also evolved according to the factors or causes of the road crash. Over the last few decades, a variety of campaigns has been established. Most current advertising campaigns focus on the harmful impacts on drivers. However, the use of positive messages under a certain group of road users can be more persuasive compared to the use of negative messages.



2.4 Health Education on Road Safety Education

Road safety is a significant public health issue, hence attention must be paid to road safety initiatives. Road safety regulation must be strictly followed to prevent injuries and road crashes (Maqbool et al., 2019). Road traffic crashes have grown to be a significant public health concern as well as a transportation system challenge (PF Waller, 2001). Education about health is crucial for enhancing people' health and the practise of self-management using a range of clinical and a fundamental should be to serve community contexts (Pueyo-Garrigues et al., 2019). All healthcare providers should use education as a valuable resource especially on road safety. Individuals who have the necessary education can help their self or others live more comfortably (Pueyo-Garrigues et al., 2019). In the majority of road crashes, the driver is a significant factor. In most cases, road crashes are caused by negligence or lack of road user understanding regarding road safety (El-Menyar et al.,2016). According to F. Alonso (2018), road safety in health education was one of the government actions in reducing road crashes that led to fatalities, injuries and property damage. Besides that, RSE has the same pattern and objective as health education, where it aims to reduce road crash that causes fatalities and serious injuries (Twisk et al., 2014). According to World Health Organization (WHO), health education in school can result in a positive contribution outcome, especially toward road safety (Cvahte Ojsteršek & Topolšek, 2019). This is because, 95.4 per cent of road crashes that happened are caused by human error, which outweighs environmental and vehicle factors significantly (Riaz et al., 2019).

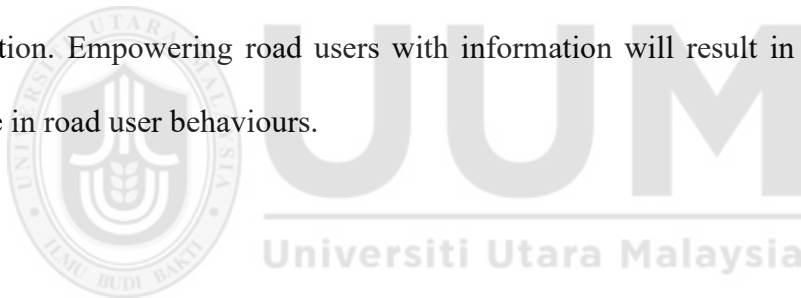
Thus, many elements interact to induce human error which includes practical inexperience with the driving task, as well as norm-breaking behaviour such as speeding, distracted driving and sensation seeking. Young drivers can benefit from health education about fatigue risk factors, which can help them make better decisions and recognise sleepiness (Gauld et al., 2019). In addition, as stated by Cuenen, A., Brijs, K., et al. (2017), better structure and systematic programmes have been proven to result in a positive impact on some protective and individual behaviours. This shows that health education and knowledge, which include road safety education are important. Besides, according to (Peñ et al., 2017), even children need to be kept away from dangerous road traffic. Some studies show that they need to have better health education related to road safety to provide them with positive behaviour.

Furthermore, Professor Dr Kulanthayan K.C Mani (2019), mentioned that health education with safety knowledge can prevent accidents and decrease the number of road crashes, especially those that result in fatalities. According to him, health knowledge can make huge changes in the road safety situation. In order to minimize the global burden of a road crash and improve these issues, there is a need to explore new ways which can look at this problem such as health education (McIlroy et al., 2019). Furthermore, teenagers are the majority of victims involved in road crashes who suffer losses in the form of fatalities and serious injuries. The road crashes can be reduced by well-designed road infrastructure and the presence of health education (WHO, 2018).

The importance of health education in RSE is to improve road safety, especially on improving road user's behaviour (i.e. helmet usage, seat belt law and drunk driving law) (Ahmad et al., 2020). Additionally, together with health education, the raising penalties and lowering the allowed amount of blood alcohol content, speed limits in crowded area and the use of the term 'violent driving' have all a significant impact on the decreases in the number of traffic collisions (Jovic Vranes et al., 2018).

In addition, suitable with operant conditioning, health education events offered awards and prizes to persuade the road users for using their seatbelts (Ahmad et al., 2020). Various studies show that wearing a seatbelt is the most effective restraint for reducing road traffic crashes. The road traffic crash is not only a problem for the transport system but also a major problem in health management. Considering the contemporary health-oriented approach to road traffic crash prevention and the involvement of numerous organisations in this regard, it is necessary to identify the roles of the health system in road traffic crash prevention (Khanijahani et al., 2021). Road traffic crashes are global hazard to social progress and health. As a result, the health sector needs to rethink its responsibilities and roles to engage more actively with transportation systems.

One of the primary area in which the health system may act to decrease road crashes is education on several aspects of a traffic crashes. Establishing a traffic injury surveillance system is one of the health system's primary responsibilities (Khanijahani et al., 2021). Another key area in which the health system could intervene was education such as public education, academic and systemic education. Driving norms, laws and vehicle safety can all be covered in education. It can also help to establish a positive environment for intervention safety and acceptance ((Sadeghi-Bazargani et al., 2015). Although some public education is not provided about road safety, it is should be included in academic subjects as curriculum.. Thus, teachers can mould their students at school to become better road users in the next generation. Empowering road users with information will result in a huge change in road user behaviours.



2.5 Social Media role in Road Safety Education

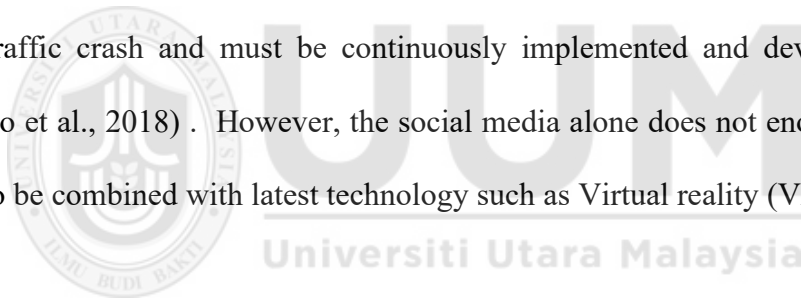
The driving task needs the driver to successfully go from one location to another while avoiding potentially dangerous situations (Bates et al., 2016). These days, young people increasingly frequently use digital media content, games and smartphones for entertainment, learning process and also education purposes (Edwards et al., 2018). Also, found that social media is a new and effective method for teaching and sending messages to the public which is also a method that can reach the biggest population (Bannor et al., 2017). Social media is still a crucial tool for bringing together members of different communities who utilise web-based tools to share, interact, contribute and communicate (Andrianary & Antoine, 2019). Plus, most road users used web-based applications to share, interact, contribute and also communicate. The communities and social media have remained as a vital medium for connecting all of them (Andrianary & Antoine, 2019). The lives of young people are now constantly influenced by social media. Social media has influenced a variety of educational practices and procedures aside from being used amusement and information (Zachos et al., 2018).

Social media be used as a platform for road safety personnel to communicate with the public and deliver various enlightenment programmes on road traffic regulation because it has the potential to quickly reach millions of people (Andrianary & Antoine, 2019). Also, social media has given opportunities for security agencies such as Road Safety to interact and share information as well as reach out to the public more effectively. Also, according to (H Mukthar in 2019), social media platform is capable to share online message such as videos, photo and sounds online which can use to educate the road user and directly help reduce road crash. Thus, this type of information sharing (media) can create awareness and increased the level of productivity of RSE personnel due to the learning and knowledge. It is important to understand the origins of road user attitudes and behaviour based on the principle of operant conditioning and reinforcement (Rowland, 2018).

In addition, the use of media by an authority such as police organizations like Facebook, Twitter, WhatsApp and YouTube can evolve and improve road safety rapidly (Andrianary & Antoine, 2019). Road safety personnel can educate a large number of road users individually or collectively using these media platforms (Andrianary & Antoine, 2019). It is proven, in the last few years the emergence of media has given regular people the ability to express themselves to larger audiences than ever in the blink of an eye.

