Empowering the Next Generation:

Engaging Thai Youth in Environmental Issues

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Abstract

In recent years, the aggressive progression of climate change has caught the attention and concern of the public worldwide. Thailand Environment Institute (TEI) sought assistance from a team of Chulalongkorn University and Worcester Polytechnic Institute students to develop a strategy for youth engagement and address the effectiveness of their current efforts. TEI's social media pages were not gaining adequate traction, and their workshop approach could be improved to better engage students. To address this, the most effective engagement methods were determined by surveying students and interviewing teachers to understand how students are engaged. Lower secondary students and upper secondary students from 7 schools were visited around Bangkok Metropolitan region, Thailand to distribute surveys and hold teacher interviews. The effectiveness of TEI's current social media approach was determined by analyzing the engagement numbers on their profiles. The effectiveness of TEI's current workshop approach was determined by hosting two, using an outline provided by them. Pre- and post-surveys were distributed to gain student insight, and observations were made to gauge engagement throughout the events. It was found that the most effective engagement methods were posting on TEI's platforms, such as Facebook, Twitter and Youtube that host short videos, creating hands-on activities for youth, and bringing them outdoors to connect with their environment. Thailand Environment Institute sponsored this research and are encouraged to implement our recommendations in order to engage youth in environmental issues, and ultimately motivate them to make a change.

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Executive Summary

In recent years, the aggressive progression of climate change has caught the attention and concern of the public worldwide. Due to climate change affecting all aspects of life broadly, and having a lasting impact, much of the responsibility to advocate for environmental issues falls upon youth. Youth are the future leaders of our world and can make positive changes for their future.

Following the rising frequency and increased documentation of climate protests and activism, TEI sees the importance of increasing the involvement of today's youth in environmental movements. Efforts have been placed on encouraging Thai youth to participate in discussions about environmental issues by creating leadership conferences and implementing education-based programs in schools. Because of the youth's role in the future of environmentalism, it's important that environmental agencies in Thailand put in effort to connect to the younger generations. Thailand Environment Institute (TEI) is seeking assistance to develop a strategy for youth engagement.

The goal of the project was to identify methods that Thailand Environment Institute can utilize to effectively communicate and engage with Thai youth on environmental issues. We will achieve this goal by completing three objectives: Determine the most effective methods to engage youth, determine the effectiveness of TEI's current social media approach and outreach, and determine the effectiveness of TEI's current workshop approach.

In order to identify methods that TEI can use to engage youth, our team first gathered information from Thai students and teachers. We surveyed students to gain knowledge on what engages them along with their current understanding of environmental issues. We also interviewed teachers to gain their perspective on engaging youth and other efficient delivery methods for teaching environmental issues. These methods allowed us to uncover the most effective methods to engage youth.

We then had to determine the effectiveness of TEI's current social media. This included looking into the platforms our sponsor utilizes. TEI has active accounts on Facebook, Twitter, and YouTube. Our team analyzed the following counts and engagement of each social media profile. Insight statistics found on each media post were then compared to the following count on the media profile. Comparing engagement rates and follower count is an indicator of interest (Warren, 2021). Assessing gaps between account engagement and the follower account indicated the sustained attention by TEI's audience. Investigating the traction that each profile received allowed our team to determine the effectiveness of their current social media approach.

Our team then hosted two workshops using an outline provided by the organization to determine their effectiveness. To do this, we provided pre- and post-surveys to attendees, gauging their interest and engagement throughout the workshop. We also made observations on engagement levels of the students during the workshop. With this data, we were able to analyze the content and structure, and ultimately determine the overall effectiveness of the current workshop approach.

Ultimately, through this project we used our findings to assist TEI in boosting engagement in their environmental programs for youth. Our findings dictate that 7-9th grade students enjoy hands-on activities and show interest in environmentalism, but lack opportunities to take action. We recommended TEI establish a strong relationship with teachers and provide opportunities for students to learn about the environment and experience the natural world. In addition, we advised TEI to broaden its reach by advertising events and information on social media platforms that are popular with its target audience. With these steps, our team feels this will assist TEI and similar organizations with reaching and engaging youth in environmental issues.

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Appendix E	All	All
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1.0 Introduction

In recent years, the aggressive progression of climate change has caught the attention and concern of the public worldwide. Climate change includes various environmental issues including rising sea levels, heat waves, plastic pollution, and air pollution. Despite increasing evidence of the effects of climate change, the general public does not prioritize environmental issues (Novacek, 2008). Citizens can use their voices to bring about change and may elect political leaders who can pass legislation to improve these problems (University of Nevada, 2022). Youth, individuals who are 10 to 19 years old, as a unique stage of human development (World Health Organization, 2022) which specifically have the power to push for change, and have their own future to fight for (World Health Organization, 2019). The outcomes of youth involvement in environmental concerns vary considerably around the world. Some nations, such as Sweden, have well-established programs for youth to become involved in environmental activism (Heidenblad, 2021). Programs promote individuality and amplify young voices, allowing young icons of environmentalism to emerge, such as Greta Thunberg. Conversely, many other countries including Thailand struggle to gain any amount of youth involvement for reasons including lack of relevant education, funding, and politics (Prendergast et al., 2021). It is important to address these obstructions and encourage more youth involvement.

The Thailand Environment Institute (TEI) is a non-profit, non-governmental organization that serves as a resource for environmentalism in Thailand (Appendix A). They are seeking to connect with today's youth to provoke interest in environmental issues. TEI recognizes the importance of youth engagement in these important global issues. However, due to the lack of research on effective youth mobilization methods, TEI has not yet found the right approach to engage them. They have expressed their desires to engage youth in environmental issues and have asked for our help in doing so.

The aim of this project was to identify strategies that TEI could utilize to engage youth in environmental issues. To achieve this, our objectives were to determine the most effective methods to engage youth, determine the effectiveness of TEI's current social media approach and TEI's current workshop content and structure. The team has identified strategies that can be utilized to engage youth globally, and mobilize Thailand's youth. By researching youth interest in environmentalism and the impact youth can create, the team has helped TEI and potentially other organizations to increase the impact youth can have on a larger scale.

In a study commissioned by UNICEF and UNESCO, participating Thai youth in the Greater Mekong region indicate that they are not well informed and do not have adequate knowledge on green industries. (UNESCO & UNICEF, 2021). This may be partly due to inadequate attention on environmental issues in Thai education (UNESCO & UNICEF, 2021). Research shows that while the Thai school curriculum (Basic Education Core Curriculum, 2008) does cover these problems, the scientific aspects of climate change are only covered in the later stages of secondary education, grades 9 and 10 through 12 (Katerenchuk et al., 2008). The environmental topics are in the curriculum beginning in grade one, but they are covered under the lens of geography. Biology, chemistry, and social studies teachers who participated in interviews state that the subject of climate change and resource management is rarely covered in depth, focusing on the science behind these issues rather than discussing solutions to them (Personal Interview, 2 Feb. 2023). Because of this, youth have minimal basis for environmental engagement. (Chankrajang, & Muttarak, 2017). Incorporating environmental issues into the curriculum is vital because classrooms are communal learning environments and where learning happens which allows teachers to connect what students are being studied in classrooms to the outside environment (Kowasch et al., 2021).

It is a shared responsibility between all ages to protect and conserve the world's ecosystem as the world's hope rests on the preventative actions of all generations (UNESCO,

2022). Studies have shown that youth have a measurable influence when they become involved. They have a future to fight for and address environmental issues with drive, which motivates the older generations to view them as potential change makers (Hartley, 2021). Globally, youth have the power to influence environmental change, making it necessary to provide them with the resources to do so. Our background research was an important step in understanding how youth are engaged.

2.0 Background

This chapter will present research on environmental issues, the importance of nature connectedness, and the importance of youth activism to establish a fundamental understanding of the problem. In addition, this chapter will describe our investigations of the use of popular social media platforms among youth in Thailand, effective teaching methods, and effective forms of youth engagement. This portion of our research has aided our team in determining the most effective way of engaging youth in environmental issues.

2.1 Environmental Issues in Thailand

Climate change, plastic pollution, and air pollution are TEI's current and global concerns (Thailand Environment Institute, 2021). These issues are crucial to address as soon as possible. For example, the incineration of plastic is a significant source of air pollution which results in the increase of climate change effects (WWF-Australia, 2021). Addressing these issues is valuable for understanding the tangible issues that Thai youth face.

2.1.1 Climate Change

Climate change refers to long-term shifts in temperatures and weather patterns. Though this process can be natural, human activities have ultimately accelerated the shifts (United Nations, n.d.). More frequent and intense droughts, storms, heat waves, rising sea levels, melting glaciers, and warming oceans resulting from climate change can directly harm animals, destroy the places they live, and wreak havoc on people's livelihoods and communities. As climate change worsens, dangerous weather events become more frequent or severe, such as heat waves, wildfires, coastal storms, and flooding (World Wildlife, n.d.). To effectively address the climate problem, carbon and methane emissions must be reduced as promptly as possible in order to reduce the effects of global warming. Carbon and methane can enter the atmosphere due to the emissions from driving a car, heating a building, clearing land, burning garbage and more (United Nations, n.d.). Ultimately, climate change has or will have

detrimental effects on every inhabitant of Earth.

2.1.2 Plastic Pollution

Unattended garbage can commonly be found in Thailand, in the city, mountains, beaches and oceans. According to the World Bank Group, despite Thailand's high waste collection and 88.8% recycling rate, poorly managed plastic waste amounts to 428 kilotons per year (2022). This is often due to uncollected garbage and numerous unhygienic disposal sites. The effects of plastic pollution can lead to several environmental problems, including soil, water, and air pollution. These can cause health issues such as damage to the heart, nervous system, and reproductive system, and potential cancers. Moreover, plastic has a low decomposition rate leaving plastic waste today to remain on the earth for up to 1,000 years (Daltry et al., 2021). Waste management must be addressed in order to begin solving plastic pollution. It affects the inhabitants of Thailand, as well as the entire globe.

2.1.3 Air Pollution

The leading environmental threat in Thailand is the PM 2.5 air pollution. This is described as particulate matter smaller than 2.5 micrometers, which cannot be seen with the naked eye (J., 2020). Masks are widely used throughout Thailand to combat the consequences of the air pollution. The fine particles can inflict adverse effects on many people, including extreme respiratory problems and heart and lung diseases (Rutnin-Gimbel, n.d.). Awareness of these problems is essential in sustaining the health and well-being of the population. Moreover, environmental experts point to the fact that PM 2.5 particles contribute to global warming in the long run (J., 2020). The severity of air pollution in Thailand poses immediate effects on its inhabitants and long-term advances in global warming. Engaging and motivating youth to engage in addressing these environmental issues is vital.

2.2 Connection to Nature and Environmental Loss

Because there are environmental issues that have different levels of severity in various parts of Thailand, it is important to understand how a student's location can impact them. Specifically, students that live in or attend schools in cities may not see obvious signs of environmental issues. Research shows that being exposed to and connecting with nature is vital to children. Outdoor learning environments (OLEs) stimulate the diversity in child play and contribute to healthy mental and physical development (Natural Start, n.d.). Children today spend a lot of time on social media and technology; often spending most of their day watching TV or playing games on tablets, rather than playing outside (Natural Start, n.d.). Richard Louv coined this "nature-deficit disorder," in which children are missing out on the crucial developmental effects that being in nature provides (Staff, 2006). There are many great outcomes to OLEs; they enhance cognitive abilities, improve academic performance and social relations, and they reduce stress (Natural Start, n.d.). Therefore, it is crucial for youth to be exposed to nature often, especially when learning.

Those who are connected to nature are more apt to practice environmentally friendly behaviors. In a youth survey conducted in 2018, a relationship between nature connectedness and environmental friendliness was discovered. Youths who spent more time outside also did things such as filling bird feeders or joining nature clubs (Chawla, 2020). Some of the study participants also included that they performed more nature-conservation behaviors including recycling and energy saving. The research concluded that an increase in connectedness with nature will increase likelihood that an individual will be more engaged and active in protecting the environment. This finding may explain the cause of the lack of environmentalism among people who live in large cities (Chawla, 2020). Students who live in cities don't have as much of an opportunity to interact with the environment, and they consequently become more disconnected with nature (Jones & Gleason, 2019).

2.2.1 Importance of City Dwellers Connecting with Nature

Because there is little access to nature, or the need to travel far to access it, there is a lack of nature connectedness among people who live in cities. University of Washington researcher Peter Kahn noted that "kids in large cities are growing up having never seen the stars" (UW News, 2016). As previously mentioned, it is essential for child development to be exposed to nature regularly, especially while learning. Connecting with nature is more difficult for children who live in cities (UW News, 2016).

Connecting with nature is also vital for understanding and coming up with solutions for environmental degradation and loss. Most city dwellers do not have a sense of urgency to solve environmental problems because they cannot see the effects or the magnitude of them (UW News, 2016). Although, some cities such as Bangkok, Thailand may be exposed to air pollution and trash-filled streets, which may open their eyes to global issues. Albeit due to the lack of nature connectedness, they may not have the same eco-anxiety, or fear that environmental issues will bring irreversible destruction, as rural citizens. Khan discusses the disconnect between cities and the natural world and how it has created "environmental generational amnesia." This is the phenomenon where different generations have different ideas about what is normal with regard to things like plastic waste and air pollution based on their individual childhood experiences (UW News, 2016). Due in part to this, the disconnect between nature and cities is prominent. It is vital for city dwellers to be provided with opportunities to connect with nature, not only for themselves, but for the environment too.

2.3 Importance of Youth Environmental Leadership

Youth can play an essential role in sparking change regarding environmental problems. They see the impacts of today's problems and will eventually bear the consequences. This is a common motivator for youth to advocate for change. (Rabin J., 2019). However, some young people in the Greater Mekong Region agreed that there are few opportunities to participate in

government policy-making processes, including environmental policies. In addition, schools, universities, and the government have given only a small amount of extracurricular support through training, events, and campaigns (UNESCO & UNICEF, 2021). The role of youth in policymaking is not a new concept. Some governments, such as countries in Central and Eastern Europe have departments with “youth affairs” in order to actively give youth the opportunity to have a voice in their future (*Youth & the environment*). A potential obstacle with this approach is outside influence, as youth could be in danger of being under the control of public figures aimed at gaining political leverage. This is important so they can provide honest opinions while still meeting the conditions set by law (Khmer Times, 2022). The Secretary of State for the Environment Ministry in Cambodia, Neth Pheaktra, encouraged youth to participate in environmental protection starting at the individual level. Youth can participate in environmental protection in a variety of other ways as well. They have the power to start small with grass-roots activism, as well as the power to make policy changes (UN, 2022). Though, this requires collaboration between youth and older generations.

It is necessary to promote awareness, a sense of personal responsibility, and environmental leadership among today’s youth; as they constitute about 16% of the world’s population (UNESCO, n.d.). The United Nations suggest that young people should be encouraged to "engage in new forms of action and activism that will generate effective responses to ecological challenges" (United Nations, 2004). Engaged youth could make their hometowns, schools, or youth organizations more environmentally friendly. Performing volunteer work with environmental organizations can help raise awareness on environmental impact and the ways in which it will affect future generations (Simpson, 2019). There are opportunities for youth to volunteer and partake in school initiatives that emphasize environmental preservation, like rubbish collection and tree planting. Providing young people with safe ways to engage with environmental policy through volunteering, campaigns, and

leadership events will allow them to participate in environmentalism (UNESCO & UNICEF, 2021). The collaboration between youth and foundations has the potential to be extremely effective, which is why it is so important that TEI and similar organizations reach youth, and ultimately motivate them to advocate for change.

2.4 Attempts at Engaging Thai Youth in Environmental Activism

Many organizations such as Thailand Environment Institute (TEI), the United Nations Development Program, the Environmental Education Centre (EEC), and SAFETist Farm have taken steps to involve youth in environmental activism. TEI's "Youth in Charge" program was founded in 2021 and focused on raising awareness about climate change, plastic consumption, and other related issues (2017d). Their goal is to share knowledge and experiences with youth about environmental issues. By analyzing attempts at youth engagement, patterns of success can be determined.

The United Nations Development Program created the Sustainable Development Goals in 2015 “to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity” (UNDP, n.d.). The "Youth for SDG" conference in 2018, was attended by over 250 students from various schools and universities. It aimed to help students become aware of the Sustainable Development Goals, create networks, increase problem-solving skills, and help them feel like their voice has an impact (UN, n.d.). The program focused on environmental issues such as managing plastic waste, a circular economy's advantages, and the impacts of climate change. Today, “Youths for SDGs” utilizes social media to promote and advertise their program and in turn has a high attendance at their events. The turnout of the conference also proved that uniting youth provides a comfortable environment to brainstorm solutions. The Sustainable Development Goals program has successfully engaged youth by allowing them to interact with their peers.

EEC Thailand is an organization that aims to educate Thai youth about the environment through camps, outdoor activities, and school programming (EEC Thailand, 2020a). Their academic model emphasizes the value of preservation and sustainability of natural resources under the SDG model. Students attend field trips that feature trips to the rainforest to learn about biodiversity in their local area with academic instruction to connect the natural world with a solid foundation in academics. EEC Thailand is directly affiliated with Thai teachers and instructors that specialize in environmental education and engaging youth in environmental issues (EEC Thailand, 2020b). Collaborating with teachers provides valuable insight on engagement methods for youth.

