

Category 4 Resource Development

Group ID: 4-027

Project Learn Create Reuse

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Abstract

Science is an important subject that all primary school students must take. On top of just being a compulsory subject, Science also helps to cultivate a sense of wonder and creativity in children. Science is important because it helps us understand the world around us¹ and it has also helped to improve our lives. From our knowledge of gravity to cutting-edge medicines, students of Science have shaped our modern world. All of these advances can trace their origin back to individuals learning about science as students. However, some may find the subject difficult to understand and require extra help. As such, if students think that Science is too challenging and boring, they will begin to dislike the subject and thus not give it their all. The aim of Project Learn Create Reuse is to teach students about various Science concepts and help them gain a better understanding of them. This is done through the use of fun experiments and projects that grabs the attention of students and sparks their interest towards Science, whilst allowing them to comprehend certain topics better. Furthermore, these projects and experiments are hands-on opportunities for students to interact with and see Science happening around them in their daily lives. Lastly, the projects and experiments are mostly done with reusable materials which can be found easily at home, making it accessible and affordable for all.

1. Introduction

1.1 Rationale

Students only start learning Science when they are around Primary 3. Being newly introduced to the subject, students often face challenges in understanding and grasping the various concepts. The rationale behind Project Learn Create Reuse is that many lower primary school students who just recently started learning Science struggle to cope. On top of that, due to the fact that Science is a very broad subject, having a strong understanding of concepts is crucial. In order to ensure that students have an interest in the subject², interesting and exciting experiments and projects are used to

draw their attention and cultivate their passion for Science. Engagement is necessary in getting students excited and interested in the learning that will follow. This can be done through hands-on experiences³ where students can see and understand science right in front of them rather than just through textbooks. They also have fun while learning Science. Secondly, real life examples should be used to teach Science. This is because real life examples provide context to the topics and concepts that students are studying, allowing them to have a better understanding of them. When students understand how science looks in the real world, they will also become interested in wanting to learn more about it.

1.2 Objectives

- Spark students' interest in science
- Ensure that the students have a solid understanding of basic science concepts
- Through fun projects, students learn the importance of recycling.

1.3 Target audience

The target audience is primary school students (mainly students aged 9 to 12)

1.4 Resources

The resources created for this project are:

1. Website

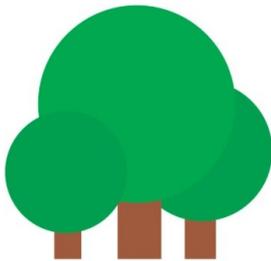
In our courses, after we have carried out demonstrations of projects and allowed students to try carrying out experiments on their own, we provide free, consolidated notes based on the experiments, which are very relevant to the primary school science syllabus, and cover a wide range of topics. We have even created a website which students can freely access. This website comprises many relevant topics such as magnets and energy conversion, as well as some topics out of their syllabus for those who are more interested. The website provides various experiments that they can carry out on their own and helps them learn various science concepts at the same time.

PROJECT LEARN CREATE REUSE

- At the top right-hand corner of this website, you can find the page for "Science Experiments". Click on the arrow next to it to see the list of science concepts.
- To learn more about each science concept, click on the concept itself and not the arrow on its left. There you can find the various experiments and projects that we have chosen for each topic/concept.
- Under each project/experiment, there are step-by-step instructions for you to follow along.
- There will also be "further-thinking" questions for you to think about and help to better grasp concepts, as well as 'notes' on the experiment/project to explain all the Science behind them.



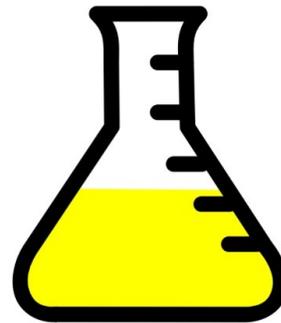
Welcome to our Science experiments! Click the arrow on the right to see the list on concepts and experiments related to it, or click on the various buttons below to find your wanted concepts!



Environment



Energy Conversion



Chemical Reactions



TERRARIUM



WHAT IS A TERRARIUM?

A terrarium is a self nourishing and independent tiny ecosystem. It contains soil, plants, and sometimes even smaller land animals! It requires very little maintenance from us as it can survive on its own!