The main interaction with real-life experiences such as traffic simulators or e-learning is an option regarding the media and technology (Assailly, 2015). Facebook has been used as the platform for teaching and learning which has positive and effective learning outcomes (Zachos et al., 2018). Most students agreed the posts on the Facebook web page was helped them improve their knowledge of road safety (Fonseca et al., 2021). It is shown that the participant's awareness of road safety has improved dramatically as a result of the material supplied via social media such as Facebook (Gauld et al., 2019). Positive road safety messaging, for example, encouraged young drivers to drive more safely. Human factors such as traffic law infractions and driver errors are the primary contributors to road crashes (Bucsuházy et al., 2020). Media can be used as an element of interactive and innovative learning tools that enables intervention and easier learning of the information. The mix of appropriate intervention approaches and media is critical to the effectiveness of adolescent behaviour modification programmes (Stellefson et al., 2020). Social media as informal learning process help drivers to collect knowledge, improve skills, attitude and value directly from their daily experiences and social environment.

In addition, media allows everyone to swiftly exchange information and ideas in the form of videos, photographs, words and multimedia, social media has the potential to be an effective health promotion tool (Allcoat et al., 2021). TikTok is one of the most popular social media platforms among teenagers. TikTok is considered vital to the maturation and experience of the millennial generation, which is inextricably linked to the digital world, which includes gadgets (Xu et al., 2019). This RSE uses a variety of stimuli and has been shown to change road users' behaviour for the better. RSE has also been shown to be effective in changing road users' behaviour to safe driving in various countries compared to those who do not receive the RSE. Additionally, social media in RSE can reduce the risk of being involved in a road traffic crash and must be continuously implemented and developed (Alonso et al., 2018) . However, the social media alone does not enough, it need to be combined with latest technology such as Virtual reality (VR).



2.6 Virtual reality (VR) functions in Road Safety Education

Today's school-based road safety education programmes include traffic regulations as a crucial component. However, students have never before been taught to focus on how to use attention appropriately in complicated traffic scenarios. Based on Skjermo, J., Roche-Cerasi, I., Moe, D. et al. (2022) the most recent research in neuro-education, a brand new road safety education programme has been created which is virtual reality (VR). Three new concept risk, direction and attention were taught to students in the programme. This was done in order to get students to reflect on their own behaviour which also related with operant conditioning. Virtual reality (VR) is a system that gives users the impression that they are within a virtual environment equipped with different devices and that they can interact with this world. Virtual reality is incredibly beneficial for many professions, including teaching due to its capability. Also, through the use of virtual reality applications in the classroom, students can learn by doing and experiencing things that would be risky or impossible for them to perform in real life (Serin, 2020). These traits that digital natives bring with them from the beginning have helped to advance education.

As Thomas and Brown (2016), note that a new learning culture has arisen and suitable for this new generation. The term education describes the process of assisting students in learning and in the acquisition of knowledge, skills or positive value in order to prepare them for citizenship and life (Kamińska et al., 2019). The adoption of digital technologies can help students improve their abilities and increase their willingness to learn, educators are faced with the issue of identifying assessing and choosing the optimal tools to accomplish these goals (McGovern et al., 2020). Application for virtual reality in the educational setting give students hand-on learning opportunities, accelerate learning and increase memory retention which suitable for road safety education (Serin, 2020).

Road traffic crashes are the major cause of fatalities and injuries around the globe. According to the UN (2018), road safety is the key factor to achieving a sustainable development goal in almost all countries, however, the complexity of how road traffic crashes still happen makes this difficult challenge leaving many countries struggling with this problem. Road safety management was a complex process that not only depends on technical and environmental factors (Alonso et al., 2018). This is because it shows that 70% and 80% of road traffic crashes are considered as from individual behaviour. To develop road users with better road safety skills, (Szczurowski & Smith, 2018) mentioned that, road safety skills and knowledge need to teach early and often practised under the supervision of parents by providing a combination of theoretical and practical knowledge.

Thus, road safety education for children is one of the many uses of VR as a tool to help people by allowing them to learn and replicate scenarios that are too risky and harmful to practices in real-life (Khan et al., 2021). At the same time, virtual reality appears to be a potential way to give aspiring drivers enough training in real-world traffic safety.

In this era, the Fourth Industrial Revolution (IR 4.0) has an impact on road safety education. The latest advancement in technology, Virtual reality (VR) has been used as a development factor of a computer support learning method that attempts to address road safety skills such as road user attitude and behaviour while on road. Plus, according to Road Safety Authority (RSA) (2018), the implementation of game-based road safety methods and following best practices for educational purposes, not only can work effectively but also engage the road user to transfer the skills in a real-life situation. The suggested system (VR) intends to teach younger road users on how to properly read road sign, cross busy crossroads and junctions at authorised zebra crossing, pay attention to traffic signals and cross pedestrian walkways safely (Vergara et al., 2017). Also, with better practice through this method, it can conduct road users with safe behaviour and increase their awareness about road safety. Plus, mentioned that technology has impacted almost all aspects of life today and has dramatically impacted toward education process (Szczurowski & Smith, 2018). Proven that the classroom-based learning approach is less helpful for children, where they easily get bored. In order to deal with young drivers or children, visual and physical interaction plays a vital role as they are easier to understand (Khan et al., 2021).

Today, young people such as teenagers or children are more likely to learn new knowledge through Internet (Hussin & Hanis Mohd Fouzi, 2018). Also stated by Hussin (2018) that, media education such as computer game education were able to provide better knowledge and information as well as skills to the young driver as it is very attractive. Three-dimensional depiction of instructional scenarios in all subject area is made possible by the usage of VR as a learning technology (León-paredes et al., 2022). It shows that students who are more knowledgeable about road safety have good views toward it, which it can help reduce the risk of road crashes among them (Hussin & Hanis Mohd Fouzi, 2018).

Furthermore, (Chittaro & Buttussi, 2020), notes that these recent years have shown the growing interest in the use of games as virtual practice for education and training. According to (Szczurowski & Smith, 2018), the virtual learning and practical approach to road safety education has several issues which can prevent any road crashes for example, the risk of pedestrians getting accidents during crossing the road due to a lack of attention. In the context of road safety education, the virtual game supporting road safety is useful for evaluating learner performance and also used to condition drivers behaviour by enforcing operant conditioning. As stated by (Szczurowski & Smith, 2018), the solution that is considered to reinforce correct behaviours among road users is by using operant conditioning. According to the game concept, the completed player will be rewarded meanwhile another possible solution was introducing punishment reinforcement for a player who is unable to complete the game. This theory was applied by the road users in their real-life situations while on the road.

It is proven that, with the game's ability to explore hypothetical scenarios, players can immediately see the link between their actions and the consequences of their chosen behaviour. It also adds feedback after an error is made, which explains how to prevent it. In addition, young ages are easy to understand and absorb something through visual and animation compared to oral education (Hussin & Hanis Mohd Fouzi, 2018). In order to tackle the road users, especially young ages attention, the education methods require to the used interesting technique for an example by use of IT or video game. This is also supported by (Abdul Rawi et al., 2015), that road safety education through a video game is a better approach. Road safety education must not only focus on helping road users' knowledge and skills but also improve their driving behaviour and judgements.

The utilisation of this technology (VR) is shown by the engagement a user has with it as well as by its capacity to stimulate all of the sense of the human body. Especially touch, vision and hearing, making learning more effective (León-paredes et al., 2022). Examine the presence and immersion qualities of VR, which are thought to be important elements in enhancing learning. Immersion involves the believability that technology can conjure, whereas presence gives the user the impression of living and existing in the virtual environment (Fonseca et al., 2021). The development and widespread acceptance of VR provides a great chance to design training courses around the needs of a particular industry especially safety management (Grassini & Laumann, 2020).