SAFETist Farms is an organization that revitalized a portion of the Thung Khru district into a farm that hosts events and programs. Their goal is to raise awareness among Thai communities of the concept of sustainable farming and environmental stability (SAFETist Farms, n.d.). Their programs are rooted in an understanding of the green economic model and the importance of connecting communities with nature. Students are offered tours of the farmland, farm training events or to learn about sustainable food sources and farming practices (Green Network, 2020). Certain training programs are also held for free, which eliminates the monetary barrier that many Thai youth face. The success of this program can be attributed to its mission and the accessible programming that these organizations provide as examples of successful youth engagement in which TEI may want to consider. Perhaps, another venue for engaging youth is through social media. We will describe this in the next section.

2.5 Media Consumption

It is necessary to understand the media platforms and content that youth consume in order to understand the way in which they are engaged. A Thai youth and Global Warming study that took place from early 2008 to mid-2009 in various parts of Thailand found that most Thai youth do not watch television programs or news channels to learn about global warming.

It also concluded that youth receive minimal exposure to global warming through government agencies. Instead, they rely on media provided to them in formats that interest them (Chokriensukchai & Tamang, 2010). TEI presents their information through news publications and journals (TEI, 2017). Circulating information this way ensures that reliable information is distributed but will not lead to lasting engagement with youth. Chokriensukchai and Tamang suggest that Thai youth want pop-culture icons to be spokespersons to address global warming (2010). This is likely due to celebrity figures being recognizable, allowing their presence to be associated with a topic and raising awareness as a result (Gladwell, 2000). The team's analysis of social media usage among youth will provide necessary insight on how to engage youth through it for TEI.

2.5.1 Social Media

Social media is one of the best ways to reach a broad youth audience. In January 2022, there were 56.85 million social media users in Thailand: 81.2 percent of the country's population (Kemp, 2022). In a study done on Thai youth aged 15 through 18, participants expressed that they learn about environmental degradation and climate change through social media sites like Facebook, YouTube, Twitter, and TikTok. They asserted that social media is a location where they can start or join a movement in addition to speaking out about the issues (UNESCO & UNICEF, 2021). Currently, TEI has a small online presence with their website, YouTube, Twitter, and Facebook accounts. Utilizing platforms and posting content that appeals to youth will boost engagement. TEI's current social media platforms feature lengthy informational videos that don't consider the short attention span of today's youth. To successfully reach youth through social media, the youth dominated platforms need to be taken advantage of. The team has focused on platforms that have the largest youth presence.

2.5.1.1 Facebook, Twitter and YouTube

Facebook is the most used social media platform in Thailand, with 50.05 million users

(Kemp, 2022). Furthermore, reports have shown that Facebook is the social media platform that ranked highest for consuming news, which is beneficial for organizations like TEI. However, Facebook has shown to be most popular with Gen Y and Gen X, which is not TEI's target audience. Furthermore, Facebook is projected to have peaked in 2020 and will lose active members in the upcoming years (Statista, 2020). An online presence on Facebook is valuable due to its large user base, and its format for informative news, though it does not reach youth at a high rate.

YouTube continues to gain members every day and is not expected to lose numbers (Statista, 2020). It is actively used by 42.8 million people in Thailand (Kemp, 2022). In Thailand, the average person spends 2.3 hours on YouTube on a weekday and 2.9 hours on the weekend (Areepermporn, 2018). Currently, TEI has a YouTube channel they regularly post on, but the videos are lengthy and do not have traditionally appealing features for young people. The platform hosts a feature called YouTube Shorts that allows creators to make short videos; much like Tik Tok. YouTube is a platform that can provide a lot of information in entertaining, digestible ways; and if used effectively, could bring awareness to a large group of people.

2.5.1.2 TikTok and Instagram

Instagram and TikTok have been consistently gaining users and are forecasted to continue climbing (Statista, 2020). In addition, these platforms are more popular with youth, TikTok being especially popular with Gen Z. TikTok provides the trend-setting feature to produce short, digestible videos. TikTok also supports a feature known as the *For You Page*, which recommends tailored videos to those who have an interest in specific type of content, such as environmentalism, but can also be randomly shown to people who do not typically interact with that type of content. These features have become increasingly popular and appeal to youth (Y. Zhao, 2020). TikTok is relatively new compared to other social media platforms, being released in late 2016. Because of the widespread success of TikTok, many other

platforms began replicating their style of videos (Y. Zhao, 2020). As mentioned earlier, YouTube Shorts and Instagram Reels are very similar to TikTok videos. Instagram also hosts features such as Instagram Stories, which allow posts to be visible for up to 24 hours, and Instagram Live, which is a live streaming function for sharing event information and direct audience interaction. Assisting TEI in utilizing these features will allow them to reuse content on all their social media platforms. This will save time and resources and will reach as broad an audience as possible.

2.6 Inclusion of Environmental Issues in School Curricula

Environmental awareness must be included in elementary-level school curricula in order to interest students at a young age. The current Thai school curriculum does not outline environmental science in their listed school curriculum (Katerenchuk, W. et al., 2008). As a result, these students may not be aware of the effects of global warming and will not create habits to alleviate the problem (Kanchana & Ritendra, 2010). Results of the study by Kanchana and Ritendra (2010) also suggest that individuals that are exposed to the issues frequently are more apt to make everyday efforts to help the environment.

2.6.1 Environmental Issues in Thai School Curricula

Education is a crucial tool for increasing awareness of environmental problems among youth (Kowasch et al., 2021). While environmental issues are present in Thailand's school curriculum, they are not incorporated and elaborated on as much as teachers recommend they are (Personal Interview, 2 Feb. 2023). Participation in school activities can reveal one's creative side and foster the growth of original ideas that may allow them to come up with innovative environmental solutions, as well as providing memorable experiences and catalyzing long-term interest. Students should be exposed to learning about the environment in a traditional classroom and in nature for this personal development to take place (Yeşilyurt et al., 2020). Although this is important, The current Thai curriculum still lacks the necessary content within

the 7 through 9th grade curriculum to have an impact on youth's knowledge, attitudes, and behaviors towards environmental issues (Katerenchuk, W. et al., 2008). Our review of the Thai school curricula as well as interviews with teachers suggest that students are not exposed to enough environmental issues in school (Personal Interview, 2 Feb. 2023).

In the Thailand school curriculum, topics such as sustainable natural resources and how consumers can utilize them are briefly covered from grades 1 through 6 (Katerenchuk, W., 2008). From grades 7 through 9, or lower-secondary education, students are taught more about the environment as it relates to geography, such as how to prevent natural disasters and relationships between geographical landmarks on a map. During grades 10 through 12, students learn about human interactions in nature and the corresponding human geographical patterns. While these topics are centered around the environment and human involvement with environmental subjects, research conducted with students and teachers shows that they do not believe it is sufficient (UNESCO, 2022). Incorporating more about the social aspects of environmental concerns provide students theoretical and foundational knowledge that can help them to understand environmental issues and push for change (Chankrajang, T., & Muttarak, R., 2017).

Environmental issues are inadequately covered in the curriculum, but there are active movements that seek to improve it. The Government of Thailand has been implementing Thailand 4.0, a value-based economic model driven by innovation, creativity, and technology that focuses on social and environmental sustainability. The goal of this model is to inspire innovation within educational systems as well as restructuring economic programs to benefit the local economy in a way that aligns with the SDG plan (UNESCO, 2022). Governmental action on this issue is influential in making lasting change. Exposure to environmental issues in academics is vital to create future activists.

2.7 Summary

This background chapter reviewed the necessary research to properly engage Thai youth in environmental issues, and ultimately motivate them to make change. By addressing the environmental issues that Thailand is currently facing, we can understand the concerns youth may already be aware of. It also highlights the importance of Thai youth becoming involved in environmental protection. Youth need to be given the opportunities to volunteer, join initiative groups, and even help make policy adjustments. Additionally, it is vital that youth have chances to learn in outdoor environments and form a connection with nature. This connection can help boost motivation to create change because there is a relationship between human and nature.

Analyzing attempts at youth engagement made by various organizations provides helpful insight on the methods that work most effectively. Many of these organizations utilize social media, which is the most used delivery method of news for youth. Some platforms are better suited for youth engagement than others. Furthermore, covering environmental issues in school will give youth the necessary information to be able to spread awareness and make a difference. This portion of our research has aided our team in determining the most effective way of engaging youth in environmental issues. However, there is still more specific unknown data that needs to be researched. This consists of the most effective ways to engage Thai youth, including which social media platforms they use and how they learn best in an educational environment. Additionally, TEI's current youth engagement methods need to be evaluated such as their existing social media platforms and effectiveness of their workshop format. In the following chapter we will describe the methods used to find this data.

3.0 Methodology

This project aimed to identify strategies that Thailand Environment Institute can utilize to engage with Thai youth around environmental issues effectively. Our objectives were:

1. Determine the most effective methods to engage Thai youth
2. Determine the effectiveness of TEI's current social media approach and outreach
3. Determine the effectiveness of TEI's current workshop approach

This chapter will describe the methods the team used to achieve each of these objectives.

3.1 Determine the most effective methods to engage Thai youth

In order to identify methods that TEI can use to engage youth, our team gathered information from Thai students and teachers. We surveyed students to gain knowledge on what engages them along with their current understanding of environmental issues. We also interviewed teachers to gain their perspective on engaging youth and other efficient delivery methods for teaching environmental issues. These methods allowed us to uncover student and teacher perceptions about the most effective methods to engage youth.

3.1.1 Surveying Students

The team conducted surveys with students in grades 7 to 12. Surveys were used rather than interviews to get a larger sample size in a shorter period. The team surveyed 779 students from seven schools in Bangkok Metropolitan Region. We determined this sample size is an accurate representation of the student population for our purposes due to the mathematical sample size associated with the average population in each school (Smith, n.d.). The formula and a sample calculation for the sample size is described in Appendix B. Before distributing the surveys, it was crucial that the team communicated with schools to get permission to survey their students. A letter of request sent to all schools is outlined in Appendix C. Once permission and access were obtained, our team distributed the surveys in person or via email. The survey

protocol, as listed in Appendix E, was limited to students who attend school in the Bangkok metropolitan area. While TEI's target age range is between grades 7 to 9, our team felt it was beneficial to include older students to add perspective on previous years in school but were analyzed as two separate groups.

To conduct these surveys, the team used a format that favored closed-ended questions to ensure that a larger volume of responses could be adequately analyzed (Sinkowitz-Cochran, 2013). The survey contained five parts; this allowed for a chronological flow of thoughts for the survey-taker. Sinkowitz-Cochran argues that surveys should maintain a clear logical structure to streamline the analysis process (2013). The survey inquired about students' interests, media consumption habits, and environmental protection habits. The choice of questions was largely guided by TEI, who emphasized the importance of gauging knowledge on concepts such as PM 2.5 and the 3 R's: reduce, reuse, and recycle. By conducting and analyzing the data collected from these surveys our team was able to gain necessary student insight on our first objective.

3.1.2 Interviewing Teachers

Our team interviewed 22 school teachers to gain additional perspective on how students effectively learn, and the scope of environmental issues covered in curricula. Our team used a face-to-face interview format with the hope of better establishing a connection with the interview participant. Interviews provide a more personal approach due to the conversational delivery of each question; this makes the interview participant comfortable and more likely to answer in detail (Castillo-Montoya, 2016). Conducting teacher interviews has allowed our team to understand where environmental issues are included in the curricula and how content is presented in the classroom and how they engage students.

To create the interview protocol, we used open-ended questions. The interviews began with questions broad in nature, such as asking about the subjects and grade levels they teach.

The questions were targeted towards student involvement in environmental conservation and the coverage of environmental issues in the classroom. Castillo-Montoya recommends an interview protocol where each phase constructs a conversation that aligns with the research question (2016). Our interviews followed a similar model; the questions were framed in a casual, non-confrontational manner while still striving to gain insight through the lens of an educator. Some interviews were conducted in person while others were online via Zoom. Additionally, all interviews were recorded and transcribed. These surveys and interviews provided valuable data to determine the most effective methods to engage youth.

3.2 Determine the effectiveness of TEI's current social media approach and outreach

In order to assist TEI to improve their outreach, you had to assess the effectiveness of their current outreach strategies and content. This included looking into the platforms our sponsor utilizes. TEI has active accounts on Facebook, Twitter, and YouTube. Our team analyzed the following counts and engagement of each social media profile. Insight statistics found on each media post were then compared to the following count on the media profile. Comparing engagement rates and follower count is an indicator of interest (Warren, 2021). Assessing gaps between account engagement and the follower account indicated the sustained attention by TEI's audience. Investigating the traction that each profile received allowed our team to determine the effectiveness of their current social media approach.

3.2.1 Analyze TEI's Facebook, Twitter, and YouTube

In order to determine the effectiveness of TEI's social media presence, we analyzed their three current accounts. First, on TEI's Facebook profile, the team was able to find the user following count, number of views, likes, comments, and shares. This was done by exploring the main account page, the account information, and the video page. The team then analyzed the social media account insights of TEI's Twitter page. Their handle, or username, was not

able to be searched but using TEI's website we were able to find the main account page. The page displayed the follower count as well as their posts. The team was able to analyze the like, comment, re-tweet, shares, and viewing insights. Lastly, the account associated with TEI's Youtube channel was evaluated. The main account page displayed the subscriber count and associated channels. The "Video" and "Shorts" pages on the account were then used to determine the number of views, likes, and comments. The team was also able to identify the most popular videos using the sorting algorithm provided on the account page. Investigation into TEI's approach to social media outreach has helped the team be able to assess the effectiveness of their current outreach on these platforms.

3.3 Determine the effectiveness of TEI's current workshop approach

In order to determine the effectiveness of TEI's current workshop approach, the team hosted two workshops using an outline for a potential workshop structure provided by the organization. Our approach to the workshops and assessment of the content and structure to the provided workshop structural outline is described below.

3.3.1 Host workshops with TEI's current content and structure

Our team held workshops at two secondary schools in Bangkok: Assumption College English Program School and Chulalongkorn University Demonstration Secondary School. The program's details were outlined directly by our sponsor, including the timing, segments, activity, and primary environmental topics that would be covered. We distributed surveys to students before the workshop to gain baseline data on their knowledge of environmental issues. Surveys were also distributed after the workshop to determine the aspects students found engaging and informative.

This workshop served to gather feedback for TEI on the effectiveness of their current workshop structure. The organization's workshop structure used a lecture-style instruction method about a prominent environmental issue followed by a student presentation, which

mirrors a form of standard classroom instruction (Vallin and Åkesson, 2012). The group activity was the creation of a mind-map based on an environmental concern discussed in the lecture. The student groups were each assigned a topic of climate change, plastic pollution, or PM 2.5 air pollution and were then tasked with illustrating prior knowledge and their possible solutions. This was followed by a presentation by each group on their final mind-map. The complete schedule of the workshops is detailed in Appendix D. The survey data and other data collected during the workshop itself allowed us to assess its content and structure.

3.3.1.1 Analyze TEI's current workshop content and structure for audience engagement

Our team assesses the content and structure in TEI's current workshop approach in order to determine its effectiveness. During the workshops, three team members were tasked with observing and taking notes on the engagement of workshop attendees. These team members looked for audience behaviors during each portion of the workshop, with specific focus on how long the students remained attentive or appeared interested in the content or activity. Digital notes were recorded dictating when students were most engaged in the lecture material and how long it took for the speaker to lose engagement, or if distractions held their attention. Additionally, notes were taken on the physical layout of the workshop and how students in different areas of the room behaved differently. These notes comprise the majority of the qualitative data analysis for the workshop, and were drawn from the subjective judgment of the observing team members. Furthermore, the pre- and post-surveys were quantitatively analyzed for common themes such as the probability for future attendance and the amount of new information that the attendee learned. New information learned was measured by students ranking their own awareness and understanding of certain aspects of environmental issues before and after the workshop in the pre-survey and post-survey respectively. Our team derived students' attitudes towards the workshop by using the post-survey, which provided students the opportunity to elaborate on their feelings towards aspects of the workshop. By analyzing the

content and structure, we were able to determine the efficacy of TEI's current workshop approach. The data collected from our methods were analyzed and several findings were discovered, which will be detailed in the next chapter.

4.0 Findings

The Thailand Environment Institute's (TEI) target audience was students from grades 7 through 9, or lower secondary level students. Our team conducted student surveys on this age range as well as older secondary school students. We surveyed a relatively equal number of upper secondary students in order to gain a better perspective on how secondary students learn and what is taught within schools. This information was useful for understanding any potential differences between opinions, activism methods, and media platform usages between the age groups. The data can be used to retain student attention as they age out of TEI's target range, as the media and environmental habits of 10-12 grade students will become more applicable to 7-9th grade students as they age.

Table 1 shows the number of students by grade level that completed the survey. The number of students from each grade level averaged around 100, with a total of 383 responses across lower and 396 from upper secondary levels. Table 2 outlines the number of teachers who participated in an interview. Over 7 schools, an equal number of teachers participated, with a total of 22. Obtaining relatively even amounts of responses between ages of students and teachers from different schools gave our team's data more credibility. This is attained by asking schools and teachers to equally distribute surveys to the same amount of classes per grade level.