How does a terrarium work?



THE TERRARIUM WATER CYCLE

- 1 Water goes in
- 2 Roots suck up water in the soil



- 6 Before sliding down the glass sides and back into the soil again, or **percolation**



A bit like when it rains!

- 5 This creates water droplets, or **condensation** on the glass
- 4 Where it evaporates, or **transpires** through the leaf pores, or **stomata**
- 3 Water travels up the stems to the leaves

WATER CYCLE

1. Water is absorbed up the roots of the plant.
2. The water is released back into the environment as water vapour through the stomata (pores on the underside of leaves).
3. The water vapour condenses on the cooler surface of the container and turns into water droplets.
4. Water droplets trickle back into the soil, restarting the cycle!

Create your own terrarium!

Materials required:

Container - plastic bottle

Soil

Gravel

Plants - fittonia/succulent/cactus



STEP 4: FINAL TOUCHES

At this point, your terrarium is almost done, but wait, there are still a few important points steps!

Add your colourful pebbles around the plant and other decorations if you wish to. (This is strongly recommended as it really brightens up your terrarium.)

Before you cover up the terrarium, spray the plant several times with water to make sure that it has a supply of water. Alternatively, you could also just pour some water in, making sure not to put too much or too little.

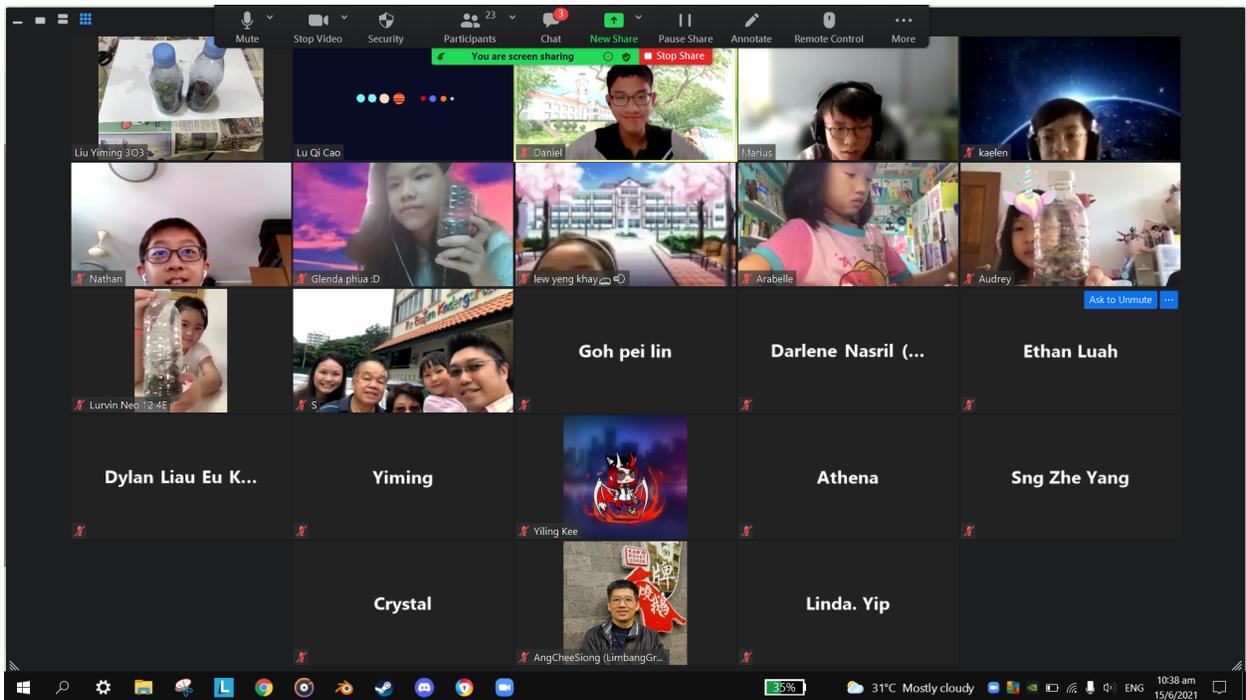
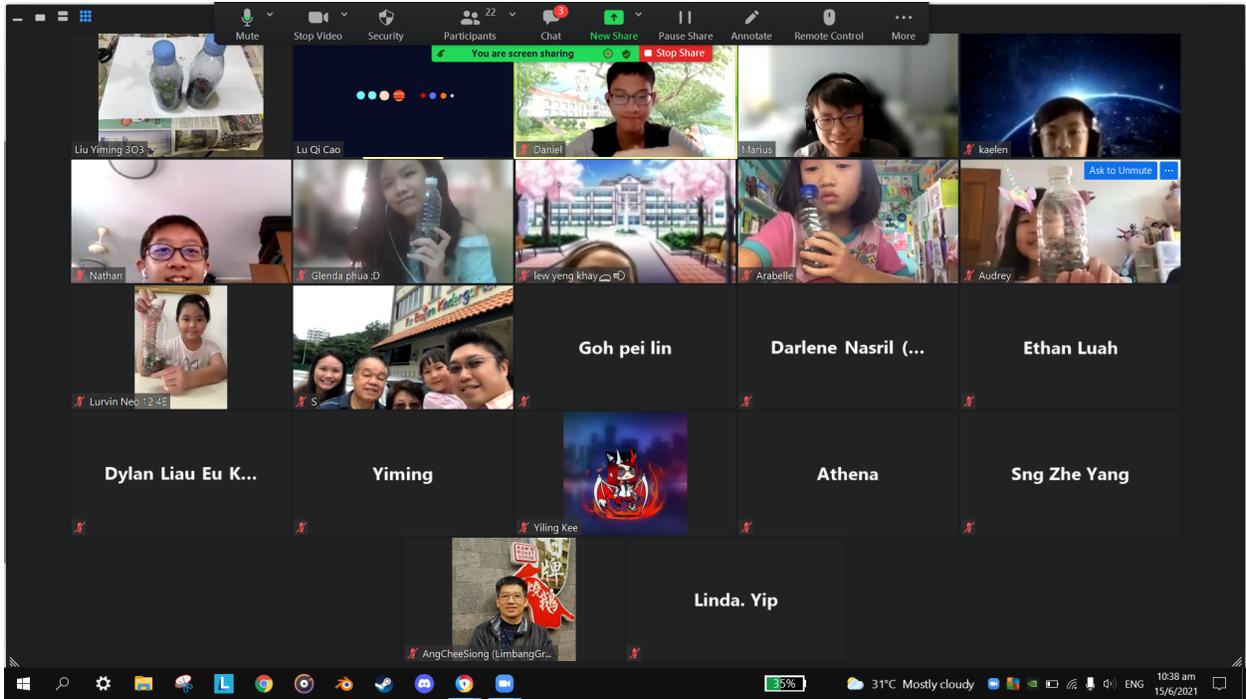
Finally, cover up the terrarium with the upper part of the bottle and you are done!