| No | Author | Year | Title | Finding |
|----|-----------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | ABM Asadullah, Nurita Binti Juhdi, Md Nazrul Islam, Alim Al Ayub Ahmed and ABM Abdullah | 2019 | The Effect of Reinforcement and Punishment on Employee Performance | The researcher found that the individuals can use operant conditioning to shape behaviour. Besides, the positive and negative impact able to focused on the person due to their actions. Plus, operant conditioning also used as motivational to conduct individual characters. |
| 2 | N. Nsiah-Achampong, N. Migle, I. Yankson | 2018 | Traffic Communication as Determinant of Motorist Behaviour | Operant conditioning occurs before the behaviour. It operant as a noticed or signal to produces reinforcement such as the car stop when the light red to avoid any crash |
| 3 | L. Chittaro, F. Buttussi | 2020 | Learning Safety through Public Serious Games : A Study of “Prepare for Impact” on a Very Large, International Sample of Players | The researcher seen that the video games can operate as operant conditioning. The video games can help players to responses positive reinforcement by receiving the positive outcome from the games. |
| 4 | J. Wijnands, J. Thompson G. Ashwanden et al. | 2018 | Identifying behavioural change among drivers using Long Short-Term Memory recurrent neural networks | Shows that operant conditioning models operate efficiently when it associates between the environment and behaviour (the actions of individual). Also, the operant conditioning model known as positive reinforcement or in other words ‘reward’. |

| | | | | |
|---|-------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | M. Khairul, A. Kamarudin, N. Wahab et al. | 2018 | Road Traffic Accident in Malaysia: Trends, Selection Underlying, Determinants and Status Intervention. | In Malaysia, the road safety issue need be taken seriously especially for those road users. The main action to decreased number of road crash by alert road users on road safety education. Advertisement such as reminder should be in mass media. |
| 6 | F. Alonso, C. Esteban, S. Useche | 2018 | Effect of Road Safety Education on Road Risky Behaviors of Spanish Children and Adolescents: Findings from a National Study | Road safety education become more effective if it starts from the young age. The behavioural approach on road safety education without any effective method will nit effectively to prevent road crash. |
| 7 | H. Ismail, A. Khairani, S. Mohamad et al. | 2019 | The Effect of Road Safety Education on Knowledge, Attitude and Perceived Behavioural Control Regarding Road Safety Among Malaysia School Students | Main goal of road safety education is to reduce the number of road crash and fatalities. However, there is an argument where the classroom learning is inferior. This is due to the classroom learning is lack of practical. |

Table 2.2 :
Summary of Previous Study

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

The purpose of this chapter is to review the process on how this study will be conducted. Plus, in this chapter also it will give an explanation about the details for this process for an example the data collection and method that will be use in order to gather information and analysing the data. Besides, in this chapter will includes the details on population, research design, sampling method and data analysis.

3.1 Research Framework

This study investigates the relationship between campaign, social media, health education and (VR) as independent variable and preferences on instructional methods for road safety education as dependent variable.

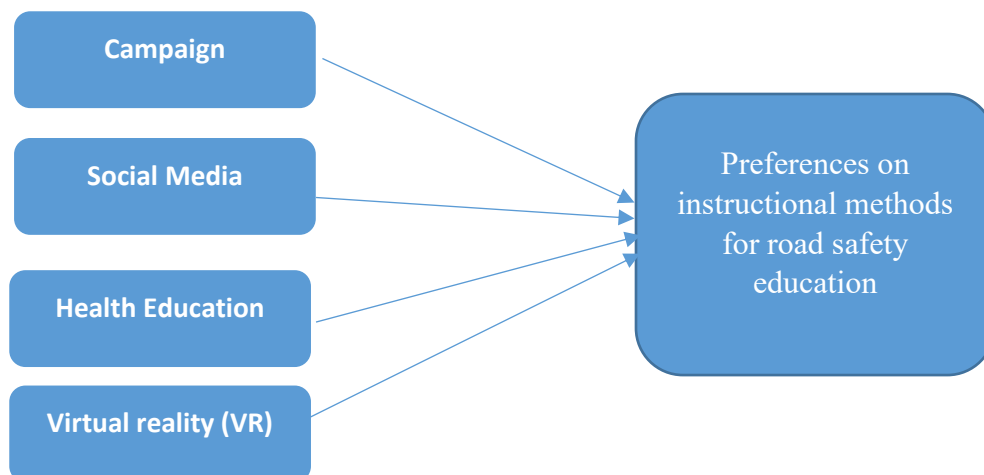


Figure 3.1: Research Framework for this research

3.2 Hypothesis

H0: There is no significant relationship between campaigns and OC on instructional method for RSE

H1: There is significant relationship between campaigns and OC on instructional method for RSE.

H0: There is no significant relationship between social media and OC on instructional method for RSE

H1: There is significant relationship between social media and OC on instructional method for RSE

H0: There is no significant relationship between health education and OC on instructional method for RSE

H1: There is significant relationship between health education and OC on instructional method for RSE

H0: There is no significant relationship between virtual reality and OC on instructional method for RSE

H1: There is significant relationship between virtual reality and OC on instructional method for RSE

3.3 Research Design

Research design is a vital for researchers to complete their study, especially to provide the guidelines in term of data collection, data analysis and data interpretation. A correlation, as defined by Cresswell (2012), is a statistical test that determines the probability or pattern of consistent variation between two or more variable or two sets of data. The purpose of correlation research is to determine the relation among two or more variables. Positive, negative, strong or weak correlations are possible. Sometimes there no relationship at all. Correlation design allow the researcher to observe natural relationships between variable, this results in the data being more reflective of real-life situations. Plus, types of correlation research that the researcher used in this study was questionnaires.

3.4 Quantitative Method

A quantitative research method is the process of gathering and performing a numerical analysis. The researcher used it to identify trends and averages, formulate hypotheses, examine relationship relationships and extrapolate to large populations. The quantitative method is likely to involves the large sample which is randomly selected (Carr, 1994). Aside from sampling, data processing takes less time because it makes use of statistical tools like SPSS (Conolly, 2007).

Furthermore, remark that quantitative research start with problem statement, generating hypotheses, research question, evaluates related literature review and also a quantitative data analysis (Williams, 2011). Also, the use of quantitative method a time saving (Bryman, 2001).

In addition, the researchers are able to spend less time and effort because quantitative the use quantitative research method for research description and analysis. Plus, the researchers using correlational research, in order to study the relationship between campaign, health education, social media and Virtual reality (VR) with road safety education. Correlation study can shed light on intricate real-world linkages, assisting researcher in the creation of hypotheses and prediction. The data collected through surveys and secondary data. The questionnaire will be conduct through online such as WhatsApp, Facebook, Email and Telegram. This is because, survey is quick and flexible to collect the data from many participants. As for now during Covid-19, it helps to reduce the human interaction. Not to forget, for the secondary data, the researcher the data that already been collected for different purpose such as journal from previous study, official records and books. It is important that the researcher will ensure the questions are worded an unbiased way and suitable for this study.

3.5 Sampling Method & Collection Method

The main focus respondents for this study will be the road users, such as drivers. This is due to the fact that these respondents are the people or individuals that use the roads in their daily lives and have experienced more on road safety issues.

3.5.1 Sampling Method

All of the elements that involved in the universe that shares common characteristics can be stated as a population. The common sampling method used by researcher is to create a subset of the population and use it to represent the whole population (Sekaran & Bougie, 2009). In other words, sampling is the process of determining selected numbers that represent a portion of the population. That generalises the characteristics of the population based on the sample analysing. Sampling techniques are normally categorised into two main categories which are probability sampling and non-probability sampling. In this case, the researcher uses non-probability sampling as it is suitable for sampling finding. Plus, the researcher uses non-probability sampling to help with the faster return of data and because of it is suitable for budget and time constraints.

Convenience sampling is used in this study, which it is under the non-probability sampling. This method used when there are time and cost limitations in collection feedback. Besides, the convenience sampling was used because it allows the researcher to distribute the questionnaire in more convenient. Therefore, the population for this research is all road users including young drivers or people that has experienced in road crash. Additionally, the researcher also decided to use convenience because the study was carried out during the COVID-19 lockdown.

3.5.2 Sampling Size

Sample size is a research term used to define the number of individuals included in a research study to represent a population. A large population should be using a large sample size in order to help the researcher to have more reliable, significant and accurate result (Thayer-Hart et al., 2010). Unfortunately, previous studies have mostly focused on the causes of traffic accidents that occur in city areas such as Selangor or Kuala Lumpur. Road safety in Seremban Negeri Sembilan has received less attention and has been neglected. Therefore, road users in Negeri Sembilan as a sampling is the population for this research.

That follow the rules of thumb for this theory stated that sample size that not more than 500 and not less than 30 respondents are suitable for most research. (Roscoe, 1975). In this study, the researcher used 204 respondents as it can help for better results.

3.5.3 Collection Method

Data collection is the process for researcher to gathering and analysing the specific information to proffer solution for relevant questions and results. There are two methods for data collection that can be implemented on these study which is, primary data and secondary data collection.

Primary Data

By definition, primary data collection is the gathering of unprocessed data gathered at the source. It is the process of gathering the unique data that a researcher has gathered for a particular research objective. (Hamed Taherdoost, 2021), stated that data can collected by using several methods, which are by survey, face to face interviews, observation and experiment method. In this study, the researcher uses primary data collection by conducting a survey method to collect the data, such as questionnaire. The researcher used close-ended questions and distribute the questionnaire through online method such as WhatsApp, Facebook or email. Online questionnaire is helpful for gathering data, storing data and visualising data. Online questionnaire can be carries out quickly and affordably (Nayak & K A, 2019). Plus, people now have better access to the Internet and become more user-friendly.

