Problem:
This experiment uses a model created by local firm Bodker Scientific with help from Dunstan High School students that projects different climate change scenarios onto a 3D printed map of the Queenstown Lakes District. We want to see if using this model has more effect than a standard powerpoint presentation.

Question: Does using a model that projects climate change scenarios create a greater impact on people's knowledge around climate change than a standard oral presentation?

The purpose of this experiment is to see if different ways of presenting the same information to students have different effects depending on the style of presentation. There isn't much research done on the effectiveness of different presentation methods, however, sites such as Build your future[1] and Harvard business review[2] say that if you want to capture your audience you should use images, visual aids and short points/ideas. According to BYF hands on learning is very effective for learning new skills as it engages both sides of the brain. Listening and analyzing occurs on the left side whereas visual and spatial processes happen on the right. This helps the brain to store more information and create stronger connections. Being able to touch and interact with something is much more effective than just reading or listening to the information.

Speeches on the other hand can be good to get an option across but sometimes if people don't tend to agree or necessarily care about the subject then they zone out. Humans tend to pick and choose when they want to listen so just being presented information in speech form won't have the best results if you are wanting people to become engaged and learn something from your presentation.

In America during 2015 a poll[3] by the Pew Research Center was done to see how many people thought climate change needed urgent action. Only 29% of people polled thought that it was a top priority. World wide people are aware of climate change but very little think that we need to take urgent action. An article from The Washington Post says that 63% of Americans are concerned about climate change, however, only 47% think that the government should do something about it. There are small changes being made to try to curb the effects of climate change but there aren't enough people doing these things on a wider scale.

Through this experiment the goal is to get young people to care about climate change. The younger generation coming though will be the driving force of change so it is essential that we educate them about how serious climate change really is. I have decided to do this experiment comparing two presentation styles as there isn't much research that compares the effectiveness of the two. With carrying out this experiment I hope to discover new information related to how people process information when given in different formats. Also the hope is to make people aware of the significance of climate change and how it can impact our local area.

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[1] Is Hands-On Learning Better? (2020, May 14). Retrieved from https://www.byf.org/news-item/is-hands-on-learning-better/#:~:text=Hands-on learning is proven,learning has a significant impact:&text=Another study found that students,course than students who did.

[2] Listening to People. (2019, November 27). Retrieved from https://hbr.org/1957/09/listening-to-people

[3] Lombrozo, T. (2015, November 30). How Psychology Can Save The World From Climate Change. Retrieved from https://www.npr.org/sections/13.7/2015/11/30/457835780/how-psychology-can-save-the-world-from-climate-change

Hypothesis:

I predict that the method of presenting the information using the model will be more effective because people tend to gage new information easier if they can actually physically see it. An article from 'Build Your Own Future' by Social Media Specialist Jonathan Arnholz states that " Hands-on learning is proven to be more effective at helping students grasp what they're taught. Hands-on learning better engages both sides of the brain. Listening and analyzing processes occur in the left hemisphere, but visual and spatial processes are handled on the right. By combining multiple styles of learning, the brain forms stronger overall connections and is able to store more relevant information. "

Plan:

In our experiment we are going to see if using a model that projects climate change scenarios created by Bodeker will make students care more about climate change than just listening to an oral presentation.

For this experiment we will use 2 year 10 classes from Wakatipu High School to partake in our experiment. We will randomly divide them into 2 even groups. One group will listen to a speech with some images to go alongside it and the other group will be taken into the room with the climate model. For the visual aspect of the presentation we will use a model designed and made by Bodeker Scientific that projects climate change scenarios. We will then have one of the scientists from Bodeker do the talk and presentation. At the end of the separate presentations we will hand out a slip of paper with a question asking how much of an impact the presentation had on them to gage what presentation has had a greater effect on people's understanding of climate change in the region. We will compare the results from the model group and the speech group to see which was most effective. Each presentation will take around 10 minutes. I have chosen this time because teenagers don't typically have long attention spans so 10 minutes is enough time to get our main points across in a fairly short and sharp manner.

The groups: The groups will be 2 year 10 classes. The class that is partaking in the model presentation will be split into smaller groups of 4-5 people so everyone can clearly see the model. Also with these smaller groups there is less room for people to hide so hopefully they will be more engaged. By splitting the groups randomly it ensures that there isn't a bias in the groups. For example we don't want one group with all boys and one with all girls as they tend to have different attention spans and prior knowledge. Also if people were with classmates that they know they may be more inclined to chat to them therefore missing out on the information being presented.