① **HERE'S A PICTURE OF ONE WE MADE!**



2. Workshops

We have conducted several workshops over the school term. The workshops were conducted online through Zoom, which included live demonstrations of experiments and projects being done, followed by an explanation of the concepts that can be learnt from them. The screenshots below show one of the workshops we conducted with another project group, GreenBox, over the June holidays.



2. Review

The existing resources reviewed are:

1. KiwiCo⁴

KiwiCo is a website also dedicated to teaching children about science through project crates. KiwiCo even delivers these project crates to the home of subscribers every month. However, the cost of a subscription is rather costly and according to some comments, “the cost does not match the price of materials”. In contrast, Project Learn Create Reuse teaches Science using experiments and projects made from reusable materials that can be easily found at home, making it more affordable and accessible. KiwiCo also has a ‘DIY Craft Activities’ page⁵ where there are many DIY projects to do. However, these projects were mostly arts and crafts and lacked a link to science concepts. Our Project website included experiments that were more relevant to Singapore’s school syllabus and can be applied in real life.

2. ScienceBob⁶

Although it has many interesting experiments, similar to KiwiCo, they are unrelated to the science syllabus in primary schools and the instructions are also not very clear due to the lack of actual pictures to follow along. On the other hand, Project Learn Create Reuse aims to create science experiments that are mostly related to the syllabus, with some extra experiments for further information.

