

Otago Participatory Science Platform - Final Report

Explanatory notes and comments are provided in italics. *Please remove these before submitting.*

Section 1: Project Information

Project Title: Science Art Education - Visualising the impact of climate change

Lead Organisation: Bodeker Scientific

Contact Person: Ethan Dale

Number of Participants: Actively took part in model and experiment development	4, Bodeker Scientific Staff 5 students + 3 teachers, Dunstan High School 12 total.		
Number of Participants: Engaged with model	120 engaged with the model at A&P show. 82 experiment participants (Dunstan and Wakatipu High schools) 202 total.		
Engagement hours: Active	114 hr Bodeker Scientific staff 250 hr Dunstan high students and staff 364 hr total		
Engagement hours: Participants	10 min per person 33.7 hr total		
Gender: Active	Female: 3	Male: 7	Gender diverse:
Gender: Participants	Female: 50%	Male: 50%	Gender diverse:
Age Breakdown: Active	0-4: 0 19-30: 2	5-10: 0 31-65: 3	11-18: 87 65+: 0
Age Breakdown: Participants	0-4: 0 19-30: 10%	5-10: 0 31-65: 15%	11-18: 70% 65+: 5%
Ethnic Group: (estimate number of people in each group, add new ethnic group categories as needed)	<i>New Zealand European:</i> <i>Māori:</i> <i>Tongan:</i> <i>Chinese:</i> <i>Fijian:</i> <i>etc.</i> <i>Add more lines to suit.</i>		
Residence type:	City:	Town:	Rural Area:
Project Partners:	Education Partners: <i>Include all schools/kura, education institutes, and education professionals that collaborated on your project.</i>		



	<p>Science Partners: <i>Include scientist/expert name, field of research code</i> (https://royalsociety.org.nz/what-we-do/research-practice/field-of-research-calculator/), and ORC ID/Scopus Author ID if relevant/known.</p>
	<p>Community Partners/Other Collaborators: <i>Include any other partner organisations and individuals that contributed to your project. This can include business and industry.</i></p>

Section 2: Project Tasks

Research Question(s):			
Does visualising regional climate change information on a 3D-model onto which data are projected, enhance people's perception of what climate change might mean for them?			
Project Objectives:			
<ul style="list-style-type: none"> Produce a 3D-model and visual presentation of the effects of climate change on the QLD. Design a social experiment where the target group will be presented with three different forms of communicating the research outcomes of climate change. The experiment will be conducted on an independent target group who reside in an area where the results are relevant. 			
Project Milestones	Date	Code/Area	Status
Project Begin Date - meeting with students and teachers at Dunstan High School.	1-10 July 2020	Community Science	Achieved
Produce input data (temperature, wind and precipitation) for a range of greenhouse gas scenarios that are required for the projections onto the 3D model.	11-15 Aug 2020	Science	Achieved
Build and complete physical 3D model of QLD.	11-15 Aug 2020	Community	Achieved
Develop and complete the program for generating the projections onto the model.	15 Aug- 15 Sep 2020	Science	Achieved
Design and complete the description of the social experiment.	1-5 Feb 2021	Community Science	Achieved
Organise social experiment event.	5-31 Jan 2021	Community	Achieved
Host social experiment event.	7-20 Feb 2021	Community Science Educational	Achieved
Analyse results of social experiment.	20-28 Feb 2021	Science	Achieved
Write a report presenting results of the experiment.	20 Feb-7 Mar 2021	Educational	Achieved
Share results with the community.	7-30 Mar 2021	Community Educational	Achieved

Were there any significant changes to how the project was delivered compared to what was proposed in your original application?

Due to the disturbances caused by COVID-19 on the students several key dates were moved to later dates. The content of the project was not changed.

Section 3: Project Impacts and Outputs

When answering the impacts section think about the three core criteria of Curious Minds PSP: Community engagement, scientific rigour, and educational value. Where possible, please include evidence to support your statements (survey results, quotes, etc.).

Project Impacts

Community:

Since the completion of the model we have strived to effectively share our model with the community. This has mostly been undertaken through two public showings of the model. The first was the Wanaka show. We had the model at the two-day event alongside the Otago museums 'Far from frozen' exhibit. During the show the model was made available for the public to interact with and our science staff as well as Dunstan High school students were present and able to answer questions about climate change.

Secondly the model was presented at the Catalyst NZ pop-up climate change museum in Queenstown. This exhibit lasted 4 weeks and was open to the public in central Queenstown. The turn-out for this exhibit was estimated to be 50-100 visitors per hour during this time.

moving forward beyond the scope of this project we aim to continue to share our model with the local community as much as possible. We will offer the model to lend out to schools and community groups. Specifically we have arranged to have the model present at the LUMA light festival over Queens birthday weekend. This is a large event, at last year's event 30,000 people visited the science lab exhibit.

Scientific:

Our research question was: "Does visualising regional climate change information on a 3D-model onto which data are projected, enhance people's perception of what climate change might mean for them?". In order to answer this question we undertook a social experiment on students at Wakatipu High School. The results of this experiment was that there was no significant difference in perception of climate change between students that received a traditional talk and those who were able to interact with a physical model. While this result is somewhat disappointing it highlights the need for a multi-faceted approach for science communication as different audiences will respond differently to different forms of communication.

