

Determining Malay Youth Awareness of Climate Change Education and Ocean Sustainability

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Abstract

The oceans and seas are now under increasing threat from human activities and needing immediate action to protect their health and resilience. Clearly, pollution from human activities, such as industrial effluents and solid waste, continues to pose a threat to marine biodiversity and ecosystem function. Towards these scenario, numbers of initiatives taken by the global world including emphasizes the importance of conserving and using marine resources sustainably for Sustainable Development Goal 14 (Life Below Water). However, despite worldwide initiatives, achieving these objectives remains difficult. Thus, this research examines the importance of educating teenagers on the effects of climate change on ocean sustainability through evaluation of their awareness, attitudes, and behaviors towards environmental conservation activities. This research project aims to introduce a fresh perspective on addressing Malaysia's pressing ocean sustainability issues. To assess youth awareness and views on ocean sustainability and climate change education, a questionnaire was distributed to youth aged 18 to 25 in Selangor state using voluntary response sample methods. Through iterative design and refinement processes, driven by research insights and professional feedback, the study aspires to enhance youth awareness in ocean sustainability and climate change mitigation, aligning with global priorities for a resilient and equitable future.

1. Introduction

The number of people on the planet has grown from 2.5 billion to over 7.6 billion today, and with it, so too have the types and magnitude of dangers to human health and welfare that arise in the seas and oceans (Fleming *et al.*, 2019). Numerous studies have confirmed this, citing hazards to the "health" of the global ocean and human population, including overfishing, hypoxic dead zones, coastal zone destruction, ocean acidification, sea level rise, coastal flooding, and an increase in the frequency and intensity of extreme storms (Fleming *et al.*, 2015).

The United Nations (UN) 2030 Agenda for Sustainable Development, which includes 17 Sustainable Development Goals (SDGs), was implemented in 2015 and calls for a more sustainable use of our planet. "Conserve and sustainably use the oceans, seas, and marine resources for sustainable development" is the goal of SDG 14: Life below Water. By 2020, one of the goals is to "increase scientific knowledge, in order to improve ocean health" and "sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience and taking action for their restoration in order to achieve healthy and productive oceans (Cormier and Elliott, 2017). However, it is still unclear how to operationalize these goals. Additionally, in order to support "efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide" and the "momentum for restoring our natural environment," the UN has declared the

"Decade of Ocean Science for Sustainable Development" and the "Decade on Ecosystem Restoration" (both 2021–2030). This is done by highlighting the urgent need for "adaptation strategies and science-informed policy responses to global change." Many experts have lately confirmed the need for broad measures to be taken in order to restore the health of the ocean (Claudet *et al.*, 2020).

Ocean sustainability basically aims to protect the ocean and its resources so that subsequent generations can enjoy them. The earth's seas are vital, and coastal areas support a wide variety of unique ecosystems. The ocean has always been essential to the nation's socioeconomic growth since it is the foundation of international trade and commercial endeavors such as shipping, tourism, fishing, and offshore oil and gas. As part of its commitment to establishing a sustainable ocean by 2030 as a UN member state, Malaysia has incorporated Sustainable Development Goals (SDGs) 14: life below water, into the 11th Malaysia Plan (MP) for the 2016–2020 term (Zaideen, 2022). The Ocean for Sustainable Development (2021–2030) initiative offers an opportunity to consider the intricate relationships between the health and well-being of humans, the oceans, and the seas. Historically, these relationships have been chiefly understood regarding risks, such as the adverse effects of extreme weather, chemical pollution, and climate change. But in the present day, the seas are getting more and more contaminated and damaged. The main causes of contamination are human activities such those that result in solid waste, oil spills, industrial and agricultural effluent, chemical input, and similar factors. Considering (Bassem, 2020), Water pollution causes the quality of the water to decrease, which in turn affects marine life and the productivity of the marine environment, ultimately resulting in the extinction of species and the deterioration of their habitats. Contributing to the achievement of SDG 14 requires maintaining, restoring, and safeguarding the variety of our marine ecosystems and their critical functions. The "blue economy" aims to preserve and manage marine environments efficiently (Zaideen, 2022). This strategy is inextricably linked to the skill of preserving robust and healthy seas.