Grade	Total student's survey
7	178
8	113
9	92

10	150
11	169
12	77

Table 1: Number of Collected Student Surveys with Corresponding Grade

School	**Total teacher's interview**
Assumption College English Program	3
Ekamai International School	4
Panyarat High School	5
Chulalongkorn University Demonstration Secondary School	2
Suankularb Wittayalai Nonthaburi	3
Wat Poramai Yikawat School	2
Wat Rat Rangsan School	3

Table 2: Number of Teacher Interviews with Corresponding Schools

Objective 1: Determine the most effective methods to engage youth

4.1 Youth prefer social media platforms such as TikTok and Instagram

To start determining ways to engage with youth, insights on which social media platforms they prefer were collected. This was done in the student survey while also gathering data on how frequently students utilized different platforms. Additionally, teacher interviews included questions about which platforms they noticed their students engaging the most with. Both data sources were used to conclude about popular platforms for youth.

Figure 1 details the media platform preferences of the Thai youth our team surveyed and included data from 7 to 12 grade students. Gathering information about preferred media platforms has shown us where youth are most likely to get their information from outside of an academic setting. These figures are indicative of the media preferences of Thai youth in various stages of secondary school, which increases the potential reach by appealing to youth within their target demographic. Frequency of usage was defined as the number of times each participant used that media source to learn about environmental issues during a typical week. The results showed a strong preference for YouTube, TikTok, and Instagram. These platforms were ranked highest by students for daily use. These were also ranked relatively high for 4 to 5 times per week usage.

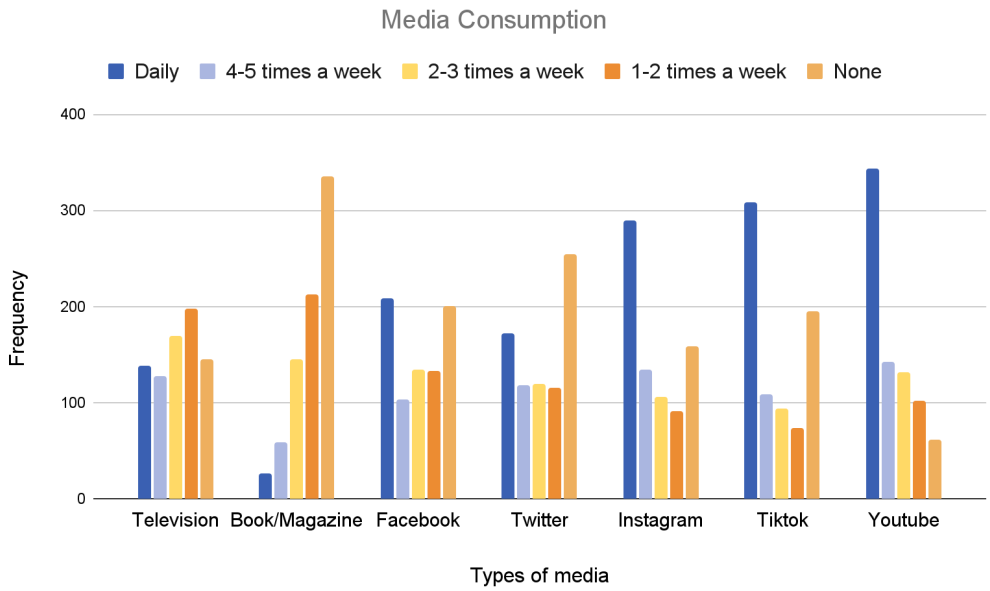

Figure 1: Student Media Consumption Platforms and Usage Frequency

The data gained from teacher interviews further supported this point. When asked about the social media habits of their students, TikTok was mentioned fourteen times, Instagram thirteen times, YouTube and Facebook eight times each, and Twitter three times, with some teachers citing multiple platforms.

4.2 Youth prefer content to be delivered in a short video format

In addition to media platforms, the team surveyed students about which method students prefer most regarding environmental news delivery. Figure 2 displays the delivery method of information preferences on social media. The data collected was from students in both lower and upper secondary levels. In an attempt to most accurately find the best possible method, survey participants were only allowed to choose one answer. The most popular response was short videos, with movies and other animation following behind. According to the data, 28% of students across lower and upper secondary levels preferred a short video format.

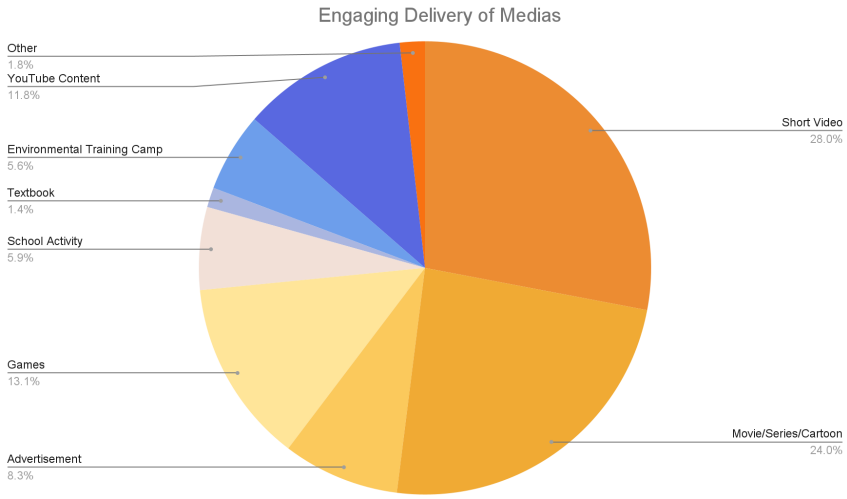

Figure 2: Student Preferred Media Delivery Methods

When interviewed, teachers were asked what media delivery methods they saw their students engaging with the most. Their answers supported student responses, which can be seen in Figure 2. Engaging videos were mentioned by 14 out of the 22 teachers, with twelve of them stressing the importance that these videos are short and to the point. One teacher explained, “The videos have gone down now in terms of lengths where it gives short bursts of information, which proves better than say to go watch a documentary for 50 minutes. That just doesn't happen anymore, they need to have something that is in short bursts… If these videos are longer

than 2 minutes, forget it, they're past it." (Zoom Interview, 1 Feb. 2023). Overall, the answers were very consistent, and one piece of information was very clear: The most engaging content for students to consume is short, digestible videos.

4.3 Lower secondary students had a lower baseline knowledge and less awareness of environmental issues than upper secondary students

The team surveyed students across lower and upper secondary levels to understand their baseline knowledge and awareness levels of environmental issues. Figures 3 and 4 detail the percentage of students that had self-reported awareness of environmental concerns. The question was posed such that students could select all issues they were aware of or write in any additional topics. Each bar in the figure was representative of the percentage of students that claimed to be aware of each issue, rather than the frequency of each response. Lower secondary students reported a 10.3% lower awareness of climate change than upper secondary students had reported. Younger students also reported a 6.5% lower awareness of plastic pollution and an 8.7% lower awareness of PM 2.5 air pollution than older students. The level of awareness in each student was self-reported, and The difference in reported awareness has shown the separation in lower and upper secondary academic curriculum.

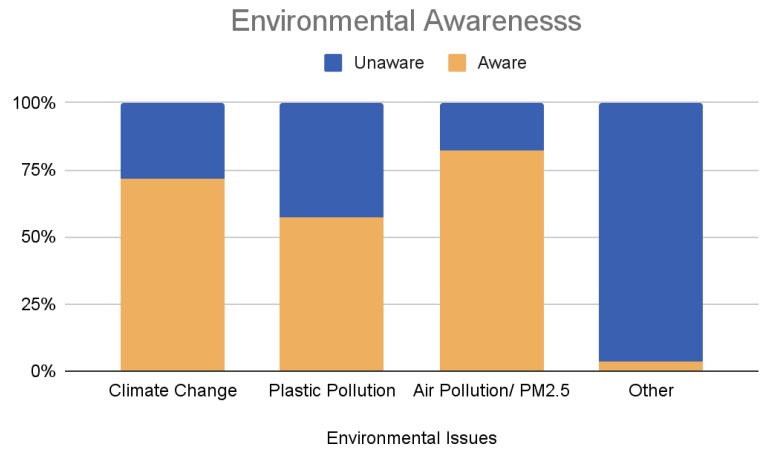

Figure 3: Lower Secondary Reported Awareness of Environmental Topics

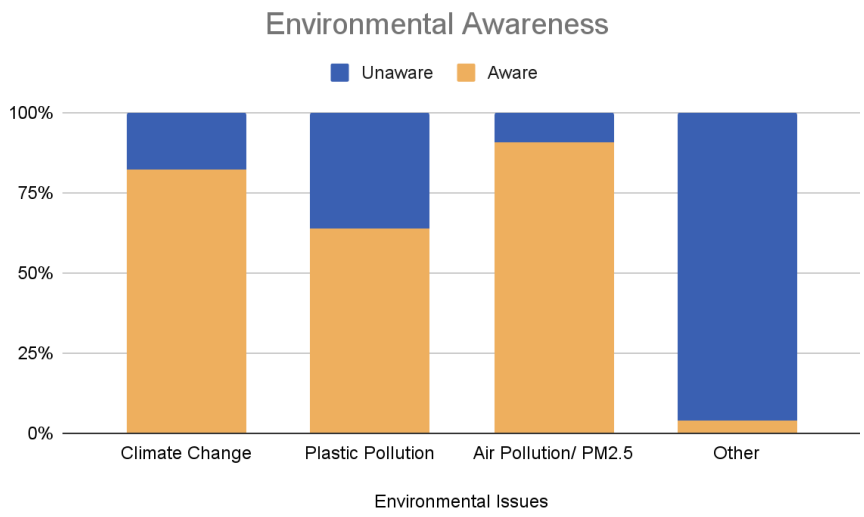

Figure 4: Upper Secondary Reported Awareness of Environmental Topics

4.4 Upper secondary students prefer to engage with environmental issues by raising awareness as opposed to hand-on activities

In the student survey, participants were given the opportunity to describe the role they play in environmental activism, or the steps they could take to better help the environment. Among the responses, only lower secondary students reported significant interest in hands-on environmental activities like cleaning and beautification projects. Students in grades 7 through 9 show a much greater level of participation in activities pertaining to environmental issues than older students. Through our teacher interviews, our team discovered that this may be in part to upper secondary students not having nearly as much time to participate in these activities as lower secondary students do. In one international school's curriculum, the expectation for time students spend on homework or projects escalates from 8 to 12 hours per week to 4 to 5 hours per day from lower secondary to upper secondary school (KIS International School, 2021). As such, upper secondary students likely only have time to engage in activities that take little time to complete or can be incorporated into a daily routine like the 3R program or reposting an informative post. Lower secondary students, by contrast, have more time available to participate in environmental activities than upper secondary students. A high workload in

the upper secondary level of education reduces the available time for upper secondary students for content outside of the curriculum.

The surveys that asked lower and upper secondary students to describe the efforts they want to make or currently make to address environmental issues can be seen in Figures 5 and 6. Lower secondary students reported methods that were categorized as “action-oriented”: where 13% of responses involved hands-on cleaning or beautification efforts. However, when asked the same question, upper secondary students only reported 3.8% of responses involving cleaning or beautification. By contrast, upper secondary students were more likely than lower secondary students to select an “advocacy-oriented” response: with a reporting frequency of 5.9% and 1.1% for awareness and government/policy-oriented responses. Advocacy-oriented responses included activities such as discussing environmentalism with friends or working to address current environmental policy through voting or campaigning. Compared to the lower secondary students, upper secondary students described awareness and government/policy change-coded responses 3 and 3.44 times as frequently. Our team also investigated student participation in extracurriculars that have to do with environmentalism. We asked students if they participate in environmental clubs or activities, to which only 25.8% of lower secondary students and 18.2% of upper secondary students answered “Yes.” Using context from the interviews, our team hypothesizes that self-teaching methods, such as independent research or group study projects, are better for older students and the hands-on teaching method is more effective for younger students but can be applied to all age ranges.

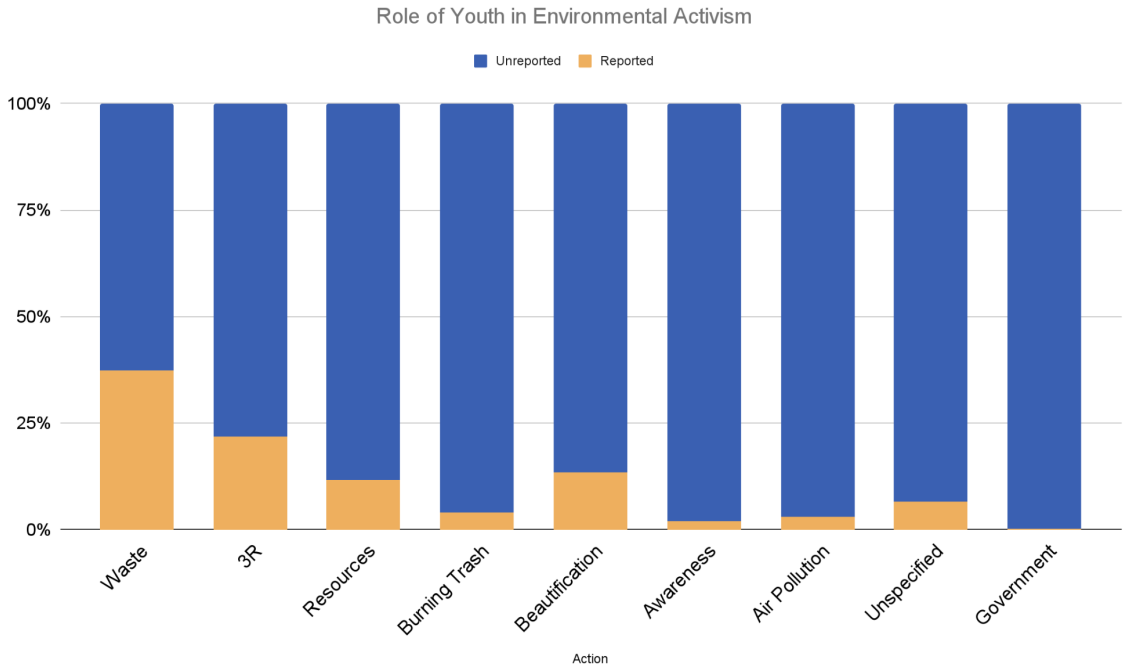

Figure 5: Lower Secondary Reported Roles in Environmental Activism

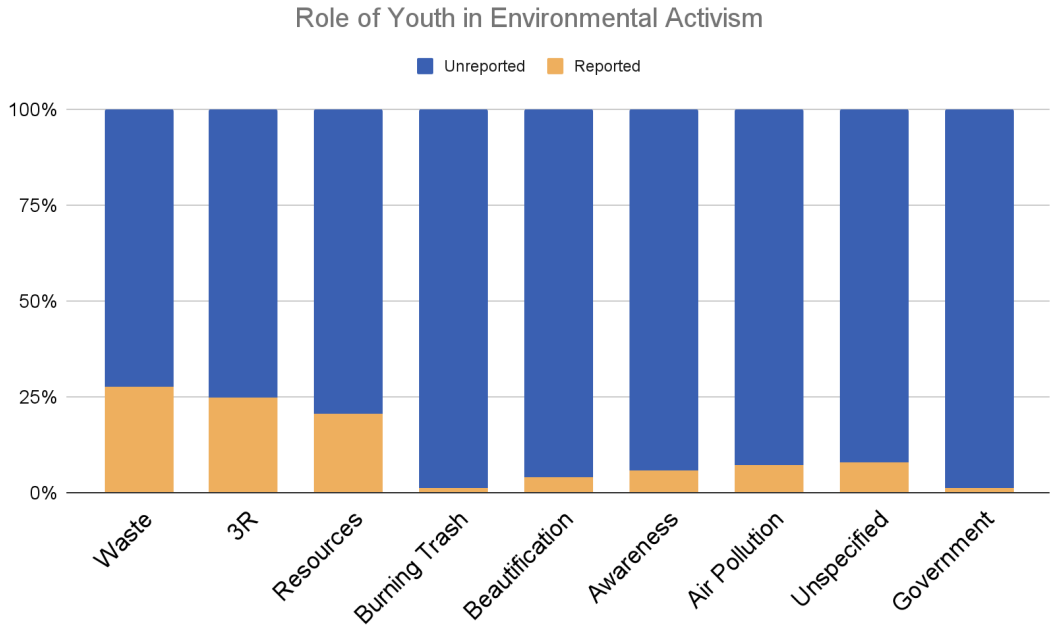

Figure 6: Upper Secondary Reported Roles in Environmental Activism

4.5 Both students and teachers believe that environmental issues are not sufficiently covered

Students across lower and upper secondary education levels believe that their school's curriculum only covers environmental issues in the curriculum a moderate amount. Contrarily, these students believe that their level of understanding on these issues surpasses what they have been taught on an academic front. Results were gathered on a 1 to 5 scale where a response of 1 refers to low understanding and 5 refers to high confidence or understanding. Surveys showed that 43% of reporting students indicated that their school teaches a moderate amount about environmental issues, with only 38% reporting that schools taught these issues well. However, 44% of reporting students claimed that they had a good understanding of environmental issues, with only 31% reporting a moderate understanding. Comparing the data sets highlighted the gap between students having more knowledge than what they are taught in a classroom setting. These findings are at odds with each other. Students are reporting that their knowledge surpasses what they are taught in schools when it comes to environmental issues. Thus, it is possible students are receiving information about environmental issues from sources outside of school.

