

CAT 4 RESOURCE DEVELOPMENT

Group 4-005
Project Three Arrows

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Abstract

Project Three Arrows is an online learning package aimed towards educating Secondary One students on the importance of saving the environment, the 3Rs- Reduce, Reuse, Recycle and how they can apply the knowledge they have learned in their daily lives. The package consists of a website which is separated into sections for saving the environment and each of the 3 Rs respectively, quizzes (corresponding to each section of the website) which test users' knowledge of a particular section, and a worksheet titled "My Eco Journey", containing simple activities through which participants can apply the 3Rs in their daily lives.

1. Introduction

1.1 Rationale

Based on a survey we conducted early in the year with 68 Secondary One students, we encountered many Secondary One students who have voiced out their desire to learn more about the 3Rs and saving the environment, as they have insufficient knowledge around this topic. Furthermore, we believed that Secondary One students are still relatively impressionable at their age and that cultivating the habit of practicing the 3Rs early on would benefit them into the long term. As a result, we had the aim of teaching Secondary One students about the various aspects of the 3 Rs and educating them on different ways in which they can apply them in their daily lives.

1.2 Objectives

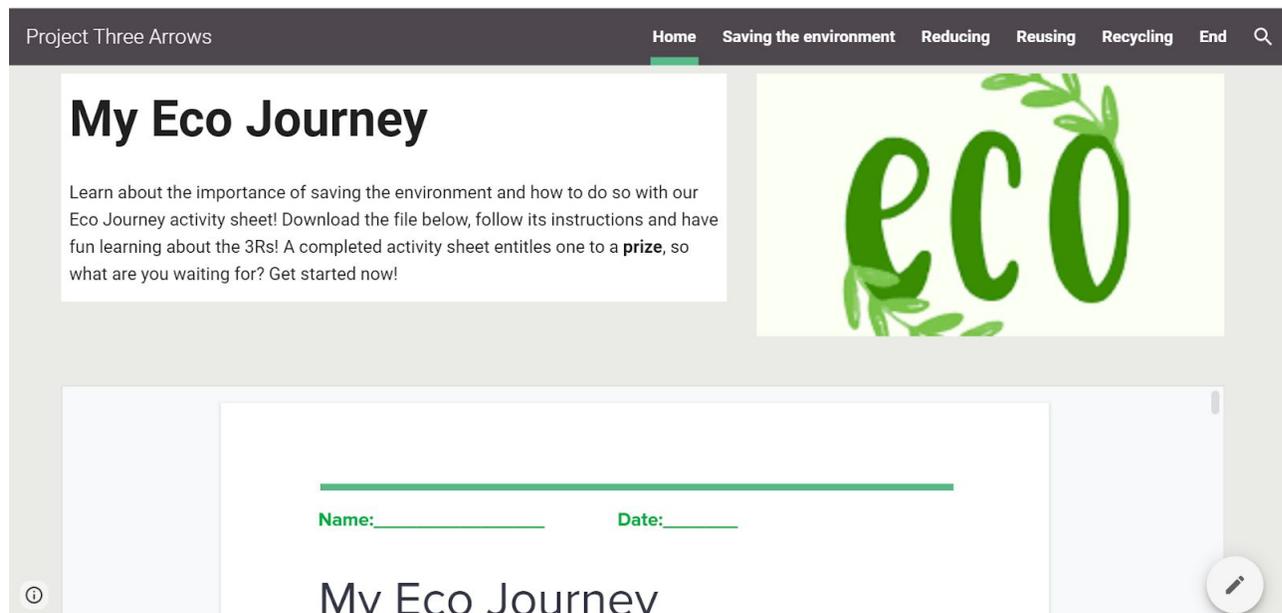
Our project carried two main objectives. The first objective was to teach the Secondary One students about the various aspects of the 3Rs and the importance of saving the environment. The second objective was to educate them on ways in which they can apply the 3Rs in their daily lives.

1.3 Target Audience

The target audience of our project were Secondary One students who showed interest in learning about the 3Rs and applying them in our daily lives.

1.4 Resources

Our main resource was a website which contained the main content and access links to the quizzes and My Eco Journey Worksheet. We added a quiz at the end of each page and a feedback survey on the conclusion page. Lastly, we also included the “My Eco Journey” worksheet which we designed, containing a few simple activities through which the participants could practice the 3Rs.