Thus, this study project seeks to provide a new viewpoint on Malaysia's ocean sustainability challenges. Based on the principles and targets of the United Nations' Sustainable Development Goal (SDG) 14 : Life Below Water, this study aims to provide an innovative method that addresses the Malaysian context's specific problems and opportunities. By offering an innovative strategy, the research intends to not only throw light on these concerns, but also to provide practical answers that can raise Malaysian knowledge and action, so helping to the protection and responsible use of marine resources in Malaysian waters.

2. Background Studies

2.1 Ocean Sustainability

The ocean covers 70 percent of Earth's surface and acts as a vast storehouse for both carbon dioxide and heat, amongst providing other ecosystem services vital to humanity. Whilst climate change imperils marine life, the ocean is increasingly recognized as providing opportunities for solutions in the fight against climate change. Maintaining the productivity and overall health of the ocean ecosystem over time is known as ocean sustainability. It entails directing human activity in a way that guarantees the resources of the ocean are used in a way that does not deplete them and permits them to naturally replenish. Reducing pollution, encouraging sustainable fishing methods, safeguarding marine biodiversity, and addressing the effects of climate change on the oceans are all important components of ocean sustainability. By placing a high priority on ocean sustainability, we can make sure that the resources and services the ocean offers will still be available to future generations.

The health of the oceans and the consequent provision of its services are under threat due to factors like pollution and other human-caused changes like climate change. The value of the oceans' ecosystem services and resources to all nations has been better understood in recent years thanks to study. Oceans and seas, however, have not historically been given priority in international fora or on national agendas. The transboundary nature of marine resources and human impact on oceans pose a major problem. Governments at the sub-regional, regional, and international levels must work together to address problems like marine pollution (IASS 2017).

The majority of how humans interact with the world is through a variety of little activities. For example, feeding fish, storing fish while they grow, and shielding them from predators are all necessary for aquaculture. The aquaculture business as a whole cannot be regarded as sustainable if one of these actions has consequences that are not reversible within a timeframe that is acceptable to society. The conservation of commercial stocks and the effective control of effects on non-commercial species and the larger marine environment are the two primary areas of sustainable use in the context of ocean sustainability. Agreeing to this, Hilborn *et al.* (2015) asserted that sustainable overexploitation is one of the three sustainability pillars that are included in the criteria for ocean sustainability.

3. Methodology

This qualitative study used survey questionnaire in gathering the data. The questionnaire is methodically designed to provide a comprehensive picture of the youth's understanding, views, and behaviors around ocean sustainability and climate change education. Each part of the questionnaire is aimed to cover a certain area of the research, such as demographic information, awareness, and the Sustainable Development Goals (SDGs). The survey was involved 200 voluntary participants across Selangor states in Malaysia. The outcomes are presented in the following section.

4. Data Collection

4.1 Demographic of the participants

Out of 200 participants, there are 40% of the respondents is Male and 60% is Female. In sum, most of the respondents graduated with from Master Degree (45% of the participants) and only 5% having Primary education background (Fig. 1).