Secondary Data

Secondary data is known as data that has been used previously. (Thwaites, 2020) mentioned that secondary data can be acquired authentic journals, books, various article, proceedings, magazines, newsletters, newspaper, websites and other source were taken into consideration. In other words, all the data sources that already exist can be secondary data resources.

Secondary data is more readily available, less time-consuming and less expensive. Secondary data is used as an argument and support in order to ensure this research is solid. The secondary data highlight the information from previous journals depending on independent and dependent variables in this study.

3.6 Measurement and Scaling

In this study, the researcher choose to use two types of scale, which are the Nominal scale and the Likert scale. The nominal scale is suitable for assigning number symbols to elements in order to label them. For example, Section A of the questionnaires in this study use the nominal scale that is connected to the demographic information of respondents, such as gender, age and occupation.

Table 3.2
Item Questionnaire

| SECTIONS | PART | ITEM |
|----------|----------------------------|------|
| A | Demographic | 6 |
| B | DV (Road Safety Education) | 6 |
| C | IV 1 (Campaigns) | 11 |
| D | IV 2 (Social Media) | 9 |
| E | IV 3 (Health Education) | 12 |
| F | IV 4 (Virtual reality) | 11 |
| G | Operant Conditioning | 10 |

Table 3.3
Example of demographic questions and scaling

| Demographic questionnaire | Scale |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gender | <ul style="list-style-type: none"> ○ Male ○ Female |
| Age | <ul style="list-style-type: none"> ○ 16 – 20 ○ 21 – 25 ○ 26 – 30 ○ 31 – 35 ○ 36 – 40 ○ 41 and above |
| Occupation | <ul style="list-style-type: none"> ○ Unemployed ○ Part- time ○ Full –time ○ Other |

Table 3.4
Example of instrument and questions

| Independent Variable | Examples | Sources |
|-----------------------|---------------------------------------------------------------------------------------|----------------------------------------------|
| Road safety campaigns | As driver, I consider the campaigns effective | (Al Sandi & Ugalde, 2019) |
| Health education | Will you like reproductive health education to be included in your school curriculum? | (Benjamin Ozumba. 2007) |
| Social media | I use social media sited for reading news | (Erin Louise,2019) |
| Virtual reality | While I use a VR system, I feel like I am present in a virtual world | (Cicek, I., Bernik, A., & Tomičić, I., 2021) |

Next, for Sections B, C, D, E, F and G the researcher used the Likert scale as the measurement tool. The researcher used the Likert scale in order to collect respondent's attitudes and opinions. Also, in this study, the researcher used Likert scale to measure respondent's opinions on independent variable such as campaigns, health education, social media and VR. Researcher believes that this variable is the most relevant factors for nowadays situation to answer this research objective as stated in Chapter 1.

From the Likert scale questionnaire, the respondents can answer each section with the most appropriate answer. Respondents can answer the with an option ranging from strongly disagree to strongly agree. To answer the questionnaire, the respondent is asked to mark or tick the answer that best reflects how they agree or disagree with the items in the questionnaire.

The Nominal and Likert scales is to help researchers measure the items mentioned in the questionnaire easily. Mentioned by Borges et al., (2017), the orderly arrangement of the scale is based on the lowest to the highest level. All of this questionnaire is based on the previous research study that has related to this research topic and according to the literature review in this study.

3.7 Pilot Test

The research's supervisor examines the questions and make any necessary amendments and correction before the researcher distributing the questionnaire and conducting the pilot test. Subsequently, a pilot test distributed on a small scale in a trial run of sets to test the reliability and effectiveness of the questionnaire, wording and reliability.

Before conducting the main study, a researcher might evaluate their research approach on a small sample of participants using pilot testing, which is essentially a rehearsal of the study. A pilot study is characterised as ‘a small-scale study carried out in qualitative, quantitative or mixed method research before data collection for the actual study (Creswell, 2012).

Table 3.6
Changes made to questionnaire after pilot test

| Sections | Pilot- Test | Remark |
|----------|----------------------------|------------------------|
| A | Demographic | No changes |
| B | DV (Road Safety Education) | Add more information |
| C | IV 1 (Campaigns) | Increases choices |
| D | IV 2 (Social Media) | No changes |
| E | IV 3 (Health Education) | Increases choices |
| F | IV 4 (Virtual reality) | Increases choices |
| G | Operant Conditioning | Use simple words/terms |

3.8 Ethical Consideration

The researcher has considered some ethical issues while conducting this study. The data or results collected is collected and conducted without any manipulation, which can ensure the result of his study are genuine. Participants were given information which explained the objective of this research and informed them that the information was kept confidential. Besides, the participants were also asked to voluntarily answering the questionnaire. Due to the pandemic, the questionnaire was distributed online. All participants were able to read and answer the questionnaire without any coercion or other distraction. The researcher used simple words so that it was easier for participants to understand the questionnaire. Other than that, participants were informed that all the findings in the research did not potentially identify personal information. This study is kept confidential.

3.9 Data Analysis

Data analysis is the process that been use to interpreting and analysing the data process. Data analysis is to turn the raw data collected and make it into useful information which allow the researcher to used. Also, data analysis is to collecting and organizing the data so it can help for making better conclusion. Plus, data analysis process able to reduce the big data into more specific and accurate data which can be used. In order to analyse all the data collected, Statistical Package for Social Science (SPSS) version 29 used for this study. The analysis techniques that used in this study are descriptive statistics, reliability analysis and multiple regression analysis.

3.9.1 Descriptive Statistics

Descriptive statistics in simple words is analysis technique that help to understand and elaborate the specific data set by summaries it. Plus, descriptive statistics is use for describe the basic elements for the data collected. Descriptive statistics can be measures by the mean, mode and median which it is useful for the calculated process. Besides that, this study also uses descriptive statistics in order to summarized the visual form for an example chart, graph and summary statistics. In this study, descriptive statistics are important for this study as it able to understand large data and set into smaller data descriptions. However, the main objective of using descriptive statistics is to provide a simple and clear summary about the samples and measurement that have be done for this study. Descriptive statistic be used in this study because it will provide the specific data about respondents such as age, gender and level of income.

Table 3.7
Descriptive table

| Variable | | Frequency | Percent (%) |
|--------------------|--------------------------------|-----------|-------------|
| Gender | Male | 81 | 39.9 |
| | Female | 122 | 60.1 |
| | Total | 203 | 100 |
| Level of Education | Sijil Pelajaran Malaysia (SPM) | 23 | 11.3 |
| | Diploma | 57 | 28.1 |
| | Bachelor Degree | 95 | 46.8 |
| | Master Degree | 16 | 7.9 |
| | PHD | 7 | 3.4 |
| | Other | 5 | 2.5 |
| | Total | 203 | 100 |
| Age | 16 - 20 | 17 | 8.4 |
| | 21 - 25 | 23 | 11.3 |
| | 26 - 30 | 60 | 29.6 |
| | 31 – 35 | 16 | 7.9 |
| | 36 – 40 | 17 | 8.4 |
| | 41 and above | 70 | 34.5 |
| | Total | 203 | 100 |
| Occupation | Unemployed | 36 | 17.7 |
| | Part-time | 12 | 5.9 |
| | Full-time | 138 | 68.0 |
| | Other | 17 | 8.4 |

| | | | |
|------------------------------------------------------------------------|-------------------------|-----|------|
| | Total | 203 | 100 |
| Do you have driving or motorcycle license? | Yes, Driving license | 112 | 55.2 |
| | Yes, Motorcycle license | 4 | 2.0 |
| | Both | 70 | 34.5 |
| | No | 17 | 8.4 |
| | Total | 203 | 100 |
| Do you prefer to use your own transportation or public transportation? | Own transportation | 176 | 86.7 |
| | Public transportation | 27 | 13.3 |
| | Total | 203 | 100 |
| Do you have any prior experience being involved in car accident? | Yes | 109 | 53.7 |
| | No | 94 | 46.3 |
| | Total | 203 | 100 |



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3.9.2 Reliability Analysis

Reliability analysis is use in this study to make an observation and determine the result of the questionnaire. This method will split the data collected into a two set which each data will be calculate base in each half of the scale. For this study, reliability analysis need to be used because it gives the probability of time operating without any failure. Plus, reliability analysis prepares the proper information about the relationship between individual items in the scale. Models that will be used for this study is Cronbach's Alpha. Cronbach's Alpha is model of internal consistency which it uses Likert questions for example questionnaire or survey. In additions, Cronbach's Alpha can be used to measure the reliability of questions about effective instructional method for road safety education. The suitable of reliability coefficient need must be greater than 0.7, however the value of 0.6 is poor but can but still can be accept.