Control variables:

Person doing presentation: In an ideal world we would've liked to have the same person doing both the talking presentation and the presentation with the model because different people may have more engaging tones when speaking or someone could've been younger so therefore more relatable. However in this experiment that was out of my hands to control so we will have 2 different people doing their respective presentations. If we have different people doing each presentation it could give us inaccurate results because some people may find the tone of the voice more interesting and engaging automatically making them score higher.

Time: We will make sure both groups have the same amount (around 10 minutes) of time so they can get a similar amount of information. If one group has more time than the other group students could become bored and zone out. This would result in students missing information since they aren't fully immersed in the presentation .

Information presented: We want to make sure the information presented is the same because the aim of the experiment is to see which presentation method is the most effective with the same information. If we gave each group different information on climate change then we wouldn't get a fair result because some information might be more significant to people depending on their interest in the topic. Also we wouldn't be able to get accurate data since the groups were scoring on completely different aspects of climate change.

Explanatory variable: The thing that we will be changing is the method in which the information is presented. The methods that we will be using are the climate change model created by Bodker and having an oral presentation with the information presented.

Response variable: We will be measuring how much effect the presentation has on students' perception of climate change. This will be gauged by having students fill out a questionnaire form prior to the presentation and having them fill out the same form after the presentation. The question is how much has this presentation changed your thinking of the significance of climate change in the Queenstown Lakes District? Students then answer the question on a scale of 1-10, 1 being that it didn't change their thinking, 5 being it somewhat changed their thinking and 10 being that it changed their thinking significantly. We will then compare the results between the two groups.

Results from DHS experiment

We first trialled this experiment on students from Dunstan High School to see if everything ran smoothly. After the initial trial we tweaked some elements of the experiment to make the end processing of data easier and ensure all participants got a fair chance at seeing and getting the information being presented. We initially had groups of about 10 at the model which didn't work as some people couldn't see the model or they were chatting to others. We also originally had 4 questions that students would answer before their respective presentations and then they would answer the same questions at the end of the presentation so we can compare the before and after. I changed those 4 questions to just one question, how much has this presentation changed your thinking of the significance of climate change in the Queenstown Lakes District? This one question was answered by the students after their presentation and we then compared the results between the two groups.

This experiment that we did on Dunstan High School students can be completely written off. Some variables were not controlled which makes our data unreliable. For example, the people presenting the speech and the presentation both had different variations on the information being presented. This means that both groups got different information. The information presented in one presentation may have been more interesting or relevant to people compared to the information given to the other group.

To make the experiment more controlled both presenters need to have a 'script' with the same information so we can control how much information each group is getting. Also at the end of the speech the speaker asked if anyone had any questions. This then caused a huge discussion which added more information to the overall presentation which potentially made that presentation more interesting and gave people more insight into the effects of climate change. Also in the model group some people were standing behind other people so they couldn't see the model. This results in the person only being able to hear the information rather than seeing it also. The person might as well have been in the speech group because they didn't get the visual information which is part of what we are trying to find out, if using visuals is more effective than just a speech.

It is important that we control these variables so we get a fair test and can collect data that is as accurate as possible. For our main experiment at Wakatipu I will make sure that both presenters have the same idea of what to talk about and make sure they know not to initiate questions and discussion until after the students have filled out the questionnaire slip.

Wakatipu High School experiment

Introduction: Throughout the term I have been working with Bodeker Scientific to design a climate change experiment. Our main purpose for doing this experiment was to see if we can get people (especially the younger generation), to care about climate change. I planned an experiment with Bodeker comparing 2 types of presentation methods to see which one is the most effective by using a model they created that projects climate change scenarios. The model created by Bodeker, James and Niall from Dunstan is a replica of the Queenstown Lakes Districts and shows different scenarios over a 100 year time span depending on the amount of emissions we emit.

We are most definitely aware of climate change since it is always a prominent feature in the news and in our everyday lives. However there is a lot of talk about climate change and not much action. When speaking to YaleEnvrionment360 Espen Stoknes said ' Is humanity up to the task, or are we inevitably short-term thinkers?'[4] He also said 'Climate scientists have been trying to educate us on this for so long that they are frustrated and exhausted and feeling exasperated. Some have become cynical saying that it seems as if humans are wired to self-destruct, maybe our genes aren't well equipped to deal with these long-term issues.' So have we as humans just given up on trying to change and accepted our deadly fate? Is it time for us to stop vocalizing the dire impacts of climate change and take action?