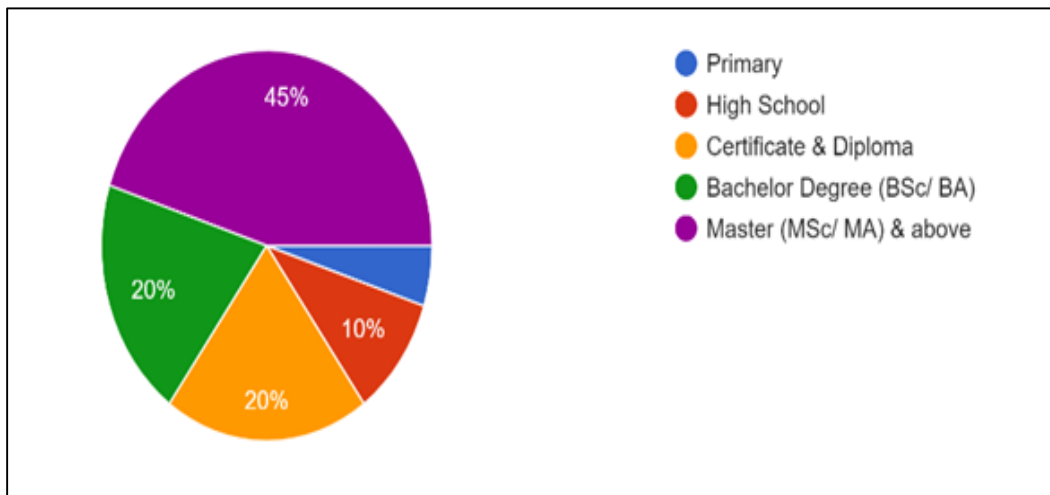


Fig. 1 Participant's education background

4.2 Awareness and Knowledge of Ocean Sustainability and Climate Change

In view of the current awareness level among the participants towards ocean sustainability and climate change, the survey revealed that most of the respondents have their own awareness. This support by the percentage of claimed that most of them was receiving education or information about ocean sustainability in the past (Fig. 2).

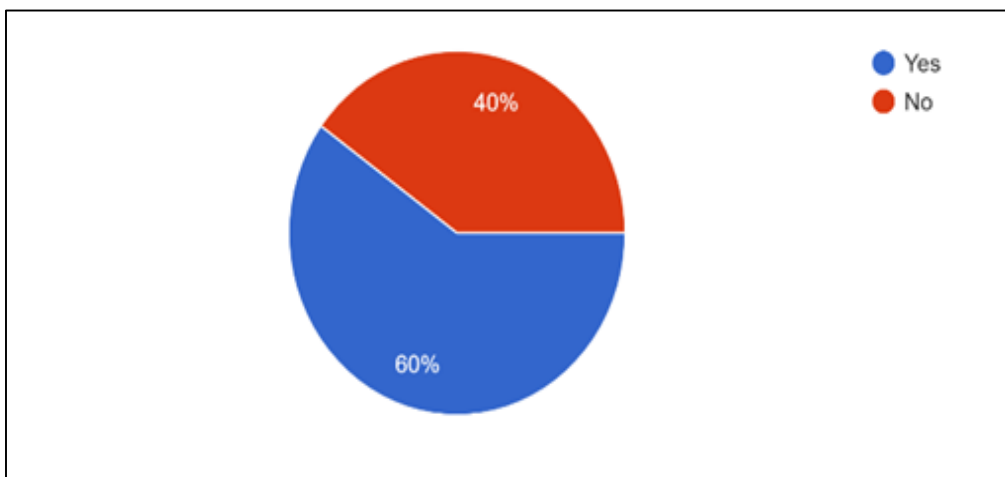


Fig. 2 The percentage of receiving education or information about ocean sustainability and climate change in past

Therefore, when answering the question on participation in any educational initiatives related to ocean sustainability and climate change such as workshop, events or short course, the survey was surprisingly revealed those participants of this study equally claimed Yes, No and Maybe (Fig. 3).