Teachers had varied perceptions about the adequacy of the amount of time spent on environmental issues in the Thai curriculum. Most teachers agreed that the curriculum could use more, this was evident by 14 out of 22 saying yes. One teacher expressed that many environmental issues only became relevant in recent years, especially PM2.5 which only really became a problem in 2018 or 2019 (Zoom Interview, 7 Feb. 2023). Teachers expressed general interest in a more detailed and updated curriculum to give students the knowledge of what is happening in the world today. However, 5 out of 22 teachers expressed concerns about the limitations of doing this, mainly concerns about time restrictions. In an interview, an upper secondary science teacher discussed the workload of Thai students in response to curriculum

modification: “Personally I have a feeling that there is an overwhelming amount of curriculum already for Thai students, so I don’t know if I would just want to add more… I think there is a danger of overloading students and I think it’s already occurring here in Thailand” (Zoom Meeting, 9 Feb. 2023). Some teachers said the problem is not a lack of content in the curriculum, but that the curriculum isn’t thorough enough or has the wrong focus. One teacher expressed, “Just a general approach of critical thinking skills, problem solving, collaborative working. I think those types of things can be applied in lots of different fields and subjects. And environmental issues are easily one of them.” (Zoom Interview, 9 Feb. 2023). Overall, a focus on practical application, or having the students apply what they have learned, and finding solutions seems to be more effective than just teaching about the existence of environmental issues.

4.6 Students have a good understanding of the causes behind environmental issues

When asked about their understanding of causes for environmental issues, many students reported having at least a moderate understanding(a score of 3 out of 5). Figure 7 details the lower secondary student’s self-reported understanding of environmental issue causes. The figure was composed of ratings on a 1 to 5 scale where a response of 1 refers to very low understanding and a response of 5 refers to very high understanding. Nearly 350 students believe that they sufficiently understand the causes of environmental issues. This understanding is evident in the fourth data column where 349 students reported that they understand the causes “well.” Over 150 students could even report that they understood the causes of environmental issues very well. These reports have shown the team how generally aware students are of the cause of these issues, not just their academic knowledge.

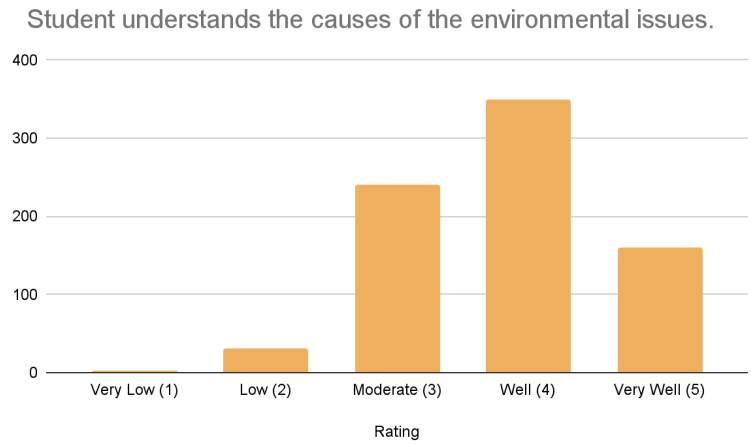

Figure 7: Student Self-Reported Overall Understanding of Environmental Issue Causes

4.7 Teachers believe organizations first need to form connections with students to engage them

When teachers were asked about what the TEI or similar environmental organizations could be doing to reach youth, many suggested raising awareness about who they are and what they represent. Some of our teacher interviews suggest that students who are knowledgeable about environmental issues want to take things a step further and become involved, but don't know how or where to start. If students learn about TEI and what they do, teachers believe they would jump at the chance to become involved.

School visitations or workshops were recommended by 12 out of 22 teachers. Students are excited by anything that allows them to take a break from regular classes. Some even informed us that their schools don't get many visitors. Visiting schools and raising awareness about TEI's purpose and goals, as well as how students could get involved, is recommended by teachers as the first step towards engaging students. One teacher mentioned that if TEI couldn't visit schools, many teachers would be happy to receive educational materials, training to teach about environmentalism, or content so that they may hold the workshops themselves (Personal Interview, 2 Feb. 2023).

Additionally, seven teachers stressed the importance of having a strong online presence when it comes to engaging the youth. When asked about how TEI could be reaching youth, one teacher stated, “It is social media with the youth. And if you’re not using that to reach them, you’re probably not reaching them, or at least to the extent that you could be.” (Zoom Interview, 9 Feb. 2023). Teacher interviews have highlighted a significant push for organizations to create connections with students via social media or at least make their presence known, in order to effectively engage them.

4.8 Teachers believe students learn better with hands-on learning approaches and being outside

When asked about the teaching methods they felt were effective at engaging students, teachers reported hands-on and other forms of active learning such as debates, group projects, and think-pair-share were preferred to a standard lecture-based approach. Out of the 22 conducted interviews, 15 teachers mentioned that they had experienced these two methods being effective forms of engaging students. One teacher expressed, “As a science teacher we have great opportunities for hands-on learning, any kind of lab experiment work” (Zoom Interview, 9 Feb. 2023). Another said, “If you can do some practical experiments in the lab, like testing the water quality, test for microplastics, different things, that’s more engaging than just reading about it in the textbook.” (Zoom Interview, 7 Feb. 2023). The teachers requesting more hands-on activity in the classroom were not the only educators to suggest a change in the traditional teaching approach.

In addition, 7 teachers reported that student-led research, or self-learning methods such as reading or searching, were equally useful in student understanding of environmental topics. This involves students doing their own research on a topic and having them present it to other students, which led to high levels of interest even after the project was completed. As reported by one teacher, “Self-learning would be more prolonged and allow students to practically learn

rather than just theoretical learning" (Personal Interview, 3 Feb. 2023). Some teachers have even tried to turn student projects into a competition or game, which also had positive results. Teachers report that these teaching methods are all applicable to students, as they promote different skills and appeal to different learning styles.

Another interesting finding was that students' engagement depends a lot on their connection with nature. When asked about students' interest in environmental issues, one teacher answered that their students have little to no interest in the environment because they live in cities and have never been directly impacted by environmental issues or witnessed them firsthand (Personal Interview, 3 Feb. 2023). As outlined in the Background section, outdoor learning environments help improve students' connection with nature and provide an enjoyable break from classroom learning. One teacher mentioned that, because their school is in an area with high air pollution and nearby rivers and canals littered with plastic, students are very focused on environmental issues and put in effort to help solve them (Personal Interview, 2 Feb. 2023). Individual students' learning differs depending on the resources available at each school, but the effort to expose students to nature is unanimous.

Objective 2: Determine the effectiveness of TEI's current social media approach and outreach

4.9 TEI's Social Media Insights

We were able to determine the effectiveness of TEI's current social media approach through analyzing their profile insights. All TEI's social media platforms were created in October of 2018. TEI's Facebook page currently has a following of 7,823 users. Their posts average 300 to 500 views; some only receiving 10 to 15 views. Each post gets 5 to 70 likes and only 1 to 5 comments. Their Facebook posts do not gain a lot of traction, measured by their likes and comments.

TEI's Twitter has a following of 121 users. Their posts receive 1 to 5 likes, no comments or retweets. The last post was uploaded in April 2022. Their Twitter account is not being actively posted on and is therefore not gaining traction.

TEI's YouTube has a following of 539 users. The two most popular videos have 12 to 18 thousand views. However, the average views on their videos are 100 to 200. Their videos receive a range of 0 to 100 likes: the most liked having 235. These videos are typically 50 minutes long, and they have utilized the YouTube Shorts feature only once. Their YouTube account does not gain a high amount of traction.

Due to the low post rate and audience engagement, our team feels that these platforms could be better utilized to reach their target audience.

Objective 3: Determine the effectiveness of TEI's current workshop approach

4.10 Students were not engaged during TEI's workshops

The workshop agenda provided by TEI was followed and the resulting workshop was evaluated. The ebbs and flows of student engagement were also observed. The workshops were held at 2 schools: Assumption College English Program and Chulalongkorn University Demonstration Secondary School. Speakers who specialized in the environmental field were invited to workshops, including Chulalongkorn University professor Dr. Puntita Tanwattana and Dome Boonyanurak, co-founder and CMO of GEPP SA-ARD. They presented lectures focusing on environmental issues, such as plastic pollution, air pollution, and climate change. A TEI representative delivered an additional presentation at Chulalongkorn University Demonstration Secondary School. However, the presentation included high levels of text and information about the organizational structure. We observed that students were distracted during this portion of the presentation, while pictures and sample models attracted the attention of students more.

Behavioral observations were recorded throughout the workshops; each portion being observed individually. When lectures were being delivered, many students displayed low interest and engagement. During these times, students were seen playing with their phones and talking amongst themselves. According to our team's observation notes, the activity portion of the workshop is where we observed the highest levels of engagement. Students were told to make their own groups and were each given a topic, climate change, plastic pollution, or air pollution. They were instructed to create a mind-map on the issue at hand. The students were given the freedom to add pictures and color as they desired. Based on the subjective observations noted over the course of the workshop, the students were showing many signs of engagement during this activity. They expressed their excitement in being able to use markers and draw pictures and brainstorm ideas with their peers. When they were asked to present their mind-maps, they continued to show signs of engagement by focusing on the other groups' presentations. The usage of phones at that time was lower than during the lecture. When students were asked if they would attend this workshop again, 56% percent answered "Maybe," and 44% answered "Yes." The responses tell us that more than half of the students were apprehensive about attending a similar workshop again. The observations show that the most effective part of the workshop was the 30-minute mind-mapping activity. These observations made it clear that it is hard to engage students during lectures and longer presentations, which limits the effectiveness of the workshop. Our team felt that these survey responses coupled with the qualitative observations indicate that the provided workshop structure was not effective at maintaining youth attention and engagement.

4.11 Limitations

Our team ran into three primary limitations in the generalizability of the data we collected. These included a small workshop sample size, two varying workshop structures, and skewed post-survey results. Due to the planning of the workshops occurring after a school's academic and program schedule was determined, the number of attendees and opportunities to host workshops was lower than anticipated. This limited both the amount of student input and amount of prospective workshops that could be held, which in turn limits generalizations that can be made about the effectiveness of the workshops. If our team was able to repeat this workshop, we would have more data to depict the aspects of the workshop that were and were not successful. Next, the two workshops our team was able to hold were not identical in structure due to having different speakers and presentations. In one workshop, the lecture was entirely conducted by the guest speaker, who presented about PM 2.5. In the second workshop, the lecture was split into a presentation about TEI and its company structure and goals and a presentation about waste management and recycling. Due to the amount of information and the selected topics being different across the two workshops, the lecture components of the workshop were not directly comparable. Lastly, the post-workshop survey results were skewed at the first workshop. Though all attendees filled out the pre-workshop survey, there was a problem with the QR code for the post survey, which meant that only one third of attendees filled it out. Due to these post surveys offering a space for students to share their feelings about the workshop, it limited the amount of specific feedback on the workshop and limited the generalizability of the post-survey results.

5.0 Insights and Recommendations

In this section, we have outlined the conclusions we drew from our data collection, and we provided recommendations for TEI based on our insights.

5.1 Short videos and platforms that support them are the best way to reach youth via social media

Student preferences on media platforms and delivery methods can be used in conjunction to determine the best method to reach youth using social media. Using the data from the student surveys, our team found that all the platforms that the youth use the most support the posting and sharing of short videos. Specifically, TikTok has this as their main format of content. The platform has grown in popularity with youth despite its recent release. Similarly, Instagram supports “Instagram Reels”, and YouTube supports “YouTube Shorts.” Most teachers described social media usage as an important step towards making a connection with youth, further supporting this recommendation. Based on data, our team can infer that short videos are the most engaging content for youth. Therefore, creating content and presenting it in short video formats and posting them on social media platforms that host this format is the best way to reach them.

5.2 Lower secondary students have not learned about environmental issues yet

Some pressing environmental issues, such as PM 2.5, can be considered technical or advanced compared to the information lower secondary students learn about environmental topics. The Thailand school curriculum outlines the beginning of human interaction with nature in 10th through 12th grade (Katerenchuk et al. 2008). This was evidenced by upper secondary students reporting a higher percentage of awareness and understanding of all environmental issues compared to lower secondary students. This means that lower secondary students are not yet knowledgeable about environmental issues and are missing a lot of information before they can effectively become engaged in environmental activism.

This provides the opportunity for organizations to inform and engage Thai youth about environmental issues that suit the base knowledge level of lower secondary students.

5.3 Upper secondary students do not have time to participate in environmental activities

When teachers were asked about the teaching methods they felt were effective in engaging students, hands-on learning and other forms of active learning were preferred to standard lecture-style teaching. Out of the 22 conducted interviews, there were 15 mentions of hands-on learning and active learning. However, among the student responses only lower secondary students reported a strong interest in hands-on environmental activities. The teacher's input suggests that students are engaged by hands-on activities in a classroom setting, and that lower secondary students are willing to engage in these hands-on activities outside of school.

When given the opportunity to describe the role they play in environmentalism, upper secondary students preferred spreading awareness or voting while lower secondary students preferred direct action and hands-on activities. One reason for low participation by upper secondary school students in these activities is a lack of time present in their schedule, as suggested by an interview with a teacher (Zoom Interview, 1 Feb. 2023). Additionally, many upper secondary students shift their focus towards preparing for higher education at a university.

Despite upper secondary students struggling to find time for more involved activism, they still show an interest in spreading awareness when possible. These students likely only have time to engage in activities that take little time to complete or can be incorporated into a daily routine. Examples of these types of actions include the 3R program or reposting an informative post. Lower secondary students, by contrast, have more time available to

participate in environmental activities than upper secondary students. This provides them with more time to attend programs and workshops that center around environmentalism compared to older students. Using context from the interviews, our team hypothesizes that self-teaching methods are better for older students and the hands-on teaching method is more effective for younger students but can be applied to all age ranges.

5.4 Students have the desire to learn but are not taught enough

Students generally report that they understand the cause of environmental issues while also asserting that their schools are only moderately successful at teaching them about environmental issues. The highest frequency of student responses depicted schools as only having moderate success in teaching about environmental issues. This contradicts the trend indicating students had a strong understanding of environmental subjects. The discrepancy indicates that students are actively seeking information about environmental issues regardless of the amount of information taught in school.

Seeking out and learning information about environmental issues outside of the classroom highlights students' desire to teach themselves. During their interviews, 7 teachers suggested that self-teaching or independent study is effective at engaging youth. Additionally, 14 teacher interviews indicate a need to include environmental issues in the Thai curriculum. Our team can infer that due to many students feeling that they are not learning enough about environmental issues in school, they are learning about them from outside media sources.

5.5 Students should be more engaged in outdoor environments and hands-on activities

Schools provide the opportunity for students to develop the capacity to learn and grow in an environment that fosters learning. When teachers were asked about effective teaching methods that they use to engage students, the most common answers involved a hands-on approach rather than a lecture-based approach. Fifteen different teachers mentioned either

“hands-on learning” or “active learning” in their responses and stated that students were much more excited to learn when these teaching strategies were used. These methods were effective due to the sustained interest in these topics even after a project’s completion. Based on our findings, our team has concluded that students learn effectively when they are engaged by the subject material and encouraged to learn in a way that excites them. In other words, many students appreciate a break from heavy lecture-based teachings and are excited to try new ways of learning.

Another interesting discovery is that students’ engagement depends on their connection with nature, with one teacher citing that students have little interest in environmental issues due to not experiencing firsthand (Personal Interview, 3 Feb. 2023). Outdoor learning environments help students enjoy their academic experience and also helps people understand and cope with environmental loss, as research from section 2.2 shows. Our findings describe that the environment a student lives in affects their attitude towards the environment: students that lived closer to nature were more passionate about environmental issues compared to students that lived in the city. Due to the resources of each school, the knowledge of individual students varies, but the push to get students into nature is unanimous.

5.6 TEI’s current social media outreach is not tailored to youth

According to the findings based on social media insights, there was low engagement on every platform TEI provided. Compared to the number of followers they have; it appears as if they should be getting a lot more views and engagement. Social media accounts with dramatically low engagement to follower count ratios are often indications of loss of interest from viewers. This can also signify that a large portion of followers are from years past and no longer hold active accounts. This allows our team to infer that a large portion of TEI’s followers are either no longer engrossed in their content or no longer utilize that form of social media. Our findings also depict short-video format as being popular with youth. This format does not

appear on any of TEI's social media platforms. Due to unsustained engagement on their posts, which indicates a lack of reach or interest, TEI is not able to reach their target age demographic.