Home page of the website

Name: _____

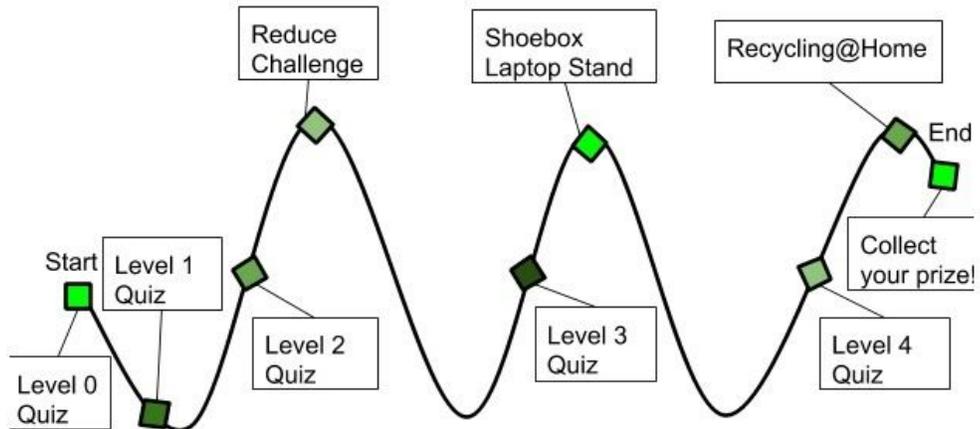
Date: _____

My Eco Journey

This guide is meant to provide information to help you get off to a great and productive start to your eco journey.

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Activity Map



Finish all the activities and get a *prize!*

Fun Activity 2: Shoebox Laptop Stand

Reusing waste

After reducing the amount of waste you produce, it's time to **reuse what you could not reduce**. One way is to **use the waste the way it was used before**(e.g. use the plastic bottle as a water bottle/container before throwing it away).Another way is to take it apart (sometimes) and **repurpose it through DIY**, which is what we are doing in this activity.

Shoebox Laptop Stand

With the COVID-19 outbreak, many countries have resorted to locking down and getting people to work and study at home. Video conference softwares like Google Meet and Zoom were flooded with the amount of people using it for their weekly work meetings and online lessons. A laptop stand can help you position the angle of your laptop so you can **reduce screen glare**, which can lead to eye strain and headaches, such that you can have a **more comfortable time using your laptop**. Here is how to make one out of a shoebox.

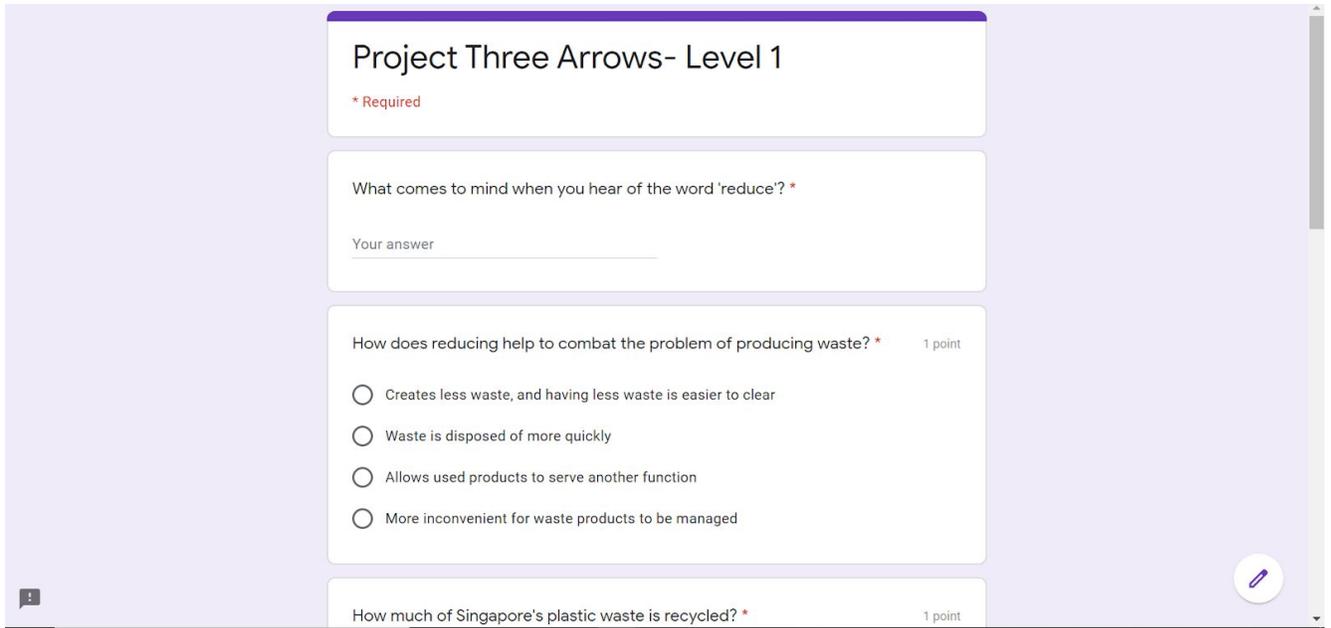
- Prepare the materials.** Scissors, Shoebox, Tape, Ruler(If you can't cut straight)
- Cut diagonally** on the sides of the shoebox with the scissors such that it is from the front up to the back, align the cut off triangular piece with the uncut triangle and secure it with tape
- Trim** the sides of the cover
- Fold** the cover such that it touches the base of the front piece and secure it with tape
- Fold** the front piece of the shoebox into a square tube and use tape to secure it onto the cover
- Cut** holes on the cover around where your laptop's exhaust would be as well as on the back of the shoebox (This is to allow better airflow for your laptop to cool better.)