There have been powerful visual messages displayed worldwide to make people stop and think about the significance of climate change. In 2015 100s of shoes were placed in Paris to show how many people rally for change. It's visual images like these that can capture the attention of many. If we can actually physically see the extent of peoples determination then maybe the rest of us will follow suit. They say pictures tell a thousand words and have a true

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[4]Richard Schiffman • July 9, Richard Schiffman, Richard Schiffman, •, Richard Schiffman reports on the environment and health for a variety of publications that include The New York Times, & Schiffman →, M. A. (n.d.). How Can We Make People Care About Climate Change? Retrieved from
https://e360.yale.edu/features/how_can_we_make_people_care_about_climate_change

story behind them. In a article by NPR[5] they state that people tend to be more compassionate and responsive to personal stories and accounts. Images have the power to do that. Humans can process images within seconds. Throughout school we have been taught to analyze what we see and explain the meaning behind it. Often images are more engaging that just being told the information.

The modality effect is a phycological that relates to memory and learning. If we understand this effect maybe we can make people care about climate change. According to Science Direct[6] audio presentations of verbal material is actually more effective than a visual presentation. The brain takes on words and can understand them quicker than decoding a visual image. The repetition of information is said to help keep the information in our brain. But if we are getting the same messages related to climate change of 'we only have 20 years until damage is irreversible' or 'we need to take action now' maybe the severity has been removed since we are so inclined to hearing about these things.

To overcome the apathy around climate change we need to think of new ways to get people interested. People need to stop repeating the dire message of doom and replace it with action against climate change. Better education is needed. Humans need to understand what is actually happening whether that be through images, speeches or models. By educating and giving out correct information, people will feel more inclined to make a difference if they understand the facts.
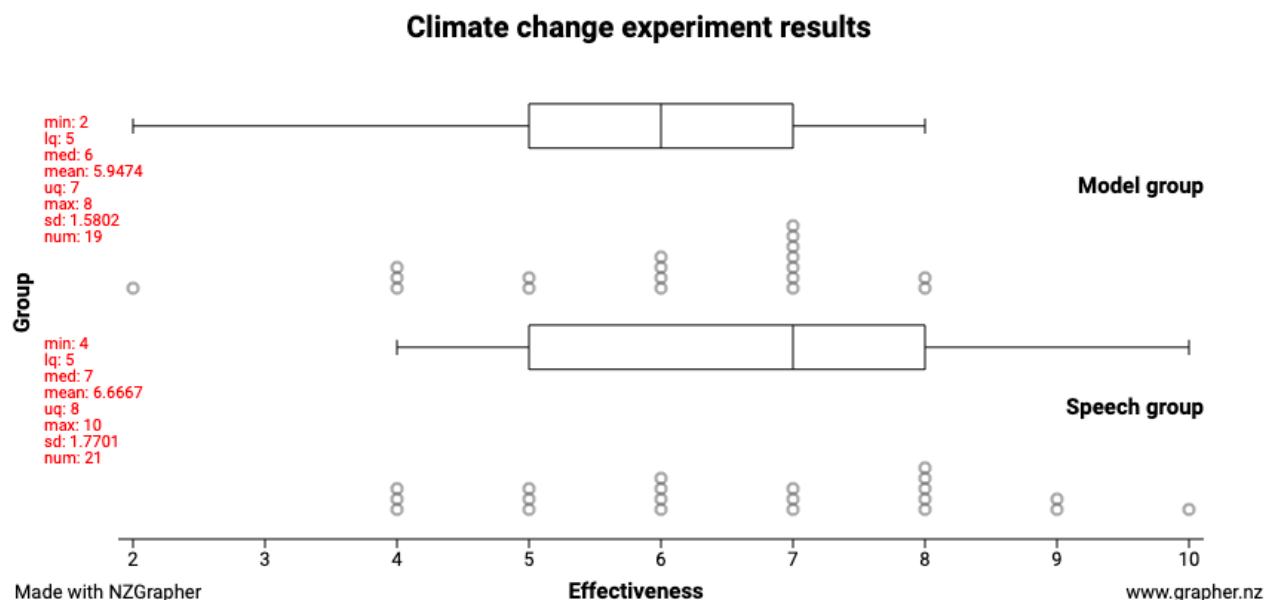

Data:
(Raw data)

[5]Lombrozo, T. (2015, November 30). How Psychology Can Save The World From Climate Change. Retrieved from https://www.npr.org/sections/13.7/2015/11/30/457835780/how-psychology-can-save-the-world-from-climate-change
[6]Modality Effect. (n.d.). Retrieved April 13, 2021, from https://www.sciencedirect.com/topics/veterinary-science-and-veterinary-medicine/modality-effect