5.7 TEI's current workshop format is not effective

Based on our findings, students were not engaged during TEI's workshops and are indecisive about attending another workshop. Our team's observations point to the fact that the students did not enjoy the lecture portion of the workshop, and engagement was lost early in the program. Despite students not being attentive during the lecture, they were involved and showed interest during the interactive portion. Additionally, in the workshop post-survey, the majority of students answered that they were unsure if they would attend another workshop again. It was safe to assume that some students who answered this way, truthfully, would not want to attend another workshop. Our team believed students selected "Maybe" in order to satisfy and respect those holding the workshop. Also, the large number of "Maybe" answers indicates that many students did not have strong feelings about the workshop. This often means the experience was not memorable or impactful. An ideal workshop would produce confident assurance that participants would attend another workshop. On top of this, the number of post-survey responses received was less than the total number of participants, meaning some students chose not to take the survey. We believe that this selection of people was apathetic to the experience and would almost definitely not want to attend another workshop, as people who feel more strongly about an experience would be more inclined to leave an exceedingly good or bad review. There are some parts of the workshop that are effective, but the overall structure needs to be adjusted in order to engage with young students.

5.8 Recommendations

The following section includes our recommendations to effectively engage students in environmental issues. Our team prepared final recommendations for our sponsors, Thailand

Environment Institute and Thailand Business Council for Sustainable Development. The data and findings we collected provide evidence and insight to support our suggestions. These recommendations will benefit TEI and TBCSD in improving the effectiveness of their outreach attempts.

5.8.1 Research audience's knowledge to properly make engaging content and workshops

As seen from our findings, lower secondary students do not learn about environmental issues at the same depth as upper secondary students. To ensure that presentations are suited to the background knowledge of the students, we suggest working with teachers and faculty members about the content organizations wish to teach students. Teachers provide valuable advice about the behaviors and education of students in Thailand, and can assist TEI in ensuring that the educational content is suited to the knowledge level of students. Additionally, they have practical experience in engaging students in a variety of subject matter, and can provide insight about the delivery method used in future programs and workshops.

5.8.2 The correct audience is being targeted

TEI has established that their target audience is currently students in year 7 to 9. Our research has reinforced that this is the ideal age range for TEI to target. Through our data collection, we found that Thai students older than year 9 struggle to find time to commit to environmental extracurricular activities and prefer to take the less time consuming route of spreading awareness when they can. Furthermore, many lower secondary students have yet to learn about environmental issues, and they learn best through hands-on activities. We found that students are interested in and will often learn about environmental issues in places other than the classroom. Our team recommends TEI should continue to engage with 7th through 9th grade students and do so in a way that appeals to this age group's specific media and content preferences.

5.8.3 Use TikTok and similar platforms to make short video content for youth

We recommend that TEI use TikTok and similar platforms to share short video content. It is important to create a strong social media presence in order to spread awareness and engage and motivate youth in creating change. Some examples of social media accounts that have been successful are World Wildlife Fund (WWF), Action4Climate (ACE), and Sam Bentley. These accounts include short, informational videos that follow trends and provide clean infographics. Additionally, we found that the common theme among all three was the use of the same content across all social media accounts. This is made possible due to most platforms adopting the short video option, i.e., Tik Tok, Instagram Reels, YouTube Shorts.

Tik Tok was the most used platform among 7th to 9th graders, and the second-most used platform from our youth survey. As suggested by the research conducted in section 2.5.1, TikTok hosts features that promote sharing a wide variety of content, which would allow environmental content to be shared to a broad audience.Instagram was the third-most used platform among all students surveyed (Fig. 1). In addition to the features that it shares with TikTok, users can also livestream through Instagram Live, which is a great option for Q&As or live event sharing. YouTube was the most-used platform from our youth survey (Fig. 1),but the videos TEI currently have posted on YouTube are long and don't seem to catch youth's attention. Videos should be shorter in length and not in a lecture-style format. YouTube Shorts should also be used as they share a format with TikToks and Instagram Reels. Although Facebook is not used much among youth, improving it will be beneficial. Posting youth event posters and news can help reach parents who have younger children without social media. Though our data shows that Twitter is the fourth-most used platform, it is still necessary to boost performance. Twitter typically makes use of short, 100-character posts. When people come across longer posts, they often scroll by it without reading. TEI can utilize Twitter to post clean, simple infographics, event posters or short environmentally friendly tips or gifs.

We also suggest using platform insights in order to track social media performance. Each platform provides data on daily, weekly, and monthly account engagement. This will help determine if the content is reaching the target audience appropriately. Furthermore, we recommend using A/B testing, a way to compare two versions of a website, advertisement, or social media post against each other, to determine which type of content gains more traction. This will allow TEI to narrow down what performs well and what doesn't when it comes to what they put on the internet.

5.8.3.1 Feature influencers and celebrities in their social media content

In addition to their content, influencers and celebrities could also be featured to attract the interest of youth. The action seems more attainable when a celebrity participates in an activity or engages in a social issue (Arnold, 2010). There are several approaches that can be taken when it comes to featuring influencers and celebrities. First, TEI could try and get influencers who are well known in the environmentalism community and have the same goals as TEI, drawing in a crowd of users who have an existing passion for environmental activism. Second, they could try and get influencers outside of this community who are well known to the general public. Looking into which public figures and pop culture icons appeal to youth would be incredibly effective at drawing in a large, new audience. Especially if these influencers also post about a collaboration with TEI on their personal pages, it will gain huge amounts of visibility that they wouldn't have had before.

5.8.3.2 Utilize social media insights to track progress

Once TEI understands potential methods to make high-quality online content using the methods our team has outlined, they also must learn how to get their content seen by their target audience. Although part of this is determined purely by chance and luck, strategies can be used to navigate social media algorithms (Nichifor, E. et al., 2021). Some knowledge can be gained by research, but a large part of becoming successful on social media is through trial and error.

A method called A/B testing may be used in which TEI would make two slightly different variants of a post and test which one gets more positive feedback by randomly showing it to different social media users. From their current existing social media platforms, it appears that there is room for TEI to grow their online presence and better reach their target demographic (Nichifor, 2021). Conveniently, most social media platforms have built-in statistics that are designed for individuals or businesses to gain a deeper understanding of their following. These tools are commonly known as "insights." Some statistics that insights frequently provide include unique accounts reached and interactions with posts such as how many people liked the post or shared it with other people. They can even sometimes measure audience engagement by seeing how long viewers watch videos posted, or viewer retention, or track the page's growth from followers and average viewers gained. Lastly, insights will also often include viewer demographics. This gives the account owner a breakdown of their following, including locations of followers, age groups, and times that they're most active on social media. Since TEI is attempting to move focus on engaging youth, this would be an effective way to see if changes to their social media are successful in growing their young audience. Overall, knowing how to use insights will help TEI see which individual posts are reaching a broad audience and which aren't, allowing them to rule out specific strategies and explore others.

5.8.4 Foster a better connection with teachers to better engage with youth

We recommend forming a connection with the target audience. Once TEI is a well-known name among the youth, there are countless opportunities for them to engage large amounts of youth. We have found that schools would be extremely welcoming and grateful for the opportunity to work with TEI and have them sponsor programs and projects. This could be as simple as holding a competition for students to become involved in, or some type of off-campus volunteering or work opportunity. One teacher said, "Students could get work experience there… it would be nice if they were able to study something about the environment,

and maybe they had a chance to do three- or four-week work experience with a company like that. They might learn a lot more about environmental issues and about how they could implement change." (Zoom Interview, 7 Feb. 2023). Our team believes that many students would love to get work experience, and it may even lead to more young people gaining an interest in taking up an environmental career. TEI could also sponsor smaller scale activities such as beach cleanups and mangrove tree planting, which a teacher cited as field trip activities students enjoyed (Zoom Interview, 1 Feb. 2023). If students have positive experiences during smaller, less committal experiences, they may be willing to get more involved in larger programs and projects. Overall, there is potential for a mutually beneficial relationship to blossom between TEI and schools, which would help them immensely with their goal to engage youth.

5.8.5 Revise current workshop approach

We recommend revising the structure and content of the current workshop agenda. While our team was observing the workshops, we noticed that many of the students were disinterested with the lecture portion of the program. This is especially significant because in both workshops the lecture was the first portion, so students losing interest almost immediately hurt engagement for the later parts of the workshop. After analyzing post-survey feedback from the students, we recommend focusing more on the activity portion of the workshop and maintaining interactivity throughout any lectures. It's important to keep in mind that people, especially young people, have short attention spans and need to be consistently engaged throughout the entire workshop. The interactive portion had much more success, as students were engaged during the mind-mapping activity and participated in open discussion with their peers about environmental issues during the presentation. If students have more opportunities to engage with their peers or environmental experts directly, our team feels they will be more engaged and have a better experience with the workshop.

5.8.6 Further Research

Lastly, we recommend doing further research on the engagement of youth around environmental issues. There are gaps in our research that could improve recommendations. The A/B testing can also be researched to better enhance social media content. This testing format benefits from continuous experimentation, which will help tailor TEI's social media presence to appeal to their target demographic. Communicating with teachers is vital to best engage children. Because they work with youth every day, they have valuable insight on all aspects of their interests and engagement. By gaining insight about what motivates and engages students from teachers, which would create a more effective workshop structure. Our team's research suggests holding weekend programs to help students learn about the environment from the natural world. By establishing outreach with teachers and students, these programs can ground educational content about the environment and establish a stronger connection with the natural world. In addition to promoting education about environmental issues, students would have the opportunity to discuss the topics they learned about on social media, which raises awareness of environmental issues and, by extension, TEI and its goals.

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Appendices

Appendix A: Sponsor Description

The Thailand Environment Institute (TEI) (2017a) is a non-profit, non-governmental organization that acts as a resource for environmentalism in Thailand. Their mission as stated on their website, "To be a leading organization in the environment with respect to international standards, adhering to be a nonpartisan organization that helps promote sustainable development." (para. 4). The means in which it is funded are not identified on their website, but due to it being non-profit and non-governmental it is likely that its funding comes from philanthropic donations from individuals and non-grant sources within the country.

The TEI (2017b) is structured with a President acting as a general leader for the organization. Above the President is an Executive Board of Directors, and above that is the Board of the TEI Foundation. The President oversees a group of environmental experts as well as six different “programs,” or committees. The committees are as follows: The Natural Resources Program, The Pollution, Energy, and Environment Program, The Environmental Network and Climate Change Program, The Green Label and Environmental Label Program, The Project Development and Planning Program, and The Administration Division. Additionally, underneath each committee there are three or four sections that tackle a very specific area of expertise. An estimate of the number of employees the TEI has ranges from 100 to 200 employees. The section within the organization that will be the most relevant to our project is the Project Development and Planning Program committee. All three sections underneath this committee are relevant in different ways to our project. See Figure 1 below for a more detailed look at how the organization is structured.

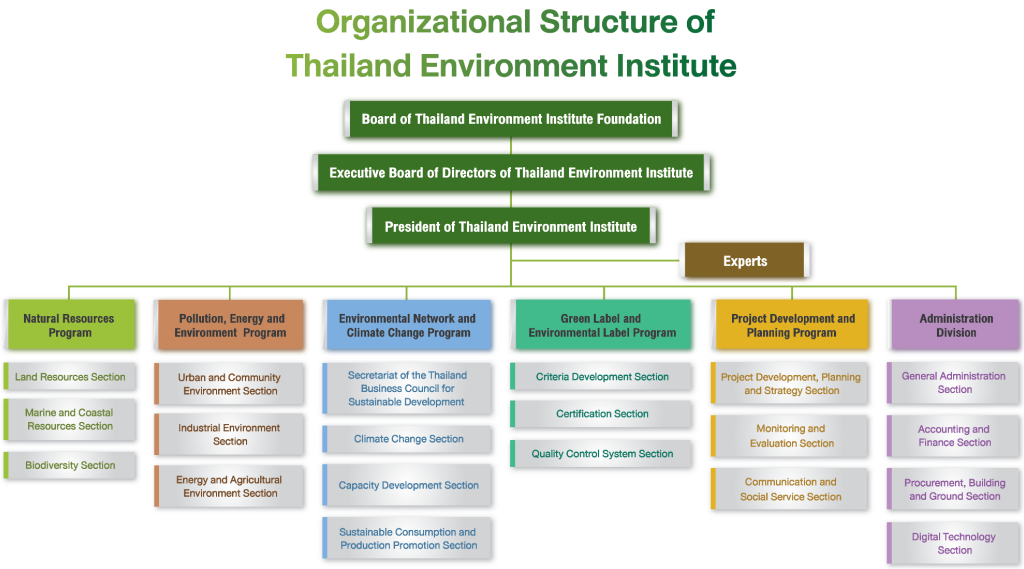


Figure A-1: *Organizational structure of the Thailand Environment Institute (TEI 2017b).*

The TEI is undoubtedly one of the largest agents of change for environmental activism in Thailand (Banerjee, 2020). They have a large variety of resources to offer, mainly people and money. Additionally, their website highlights their expertise on "environmental excellence, moral integrity, accountable partnerships, and down-to-earth practicality" (TEI, 2017c). As stated earlier, the TEI has a group of experts at their disposal who know all there is to know about environmental issues, as well as hundreds of employees. To address the specific problem of youth involvement, the TEI is looking to expand and get the next generation of Thai citizens involved. With their various resources listed earlier, they have the potential to provide amazing opportunities for Thai youth to get involved in and act as an excellent vessel for growth, training the next generation to become the experts that mentor them.

The TEI is a part of a larger organization called The Access Initiative (The Access Initiative, n.d.-b, para. 1). "The Access Initiative is the largest civil society network in the world dedicated to ensuring that citizens have the right and ability to influence decisions about the natural resources that sustain their communities." (The Access Initiative, n.d.-a). In other

words, The Access Initiative is a very large network made up of environmental organizations from various countries. There are some other organizations within Thailand that focus on environmentalism, but none can be found that focus directly on youth involvement. One important other organization to be noted is the Thailand Business Council for Sustainable Development (TBCSD). The TBCSD (n.d.) focuses on policy development and good business practice related to environmentalism, and they work in direct partnership with the TEI. Since these organizations are all fighting for the same cause, none of the organizations can really be described as "competitors." In addition, The TEI makes a great effort to build and maintain partnerships with other environmental organizations. (TEI, 2017a, para. 3) Below is a table containing information about other Thailand based organizations that also work on similar environmental issues.

Table A-1: Environmental Organizations in Thailand

Name of Organization	Description	Location
Association for the Protection of the Environment (APE)	Non-governmental organization working on conservation and restoration of the environment	Thailand based
ASEAN Wildlife Enforcement Network (ASEAN-WEN)	Inter-agency and inter-governmental initiative to stop cross-border trade of endangered flora and fauna	Founded in Thailand but expanded to all ten ASEAN countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Vietnam and Thailand)
Freeland Foundation	International NGO that aims to stop wildlife and human trafficking	Thailand based

Greenpeace Southeast Asia	Non-governmental organization working to reduce environmental pollution	Founded in Thailand but has expanded to Southeast Asia
Living River Siam	Non-governmental organization that analyzes the impact of Thailand's dam projects and coordinates the research of indigenous peoples to give Thai villagers the power to document the influence of local rivers and dams	Thailand based
Plant a Tree Today Foundation (PATT)	Non-governmental organization that attempts to raise environmental awareness and plants trees to combat deforestation and climate change	Thailand and United Kingdom based
Sustainable Mekong Research Network (SUMERNET)	Network of organizations dedicated to sustainability in the Greater Mekong Area	Greater Mekong Area (China, Myanmar, Lao PDR, Thailand, Cambodia, Vietnam)

Appendix B: Sample Size Calculations

n_0	= Mean subsample size	= 385
N_l	= Lower secondary population	= 1763
n_l	= Lower secondary sample size	= 317
N_u	= Upper secondary population	= 1920
n_u	= Upper secondary sample size	= 321
z	= Z-score	= 1.96
σ	= Population standard deviation	= 0.5
CI	= Confidence Interval	= 95%

Note: Population sizes derived from population of Suankularb Wittayalai Nonthaburi School

Table B-1: Sample Data and Mathematical Nomenclature

$$n_0 = \frac{z^2\sigma^2}{CI^2} \tag{1}$$

$$n = \frac{n_0 N}{n_0 + (N-1)} \tag{2}$$

Table B-2: Sample Size Equations

Appendix C: Letters Sent to Schools

Dear school,

The Chemistry Department has opened the course 2302307 Interactive Science and Social Projects for third year students enrolling in the Bachelor of Science in Applied Chemistry (international program). The curriculum was designed for students to apply practical applications to challenges posed by the needs of locals. Students will receive a project description from a sponsor in which they will do research on.

In this regard, the Department of Chemistry would like to request for school permission in interviewing teachers who are responsible for educating environmental issues, such as social studies teachers, science teachers, or counselors. Furthermore, the team would also like to interview 7th-12th graders on the topic of Mobilizing Thai youth in Tackling Environmental Issues in which the interview questions are stated in enclosure (1). All information will only be used for educational purposes, no information will be distributed without permission. The team would like to ask for a list of 3-5 professors who will provide the relevant information by sending names and contact information to the student project coordinator, Ms. Kamonchanok Viriyatharangkurn, Tel. 086-493-3155, Email: bsac.leadership@gmail.com by January 23, 2023.