Video example

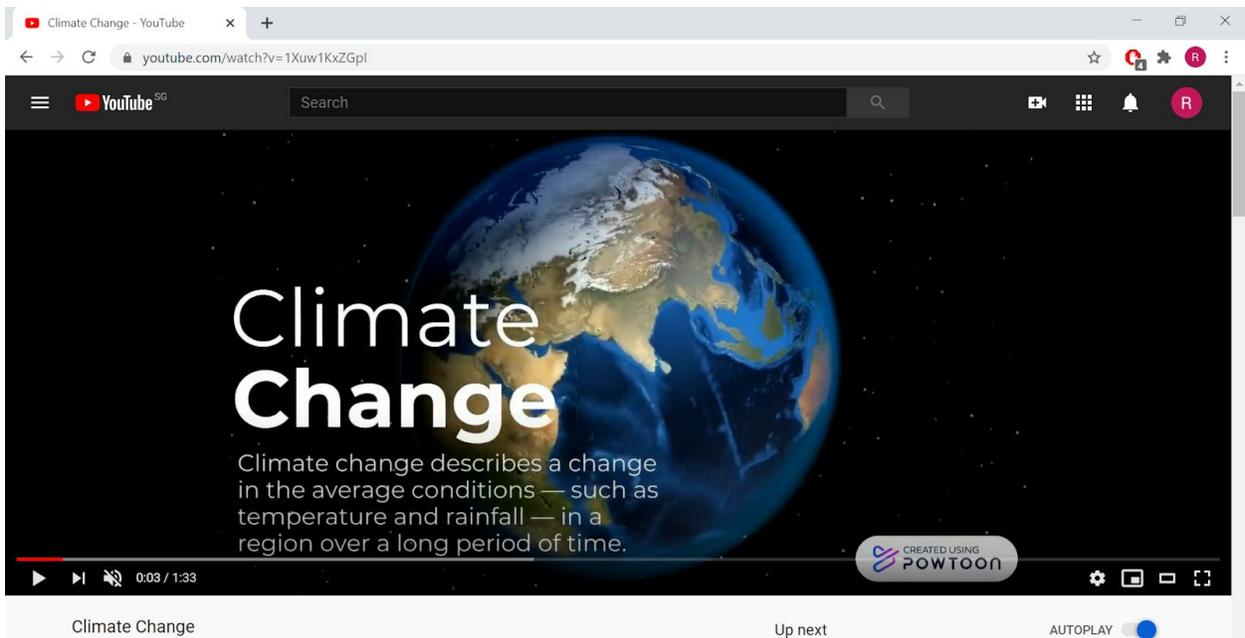
https://youtu.be/sniEITSS_8c

Submission

An activity in the My Eco Journey Worksheet



The quiz located the end of the “Reduce” Section of the website



Video on saving the environment done by us

2. Review

We began our research by finding out the recycling statistics in Singapore

Waste Statistics and Recycling Rate for 2017				
Waste Type	Waste Disposed of (tonne)	Total Waste Recycled (tonne)	Total Waste Output (tonne)	Recycling Rate
Food	676,800	133,000	809,800	16%
Paper/Cardboard	576,000	568,800	1,144,800	50%
Plastics	763,400	51,800	815,200	6%
C&D	9,400	1,599,900	1,609,300	99%
Horticultural waste	107,600	220,700	328,300	67%
Wood	97,300	326,800	424,100	77%
Ferrous metal	7,800	1,371,000	1,378,800	99%
Non-ferrous metal	1,500	92,200	93,700	98%
Used slag	3,100	269,400	272,500	99%
Ash & sludge	214,800	28,600	243,400	12%
Glass	58,900	12,400	71,300	17%
Textile/Leather	141,200	9,600	150,800	6%
Scrap tyres	2,900	33,000	35,900	92%
Others (stones, ceramics & etc)	319,300	7,100	326,400	2%
Total	2,980,000	4,724,300	7,704,300	61%