Our results have been summarised in a report written by students at Dunstan High School. This report is attached to this report.

Educational:

Students from Dunstan High School were involved in every major step of the project. One group of 3 students were involved in the coding and production of the model. These students had a range of skill levels and were able to learn from each other as well as Bodeker Scientific staff. The students primarily worked with the python code that operated the model but also worked with the hardware that the user of the model interacted with. This allowed the students to gain experience with a wide range of technology and required them to develop a versatile skill set while producing the model.

A second group of students developed the experiment that was used to test our hypothesis. This allowed the students to design and undertake an experiment in a real-world scenario. This experiment and the subsequent report that these students wrote contributed towards their NCEA qualifications.

The students from Wakatipu High School that were used as subjects in this experiment got a chance to interact with our Model and have a question and answer session with the climate scientists from Bodeker Scientific. This allowed them to learn about the effects of climate change on their home region and to have any climate change questions that they had answered.

Project Outputs:

Did the project produce any resources, materials, other outputs? Are these available? Are there any student/youth outputs that you can attach to this report? Or save to Dropbox or Google drive to send to the area lead?

Community:

Throughout the project we have posted several updates on the Bodeker Scientific facebook page to let the community know how the project is progressing and when the model is out in public.

Scientific:

The scientific results of this project are written up in a report written by students from Dunstan High school. We have attached this report to this report.

Educational:

The primary output of this project is the 3D model of climate change in the Queenstown lakes district. We are actively seeking opportunities to get this model out into the public eye in the future and are open to having various community groups borrow the model.

Media/Press:

The project was featured twice in *The News*, a local newspaper. Once as a text article and once with an online video. Links provided below.

https://www.thenews.co.nz/digital-edition/?edition=CO_2020_06_11&pub=co# (page 15)

<https://www.thenews.co.nz/community/making-climate-change-compelling-aim-of-lesson/>

Section 4: Project Insights

Implementation

Working with high school students proved to be somewhat challenging in the year of a pandemic. Several milestones had to be adjusted to work around the dynamic schedules of the students. We initially planned to work mostly with the senior students (years 12-13) at the high school but ended up working with the younger pre-NCEA students (years 9-10) as they did not have the demand of upcoming exams adding pressure to their schedules. We were pleasantly surprised by the ability of these students who proved to be competent at coding and enthusiastic about the project. In the future we will design projects with students of this age band in mind as they have more time for extracurricular activities.

Unexpected outcomes

While we always wanted to share the model after the initially planned project, the opportunity to have the model present at the Catalyst NZ pop-up museum in Queenstown was unexpected. In a stroke of good timing we managed to be introduced to the Catalyst NZ crew only a few days before the museum was opened and just after we no longer needed the model for the core project. This allowed a large number of people to see our model in the heart of the target site, Queenstown.

Feedback and Success Stories:

We are happy to announce that the model is actively being used by the community and we have had interest from several groups who would like to host the model. The model is serving its initially envisioned purpose of acting as a tool to get the community discussing the effects of climate change that they may see in future decades.

Future Plans:

We intend to make the model a 'asset of the community' and allow community groups and organisations to host the model. We are currently arranging for the model to be exhibited at the LUMA light festival. We have also had interest from these community groups who have volunteered to improve the model and make the model more intuitive for the general public.

We have also been approached by several groups who have expressed interest in using our model technology to display other geospatial data on other regions of NZ.

Feedback to area lead

We have nothing specific to say but we would like to thank the organisers for their flexibility with COVID-19 disruptions.

Section 5: Project Budget

Please compare your actual expenditure to what was budgeted in your original application. If there were additional expenditures please add them.

Expenditure Type	Budget	Actual
Project coordination	\$1,875	\$1,219.56
Science input	\$11,125	\$16,665.76
Programming input	\$5,250	\$1,706.26
Stationery and printing	\$100	\$0.00
Material	\$200	\$249.86
Travel	\$476	\$264.47
Catering	\$600	\$0.00
TOTAL	\$19,786	\$20,105.91

Do you have unspent project funds? *No*

If yes, how much funding is remaining?

If your actual spend was different to your budget, please explain why:

More time was spent on the science input which was required to support the high school students and time spent at additional events. Less programming time than planned was needed and catering at the high school event was not required as the event was held in school class time.

Note: unspent funds will need to be returned to PAL unless otherwise agreed upon between the two parties.

In-Kind Contributions & Co-funding received	Amount (\$)
<i>Material for the 3D model: Bodeker Scientific is providing the 3D printer required to print the model including the print material, Furthermore. Bodeker Scientific will provide the costs for the model frame including the required projector.</i>	\$4,000.00
<i>Community group: Educators Michelle Bromby, Frankie Boyt, Amie Jenkins, Kerry Moir, and Sally Andrew from Dunstan High School providing 50 hours @ \$63/hour of expertise and resources.</i>	\$3,150.00
<i>Travel to extra event - Pop up exhibition for Catalyst NZ, in Queenstown.</i>	\$73.80
TOTAL	\$7,223.80

Total Project Value	Amount (\$)
Total funding from Curious Minds PSP	\$19,786.00
Total in-kind contribution and co-funding	\$7,223.80
TOTAL PROJECT VALUE	\$27,009.80