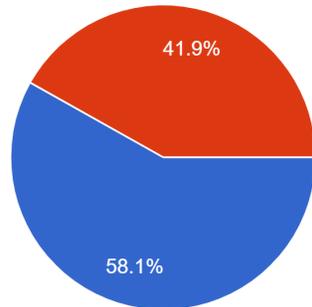
3. Methodology

3.1 Needs analysis

We conducted a google form survey to get the opinions of our target audience (primary school students aged between 9 and 12) on the topic of the Science subject.

How old are you?

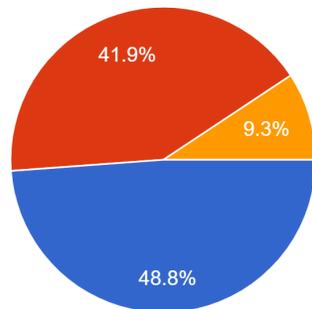
43 responses



- 9-12 (Primary school student)
- >12 (Other)

I enjoy Science and find it an interesting.

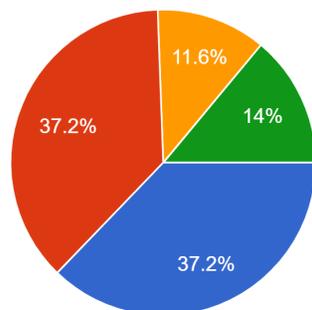
43 responses



- Agree
- Neutral
- Disagree

I think Science is a difficult subject.

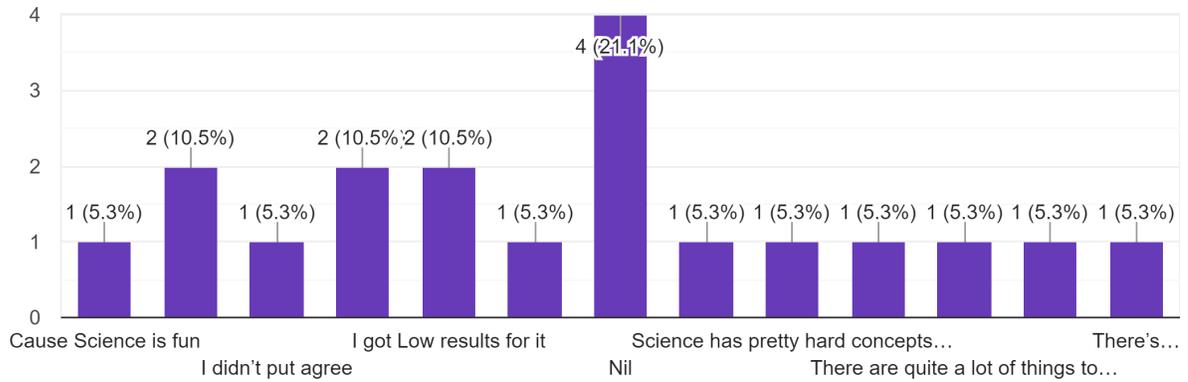
43 responses



- Agree
- Neutral
- Disagree
- No, but I would like to gain a better understanding of the subject.

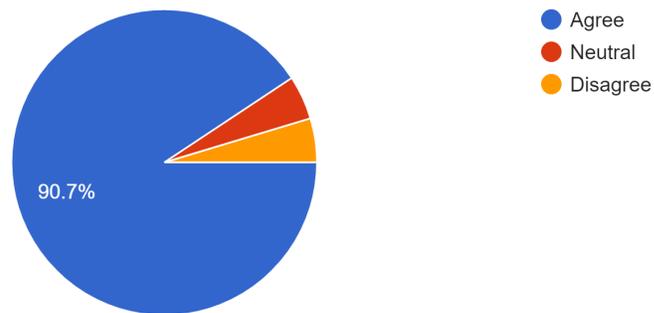
If you answered "Agree" for the above question, why?