Metal recovered from Incineration Bottom Ash for recycling is excluded from waste disposed.

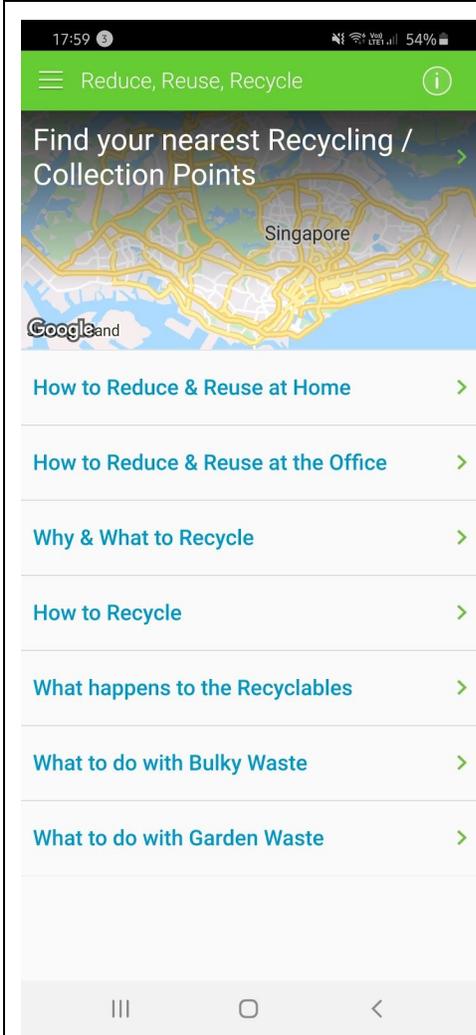
Wood and horticultural waste recycled include 347,300 tonnes used as fuel in biomass power plants.

Chart taken from the official NEA website

This is a chart showing the recycling statistics we have collected from the NEA's official site. Our target audience, being students, are unlikely to encounter industrial materials such as metals and scrap tyres, thus we decided to place our focus on the recycling rates for paper, cardboard and plastic products. As seen from the chart, the recycling rates for the materials in focus are not exactly at a favourable level. Only 50% of paper and cardboard products are recycled and only 6 % of plastic products are recycled. Hence, as there can still be improvement made in this aspect, we decided to place more focus on plastic and paper products in our resource package.

Existing Program	Pros of existing program	Cons of existing program	How our project compares
myENV app	Educates users through providing recycling tips	Lack of depth and coverage on recycling Lack of coverage on the other 2 Rs, Reduce and Reuse	Provides in-depth explanations on all 3 "R"s More coverage on applications and recycling methods
Posters /Pamphlets	Quick and easy reference material Easy to understand	Lack of depth and coverage Posters may be hard to find Pamphlets may be seen as trash and discarded instead	Easy to find and understand Provides in-depth explanation through content
OneMap	Helps users find recycling facilities easily	Does not contain any information on recycling methods/applications	Provides more information about the 3 Rs and its applications

We also compared the existing recycling initiatives to what we planned to implement. Generally, our project would be able to cover the weaknesses of the three main initiatives, while remaining easy to access and understand for users.



Recycling Page on myENV app

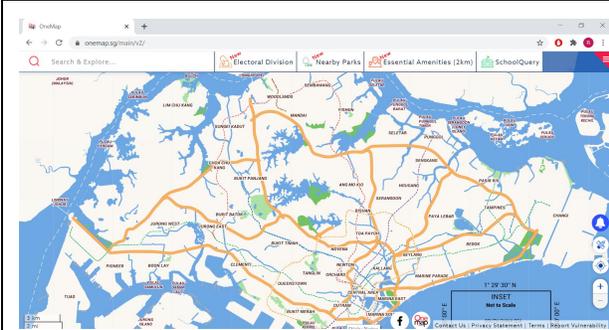


When we don't recycle, we're wasting precious resources. But when we do, it's amazing what they can be made into. Let's give our recyclables a new lease of life by putting them into recycling bags.