Table 3.8
Rule of thumb for reliability based on Alpha Value
(George and Mallery, 2003)

| Cronbach's Alpha | Internal consistency |
|-------------------------|-----------------------------|
| $\alpha \geq 0.9$ | Excellent |
| $0.9 > \alpha \geq 0.8$ | Good |
| $0.8 > \alpha \geq 0.7$ | Acceptable |
| $0.7 > \alpha \geq 0.6$ | Questionable |
| $0.6 > \alpha \geq 0.5$ | Poor |
| $0.5 < \alpha$ | Unacceptable |

3.9.3 Multiple Regression Analysis

Multiple regression analysis is the expansion of simple linear regression. Also, this method is use to predict the unknown value of variable for example, in this study multiple regression analysis is used to predict the value of independent variable (IV) of this study such as campaign, social media, health education and VR with the dependent variable (DV) which is instructional RSE methods.

3.10 Reliability & Validity

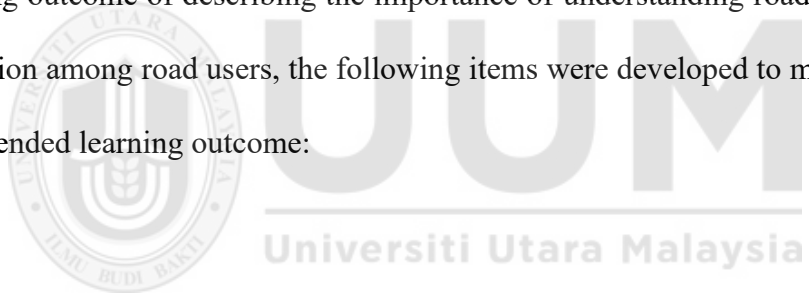
In this part, there are some analysis had been done to know the reliability and the validity of the data had received from the respondents. Therefore, construct validity using factor analysis and internal consistency reliability was being done in this research. Mostly the researcher refers and construct based on other journal publications. However, to test this reliability and validity it is essential in this research. Reliability relates to the consistency of a measure. Furthermore, research quality also can be measure by this reliability and validity concept. In quantitative research, it essential to study reliability and validity when create research method planning and design of research. There are two aspects that need to be highlight when asses' reliability. (Babin and Zikmund, 2016). Firstly, reliability should be test and need to be compared with the previous result. Then, accuracy test is reliable with what they mean to degree that various aspect of a summarize system.

However, to determine the correlation, it can be dividing into two test which is between split halves, or by using Cronbach's alpha coefficient. That calculates the sum of all divided-half coefficient. Therefore, to determine the internal consistency of an instrument in this study the researcher will use Cronbach's alpha. A Cronbach 'alpha with the higher than 0.7 is considered as an acceptable reliable score while value below 0.60 consider low. (Nunally, 1978). According to Greener and Martenelli (2015), mentioned that validity described as the accuracy of a measurement or observation. In the study to defines validity there are three key approaches. It is necessary that research method have face validity, construct validity and internal validity. There are several ways to determined validity. That is face validity act to monitors the queries seem to represent what can be accomplish. (Bryman, 2016).

Next, to do the same query independently to see how the answer varies is by the concurrent validity approach. Moreover, construct validity takes the calculation of more complex problem to convergent validity measures test that have been taken with two separate approaches.

3.11 Instrument

In this study, the knowledge construct was measured using Likert-scale questions. In particular, it measured various aspects of people's knowledge of road safety and their behaviour according to operant conditioning. The test was developed in English Language. In this study, the Likert scale was used to assess how strongly respondents (road users) agreed or disagreed with the assertions on a scale of 1 (strongly disagreed), 2 (disagreed), 3 (neutral), 4 (agreed) and 5 (strongly agreed). The items were developed and adapted from the contents of the revised RSE journals, together with the operant conditioning journals. For example, to measure the learning outcome of describing the importance of understanding road safety education among road users, the following items were developed to measure the intended learning outcome:



ROAD SAFETY EDUCATION

Road Safety Education (RSE) was one of strategies that introduce at school and also treated as lifelong learning process. Main goal of road safety education (RSE) is to minimize the rate of road crash and fatalities. Circle/ highlight the appropriate score based on the given scale.

| No. | Items | Strongly disagreed \longrightarrow Strongly agreed | | | | |
|-----|-----------------------------------------------------------------------------------------|------------------------------------------------------|---|---|---|---|
| 1. | Road Safety Education (RSE) | | | | | |
| | a. method helps me in understanding road safety issues | 1 | 2 | 3 | 4 | 5 |
| | b. material makes individuals responsible for the safety of themselves | 1 | 2 | 3 | 4 | 5 |
| | c. period should be short duration but solid | 1 | 2 | 3 | 4 | 5 |
| | d. techniques of have attracted my interest | 1 | 2 | 3 | 4 | 5 |
| 2. | I understand the road traffic rules because of the road safety education | 1 | 2 | 3 | 4 | 5 |
| 3. | I need road safety materials that easier to apply (e.g., campaigns, social media) | 1 | 2 | 3 | 4 | 5 |
| 4. | It is necessary to develop education video for better understanding in safety education | 1 | 2 | 3 | 4 | 5 |
| 5. | Road safety education helps drivers maintain traffic laws | 1 | 2 | 3 | 4 | 5 |

Figure 3.9
Sample of Road Safety Questionnaire from Google Form

3.12 Developing the Questionnaire

As the major measuring tool for the study, a questionnaire was created. The questionnaire as an instrument for providing and supporting data for the study, enhancing the validity and reliability of the study. In order to build a questionnaire relevant to this study, the researcher adapts findings from past studies. The researcher selected questionnaires from past journals because they are reliable and connected to operant conditioning and road safety education. Plus, for this study, a self-administered approach is used to gather data. A questionnaire was constructed using Google Forms and distributes to respondents via WhatsApp, Telegram, Facebook and Messenger groups. The survey method is being used in this study to gather information regarding operant conditioning and road safety education among road users.

The questionnaire was created in an effort to systematically examine, investigate and gather new knowledge or information. Road users who participated in the survey were required to answer the questions that were asked in a predetermined order. The questionnaire was created to be practical, understandable and effective. A literature review, research objectives and research questions were used to create the questionnaire.

Table 3.9

Questionnaire design framework

| Question | Survey | Scale |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Section A (Demographic Background) | | |
| 1 to 7 | A demographic survey gathers information on the fundamental traits of the population being studied. To determine the respondent's demographic background. The responses included information about the respondent's age, gender, education, driving or motorcycle endorsement and any involvement in traffic accidents. | Multiple choice (Nominal data) |
| Section B (Road Safety Education) | | |
| 1 to 8 | To measure the level of awareness among road users about the importance of road safety | Rank 1 to 5 (Interval data) |
| Section C (Road Safety Education Campaign) | | |
| 1 to 11 | To study the impact of operant conditioning and road safety education campaigns on road users behaviours | Rank 1 to 5 (Interval data) |
| Section D (Social media) | | |
| 1 to 9 | To evaluate the efficiency of social media among drivers in order to encourage good behaviour and increase public engagement | Rank 1 to 5 (Interval data) |
| Section E (Health Education) | | |
| 1 to 12 | To identify the role of health education in promoting settings for road users can be crucial educating traffic behaviour | Rank 1 to 5 (Interval data) |
| Section F (Virtual reality) | | |
| 1 to 11 | To determine the most effective manner in which virtual reality may be used to promote road safety | Rank 1 to 5 (Interval data) |
| Section E (Operant Conditioning) | | |
| 1 to 10 | To determine how operant conditioning affects road safety education and how it affects the behaviour of road users | Rank 1 to 5 (Interval data) |

Section A (Demographic)

Gender *

Male

Female

This is a required question

Age *

16 - 20

21 - 25

26 - 30

31 - 35

36 - 40

41 and above

Figure 3.10
Sample of questionnaire in Google Form

3.13 Reliability and Validity

This section includes some analysis that was done to determine the validity and reliability of the data collected from the respondents. Therefore, construct validity was evaluated in this chapter using reliability analysis which, to gives information about the relationship between the scale's various items as well as a variety of regularly used metrics of scale reliability. Likert-type scales are frequently used in the social sciences, marketing and business to collect data on attitudes, emotions, views, personalities and descriptions of people's environments. Individuals frequently employ multiple item scales and summated ratings to quantify the construct of interest when attempting to quantify concepts that are not directly measureable. Rensis Likert (1931), who introduced this method for evaluating attitudes is credited with creating the Likert scale.