19 responses



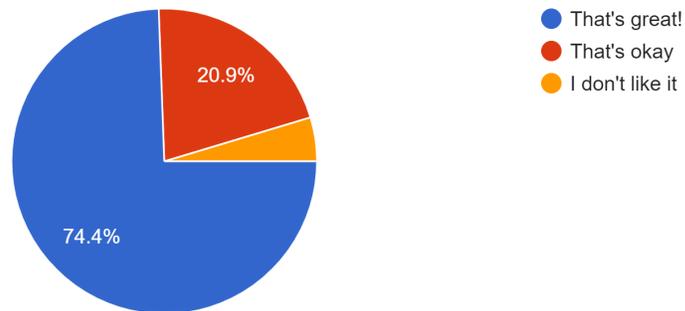
Fun projects and experiments would make me more interested in Science and I will enjoy it more.

43 responses



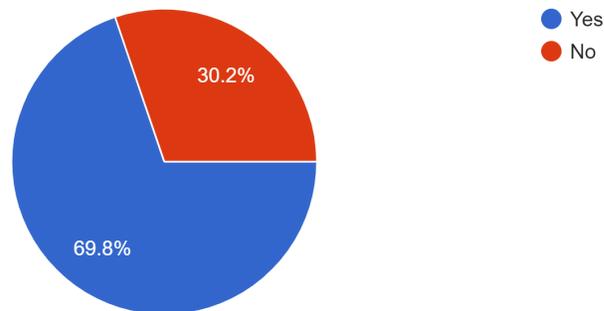
The Science projects make use of recycled materials, what are your thoughts?

43 responses



Would you like the experiments to be based on school curriculum?

43 responses



Constructive feedback received:

- This was a really nice survey. Keep up the good work!
- Science can be a tough subject but if we understand it, we can enjoy the subject better. I agree that more activities would indeed make science a more enjoyable subject to learn.
- Has to be out of syllabus or may just be a repetition of what is done in school.
- I agree with your idea as it helps educate young kids like me and also save the environment

- It's good that you reuse materials. I would like to see what cool experiments you come up with!

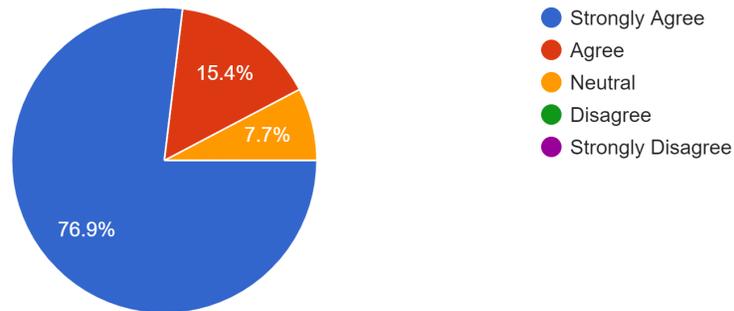
3.2 Development of Resources

Extensive research was conducted through the reference of materials online regarding the deterioration of students' passion towards science. Interviews were also conducted with primary school students and parents to collect more information on this issue which really benefited us in coming up with the resources. A website, notes and workshops were thus created from the research and findings.

3.3 Pilot test

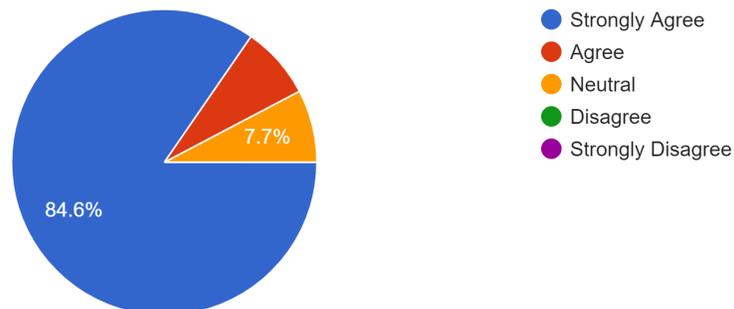
I enjoyed this workshop.

13 responses



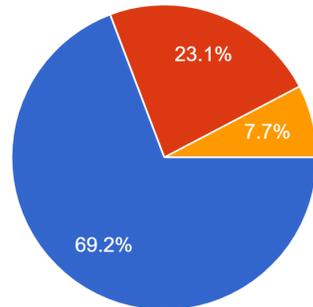
I found the workshop interesting and engaging.