www.nepmap.org



Example of recycling poster by NEA



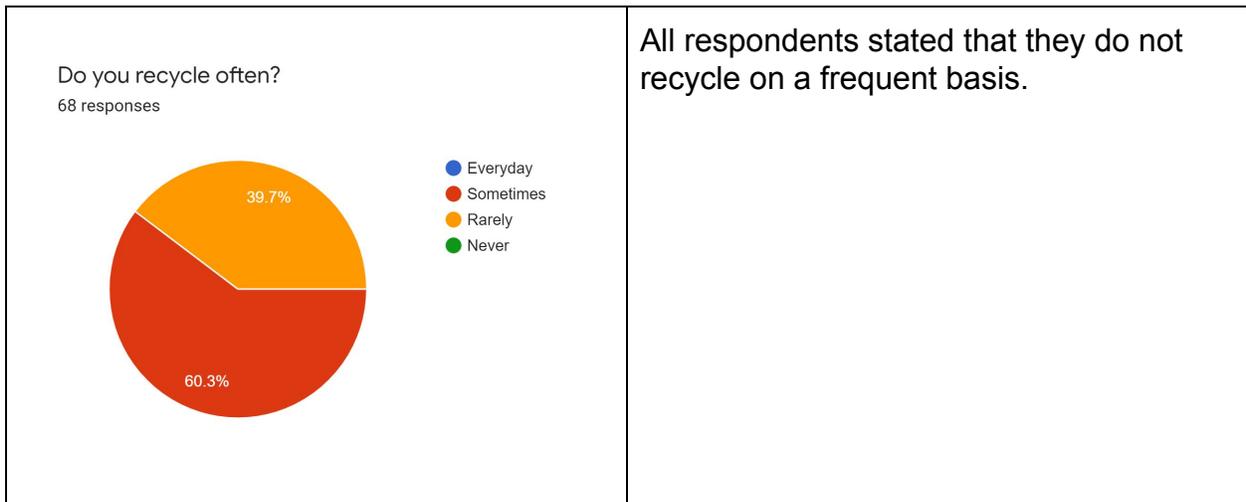
Main page of OneMap

3. Methodology

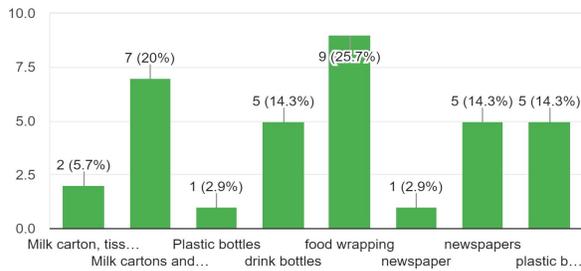
3.1 Needs Analysis

We conducted a needs analysis survey to determine the relevance and utility of such a resource package to our chosen target audience, the Secondary One students. The results showed that most of them lack adequate understanding of the 3Rs, hardly practice the 3Rs, and only recycle a limited range of products on an inconsistent basis. However, they have expressed interest in learning more in this aspect. They have also expressed a preference for such a resource package to be conducted through an online format.

3.2 Survey Results

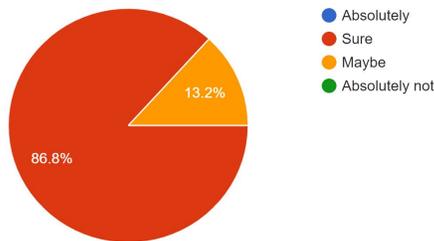


If you answered that you recycle every day or sometimes, list some items you recycle on a regular basis
35 responses



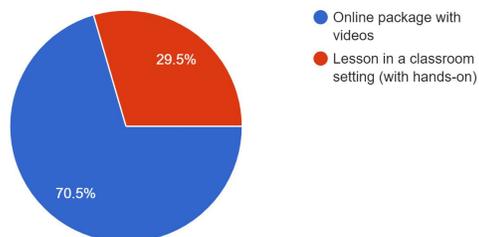
The respondents mainly said that they recycle mainly plastic and paper products such as drink cartons and plastic bottles. This shows that the range of products that they recycle is rather limited.

Would you want to learn more about the three Rs?
68 responses



All respondents have indicated that they have some form of interest in learning more about the 3Rs.