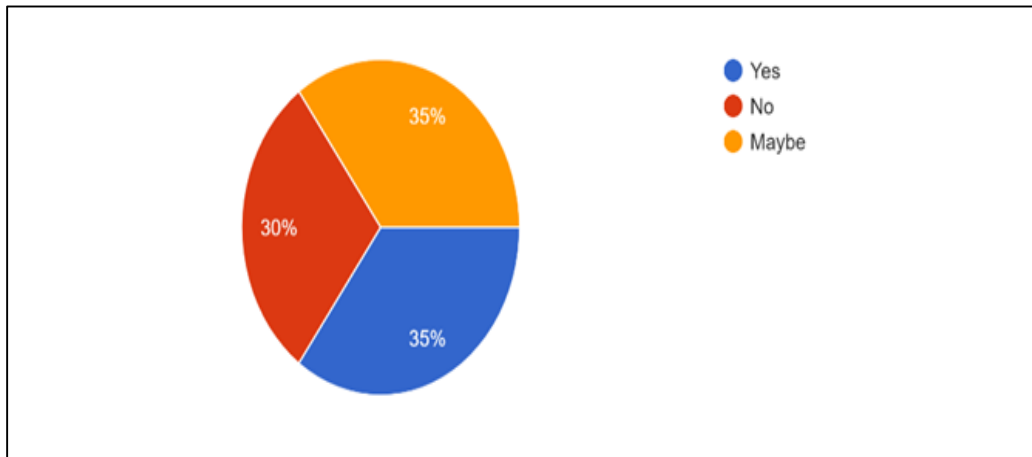


Fig. 3 Participation in any educational initiatives related to ocean sustainability and climate change

Indeed, according to the participants, just 45% of them occasionally contact with the media to learn about ocean sustainability and climate change. Additionally, 40% of those surveyed said they regularly used media. Furthermore, as Fig. 4 below illustrates, just 15% of them are not frequently involved.

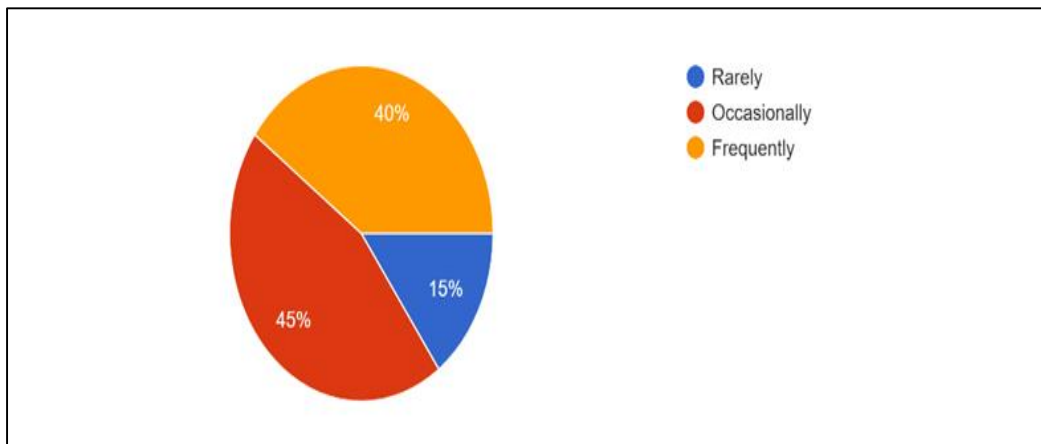


Fig. 4 Engagement with media for information related awareness to climate change and ocean sustainability

4.3 Perception and Attitudes towards SDG 14: Life Below Water

In regards of awareness towards United Nations Sustainable Development Goals, 45% of the respondents choose Yes and only 20% choose No (Fig. 5). Further, the respondents also claimed that SDG 14 (Life Below Water) is highly important to ocean sustainability and climate change (Fig. 6). This can be summarized as those participants are aware on the United Nations Sustainable Development Goals.

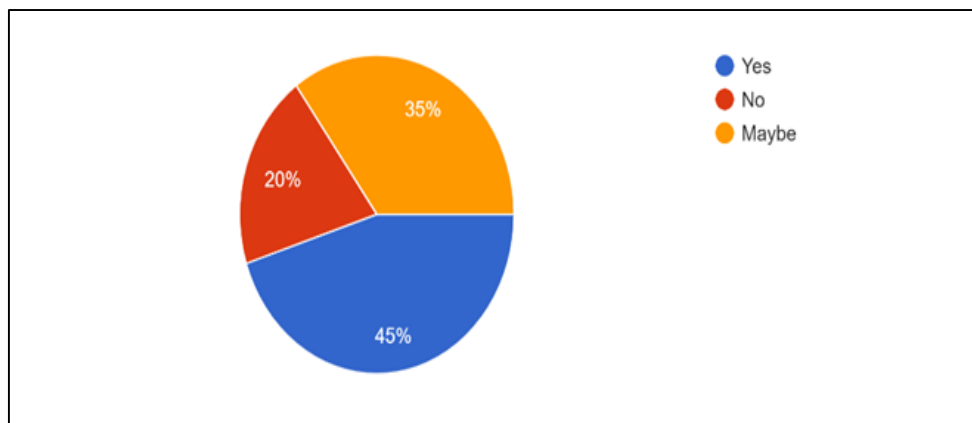


Fig. 5 Awareness of the United Nations Sustainable Development Goals (SDGs)