13 responses



I have benefitted from this workshop.

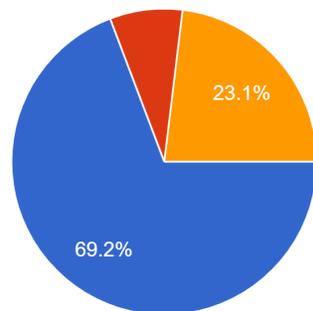
13 responses



- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

I have a better understanding of energy conversion.

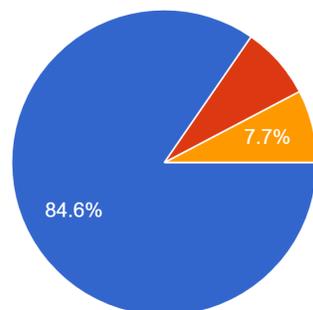
13 responses



- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I would like to attend more workshops on other science topics.

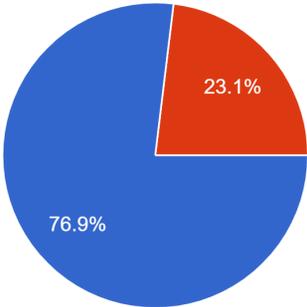
13 responses



- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

I enjoyed this workshop.

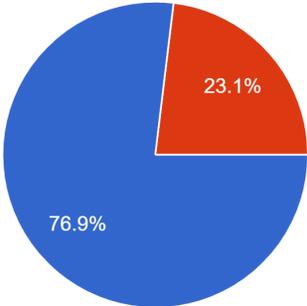
13 responses



- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

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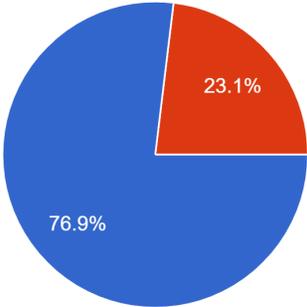
13 responses



- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

I have benefitted from this workshop.

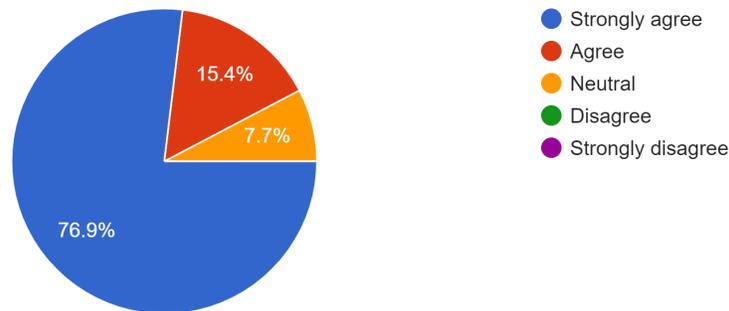
13 responses



- Strongly agree
- Agree
- Neutral
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I would like to attend more workshops on other science topics.

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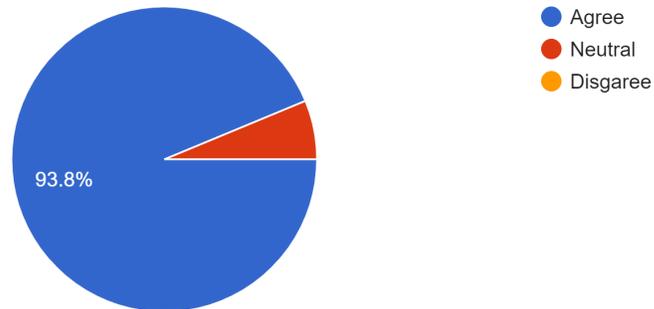


We collaborated with the Limbang Green Residents Committee and conducted 2 workshops over the June Holidays. These workshops were held online due to the existing Covid-19 situation and had a full attendance of 15. The theme of the first workshop was based on energy conversion, a very relevant science topic that students would learn in both their primary and secondary school syllabus. We had a camera set up to show our demonstration, which they could follow along. Materials were also provided.

The second workshop was a collaboration with project Green Box and was focused on the topic of man and the environment, and the workshop's main focus was on making a terrarium and getting students to understand the concept behind it. The resources we created received very positive feedback.