Thank you for your consideration.
Sincerely,
Professor Dr. Voravee P. Hoven
Head of Chemistry Department

Enclosure 1
Issues to be addressed :
1. Knowledge and understanding of environmental problems in Thailand
2. Online media usage of students in each grade level
3. Information on cooperation in activities related to campaigning on environmental issues

Student Project Coordinator	Kamonchanok Viriyatharangkurn	
	Tel. 086-493-3155	Email: bsac.leadership@gmail.com
Project advisors	Professor Dr. Supawan Tantayanon	Email: supawan.t@chula.ac.th
	Prof. Rosemary Taylor	Email: rosemaryt@wpi.edu
	Prof. Steven Taylor	Email: sst@wpi.edu

Course staff Mr. Suwat Muangtha Email: suwat.m@chula.acth
Students participating in the project:

1. Kamonchanok Viriyatharangkurn 6338002723
2. Varissara Suneeratanakul 6338087023
3. Vitsupa Hengnopparatkul 6338088723
4. Araya Deesuwan 6338110823
5. Conor Dolan
6. Mae Felkner
7. Jailyn Medeiros
8. Elliot Sherman

Appendix D: Workshop Agendas

Workshop Agenda at Assumption College English Program School

Agenda

Thai youth environmental interactive activities

Date 2 February 2023 Time 13.00 - 14.30 PM (90 minutes)

At Assumption College English Program School

12.30-13.00 30 mins	**(Registration) - give pre-survey**
13.00-13.05 5 mins	**(Opening speech/Introduction)** by WPI and CU students
13.05-13.15 10 mins	**Give a lecture to youth about why conserve the natural environment.** by Dr. Puntita Tanwattana (Chula Professor)
13.15-13.25 10 mins	**Give a lecture youth about role of youth & nature conservative** by Dr. Puntita Tanwattana (Chula Professor)
13.25-13.55 30 mins	**Group Activity: Mind mapping on problems and solutions in each topic** ● Air Pollution ● Plastic Waste ● Climate Change
13.55-14.20 25 mins	**(Youth's presentation)** Youth representative from each group ● presentation on mind-mapping ● what they learned
14.20 10 mins	**(Summary and closing) post survey** by WPI and CU students
Snack Break	

Note: The schedule is subject to change as appropriate.

Workshop Agenda at Chulalongkorn University Demonstration Secondary School

Agenda

Thai youth environmental interactive activities

Date 8 February 2023 Time 13.50 - 15.30 PM (100 minutes)

At Chulalongkorn University Demonstration Secondary School

13.50-14.10 20 mins	**(Registration) - give pre-survey**
14.10-14.15 5 mins	**(Opening speech/Introduction)** by WPI and CU students
14.15-14.25 10 mins	**Give a lecture to youth about plastic pollution and waste management** by Dome Boonyanurak Co-Founder & CMO of GEPP SA-ARD
14.25-14.35 10 mins	**Give a lecture youth about role of youth & nature conservative** by TEI
14.35-14.55 20 mins	**Group Activity: Mind mapping on problems and solutions in each topic** ● Air Pollution ● Plastic Waste ● Climate Change
14.55-15.20 25 mins	**(Youth's presentation)** Youth representative from each group ● presentation on mind-mapping ● what they learned
15.20-15.30 10 mins	**(Summary and closing) post survey** by WPI and CU students
Snack Break	

Note: The schedule is subject to change as appropriate.

Appendix E: Student Survey Protocol

Survey (Students)

Mobilizing Thai Youths in Tackling Environmental Issues

Date.....Month.....Year 2023

Interview moderator.....

For students

Please mark ☑ in ❑ that matches your answer

Part 1: General information

1.1 Name .....

1.2 Gender

❑ Male ❑ Female

❑ Other ❑ Prefer not to say

1.3 Age .....

1.4 School .....

1.5 What grade are you in

❑ Lower secondary …… ❑ Upper secondary ……

Part 2 Access to information about environmental

2.1 Which type of media do you receive environmental news from? How often?

Type of Media	How frequently of receiving environmental news				
	Daily	4 - 5 times a week	2 – 3 times a week	1 – 2 times a week	None
1. Television					
2. Book/Magazine					
3. Facebook					

4. Twitter					
5. Instagram					
6. TikTok					
7. YouTube					
8. Others….....					

2.2 What major environmental issues are you currently aware of, nationally and globally? (You can choose more than 1 answer)

- ❑ Climate change
- ❑ Plastic pollution
- ❑ PM. 2.5
- ❑ Other .....

2.3 What forms of media do you find most interesting about environmental issues?

❑ Short Video ❑ Movie/Series/Cartoon ❑ Advertisement

❑ Games ❑ School Activity ❑ Textbook

❑ Environmental Training Camp ❑ Youtube Content ❑ Other.....

Part: 3 Knowledge and understanding of environmental issues

Understanding of the environmental problems	**Level of understanding**				
	Very Well (5)	**Well (4)**	**Moderate (3)**	**Low (2)**	**Very Low (1)**
1. Your school teaches about environmental issues					

2. Students understand the causes of the environmental issues					
3. You have an understanding of the factors that cause environmental problems					
4. Student recognize the impact of human destruction on the environment					

Part 4 Environmental responsibility

Environmental responsibility	**How frequently do you do these things?**			
	Always (4)	**Often (3)**	**Rarely (2)**	**Never (1)**
1. Students are involved in reducing air pollution problems (PM 2.5) such as walking or cycling a short distance, not burning weeds or grass, etc.				
2. Students are involved in reducing plastic pollution such as reducing the use of Styrofoam and single-use plastic products, using cloth bags instead of plastic bags, carrying a personal bottle of water, etc.				
3. Students are involved in reducing the use of resources and energy, such as turning off the lights when not in use, using water sparingly, not leaving the water running while brushing your teeth, reducing the use of paper, etc.				

4. Students are involved in reducing the problem of food waste by serving just enough food and drinks, etc.				
5. Students usually separate various types of waste such as sorting out the garbage before throwing it away or doing waste management according to the 3R principle (Reduce, Reuse, Recycle).				

4.6 Do you participate in environmental clubs/ environmental campaigns/conservation activities?

❑ Yes ❑ No

4.7 From Q.4.6 , if yes, which club/ campaigns / activities? (If no, you can skip this question)

……

……

4.8 Has your school conducted any kind of environmental activity?

❑ Yes ❑ No

4.9 From Q.4.8 , if yes, what activity?(If no, you can skip this question)

……

……

Part 5 Additional suggestions/comments (please specify your opinion)

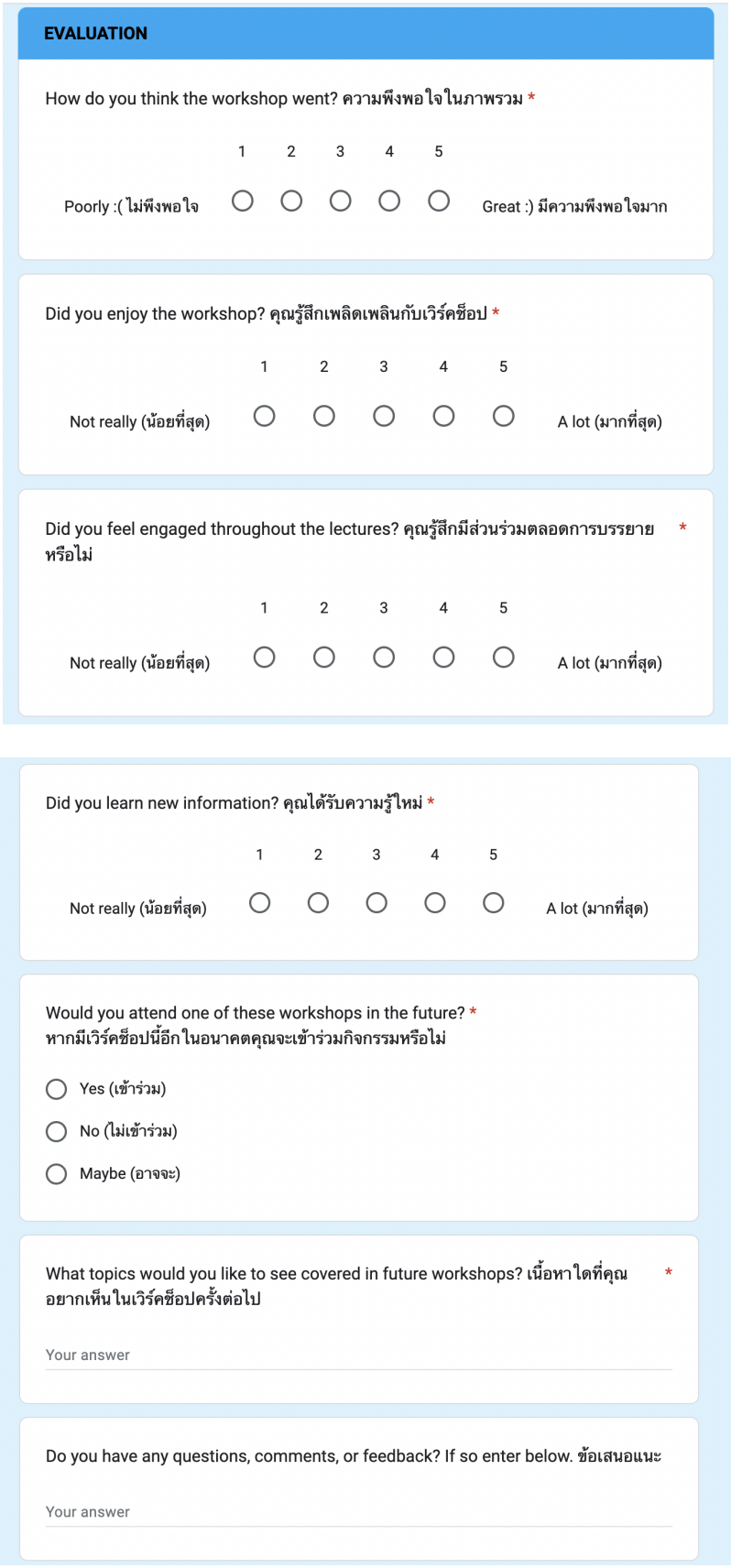
5.1 What role do you see yourself playing as a student in solving environmental issues?

……

……

**** Thank you for your time in completing our survey ****

Appendix F: Post-Workshop Student Survey Protocol



EVALUATION

How do you think the workshop went? ความพึงพอใจในภาพรวม *

	1	2	3	4	5	
Poorly :(ไม่พึงพอใจ	○	○	○	○	○	Great :) มีความพึงพอใจมาก

Did you enjoy the workshop? คุณรู้สึกเพลิดเพลินกับเวิร์คช็อป *

	1	2	3	4	5	
Not really (น้อยที่สุด)	○	○	○	○	○	A lot (มากที่สุด)

Did you feel engaged throughout the lectures? คุณรู้สึกมีส่วนร่วมตลอดการบรรยายหรือไม่ *

	1	2	3	4	5	
Not really (น้อยที่สุด)	○	○	○	○	○	A lot (มากที่สุด)

Did you learn new information? คุณได้รับความรู้ใหม่ *

	1	2	3	4	5	
Not really (น้อยที่สุด)	○	○	○	○	○	A lot (มากที่สุด)

Would you attend one of these workshops in the future? *
หากมีเวิร์คช็อปนี้อีกในอนาคตคุณจะเข้าร่วมกิจกรรมหรือไม่

- ○ Yes (เข้าร่วม)
- ○ No (ไม่เข้าร่วม)
- ○ Maybe (อาจจะ)

What topics would you like to see covered in future workshops? เนื้อหาใดที่คุณอยากเห็นในเวิร์คช็อปครั้งต่อไป *

Your answer

Do you have any questions, comments, or feedback? If so enter below. ข้อเสนอแนะ

Your answer

Appendix G: Teacher Interview Protocol

We are a group of Worcester Polytechnic Institute (WPI) and Chulalongkorn University (CU) students working with the Thailand Environment Institute (TEI). Our goal is to assist TEI to better engage young people in raising awareness about environmental issues such as air pollution and PM 2.5, climate change, plastic pollution, and waste. As a teacher, you have insights into your students' perceptions of environmental issues, as well as the best platforms to reach them on social media. Your participation in a short interview, lasting no longer than 15 minutes, will help us to better understand what young people in Thailand think about the environment and how best to engage them. Thank you for your time and consideration.

Your responses will only be used to help us assist TEI to engage with Thai youth and increase awareness of current environmental concerns.

Please introduce yourselves, which school are you from and which subject are you teaching or the head of?

1. Do you believe there is enough youth engagement and interest in environmental issues?
2. What are your thoughts on Thai youth's ability to become active around environmental concerns? Do you think youth have the ability to make a difference?
3. Do you believe more environmental issues should be covered in the school curriculum?
4. What teaching methods do you find to excite and engage students?
5. What type of social media platforms do you find your students using the most? What kind of content engages them?
6. What could Thailand Environment Institute be doing to reach young students?

If you have any further suggestions or questions, you can reach our team at bsac.leadership@gmail.com

Appendix H: Teacher Survey Protocol

Survey (Teachers and Staffs)

Mobilizing Thai Youths in Tackling Environmental Issues

Date.....Month.....Year 2023

Interview moderator.....

For Teachers and Staff

Please mark ☑ in ❑ that matches your answer

Part 1: General information

1.1 Name .....

1.2 Gender

❑ Male ❑ Female

❑ Other ❑ Prefer not to say

1.3 Age .....

1.4 School .....

1.5 Which subject are you belonging to

❑ Science ❑ Mathematics ❑ Social studies

❑ Arts ❑ Languages ❑ General administration

❑ Other ……

Part 2 Access to information about environmental

2.1 Which type of media do you receive environmental news from? How often?

Type of Media	How frequently of receiving environmental news				
	Daily	4 - 5 times a week	2 – 3 times a week	1 – 2 times a week	None
1. Television					
2. Book/Magazine					

3. Facebook					
4. Twitter					
5. Instagram					
6. TikTok					
7. YouTube					
8. Others….....					

2.2 What major environmental issues are you currently aware of, nationally and globally? (You can choose more than 1 answer)

- ❑ Climate change
- ❑ Plastic pollution
- ❑ PM. 2.5
- ❑ Other .....

2.3 What forms of media do you find most interesting about environmental issues?

❑ Short Video ❑ Movie/Series/Cartoon ❑ Advertisement

❑ Games ❑ School Activity ❑ Textbook

❑ Environmental Training Camp ❑ Youtube Content ❑ Other.....

2.4 From Question 2.3: Please specify the name of the media/channel that you are interested in.

.....

.....

Part: 3 Knowledge and understanding of environmental issues

Understanding of the environmental problems	Level of understanding

	Very Well (5)	Well (4)	Moderate (3)	Low (2)	Very Low (1)
1. You teach about environmental issues at the school you belong to					
2. You have knowledge and understanding about various environmental problems that occur today.					
3. You have an understanding of the factors that cause environmental problems					
4. You read and understand environmental information from various types of media by yourself					
5. You are aware of the impact caused by human destruction of the environment.					
6. You have knowledge and understanding of scientific and environmental terms such as global warming, microplastics, PM 2.5, plastic waste.					

Part 4 Environmental responsibility

Environmental responsibility	How frequently do you do these things?			
	Always (4)	Often (3)	Rarely (2)	Never (1)
1. Do you participate in environmental campaigns or conservation activities?				

2. You are willing to notify the relevant agencies or people when you see environmental problems.				
3. You are involved in reducing air pollution problems (PM 2.5) such as walking or cycling a short distance, not burning weeds or grass, etc.				
4. You are involved in reducing plastic pollution such as reducing the use of Styrofoam and single-use plastic products, using cloth bags instead of plastic bags, carrying a personal bottle of water, etc.				
5. You are involved in reducing the use of resources and energy, such as turning off the lights when not in use, using water sparingly, not leaving the water running while brushing your teeth, reducing the use of paper, etc.				
6. You are involved in reducing the problem of food waste by serving just enough food and drinks, etc.				
7. You usually separate various types of waste such as sorting out the garbage before throwing it away or doing waste management according to the 3R principle (Reduce, Reuse, Recycle).				
8. You choose to use products that help reduce pollution, such as products with environmental labels, products that are made from recycled or waste materials, etc.				

Part 5 Additional suggestions/comments (please specify your opinion)

5.1 What role do you see yourself playing as a teacher in solving environmental issues?

……

……

……

……

……

5.2 Any other suggestions/comments

……

……

……

……

**** Thank you for your time in completing our survey ****

Appendix I: Teacher Interview Transcripts

All of our interviews started with introductions and a description of our project.

Interview with Teacher James

Interviewer: Please introduce yourselves, which school are you from and which subject are you teaching or the head of?

Teacher James: Hi, my name is James C, I am a teacher at a high school in Bangkok, Thailand. I am the social studies coordinator and at the high school I teach social studies through high school, mainly.

Interviewer: Do you believe there is enough youth engagement and interest in environmental issues?

Teacher James: In Thailand, probably not enough. I don't think that beyond the classroom there is a great deal of exposure to these issues, and when you're looking at more traditional high schools or government high school, for example, upcountry or more rural areas, then there really isn't the impetus within them to engage in environmental studies. More often than not they are restricted by time or restricted by resources, and, you know, when they look outside in the environment it really hasn't changed in many years for them if they're in rural areas, they just see the same thing year after year. They are not necessarily seeing it from the global impacts that perhaps we see when we look at it on YouTube or some international perspective.

Interviewer: What are your thoughts on Thai youth's ability to become active around environmental concerns? Do you think youth have the ability to make a difference?