As for this study, the researcher used a Likert-type scale in the questionnaire. The respondents are asked to react to each statement by indicating how much they agree or disagree with it. They are usually told to choose one of the following five options such as strongly agreed, agreed, neutral, disagreed and strongly disagreed.

When planning and designing a research method for quantitative studies, it is crucial to consider reliability and validity. first, reliability needs to be compared to the previous outcome. The accuracy test is then trustworthy when used to measure several aspects of a summary system. Cronbach's alpha can be used to calculate the correlation. This determines the total divided-half coefficient. Thus, in thus studies, the researcher will be using Cronbach's alpha to assess an instruments internal consistency. According to George and Mallery (2003), the following rules of thumb $\geq .9$ is excellent, $\geq .8$ is good, $\geq .7$ is acceptable, $\geq .6$ is questionable, $\geq .5$ is poor and $< .5$ is unacceptable.

CHAPTER FOUR

RESULT AND DISCUSSION

4.0 Introduction

This chapter discusses the finding based on the questionnaire result. Section 4.1 explains the data analysis process, which is the process of gathering the data and transform the large data into useful information such as table for simple interpretation. This is followed by the results analysis in Section 4.2, developing the questionnaire, which describes the source of the questionnaire and the form of the questionnaire (such as Likert scale question). Plus, the data screening and cleaning process are described in Section 4.3. In addition, the researcher discussed the validity and reliability of this study in Section 4.4. Section 4.5 displayed data on Pearson correlation which is used to determine whether there is a linear relationship between two quantitative variables. Finally, regression analysis was presented in Section 4.6. It uses statistics to determine how two or more variables are related to one another.

4.1 Pilot Test

Table 4.1

Reliability Test (Pilot Test)

| Construct | Cronbach's Alpha Value | Number of item | Strength |
|-----------------------|------------------------|----------------|------------|
| Road Safety Education | 0.764 | 6 | Good |
| Campaigns | 0.769 | 11 | Acceptable |
| Social Media | 0.716 | 9 | Acceptable |
| Health Education | 0.850 | 12 | Good |
| Virtual reality | 0.869 | 11 | Good |
| Operant Conditioning | 0.769 | 10 | Acceptable |

4.2.1 Respondent profile

Table 4.1 shows the sampling data collected for this study, which included 203 road users from a variety of backgrounds in terms of gender, age, race, marital status and education attainment. According to the result, 60.1 percent of respondents were female, compared to 39.9 percent of the male population. This shows that the female population is predominant in this poll. Plus, those who are 41 years and above, accounting for 34.5 percent of all responses. Next, the majority of respondents 68.0 percent are work full-time, which is higher than other occupations. The majority of respondents 55.2 percent have driving licences, compared to 2.0 percent who have motorcycle licences, for the question about whether they have a licence. In addition, 86.7 respondents said they preferred using their own vehicles than using public transit. Finally, the response to the final question, "Do you have any prior experience being involved in a car accident?" revealed that 53.7 respondents had, which is appropriate for this study.

Table 4.2
Respondent profile

| | Frequency (N = 203) | Percentage (100%) |
|---------------------------------------------------------------------------|--------------------------------|------------------------------|
| Gender | | |
| Male | 81 | 39.9 |
| Female | 122 | 60.1 |
| Age | 17 | 8.4 |
| 16 – 20 | | |
| 21 – 25 | 23 | 11.3 |
| 26 – 30 | 60 | 29.6 |
| 31 – 35 | 16 | 7.9 |
| 36 – 40 | 17 | 8.4 |
| 41 and above | 70 | 34.5 |
| Level of education | | |
| Sijil Pelajaran Malaysia (SPM) | 23 | 11.3 |
| Diploma | 57 | 28.1 |
| Bachelor Degree | 95 | 46.8 |
| Master Degree | 16 | 7.9 |
| PhD | 7 | 3.4 |
| Others | 5 | 2.5 |
| Occupation | | |
| Unemployed | 36 | 17.7 |
| Part-time | 12 | 5.9 |
| Full-time | 138 | 68.0 |
| Others | 17 | 8.4 |
| Do you have a driving or motorcycle license? | | |
| Yes, Driving license | 112 | 55.2 |
| No, Motorcycle license | 4 | 2.0 |
| Both | 70 | 34.5 |
| No | 17 | 8.4 |
| Do you prefer to use own transportation or public transportation? | | |
| Own transportation | 176 | 86.7 |
| Public transportation | 27 | 13.3 |
| Do you have any prior experience being involved in a car accident? | | |
| Yes | 109 | 53.7 |
| No | 94 | 46.3 |

4.4 Data Screening & Cleaning

The goal of this process is to verify that all received data or transcriptions are correct and error-free. Therefore, it is necessary to detect and eliminate from the total respondents any missing value and unengaged responses.

4.4.1 Missing Value

Cooper & Schindler (2014), claimed that missing values or data are the records missing information. This should be found and fixed during the phase of data preparation and analysis missing value data often known as miscoded data or out-of-range data. This is due to a lack of relevant to the case study, such as respondents who did not respond to the survey research question. This problem will be classified as a missing value in SPSS as a result (Bryman, 2012). However, all of the missing values or data in this study were controlled by researchers. This is because, researchers employed a Google Forms online questionnaire for this study. As a result, each survey question has already been predetermined or presented and respondents must answer it before moving on to the next.

4.4.2 Internal Consistency Reliability (Cronbach Alpha)

Internal consistency reliability can be defined as a test of the consistency of responses to all the items in a measure to establish that they hang together as a set (Sekaran & Bougie, 2016). Then there is the degree to which the indicators that make up a scale are consistent (Bryman, 2012) an procedures for estimating the reliability of scores using only one administration of the instrument (Fraenkel, Wallen & Hyun, 2012). Besides that, Cronbach's alpha is a statistic that has been used to measure the consistency of responses across a set of questions (scale items) designed together to measure a particular concept (Saunders et al.,2016). Not to forget, the researcher uses this statistic to assess if a group of items consistently measures the same trait.

Based on the table below, a rule of thumb for Cronbach's alpha for Likert-type scales is in general 0.7 which is usually okay. However, some studies suggest higher values of 0.9 to 0.95. A high degree of alpha could indicate that the test's items are highly connected. But is also sensitive to the quantity of the test item. A larger item can be produced by a greater number of α , while a smaller object may be produced by a lower number of α .

Table 4.4
Internal Consistency Reliability (Cronbach Alpha)

| Variable | No. Of Items | Cronbach Alpha |
|-----------------------|---------------------|-----------------------|
| Road Safety Education | 8 | 0.864 |
| Campaigns | 11 | 0.907 |
| Social Media | 9 | 0.945 |
| Health Education | 12 | 0.928 |
| Virtual reality | 11 | 0.975 |
| Operant Conditioning | 10 | 0.949 |

4.5 Pearson Correlation

Pearson correlation used to determine whether there is a linear relationship between two variables for example in this study, to study the relationship between operant conditioning and campaigns. Table below show an exhibit the correlation analysis result of independent variable (campaigns, health education, social media and virtual reality) while dependent variable (assessing operant conditioning preferences on instructional methods for road safety education). The relationship between operant conditioning and road safety campaigns was positive and strong ($r = 0.741$, $p < 0.01$), compared to another independent variable. Meanwhile, virtual reality has positive and moderate correlation ($r = 0.504$, $p < 0.01$) with operant conditioning.

Table 4.5
Pearson Correlation

| Correlations (N= 203) | | | | | |
|-----------------------------------------------------------------|------------------------------|-------------------|-------------------|-------------------|----------------------|
| | | Campaigns | Health education | Social Media | Virtual reality (VR) |
| Operant Conditioning | Pearson Correlation | 0.741 | 0.728 | 0.675 | 0.504 |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 |
| | Strength of the relationship | Positive & Strong | Positive & Strong | Positive & Strong | Positive & Moderate |
| Correlation is significant at the 0.01 level (2- tailed) | | | | | |

4.6 Regression Analysis

Regression analysis is a statistical technique that predict the link between two or more variables. This method tests the link between a dependent variable and independent variables. For example, it can be used to predict the relationship between operant conditioning with social media and the impact toward road user. Regression analysis was used when a researcher wanted to predict the dependent variable by the regression process of the independent variable towards the dependent variable (Sekaran and Boougie, 2016). According to some journalists, regression analysis aims to obtain a self-weighting appraisal that substitutes the value of the independent variable for the value of the dependent variable. As for this study, there is a specific method that must be followed in order to improve the assessment process, accuracy and the impact it has on other parts.

a) Model coefficients

A positive coefficient means that the dependent variable's mean tends to increase when the value of the independent variable increases. A negative coefficient indicates that the dependent variable decrease as the independent variable increase.