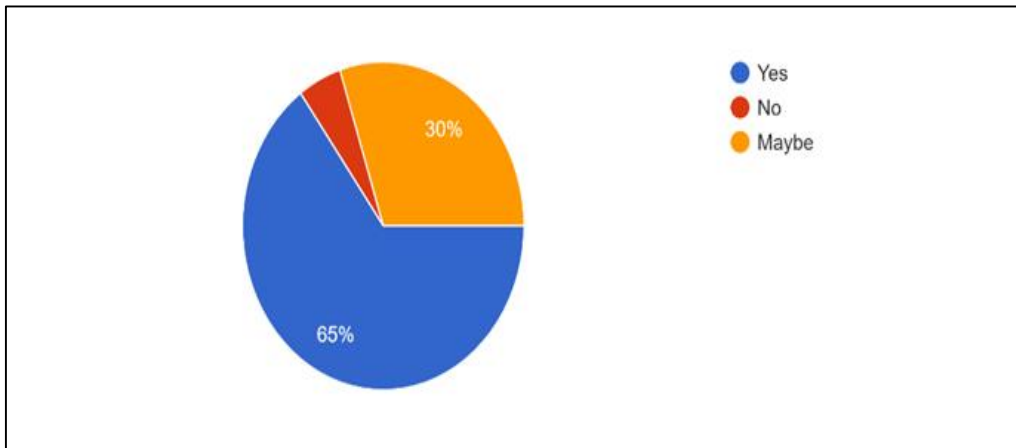


Fig. 6 The impact of SDG 14 (Life Below Water) to the context of ocean sustainability and climate change

Participants have also been enquiring about who is most in charge of organizing initiatives for ocean sustainability. The Figure 7 illustrates the perceived importance of various ocean sustainability initiatives, rated on a scale from "Not important at all" to "Extremely important". As per shown in Fig. 7, the majority of respondents to the study indicated that raising awareness about ocean sustainability requires a strong emphasis on community responsibility. Overall, "Extremely important" is the most frequently selected rating across all initiatives, indicating a strong consensus on the critical nature of these sustainability efforts.

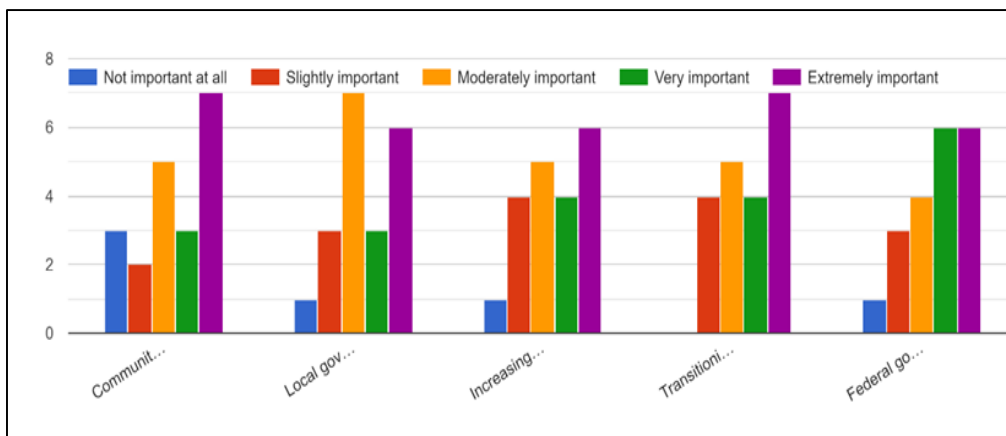


Fig. 7 Responsibility for leading ocean sustainability efforts

The survey correspondingly required the participants to choose an innovative way of medium or application which can increasing the level of awareness among youth towards ocean sustainability and climate change. Proposing a new medium of enhancing the level of awareness for youth about ocean sustainability and climate change, the participants highly preferred eco-friendly game (35%) and followed by digital storytelling (30%).