Teacher James: Oh I really do. The ones that engage in it, you know, Thai students, really engage particularly in Bangkok. The students here are more affluent and have the financial resources to engage in these activities. Those who find an interest in this will go ahead and do it. In my class we run a class on the Sustainable Development Goals (SDGs). Part of that is looking at all of the environmental issues and having students engage and contribute, so they do not just have to go and do assignments on this but they actually have to go and show me how they are involved in environmental action. That's where I give them their grades, writing another essay on it doesn't really help me get them out there, what I want them to do is go out there and show me their actions, which has been very successful. So once they are engaged it is very very possible to get them involved. Now their posting on their social media, their Instagram, showing people what they can do. If it can spread, then that's a great thing.

Interviewer: Do you believe more environmental issues should be covered in the school curriculum?

Teacher James: Yes. It's barely touched upon in social studies because of a national perspective opposed to the environment, and I think that, in the science program, they do approach climate change but they are looking at it from the scientific focus point. They look at it based on the climate, and it's never really an area of study. I believe it's a result of other factors, and it can be brought in as a subject of its own, especially in high school. This is what we've always done and we're getting good responses from the students but it should be brought in as a subject, I think.

Interviewer: What teaching methods do you find to excite and engage students?

Teacher James: Getting students excited is always a hard one. What I've tried to do with my students in the current SDG course is try to get them more engaged and involved. What I do is use what I have created which is called “PACE”, which stands for “Publicize, Act, Contribute, and Educate others", so it's part of their lessons and its 4 lessons over each topic and what they have to do is investigate it and publicize it to other people. Publishing can be short, it can be a TikTok video, posters around the school, it can be getting up and doing a small speech at assembly in the morning. They have to investigate other peoples actions, they have to investigate at different levels [grades], they have to show their contribution to this through any other way like through the app ACTnow. It's part of the AA world act, which is about SDGs, and it has a series of actions they have to complete in a week to hit a goal that I check on.

Again, we’re gamifying it. I've also had the students make info videos, they’ve created quizzes and other quiz up sites. This has made it a bit more attainable for them, rather than making it another essay, or another report. They’re more engaged because it’s hitting them in short bursts. It's where they can participate and do more activities, they are actively contributing and making changes in their life. I try to get them to reflect on that, so they think about “how easy was it to make a change in your life? To contribute to the environment? and they are getting that positive reflection thinking that it wasn't that difficult, it's not changing my life that much, I could do a plant-based meal once a week. They can start to change their lifestyle and that's really what I’m aiming for, that and then educate other people, making it more about their actions instead of just another report, another study, or reading the new report which is just too long and boring for them. The point is to reach them at their level and at something that works for them.

Interviewer: Would you say that works for the older students as well?

Teacher James: I would say when you get up to seniors they want to investigate more. But it just falls into the same trap of being another report or another assignment. What I want is to actually see them doing it. I think learning by doing is an integral part of teaching this kind of activity.

Interviewer: What type of social media platforms do you find your students using the most? What kind of content engages them?

Teacher James: I would guess TikTok and Instagram are the main ones for these guys. What engages them? Well, I’ve noticed over the years is the shortening of videos. The videos have gone down now in terms of lengths where it gives short bursts of information, which proves better than say to go watch a documentary for 50 minutes. That just doesn't happen anymore, they need to have something that is in short bursts. And that's what we understand, how the media has changed, if these videos are longer than 2 minutes, forget it, they’re past it. That's what I’m asking these kids to do, to make a short educational video that lasts 30 seconds that will get a point across. That's a task in itself, they’ve got to think outside the box in order to do that. That's what I see them watching and I think that's where they get their information from.

Interviewer: What could Thailand Environment Institute be doing to reach young students?

Teacher James: In Thailand, I think the problem here is that, in places with a lot of environmental interest, there tends to be a large divide between the wealthy and the poor in this country, so in government schools they are not very invested in they tend to be a bit run down. Where I’ve seen better responses is where there has been investment in the infrastructure for visitors centers for people to come and educate. If it's still something that hasn't been touched upon since, you know, 1980 or early 1990, then the students just aren't

interested. It's got to be updated, it's got to have that interactive quality. They can just be plaque that they're going to read again that just won't work, they're not going to react to that. Then the distance to get to these environmental areas is often very very far. The distance to get to the forest for example is like a 4-5 hour drive, that just is not achievable for a family on a weekend to just go and help with that. It takes a whole lot more planning.

There's just not the accessibility for Bangkok schools. I mean we're in Bangkok and still a day trip doesn't get you very far, just because getting out of Bangkok traffic is a hell of a job and then you've got to think about traveling back. You just can't get very far so maybe think about making it more accessible. It doesn't have to be in the middle of the forest, the learning center can be a stepping stone that gets them there because again the accessibility. I think the technology and the style of these places should change to appeal to students and children, you know this old idea of what education should have been, the idea of plaques and the rest of it. I have seen some really good ones here, and those ones, when I've gone with students, have been very successful. Perhaps I need to look back at these and realize which ones are engaging the students the most. Then of course this week we're actually going to go do the mangrove planting with a group from the school. Activities that have the student involved and actually engaged are vital, because the students love that sort of thing. Students love getting dirty, getting muddy, doing stuff like this with their friends as opposed to just learning about it and not being able to touch it or feel it. At this school we are trying to do that. We plan trips to go out and actually do something with the environment. We go out and learn about the forest, we go to the mangrove plantation, and I've seen the success that comes from those students who are actually engaged out there.

I think it is essential that the schools link up with these environmental agencies or the agencies link with schools to make this an accessible feature for them, that the schools will go and do these activities. I don't think that keeping themselves separated from schools will work, they will never be able to reach them. Schools, not to be horrible, are not innovative, they're institutions. They have habits that they won't change and they need somebody to come in and push for these changes and say "hey, this is a new thing for you guys to do and this is what is engaging for the students," that's going to help them reach the youth of Thailand. Having activities set up will get passed by students, you really have to get it into the schools, that's the only way the students will notice. Getting into the schools is really the only way to get to the students, but like I said, schools don't change the way they do things easily.

Interviewer: I know you mentioned visiting places with your students, could you tell me more about there? Where specifically did you visit?

Teacher James: Yeah, Khao Yai National Park. We went to Khao Yai National park, which is about a 3 hour drive from Bangkok. We do a three day, two night, residential there where we look at rivers, river pollution. We look at the impact of tourism on the environment. We look at the biodiversity and the plant adaptations, etc. So while they have learned about it, it's vital for them to actually get out there and touch and realize that this environment is on their doorstep. They realize that it's not just in a book or a video but it's real and a really interesting place. And then we go down to the mangrove plantation that's down in (ASK 12:01) and it's a sustainable tourist site so you've got the local people running this, they're the ones working there, and there the ones trying to manage their cockle farming. Obviously, years ago the mangroves had been deforested to make room for shrimp farming and salt plants. They are trying to reclaim that land and in order to do that planting of the mangroves, which is working as sustainable tourism in a way.

Interviewer: Thank you again for your participation and assistance.

Interview with Teacher Kraisak

Interviewer: Please introduce yourselves, which school are you from and which subject are you teaching or the head of?

Teacher Kraisak: My name is Kru Kraisak. I am teaching social studies for students in grades 7-9.

Interviewer: Do you believe there is enough youth engagement and interest in environmental issues?

Teacher Kraisak: Oh very little I'd say. Students or even teenagers in general are of the age of being uninterested in environmental issues so pollution problems or such things they wouldn't know much about. And the majority of them still have no idea how they could solve the problem.

Interviewer: What are your thoughts on Thai youth's ability to become active around environmental concerns? Do you think youth have the ability to make a difference?

Teacher Kraisak: What I can see is students keeping trash, looking after trees, or even helping reduce the use of petrochemicals. Changing from riding a motorcycle to school they may change to riding a public transportation (bus) to school. When we teach them there are certain groups that do what we taught them, but again it's just from a small group.

Interviewer: Do you believe more environmental issues should be covered in the school curriculum?

Teacher Kraisak: The educational curriculum does say about having students to learn about solving environmental issues, but that means nothing because they are only learning it theoretically and have not done it practically. For instance, we teach them about global warming and its cause but at the end they only know about it theoretically and do not know how they can solve it. Like for driving, they will still drive any way and for waste they may be able to break it down a little more but only when they are in school. So I think changes in behavioral aspects may be a little difficult.

Interviewer: What teaching methods do you find to excite and engage students?

Teacher Kraisak: I think it is a hand-on activity. But most hand-on activities we do today I have to say that it is not that efficient because we don't have that much resources and budget to allow students to really see a big and real picture of how their contribution can help enhance the world. So what we can do is only through media like television and through books they've read, but the concrete byproduct can't really be achieved.

Interviewer: What type of social media platforms do you find your students using the most? What kind of content engages them?

Teacher Kraisak: Hand on activities. First is an enjoyable teaching method because we need to gain their attention. Especially these days with social studies, which is a boring subject, it's difficult to have their attention. So first is personality, I would need to make my personality looks fun and enjoyable so that it will attract the students. So while teaching theoretical lessons I would also add in jokes and fun to make the lesson seem not too boring so they will enjoy it and tend to learn better. Content wise if there is a short video the students would be more interested. But again 'short' videos only, if they are too long students sleep. After they've watched the video I would often let them write a reflection on what they've learned. All the media displayed to students are not given by the curriculum, teachers will have to explore and show it to students.

Honestly, our schools are not that financially supported to create our own media, with our salary it's not that sufficient to create one. Like when holding an event or when they want something to be done they'll just give paper and go plan themselves, they did not give us the paper and 'money' so nothing much can be done and I think that is the problem that is ongoing and can't be fixed.

Interviewer: What could Thailand Environment Institute be doing to reach young students?

Teacher Kraisak: In order to reach more youth to be aware of environmental issues, I think TEI can have workshops and speakers to provide this information. For me personally, if I were told to teach students about the environment I can teach them but not in a detailed manner. So if they want to improve this matter in the long run they may have a workshop at school once every month. Or if that isn't possible they may give out media to teachers, train teachers so that they can be knowledgeable enough to teach these topics to students. I think that would be great.

Interviewer: What do you think about having a workshop with school? Is there anything you want to add that would catch the interest of these students? If it's a typical workshop where there are speakers to give out lectures do you think that will be efficient?

Teacher Kraisak: I'd think to make the workshop efficient and attract students you may need to have activities like games or give them incentives because if there's just only a speaker students may be uninterested. Most students like things that are achievable, for instance I teach them they answer my questions, then they'll get points for it. But it also depends on students and schools. Like for our school they are easily fooled(?) by incentives we give because their backgrounds are different. But for schools like in the cities they may not be that interested because the incentives we give them may be something that they think they could buy themselves. So it depends on different kinds of students.

Interviewer: Thank you again for your participation and assistance.

Interview with Teacher Luke

Interviewer: Please introduce yourselves, which school are you from and which subject are you teaching or the head of?

Teacher Luke: Alright, so I'm Luke, I teach at a high school in Bangkok. I'm a high school science teacher, I teach biology and physics."

Interviewer: Do you believe there is enough youth engagement and interest in environmental issues?

Teacher Luke: I mean, enough is a tricky word. It's definitely increasing, if I compare it to when I started in education more than ten years ago, or even longer in my youth. It wasn't as talked about, it would be more of a niche thing. It's much more common for students to be more aware of the issues. I don't know if that necessarily translates to large amounts of action, but I think the awareness is certainly there now. It doesn't mean there isn't more room for growth still, though. Especially taking that awareness and putting it into action, actual solutions, problem solving, I think there's certainly a lot to be done there still.

Interviewer: What are your thoughts on Thai youth's ability to become active around environmental concerns? Do you think youth have the ability to make a difference?

Teacher Luke: Yeah, they certainly do. Youth have energy on their side, that's always gonna be good for them. I think they're more connected than any generation before. The speed at which information travels and just overnight appears and then can be worked on immediately as well, collaboratively. I think there's a huge amount of potential there. They certainly do have the ability, their voice is probably their biggest ability. They can bring about the awareness, and I don't think it's their responsibility or role within a society to solve the problems, but it will be in the future certainly, as they progress through their lives and have more share of the power, they'll have more opportunity to write the policies or impact the policy writers. So I think starting at any age, there is some aspect and it might just be really basic awareness or understanding of the situation. But there is something that can be done by the youth, and it will only grow from there.

Interviewer: Do you believe more environmental issues should be covered in the school curriculum?

Teacher Luke: That is a tricky one for me. Personally I have a feeling that there is an overwhelming amount of curriculum already for Thai students, so I don't know if I would just want to add more. I think environmental concerns are definitely worthwhile, but I think there is a danger of overloading students and I think it's already occurring here in Thailand. I think that's just my personal opinion at least. Within the curriculum, there's certainly some things we can do. Maybe just a general approach of critical thinking skills, problem solving, collaborative working. I think those types of things can be applied in lots of different fields and subjects. And environmental issues are easily one of them.

Interviewer: What teaching methods do you find to excite and engage students?

Teacher Luke: Yeah, the best practice for teaching is an issue that's kind of always being pushed forward, and I think as a science teacher we have great opportunities for hands-on learning, any kind of lab experiment work, any kinds of field trips we can do, those are very memorable experiences for students. So even if they're not always that academically focused, or on heaving learning, students tend to remember it and experience it in a different way. So I think the hands-on is an easy one for science teachers. Lessons have got to become more interactive and engaging now. So maybe a short video here and there, but even that can be overdone. So I think anything where the students are engaged themselves. If you can get

competition into it, kids love the competition. Everyone loves competition, even if it's friendly and in the nurturing environment of the classroom. I think it gets people engaged and you can learn with the game-ification now is a big thing. We do something typically with our year 11 students where they can do their own science project mentored by the teachers. We've had students in past groups that have gone after things that are related to environmental concerns such as water purification, pollution, different things like that. So we do have different opportunities there.

Interviewer: What type of social media platforms do you find your students using the most? What kind of content engages them?

Teacher Luke: I have to admit I'm probably a bit out of date on some of this stuff, but I see it. Instagram is still wildly popular, and TikTok as well; YouTube. I think with that there's user-driven content, and with that there's a huge variety of stuff. You see students that spend all their time watching games on it, there's probably avenues of adding education to that. Even watching cooking shows and things like that on YouTube, you might not expect that from youth. Just from what I've witnessed, I'd say Instagram, TikTok, and YouTube are the big ones.

Interviewer: What could Thailand Environment Institute be doing to reach young students?

Teacher Luke: I think the questions kind of lead you here, and it's logical where it is social media with the youth. And if you're not using that to reach them, you're probably not reaching them, or at least to the extent that you could be. I think engagement's the big part. I'm not an expert on these things but if I see a Poland you just have to click a yes or no type of thing, I'm going to do it, and I think most people have that type of reaction. So I think if you can get the audience response from the youth, that helps. Again I don't know if that does translate to action exactly, it might even be detrimental in some ways. People have a feeling that they've done something positive just by answering a question or posting, but it doesn't really make a huge difference. Not that that's necessarily a bad thing, and if it gets the conversation started, that's impactful. It can go a lot of different ways. I think another one maybe for something that maybe like something for outreach towards schools and awareness is the goal, I think there's a lot that can be done through awareness with social media. And the information spreads instantly. If they can get the right influencers involved, you might reach audiences who might not even consider environmental issues.

Just to add on, I think everything needs to be age appropriate, and there's going to be debates on what that is. But you can't jump to problem solving, science literacy is one of the first things that needs to be taught. You probably saw some of this with the pandemic and the misinformation spread too, where if we're not teaching all students and all people science literacy, we can't even begin to think critically about it. I think it starts with really basic knowledge, awareness of it, the vocabulary involved with this stuff because it is highly technical. And if you can't read a journal article and you misunderstand it, it can go very wrong and you're not solving the problems. And then to add just one more thing, the tools might be as simple as just the scientific method, and I think any of this problem solving, we have to approach it from data driven and empirical data, where if you do try to solve a problem, you are observing and tracking it and getting results that can be replicated. So I think even some of the simple things we teach to young kids from the beginning of their science education could be applied at any level.

Interviewer: Thank you again for your participation and assistance.

Interview with Teacher Nigel

Interviewer: Please introduce yourselves, which school are you from and which subject are you teaching or the head of?

Teacher Nigel: So my name is Nigel, and I teach biology and chemistry.

Interviewer: Do you believe there is enough youth engagement and interest in environmental issues?

Teacher Nigel: There definitely could be more. In some countries around the world, they actually have a separate subject about environmental issues, environmental management. In schools here in Thailand, it's kind of, maybe one chapter that you would do as part of biology or part of chemistry, but not its own subject. I think if it was its own subject, and we came up with a syllabus and labs, it would be a lot more engaging for students and might encourage them to study at university and make more changes.

Interviewer: What are your thoughts on Thai youth's ability to become active around environmental concerns? Do you think youth have the ability to make a difference?

Teacher Nigel: Yes. There could definitely be more awareness. Before I came onto this, I looked up some stats just to kind of put it into perspective. So in 2021, green peace in Southeast Asia estimated that twenty-nine thousand people died of PM2.5. So that would be from chronic bronchitis, reduced lung function, and heart disease. And since covid started in Thailand, so almost three years ago, the total deaths are just over thirty thousand. So PM2.5 was responsible for almost triple the amount of deaths. But there is very little awareness of this. Last week was pretty bad, you guys might have noticed, it was around two hundred. People did notice then, but when it's a little bit lower and not as bad people don't notice so I think there could be a lot more engagement. I think people have forgotten about it since covid, everyone's aim shifted. So I think, yeah, people could go out, they could protest, they could try to change things, it's something that could be fixed I think and the youth definitely have a role to play in that.