How would you like the lessons to be conducted?
61 responses



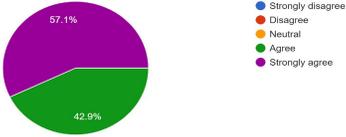
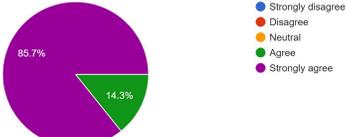
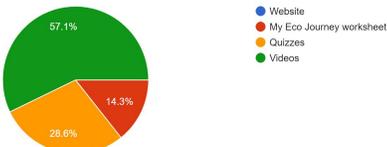
Majority of the respondents have a preference for the package to be conducted through an online format.

3.3 Development of resources

For the content on the website, we sourced some of the information from online resources such as the NEA official website, which we later integrated with our own content in various forms such as text, infographics and videos. The quiz questions and activities in the My Eco Journey Worksheet were thought out and implemented by ourselves. The worksheet also contained links to tutorials showing how to do some of the activities which were filmed by us as well.

3.4 Pilot Test

We administered an online pilot test to a group of 10 Secondary One students.

<p>I enjoyed the resource package as a whole. 7 responses</p>  <p>Legend: ● Strongly disagree ● Disagree ● Neutral ● Agree ● Strongly agree</p>	<p>All participants have expressed that they have enjoyed the resource package.</p>
<p>The resource package allowed me to learn more about the 3 Rs. 7 responses</p>  <p>Legend: ● Strongly disagree ● Disagree ● Neutral ● Agree ● Strongly agree</p>	<p>All participants agreed that the resource package has enabled them to learn more about the 3Rs.</p>
<p>Which segment of the resource package did you like most? 7 responses</p>  <p>Legend: ● Website ● My Eco Journey worksheet ● Quizzes ● Videos</p>	<p>More than half of the participants liked the videos the most, followed by the quizzes and the My Eco Journey Worksheet.</p>

4. Outcome and Discussion

4.1 Outcome

As seen from the feedback above, most of them enjoyed the package and learned a lot about the 3Rs from it. They also enjoyed the videos the most, followed by the quizzes and worksheet. When asked about what could be improved upon, most said nothing while others said to adjust the difficulty of the quizzes and add more questions, as well as to make the worksheet activities more interesting and smaller.

4.2 Limitations

There were limitations on the number of participants as our original plan to conduct face-to-face lessons was stopped by the Covid-19 situation. We changed our plan to instead make an interactive website with quizzes and a online worksheet and faced the problem of having too few participants willing to try our package.

Participants would skip certain parts of the package and only access selected parts of the package. Another limitation with the package was that the participants found the worksheet part of the package too troublesome and unrelatable to their lives. As such, many of them only went through the website part of the package and did not touch the worksheet.

4.3 Further Works

To solve the lack of participants, a solution was to use social media to popularize the package and convince more people to try it. Another was to directly invite the target audience for a Zoom meeting where we could go through the website and worksheet with them and engage in some interactive activities like a Kahoot game to test and affirm what they have learned from the session. The skipping of certain sections of the package can be solved by transferring the website from Google sites onto another platform like iSpring to make sure the participants go through all of the package.

However, such websites are usually paid services and even if there was a free version, it would impose many other limitations mainly on how much content we can make with the free account. As for the My Eco Journey worksheet, a second version was made where activities such as composting and making a planter, which were rather troublesome and inapplicable to their lives, was removed and replaced with an activity making a laptop stand out of a shoebox which was much easier and more applicable with more of them spending time using their laptops due to the online lessons caused by the Circuit Breaker.

5. Conclusions

During the course of this project, we have encountered numerous challenges. First, there was the challenge of time management. As Secondary Four students, we had many common tests, both internal and external, and also CCA commitments. It was a challenge to juggle them all, as they are all equally important. Breaking everything down into small parts helped as we were able to be more efficient over a shorter span of time.

Second, finding Secondary Ones to try out our package was another challenge too, as we could not physically go to classes and try out the package with them. Thus, we could only resort to the few Secondary One juniors in our CCAs, who were also from different classes.

Last, due to the limitations of our website (as mentioned above), we were unable to track down who actually went through all learning modules and completed all the quizzes. Despite all these challenges, we still managed to overcome them and have also acquired many useful skills from doing this project. One of which is how to plan ahead. It is crucial to set timelines and plan ahead, because it provides direction for the project and also allows us to immediately know what to do after completing a part of it.

Skill-wise, we have learnt how to communicate with each other effectively and how to make an online learning package via Google Sites.

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