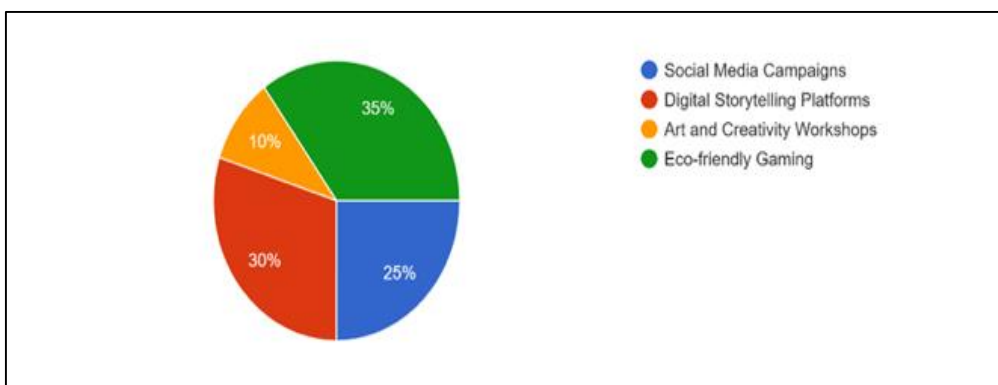


Fig. 8 What new mediums of awareness for youth about climate change and ocean sustainability.

5. The Design Process

5.1 The Pre-production

The primary goal of this research solutions prototype was to foster a shift in youth behaviors by harnessing the emotion experienced both in the video and in the game apps. The explainer video utilizes graphics to introduce the issue of marine litter, while eco-friendly gaming is utilized to convey information about the most common species in the sea. The design process for a prototype project is shown in the Fig. 9 below.

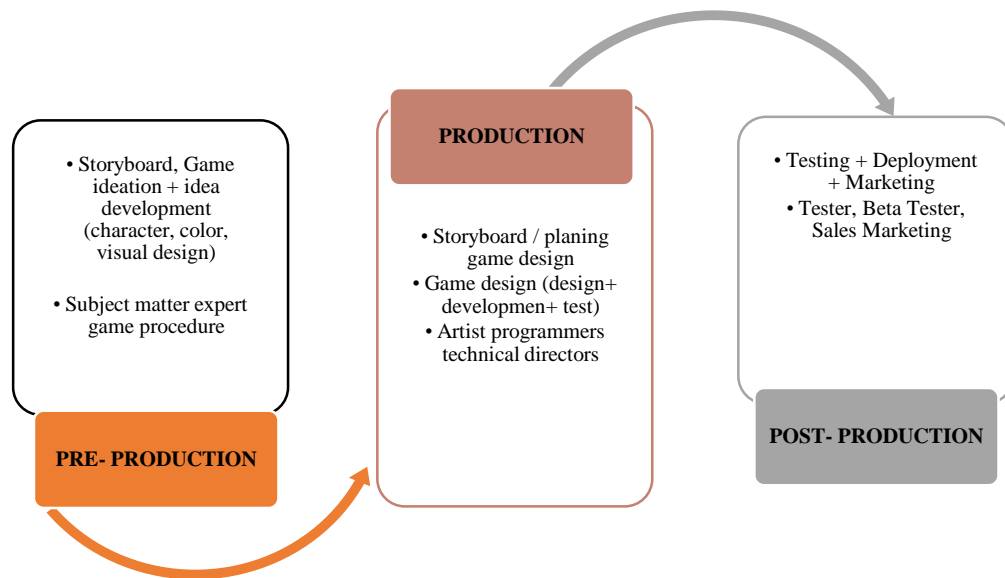


Fig. 9 The design process for a gaming project

5.2 The Production - Ideation Development of Eco-friendly Gaming

Creating the main character and game environment was the first step in the concept creation process. It includes the character's personality (Marine Biologist/Conservationist), which need to exhibit a strong feeling of duty and dedication, as well as a strong sense of enthusiasm, resolve, and empathy for marine species and ecosystems (Fig 10).