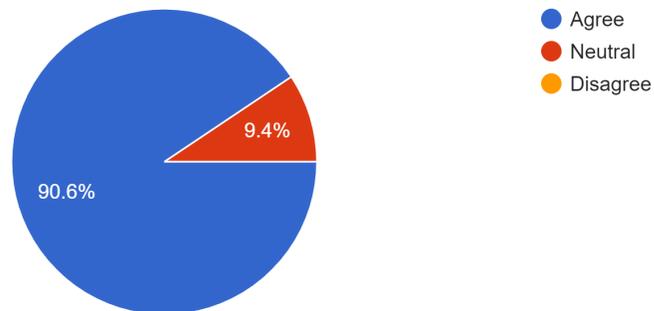
The projects and experiments on our website are fun and interesting.

32 responses



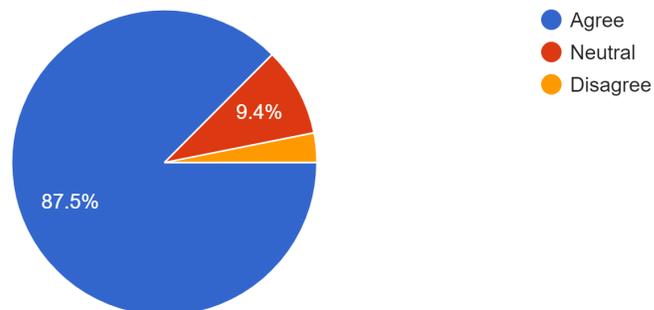
The projects and experiments on our website are educational and informative.

32 responses



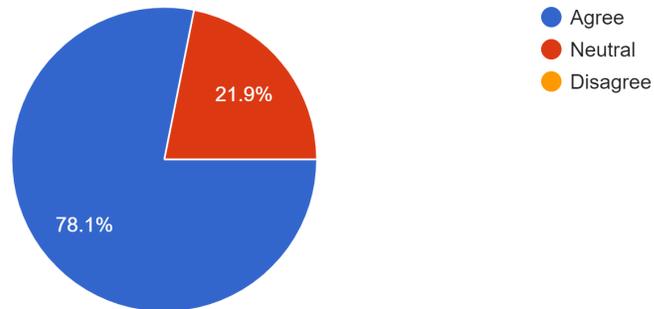
The instructions given were easy to follow along.

32 responses



I have learnt more about Science and gained a better understanding of the various topics/concepts.

32 responses



The experiments and projects are quite cool

I think there can be more cool stuff like the lava lamp

I love it

Maybe include more science concepts into the experiment.

Very well thought out.

the color and materials presentation is fresh and pleasing. this will make learning more fun.

We also conducted a survey through Google Forms to get feedback regarding our website. The feedback was generally positive and several of them were also looking forward to seeing more experiments to do on our website.

4. Outcome and discussion

Through the numerous workshops we have conducted, we found out how the students really appreciate having the website and notes for them, allowing them to better grasp the concepts and perceive Science as interesting and easy to understand. Nonetheless,

we have further improved the resources. We have tried our best to improve the accessibility of our website, creating videos which makes it easier for students to follow along and understand the concepts simultaneously. We have also created more concise and simple notes which cater to the Primary school students. The workshops that we have conducted have also been refined. We have created more simple, engaging slides and demonstrations to captivate the students' attention, allowing them to cultivate a passion for science.

5. Conclusion

Project Learn Create Reuse had its ups and downs, with the Covid-19 situation posing as the biggest challenge. From the start, we knew that this project was not going to be an easy one. Having to reach out to different Community Centres and Primary Schools, and even getting some rejection due to Covid-19 constraints, we had to work around this and conduct online workshops whilst working on our resources so as to make good use of our time. Ultimately, we feel that we have successfully achieved what we had set out to do, which is to make Science a more interesting and simple subject in which students can easily grasp the concepts and concurrently allow them to cultivate a passion for science.

6. References

Research:

1. Homden, B. (2019, December 20). Why study Science? The Sciences Explained: KAPLAN Pathways Blog. Retrieved April 02, 2021, from <https://www.kaplanpathways.com/about/news/study-science-sciences-explained/>
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