Interviewer: Do you believe more environmental issues should be covered in the school curriculum?

Teacher Nigel: Yes. Yeah. I mean a lot of these things are new issues. Like PM2.5 really only became a real issue here in 2018 or 2019 I think. Before that nobody had really ever heard of PM2.5. So it got really bad that year. And at that point there were no air filters or air purifiers anywhere so they actually had to close all the schools. I think it was around 220 or 230. So they had to close all the schools for a couple of days to reduce traffic to try to bring the air quality down. So yes, there definitely could be more education about it. Since it's only a relatively new problem in Bangkok, it's only been the last four or five years. Whereas things like plastic are widely covered, there's a lot of documentaries about it, people are aware of it. But it's hard to move away from plastic because it's so convenient and it's everywhere. But PM2.5 is definitely something that could be reduced.

Interviewer: What teaching methods do you find to excite and engage students?

Teacher Nigel: So if the students go out and do some projects, do some research. Mind who you are working with, she was in grade ten. I taught them chemistry and we spoke about plastics and crude oil and those sorts of things. They had to go out and make a video kind of presentation. They had to go out to different areas of Bangkok and do their own research and make a video together, which I think they enjoyed and they got a lot out of. Instead of me just telling them all these things they actually got to go out and research themselves. If you can do

some practical experiments in the lab, like testing the water quality, testing for microplastics, different things, that's more engaging than just reading about it in the textbook.

Interviewer: What type of social media platforms do you find your students using the most? What kind of content engages them?

Teacher Nigel: My guess would be they use TikTok and Instagram the most. I don't actually use TikTok, I'm not on it, but I think from just a general overview of teenagers and what they do, I would say TikTok and engaging videos on TikTok is what gets the most engagement and attention from young people. That'd be my guess.

Interviewer: Do you think it's because the videos are so short?

Teacher Nigel: Yes, I think they could only be a minute, two minutes. People don't have time to sit down and watch a two hour documentary but if it comes up on your news feed and it looks cool, it's interactive, people will leave it on for thirty seconds, forty seconds. So I think that's a good way to target the youth, short videos like that.

Interviewer: What could Thailand Environment Institute be doing to reach young students?

Teacher Nigel: So I've actually never heard of them before reading your questions, so they could be doing a lot more. They could be going around to schools, they could maybe do workshops, tell the students what they do, what they're trying to do. Maybe they could ask the students to volunteer, I'm sure a lot of students would give up a few hours over their weekend to do a beach cleanup or many different things. They could set up workshops, I'm sure a lot of students don't really know about them or what they do. So if they raise more awareness, went to schools, students could gain work experience there. A lot of students here you know, it would be nice if they were able to study something about the environment, and maybe they had a chance to do three or four weeks work experience with a company like that. They might learn a lot more about environmental issues and about how they could implement change. Yeah, if they just started going around to schools, I know there's a lot of schools in Bangkok but maybe one school every two weeks for an hour or two hours, that would be a start and then a lot more students would get to know about it, they would talk about it to each other, and all that would raise awareness.

Interviewer: Thank you again for your participation and assistance.

Interview with Teacher Mary

Interviewer: Please introduce yourselves, which school are you from and which subject are you teaching or the head of?

Teacher Mary: So my name is Ms. Mary, I don't have to give you my last name, and I am the oldest in years here at this school. And I happen to be the head of the science department at this time. Our school has been open for about eleven years, we've had lots of graduates because we've started from year one of course, and then year four, and then seven, and then ten, so we've had a few batches already pass through.

Interviewer: Do you believe there is enough youth engagement and interest in environmental issues?

Teacher Mary: At this moment, yes. Yes. For our school we're very… because we're located in a place where you can see, smell, all your senses, the kids are very sensitive to noise pollution or PM2.5. Just today was really extreme, I think it was nearly 200 (on the scale). I teach year nine and year twelve, a special course for the non-science students. Year nine is focused… Just recently I made them research and do a project on plastic pollution. And this place where we are right now, there are rivers and canals probably coming here, but there are canals that plastic is just floating by constantly. And I always ask the kids what do you think,where is it coming from, what you can do about it, they already know the three Rs. And we have one more R, 'refuse.' Our kids are aware. At least year nine, because that's the kids I'm focusing on right now.

Interviewer: What are your thoughts on Thai youth's ability to become active around environmental concerns? Do you think youth have the ability to make a difference?

Teacher Mary: Yes, we have the ability to. I can't speak for other schools, as you've mentioned, we have a big campus. And we had a campaign just two or three weeks ago where it was a cleanup project for the canal. Where other schools came here to help us clean the canals. They pulled the plastic out of the water, they did everything. It can happen! We just, as older people, as adults and teachers, we have to just tell them. And they realize it too, once you tell them they're eating fish with plastic inside… ooh yeah. They got it, they got it.

Interviewer: Do you believe more environmental issues should be covered in the school curriculum?

Teacher Mary: Of course. But, we're limited. At this moment the curriculum, the course selections, all these things, the books. All years are divided into different topics and at this point this topic is only about two months long. And I have other things (I need to teach), so there's not enough time. There could be more, maybe because our school is thinking about changing or adjusting the curriculum. We may have something, but at the moment no.

Interviewer: What teaching methods do you find to excite and engage students?

Teacher Mary: What's exciting is when they start looking for research by themselves. In year nine I have to teach them how to research, how to go for information, and presentations. It's too bad you didn't come a couple days ago because they gave a presentation about plastic. When you're a student in the classroom from 8:00 to 3:30, it's hard to get excited because it's too much time in the classroom.

Interviewer: What type of social media platforms do you find your students using the most? What kind of content engages them?

Teacher Mary: TikTok, all of that, they do all of that. And I'm not good with that but they do it all.

Interviewer: What could Thailand Environment Institute be doing to reach young students?

Teacher Mary: Well they could come here, that's for sure.

Interviewer: Thank you again for your participation and assistance.

Interview with Suankularb Nonthaburi School (SKN) Science Teacher

Interviewer: Please introduce yourselves, which school are you from and which subject are you teaching or the head of?

SKN Science Teacher: I am a science teacher from Suankularb Nonthaburi School.

Interviewer: Do you believe there is enough youth engagement and interest in environmental issues?

SKN Science Teacher: Current students have little interest in the environment because they live in cities, unless students who live in the countryside and would go back home get in touch with nature, but I would still say that students these days have little to no interest in environmental issues.

Interviewer: What are your thoughts on Thai youth's ability to become active around environmental concerns? Do you think youth have the ability to make a difference?

SKN Science Teacher: Actually, the students that we are teaching have good thoughts and foundation, but most of them are theoretical knowledge, they do not really have a chance to do it practically. For our schools students are divided into special program classes (3 classes) and regular (around 11 classes) classes. For the special program, they would have at least 1 camping every semester where activities would include preserving the environment and planting trees where students would be more involved in the activities. While the regular class would have some environmental knowledge laid since their lower secondary. In order for students to have the ability to make the difference I think we need to have them have their consciousness about the issue first. If they acquire and are aware of environmental knowledge, I believe when they go to a higher level they will be able to be a better part of the society in enhancing and conserving the environment. Students will be able to do many things when they are sufficiently aware of it.

Interviewer: Do you believe more environmental issues should be covered in the school curriculum?

SKN Science Teacher: I believe every school has implemented environmental knowledge in their curriculum to be in accordance with the national economic and social development plan and Thailand educational scheme. So I don't think we need to add more to the curriculum but instead add more activities so that students will be more engaged. During their typical class time from around 8am-3pm, I think having activities twice a week would be sufficient in raising their awareness, but because of many things it might be difficult to have it happen. One reason for this is also due to the time they have for each subject which was only 50 minutes. We used to have activities that would bring students out to see plants, learn about the planet system, and talk about the environment.

Interviewer: What teaching methods do you find to excite and engage students?

SKN Science Teacher: Active learning. Focus on coaching the students, and also allow these students to self learn. Self-learning would be more prolonged and allow students to practically learn rather than just theoretical learning.

Interviewer: What type of social media platforms do you find your students using the most? What kind of content engages them?

SKN Science Teacher: For lower secondary level most of them use Instagram, they don't really play Facebook these days. But most of the content they watch is through Instagram. Also TikTok videos, short videos no longer than 30 seconds. I think for

environmental content it would be great to have a short alternative of animation, cartoon, and documentary, not boring content.

Interviewer: What could Thailand Environment Institute be doing to reach young students?

SKN Science Teacher: I think it would relate to the question above, which is creating online media such as Tiktok, and I'm pretty sure it is reachable to our students because all of them have their mobile phone with them.

Interviewer: Thank you again for your participation and assistance.

Appendix J: Complete Data Collection

Platform	Frequency of Use in a Week				
	Daily	4-5 times a week	2-3 times a week	1-2 times a week	None
Television	95	62	79	94	53
Books/Magazines	16	28	75	107	157
Facebook	114	52	63	69	85
Twitter	67	54	62	53	147
Instagram	133	60	50	47	93
TikTok	190	54	39	29	71
YouTube	173	71	60	46	33

Table J-1: Frequency of Media Usage Surveys for Lower Secondary Students

Platform	Frequency of Use in a Week				
	Daily	4-5 times a week	2-3 times a week	1-2 times a week	None
Television	45	66	90	103	92
Books/Magazines	11	31	70	106	178

Facebook	94	51	71	64	116
Twitter	108	64	57	62	105
Instagram	156	74	56	44	66
TikTok	118	55	55	44	124
YouTube	170	412	71	56	28

Table J-2: Frequency of Media Usage Surveys for Upper Secondary Students

Platform	Frequency of Use in a Week				
	Daily	4-5 times a week	2-3 times a week	1-2 times a week	None
Television	139	128	169	198	145
Books/Magazines	27	59	145	213	335
Facebook	208	103	134	133	201
Twitter	172	118	119	115	255
Instagram	289	134	106	91	159
TikTok	308	109	94	73	195
YouTube	343	142	131	102	61

Table J-3: Frequency of Media Usage Surveys for All Secondary Students

Environmental Issue	Age Group		
	Lower Secondary	Upper Secondary	Overall
Air Pollution/PM 2.5	314	359	673
Climate Change	275	325	600
Plastic Pollution	220	253	473
Other (Free Response)	13	16	29

Note: Participants were able to select more than one response for this question

Table J-4: Environmental Awareness Survey for Lower Secondary Students

Form of Media	Age Group		
	Lower Secondary	Upper Secondary	Overall
Short Video	107	113	218
Movie/Series/Cartoon	95	93	187
Advertisement	25	40	65

Games	53	48	102
School Activity	27	20	46
Textbook	6	5	11
Environmental Training Camp	26	17	44
Youtube Content	37	54	92
Other (Not Listed)	6	8	14

Table J-5: Preferred form of Media Survey Results for All Age Groups

Statement	Understanding of Environmental Issues

	Very Low (1)	Low (2)	Moderate (3)	Well (4)	Very Well (5)
Your school teaches about environmental issues	4	26	166	145	42
Student understands the causes of environmental issues	1	24	121	151	86
You understand the factors that cause environmental problems	3	23	114	136	107
Student recognizes the impact of human destruction on the environment	2	10	81	144	146

Table J-6: Understanding of Environmental Issues Survey Results for Lower Secondary Students

Statement	Understanding of Environmental Issues				
	Very Low (1)	Low (2)	Moderate (3)	Well (4)	Very Well (5)
Your school teaches about	25	62	158	97	54

environmental issues					
Student understands the causes of environmental issues	2	7	116	196	75
You understand the factors that cause environmental problems	2	16	88	184	106
Student recognizes the impact of human destruction on the environment	2	5	50	145	194

Table J-7: Understanding of Environmental Issues Survey Results for Upper Secondary Students

Statement	Level of Understanding				
	Very Low (1)	Low (2)	Moderate (3)	Well (4)	Very Well (5)
Your school teaches about environmental issues	29	88	324	242	96
Student understands the causes of environmental	3	31	237	347	161

issues					
You understand the factors that cause environmental problems	5	39	202	320	213
Student recognizes the impact of human destruction on the environment	4	15	131	289	340

Table J-8: Understanding of Environmental Issues Survey Results for All Students

Environmental Issue	Frequency of Behavioral Action			
	Always	Often	Rarely	Never
Air Pollution	45	161	158	19
Plastic Pollution	53	208	111	11
Resource Management	150	179	49	5
Food Waste	132	193	54	4
3Rs (Reduce, Reuse, Recycle)	52	183	135	13

Table J-9: Frequency of Environmental Behaviors Survey Results for Lower Secondary Students

Environmental Issue	Frequency of Behavioral Action			
	Always	Often	Rarely	Never
Air Pollution	62	186	140	16
Plastic Pollution	55	212	128	9
Resource Management	174	166	53	11
Food Waste	155	193	51	5
3Rs (Reduce, Reuse, Recycle)	57	200	130	17

Table J-10: Frequency of Environmental Behaviors Survey Results for Upper Secondary Students

Environmental Issue	Frequency of Behavioral Action			
	Always	Often	Rarely	Never
Air Pollution	106	343	296	34
Plastic Pollution	108	414	237	20
Resource Management	322	342	99	16

Food Waste	285	381	104	9
3Rs (Reduce, Reuse, Recycle)	109	378	263	29

Table J-11: Frequency of Environmental Behaviors Survey Results for All Students

Participation Question	Response	
	Yes	No
Do you participate in an environmental club/campaign?	99	284
Has your school conducted an environmental activity?	239	144

Table J-12: Participation in Environmental Activities Survey Results for Lower Secondary Students

Participation Question	Response	
	Yes	No

Do you participate in an environmental club/campaign?	72	324
Has your school conducted an environmental activity?	190	208

Table J-13: Environmental Participation Survey Results for Upper Secondary Students

Participation Question	Response	
	Yes	No
Do you participate in an environmental club/campaign?	171	608
Has your school conducted an environmental activity?	429	352

Table J-14: Environmental Participation Survey Results for All Students

Type of Role	Age Group		
	Lower Secondary	Upper Secondary	Overall
Waste Management	174	128	302
3Rs (Reduce, Reuse, Recycle)	102	115	217
Resource Management	54	96	150
Burning Waste	19	5	24
Cleaning/Beautification Project	62	18	80
Awareness	9	27	36
Air Pollution	14	34	48
Government Policy	1	5	6
Other (Not Listed)	30	37	67

Note: Participants were provided a free space to list multiple responses

Table J-15: Role in Environmental Activism Survey Results for All Students

Platform	Frequency of Use in a Week

	Daily	4-5 times a week	2-3 times a week	1-2 times a week	None
Television	25	18	27	31	29
Books/Magazines	9	13	24	40	44
Facebook	21	9	26	23	51
Twitter	27	24	19	15	45
Instagram	52	18	14	18	28
TikTok	51	11	22	7	39
Youtube	70	23	9	21	7

Table J-16: Frequency of Media Usage Results for Workshop Participants

Form of Media	Group
	Workshop Participants
Short Video	36
Movie/Series/Cartoon	25
Advertisement	12
Games	21

School Activity	12
Textbook	0
Environmental Training Camp	9
Youtube Content	13
Other (Not Listed)	2

Table J-17: Preferred form of Media Survey Results for Workshop Participants

Statement	Level of Understanding				
	Very Low (1)	Low (2)	Moderate (3)	Well (4)	Very Well (5)
Your school teaches about environmental issues	4	20	61	29	16
Student understands the causes of environmental issues	0	10	36	50	34
You understand the factors that cause environmental problems	2	8	41	50	29

Student recognizes the impact of human destruction on the environment	0	2	33	40	55

Table J-18: Understanding of Environmental Issues Survey Results for Workshop Participants

Environmental Issue	Frequency of Behavioral Action			
	Always	Often	Rarely	Never
Air Pollution	15	60	46	9
Plastic Pollution	21	68	38	3
Resource Management	31	64	30	5
Food Waste	31	67	32	0
3Rs (Reduce, Reuse, Recycle)	16	63	43	8

Table J-19: Frequency of Environmental Behaviors Survey Results for Workshop Participants

Participation Question	Response

	Yes	No
Do you participate in an environmental club/campaign?	78	52
Has your school conducted an environmental activity?	92	38

Table J-20: Environmental Participation Survey Results for Workshop Participants

Type of Role	Group
	Workshop Participants
Waste Management	49
3Rs (Reduce, Reuse, Recycle)	33
Resource Management	18
Burning Waste	0
Cleaning/Beautification Project	1
Awareness	6

Air Pollution	2
Government Policy	3
Other (Not Listed)	3

Note: Participants were provided a free space to list multiple responses

Table J-21: Environmental Awareness Survey Results for Workshop Participants

Statement	Rating				
	1	2	3	4	5
How do you think the workshop went?	1	1	12	28	34
Did you enjoy the workshop?	0	2	15	29	30
Did you feel engaged throughout the lectures?	0	6	18	19	32
Did you learn new information?	1	5	11	19	40

Table J-22: Workshop Feedback Survey Results for Workshop Participants

Participation Question	Response		
	Yes	Maybe	No
Would you attend one of these workshops again in the future?	33	42	0

Table J-23: Future Workshop Attendance Survey Results for Workshop Participants