Fig. 10 Main character of strong personality empathy towards marine life and ecosystems.

The Main Character, who is the player-controlled character, is the inspiration behind the story and gameplay elements of the game. In order to solve environmental issues, it organises study trips, puts conservation plans into action, and interacts with other characters. Additionally, a local community living close to the marine ecology is represented by a supporting character in the game. This figure gives dimension to the plot by either opposing the protagonist's endeavours or providing resources and support. The themes of empathy, resiliency, and group action in the face of environmental concerns are embodied by the characters through their individual experiences and connections. Their development and evolution throughout the game serve as a powerful reminder of the transformational potential of community involvement and environmental advocacy.



Fig. 11 *The expedition's response to environmental difficulties*

The colour scheme is inspired by the ocean's grandeur, with blue tones suggesting the ocean's depth and openness. The delicate use of complementary colours like green, turquoise, and aquamarine brings life to the scene while capturing the complex beauty of seagrass meadows, coral reefs, and other underwater environments. Warm colours like gold, orange, and yellow are skilfully used to mimic the soft dance of sunlight passing through the water's surface, giving the marine environment a feeling of life and warmth. Vibrant colour accents break up the landscape, emphasising underwater vegetation, coral formations, and marine life to give the game world more depth and visual appeal. This tasteful combination of hues not only appeals to the senses but also emphasises how crucial it is to protect these amazing ecosystems for future generations.



Fig. 12 Selection of colors is paramount to immerse players in the captivating underwater world

To ensure that gamers can empathise strongly with the ocean's beauty and awe, the art style has been carefully developed to strike a balance. A sense of realism and immersion are enhanced by the thorough rendering of lifelike and detailed representations of marine animals, including fish, mammals, crabs, and corals, employing top-notch textures, animations, and models. With wonderful underwater landscapes like coral reefs, kelp forests, seagrass meadows, and deep-sea trenches brimming with biodiversity and life in colourful visuals, the game's surroundings are similarly rich and diversified. The game world has a sense of energy and realism because environmental features like dynamic lighting, weather effects, and underwater currents are seamlessly interwoven to mimic the ever-changing nature of marine ecosystems.

This proposed prototype game is a simple and interesting way to teach young people about the significant issue of marine trash and the harm it does to marine life as well as humans. With a duration of one to three minutes, the video uses simple language to convey difficult ideas. By using eye-catching virtual designs (Fig 13), the video ensures maximum engagement by grabbing viewers' attention right away. The content is carefully selected to enable the quick transfer of important knowledge in the limited amount of time through carefully created words, animations, and visuals. The movie emphasises how urgent it is to solve the issue of marine litter in the modern era by showing used plastic bags as the main source of marine litter. It is an effective instrument for bringing attention to issues and motivating young people to act because of its clear presentation and focus on strong images.



Fig. 13 Scene appealing virtual designs of marine litter and its consequences on both human and marine life.

The game is also intended to teach players about their critical role in protecting the planet's fragile ecosystems and to foster sustainable behaviour. Furthermore, users can increase their understanding of Malaysian Sea species by deliberately placing educational content throughout the game. These insights explore several facets of related risks. Youth are empowered to take on the role of stewards for marine ecosystems through immersive gameplay experiences provided by the game material, advocating for a healthier and more sustainable earth for future generations.

Furthermore, the game gives players a vital task to perform: gathering and handling waste contaminants. This task gives players a virtual understanding of the difficulties marine animals suffers due to pollution. Through coin collection and active pollution prevention, players earn "healthy points" as they go through the game and protect the marine environment from pollution. In order to highlight the negative effects of trash, the character temporarily loses swimming speed when they come across waste, and consuming too much trash in the game results in the loss of a life.