Table 4.6

Model Coefficient

| Model 1 | Unstandardized B | Coefficients Std. Error | Standardized Coefficients Beta | t | Sig |
|--------------------------------------------------------------------------|-----------------------------|------------------------------------|-----------------------------------------------|----------|------------|
| (Constant) | .196 | .209 | 0.000 | .937 | .305 |
| Campaigns | -.036 | .089 | .280 | .407 | .684 |
| Social Media Health Education Virtual reality | .050 | .072 | .430 | .693 | .489 |
| | .546 | .086 | .458 | 6.341 | .001 |
| | .413 | .045 | .479 | 9.222 | .001 |

a. Dependent Variable: Operant Conditioning

Table 4.6.1

*Model summary and ANOVA***b) Model Summary and ANOVA**

| Model summary | | | | |
|----------------------|----------|-----------------|------------------------------|-----------------------------------------------|
| Model | R | R square | Adjusted R square | Standard error of the estimate |
| 1 | .835 | .697 | .691 | .35218 |

| ANOVA | | | | | |
|-------------------|--------------------------|-----------|------------------------|----------|------------|
| Model 1 | Sum of square | df | Mean square | f | Sig |
| Regression | 56.517 | 4 | 14.129 | 113.919 | .001 |
| Residual | 24.558 | 198 | .124 | | |
| Total | 81.075 | 202 | | | |

The overall model fits was $R = 0.835$. the main effect of all situational factors was significant, $f = 113.919$ while $MSE = 0.124$ as shown in table above.

As a conclusion, the validity and reliability of questionnaire that was created for the research shown by the Cronbach's alpha value. Also, the used the Pearson correlation on this data is to determine the highest correlation. In addition, to find the coefficient and ANOVA, the researcher uses regression method.

4.7 Summary of Hypothesis Result

A multiple regression analysis is carried out to clarify the hypothesis, where it makes references to a standardise regression coefficient that shows how many standard deviation units the dependent variable changes for each standard deviation unit of the independent variable. Beta value greater than 0.2 is considered significant, whereas beta = 0.11 to 0.19 is considered uncertain and 0 to 0.10 is considered not significant. The alpha (α) level is typically set at .05. This mean that if the p-value is less than .05 (i.e., $p < .05$), the result is considered to be statically significant. Alternately, if the p-value is higher than .05 (i.e., $p > .05$), it considers the result to be not statistically significant.

Table 4.6.2
Result of Multiple Regression Analysis

| Relationship | β | T | Sig. | R₂ | Decision |
|----------------------------|---------------------------|----------|-------------|----------------------|-----------------|
| Road Safety Education → OC | .280 | .407 | .684 | .697 | Not Accepted |
| Social Media → OC | .430 | .693 | .489 | | Not Accepted |
| Health Education → OC | .458 | 6.341 | .001 | | Accepted |
| Virtual reality → OC | .479 | 9.222 | .001 | | Accepted |

The model estimation revealed that there was no significant correlation between operant conditioning and the adoption of road safety campaigns among road users ($t > 2$, $p > 0.05$; H1). Regarding the mass media context, such as social media, it also showed no significant between operant conditioning and social media ($t > 2$, $p > 0.05$ H2).

However, in term of health education, it shows that operant conditioning has a positive relationship with health education since it can raise awareness of traffic safety and enhance driving behaviour through health education ($t < 2$, $p < 0.05$; H3 accepted). Health education is one of the most important parts of non-communicable disease prevention (Osborne et al., 2022). The study's most important finding seems to be the communication/informing aspect, which implies that the health sector may have a role in the strikingly decreasing number of traffic crashes. Based on this study, by raising road users awareness, the health sector can contribute to prevention of traffic crashes and therefore lower hospitalisation rates.

Not to mention, the usage of technologies like virtual reality (VR) has a major impact on the conduct and action of road users ($t < 2$, $p < 0.05$; H4 accepted). VR has the ability to influence changes in health-related behaviour. Compared to other existing technologies, VR offer potential for safer method of conducting such road users education since it provides a unique degree of immersion and brings the experience closer to real-life situation (Vankov & Jankovszky, 2021).

Based on this study, VR capabilities are useful for road studies, which frequently aim to reduce fatalities by changing the behaviour of drivers. Per Oyelere et al. (2020), VR has gained popularity in road safety education because of its ability to simultaneously engage many senses, such as hearing, touch, vision and the sensation of heat. It also minimises treatment risk for users and provides a safe training environment. Cakiroglu & Gokuglu (2019), have noted that there is a growing demand from businesses and society for education by VR that emphasises safety, promotes safety habits and reduces road user errors.

4.8 Discussion of Research Objective

RO1: To determine the relationship between operant conditioning and instructional methods for road safety education.

The first objective is to determine the relationship operant conditioning and instructional methods for road safety such as campaigns, health education, social media and virtual reality. Based on the result of Pearson Correlation, it can be concluded that operant conditioning has favourable association with the instructional method used in the field of road safety education such as health education and virtual reality. Operant conditioning toward road users can assist them in making better decisions and improving their behaviour while driving, according to instructional methods for promoting road safety such as campaign, health education, social media and virtual reality. Operant conditioning can make sure that drivers choose wisely when confronted with decisions on the road.

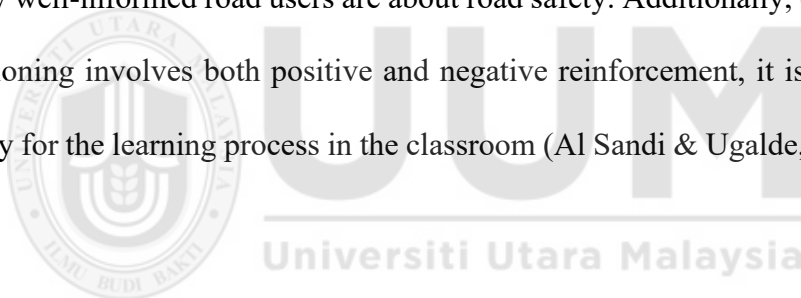
The use of operant conditioning to change human behaviour can be positive or negative, depending on the intention of the person using the techniques. Additionally, according to operant conditioning theory, shaping can be used to teach complicated behaviours. A complex behaviour is shaped by breaking it down into smaller, more manageable steps and then reinforcing each step until the desired behaviour is reached.

RO2: To evaluate the functions of operant conditioning in assessing the preferences on instructional methods for road safety education.

The second objective is to evaluate the functions of operant conditioning on road safety education model development. It was shown that operant conditioning has an influence on road safety education model development. For example in a health education, operant conditioning shared more knowledge regarding road safety, such as the cause of road crashes or the benefit of following traffic rules, by using positive and negative framed advertising. Based on B.F Skinner's theory which is punishment for behaviour, the effective of health education that shows negative emotional messages may lead to successfully reducing risky behaviour. However, the use of positive messages among a certain group of road users can be more persuasive compared to the use of negative messages. Plus, the operant conditioning theory was based on the idea that learning processes are a function of changes in human behaviour (Al Sandi & Ugalde, 2019).

RO3: To measure the importance of operant conditioning toward the level of road safety education among all road users.

Plus, the third objective in this study is to measure the importance of operant conditioning toward the level of road safety education among all road users. The Pearson Correlation results show that operant conditioning is significant for the degree of road safety education since it aids road users in changing their behaviour while on road. According to Nsiah-Achampong et al. (2018), operant conditioning works as a signal that generates responsive reinforcement, such as when a vehicle stops at a red light to avoid an accident or fine. The data shows that operant conditioning has an important influence on how well-informed road users are about road safety. Additionally, operant conditioning involves both positive and negative reinforcement, it is viable strategy for the learning process in the classroom (Al Sandi & Ugalde, 2019).



Conclusion

Operant conditioning has an effect on four different instructional methods used in the education of road safety. Firstly, there are the road safety campaigns that showcase and demonstrate the knowledge gained via road safety education in distinctive and original ways. To guarantee that the campaigns message is interesting to road users and easy for them to remember, it should use a variety of promotional techniques such as offering incentives or gifts to participants. This is due to the fact that behaviour that receives praise is more likely to be remembered and repeated through operant conditioning. Additionally, road safety campaigns can draw in more drivers by utilising innovative techniques such as highlighting the benefits of adhering to traffic laws rather than focusing only on the detrimental effect such as fatalities cause by road crashes.