	How much has this presentation changed your thinking of the significance of climate change in the Queenstown Lakes District? (Scale of 1-10)
Model group	7
Model group	4
Model group	6
Model group	6
Model group	7
Model group	7
Model group	6
Model group	6
Model group	7
Model group	7
Model group	4
Model group	2
Model group	7
Model group	5
Model group	4
Model group	5
Model group	7
Model group	8
Model group	7
Model group	8
Speech group	4
Speech group	8
Speech group	4
Speech group	7
Speech group	7
Speech group	7
Speech group	5
Speech group	6
Speech group	4
Speech group	8
Speech group	6
Speech group	10
Speech group	9

Speech group		9
Speech group		8
Speech group		8
Speech group		5
Speech group		6
Speech group		5
Speech group		6
Speech group		8

Climate change experiment results

min: 2
lq: 5
med: 6
mean: 5.9474
uq: 7
max: 8
sd: 1.5802
num: 19

Model group

min: 4
lq: 5
med: 7
mean: 6.6667
uq: 8
max: 10
sd: 1.7701
num: 21

Speech group

Group

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Analysis:

To my surprise, the average result between the two groups are slightly similar. The mean of the model group is 5.9474 compared to that of the speech group at 6.5667. On the box and whisker graph 4 of the main points of the box (minimum, median, upper quartile and maxim) all sit higher up, the lower quartile is the same for both groups. From this we can gather that the people in the speech group ultimately got a greater understanding of the information being presented to them.

This shows that the oral presentation of information was more effective than the model group where we showed them projections of scenarios and gave them a brief talk related to the information displayed. Also in the model group there was an outlier (2), even if the outlier wasn't there the speech group would still have the upper hand although both minimums

would have started at 4. The speech group scored higher on average having a median of 7 compared to the model group with a median of 6.

Both groups also have the same range of 6 however the speech groups range starts at 4 and ends at 10 compared to the model group which starts at 2 and ends at 8. The students in the model group may have been too focused on looking at the projected images on the model and weren't listening to the information also being given to them. The interquartile range for the model group is 2 compared to the IQR for the speech group which is 3. The IQR shows us how variable the middle 50% of the data is. The model groups IQR is 2 showing us that there isn't a huge variety in the middle section of the data. The IQR for the speech group is 3 showing that there is a larger variety of results in the middle part of the data. The results show that the group who listened to the speech felt it had a bigger impact on them than those who were viewing the model group. The overall results are quite different in terms of factors such as spread and the IQR. If the presenter is obviously passionate about what they're talking about then people will be more engaged.

Conclusion:

The main aim of this experiment was to find out if using a model that projects climate change scenarios creates a greater impact on people's knowledge around climate change than a standard oral presentation? The short answer to the question is no, in this case it didn't. The results were actually the opposite to what I expected. I thought that the presentation method with the model would be more effective but it turns out the oral presentation was more effective. On the box and whisker graph the maximum for the speech group was 10 compared to that of the speech group which was 8. The median for the speech group was also greater than the model group being 7 and 6. Also the upper quartile and minimum for the speech group sit higher up the scale than the model group. However there are many factors that may have changed our results and ways that we can improve the experiment for a more fair test.

Our experiment wasn't completely controlled as we had a limited amount of time. Ideally we would've liked to have the same person doing both presentations so we are guaranteed to have the same information being presented to both groups. To try to make our results fair both presenters were asked to come up with a script that included the same information for both people to talk about. I believe that this wasn't done which could've affected our results. We want both groups to have the same information so the only difference in the experiment is the way in which they were presented the information. Also with the model group there were around 5 smaller groups with 4 people in each. Each model group got the same information but some points may have been missed. With smaller groups there wasn't really anywhere for people to hide so they could have all the attention on the model. However, at the end of the presentation for a couple of the models groups the presenter asked for any questions. In one case this started quite a bit of back and forth discussion which added additional information into the mix that other groups didn't receive.

I also noticed that the scores for the model group increased fairly noticeably between the first group and the last few groups. This is probably due to the fact that the presentators confidence grew with practice from each group.

The results from this experiment were unexpected for me. From doing research I thought that using visuals would help get the message around climate change scenarios across considering that Harvard business review said if you want to capture your audience use images, visual aids and short points/ideas. However our experiment wasn't completely controlled which has had some major effect on the overall results. If we wanted to get the most reliable and accurate data from the experiment we would have to be very strict on controlling all the dependent variables such as having the same person speaking, each group having the same information and all groups having the same amount of time.

It would be interesting to redo the experiment but this time have the person who did the oral presentation present the model as there was a great response to the speech that he did. By doing this we could compare the results from the speech group this time round to the results from the model presentation. That would give us a better indication of whether the model does actually create a more significant effect of people's understanding of climate change or is it solely on the person presenting that information?