Moreover, the game's leader board combines "healthy" and "unhealthy" scores, and the total score is derived from the algebraic sum of the points that are accrued during gameplay. Understanding that players would rather focus on gameplay than learning material, the game purposefully includes factual information at the conclusion of each level. By offering relevant information about environmental stewardship and marine conservation, these facts help the gamer expand their knowledge base. This game enables players to actively participate in learning about the issues affecting our seas and the significance of sustainable practices by deftly fusing entertaining gameplay with insightful educational content.



Fig. 13 Scene places players in the role using an avatar, swims of scientists collecting and managing waste pollutants & various aspects of associated dangers.

This prototype game incorporates critical information about conservation facts and issues using mini-games and educational pop-ups to improve player engagement and learning. As a complete resource for comprehending the principles of ocean sustainability, players can track their progress through a virtual research logbook, receive achievements, and unlock rewards. With the help of multiplayer capabilities, users may collaborate, promote teamwork, and take part in community-driven conservation projects as well as worldwide challenges.

Conclusion

This study presents a research project focused on enhancing Malaysian youth awareness of ocean sustainability and climate change education. The study aims to address the pressing issue of ocean sustainability in Malaysia by examining the awareness and behaviors of teenagers aged 18 to 25 in Selangor state. The research is driven by the need to protect marine biodiversity and ecosystems from human activities such as pollution, which is a threat to the health of the global ocean and human population. The study aligns with the United Nations' Sustainable Development Goal 14 (Life Below Water), which calls for sustainable use of marine resources and the protection of marine and coastal ecosystems.

The findings conclude with recommendations for ongoing updates to the gaming prototype, partnerships with educational institutions, and the exploration of emerging technologies to enhance the youth awareness. Community engagement is emphasized as crucial for fostering collective action to address global challenges and participate in conservation initiatives. In summary, the propose games prototype is an innovative approach to promoting ocean sustainability through eco-friendly gaming, aiming to inspire environmental activism and empower individuals to protect the oceans for future generations.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** A. and N.K.; **data collection:** A. and N.K.; **analysis and interpretation of results:** A. and N.K.; **draft manuscript preparation:** A. and N.K. All authors reviewed the results and approved the final version of the manuscript.

References

- Fleming L. E., Maycock, B., White, M. P., & Depledge, M. H. (2019). Fostering human health through ocean sustainability in the 21st century. *People Nat.* 2019;1:276–283. <https://doi.org/10.1002/pan3.10038>
- Fleming, L. E., Depledge, M., McDonough, N., White, M., Pahl, S., Austen, M., & Stegeman, J. J. (2015). The Oceans and Human Health. *The Oxford Encyclopedia of Environmental Science, Environment and Human Health*. Oxford University Press: Retrieved from: <http://environmentalscience.oxfordjournals.org/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-12>
- Cormier, R., & Elliott, M. (2017). SMART Marine Goals, Targets and Management—Is SDG 14 Operational or Aspirational, is “Life below Water” Sinking or Swimming? *Marine Pollution Bulletin*, 123, 28-33. <https://doi.org/10.1016/j.marpolbul.2017.07.060>
- Claudet *et al.* (2020). *One Earth* 2, 380–384 (2020, April 24) The Author(s). Published by Elsevier Inc.
- Zaideen, I. M., & Ramli, M. F. (2022). Sustainable Blue Economy. Retrieved from: <https://www.thesundaily.my/home/sustainable-blue-economy-LC8859782>
- Bassem, S. M. (2020). Water pollution and aquatic biodiversity. *Biodiversity International Journal*, 4(1), 10-16.
- IASS (2017). Achieving the Sustainable Development Goal for the Oceans. IASS Policy Brief 1/2017. Institute for Advanced Sustainability Studies (IASS). http://www.iddri.org/Publications/Rapports-and-briefingpapers/IASS%20IDDRI%20TMG_SDG%2014%20oceans.pdf.
- Hilborn, R., Fulton, E. A., Green, B. S., Hartmann, K., Tracey, S. R., & Watson, R. A. (2015). When is a fishery sustainable? *Canadian Journal of Fisheries and Aquatic Sciences*, 72 (9), 1433–1441.