Secondly, there are lots of angles from which to view health education. For instance, a scenario for traffic accidents was created with a driving attitude that enables drivers to recognise any risk while driving and to ensure the health education information is presented more simply. Additionally, health education supports the promotion of awareness and comprehension of traffic laws and circumstances. Mentioned by F. Bakhtari Aghdam (2020), health education, which is often used as a location for health promotion, can play a significant role in promoting safe driving practices.

This shows that operant conditioning has connection between the health education because, it can play the importance role which is to ensure that road users always make better decision while using road such as drive within the speed limit, so that in can reduce the risk or accidents. This highlights the connection between operant conditioning and health education since it can play a crucial role in ensuring that drivers always make better decisions when using the road such as maintaining below the speed limit in order to minimise the chance of being involved in accidents.

Finally, in addition to IR 4.0, the use of technology like virtual reality is seen as an educational strategy that increases road users awareness of road safety. Through the use of virtual reality, it is possible for drivers to experience real-life situation, such as those in vehicle games that demonstrate the effects of breaking traffic laws. As a result, it can encourage drivers and cyclists to use the road with greater caution. Thus, the application of operant conditioning can be related to the behaviour of drivers. As previously said, employing virtual reality forces users to experience real-life situation, forcing them to constantly consider the consequences of breaking the law. Technology such as VR is also a useful tool for attracting attention to road safety programmes. VR can also serve as a platform for disseminating information about road safety in more appealing and simple ways. In this era, the use of games to spread important information like road safety is the most efficient way to educate people.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

Introduction

The research aims and objectives are reviewed in Chapter 5, and the conclusions reached as a result of the work done through the research are discussed in relation to these. This chapter start with Section 6.1, with the discussion on the purposes of this study. Section 6.2 focusses on the limitation of the study. Implication of the study discussed in Section 6.3, followed by recommendations for future studies in Section 6.4, this chapter then closes the thesis with the conclusion.

5.1 Discussion

The purpose of this research is to determine independent variable that will influence by operant conditioning. The findings showed that campaigns ($t=0.407$, $p > 0.648$) and social media ($t=0.693$, $p > 0.489$) shows a no significant relationship towards operant conditioning while health education ($t=6.341$, $p < 0.001$) and Virtual reality ($t=9.222$, $p < 0.001$) have significant relationship towards operant conditioning.

5.2 Implication of The Study

The objectives of this study include determining the influence of operant conditioning in assessing the preferences on instructional methods for road safety education among road users. This study showed which variable has a highly significant impact and which has a lower impact with OC. Operant conditioning is a suitable method for the learning process in the classroom because of uses both positive and negative reinforcement (Al Sandi & Ugalde, 2019). Thus, this can be an opportunity for the government to identify key factors that can be used to improve road safety and reduce road crashes. By having the data collection, it may lead to the development of methods that could impact OC on road safety education.

In terms of road crashes, the instructional methods for RSE such as health education and VR could reduce any risk that may occur by giving awareness and knowledge to the road users. The OC also helps road users to make better decision. For example, drivers will think first before driving over the speed limit as it can be harmful for themselves and other road users. Some advanced systems, such as VR have simulators that allow road users to create awareness about road safety. The simulators let road users to experience real-life situations and help them make better decisions. The VR games that related to road safety is help road user to increases their awareness and may change road users behaviour. Virtual reality games that focus on road safety can assist drivers becoming more aware of their surroundings and potentially changing their behaviour.

Plus, health education is one of the government actions in this scenario that can also decrease the number of road crashes. As health education results in a positive outcome, it plays an important role in road safety education. The better structure of health education has been proven to have a positive impact and provide better knowledge for road users. It shows that health education is also one of the most effective methods for road safety education. Health Education on Road traffic Accidents and Road Safety – 2023 organized World Trauma Day, an annual global initiative observed on October 17th, highlights the profound impact of trauma on both individuals and societies. It underscores the importance of injury prevention, effective medical response, and psychosocial support, fostering a culture of safety and resilience in the face of traumatic events.

5.3 Limitation of study

The researcher identified that there were limitations while doing this study that make it difficult to complete it. The limited access to sources for the literature review. In Malaysia, there were a large number of studies related to road safety however, very little literature was found that showed an instructional method for road safety education. Also, there is limited studies by past researchers that have studies the preferences of operant conditioning (OC) on road safety education. Plus, it was difficult to find the journal based on a recent year such as 2018 until 2022 that related to this study. However, this factor does not impede the researcher from achieving the objectives of this study.

Additionally, the respondents may have simply filled out the questionnaires in order to complete their work quickly, or they may have tended to leave the questionnaires blank or have selected 'neutral' answer for all of the questionnaires because they were unsure of the appropriate answer. As a result, the researcher unable to guarantee the validity and accuracy of the data gathered from the respondents. In order to overcome or reduce bias issues, researcher has used simple language to avoid misinterpretation. Plus, the researcher distributed the questionnaire to group of people that has intention to answer the questionnaire and not by force.

It is uncommon for many people to hear about operant conditioning. As a result, it is challenging for respondents to comprehend the questionnaire's questions. It is more difficult for respondents to respond to the questionnaire since operant conditioning and road safety education are novel concepts. Furthermore, because the information is new to the respondents, it is more difficult for the researcher to impart it to them.

5.4 Recommendation

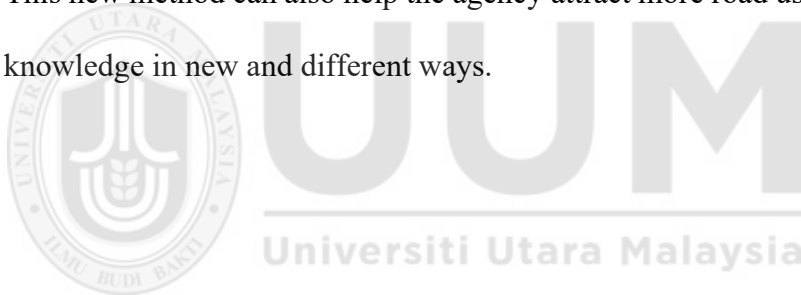
Future Studies

To improve and expand the findings of this research, several recommendations are needed. Therefore, it can be used by future researchers and by the researcher itself to improve the research in the future. The future researcher can investigate and identify the other factors that would guide people to become better road users and better statisticians of road traffic crashes. As in this study, the researcher already used campaigns, health education, social media, and virtual reality as methods to guide road users.

In addition, the next recommendation for future studies is that other researchers can explore the new method for improving statistics on road crashes. This is because nowadays, there are many technologies that can be used to educate people on road safety management. Furthermore, the researcher hopes that future researchers can try to apply operant conditioning to the different methods to study if there is any connection or impact, since not many studies have used OC in road safety education. Not to forget, future researchers can use other survey methods, such as interviews, for their study to get a more accurate result.

Government

In other words, this study can also benefit the government sector in Malaysia, such as MIROS, MKJR, and MOT. The recommendation for the government sector in Malaysia is that they can use the methods from this study to improve road safety education, such as health education and VR. This is because in this study, the researcher has listed methods that can be used to improve road safety education in Malaysia based on the result from questionnaires, which can also help reduce the rate of road crashes in Malaysia. Besides that, by using all the methods in road safety education, it can help support the government in coming up with new solutions for these issues. This new method can also help the agency attract more road users and spread knowledge in new and different ways.



Conclusion

The researcher objective (RO) and the research questions (RQ) that were developed for this study have already been met. The dependent variable (DV) and independent variable (IV) for this study likewise showed a significant relationship, indicating the validity and suitability of the variable for the investigation. This study also demonstrated that road users felt that VR and health education were effective education methods for road safety especially with the operant conditioning. Additionally, using social media and campaigns to educate people about road safety may not have a significant impact on how people behave on the roads.

The main contribution of this study was to study the assessing of operant conditioning preferences on instructional methods for road safety education. The result shows that the variable has different levels of significant regarding operant conditioning and education methods.

Plus, this study may help transportation agencies such as Ministry Of Transportation (MOT) develop different strategies for creating awareness among road users. In addition, the government can could more attention to managing its strategies since behaviour is one of the factors that can affect road users. Also, the government should improve health education services for road users, which would be beneficial for them. Lastly, virtual reality can help attract more road users in and spread knowledge on road safety education. Thus, these methods may help in reducing numbers of road crashes and fatalities in Malaysia.

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