



WPI

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Australian Institute for
Disaster Resilience

Disaster Resilience in Victorian Schools: Educating Students Using Interactive Lesson Plans

May 11, 2020

INTERACTIVE QUALIFYING PROJECT (IQP)



LIMITATIONS OF OUR PROJECT



OUR SPONSOR

Australian Institute for Disaster
Resilience
(AIDR)



Australian Institute for
Disaster Resilience

AIDR MISSION



Image Source: AIDR Education for Young People Program



Spread knowledge of **disaster resilience** to help build safer, stronger **communities**



Help **children** develop knowledge, skills, and confidence to **take action**

DISASTER RESILIENCE

Preventing hazards from causing harm in the **future**

**Prevention
-Mitigation**

Preparing for a hazard **before** it occurs

Preparedness

Recovering from a hazard **after** it occurs

Recovery

Responding to a hazard **while** it is occurring

Response



AIDR TRACKS DISASTERS IN AUSTRALIA

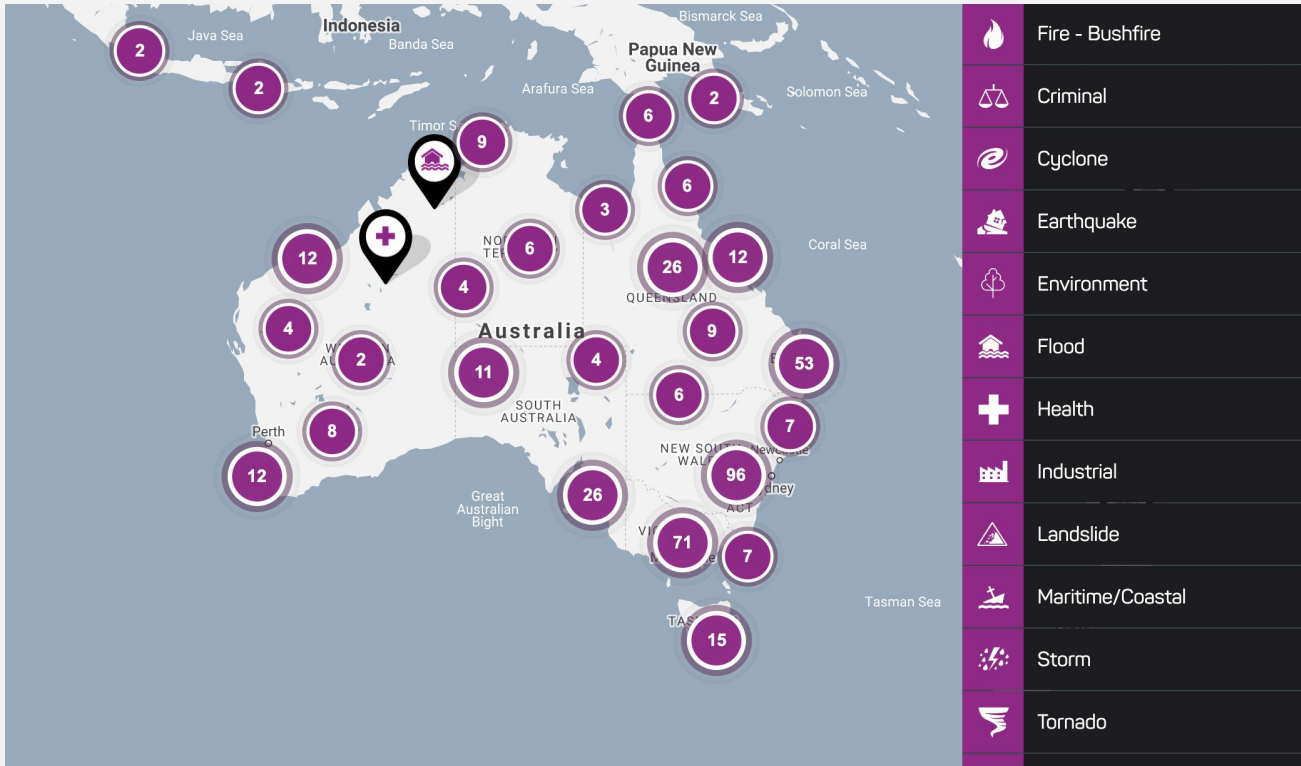
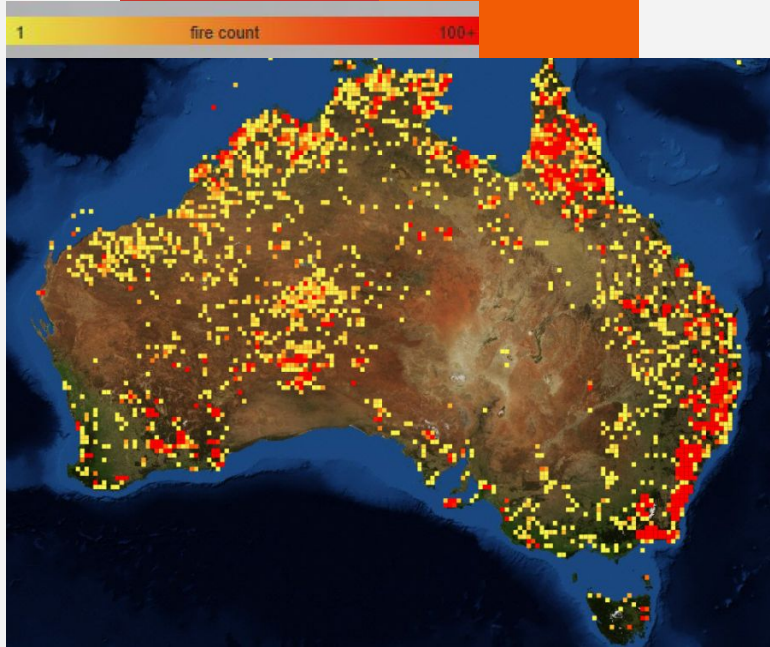


Image Source: AIDR Knowledge Hub 1870-2020

FIRES IN AUSTRALIA



*Image Source: NASA Fire Information for Resource Management.
System Satellite: Bushfire Data,
December 2019*



Australia had the biggest fire season in modern history in 2019-2020

(Woodward, 2020)



25+ Million acres of forest burned in Australia

(Woodward, 2020)



8x more land destroyed in Victoria and NSW than 2018 California Camp Fire

(Tarabay, 2020)

FIRE SEASON IMPACTS 2019-2020

1,000,000,000+

Estimated animal deaths (University of Sydney, 2020)

30+ People Dead

Hundreds more injured (Tarabay, 2020)

2500+ Homes Destroyed

Thousands of communities devastated (Tarabay, 2020)



KEY FACTORS FOR DISASTER RESILIENCE

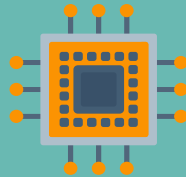
Involving the Community



Education



Using Technology



EDUCATING CHILDREN



11

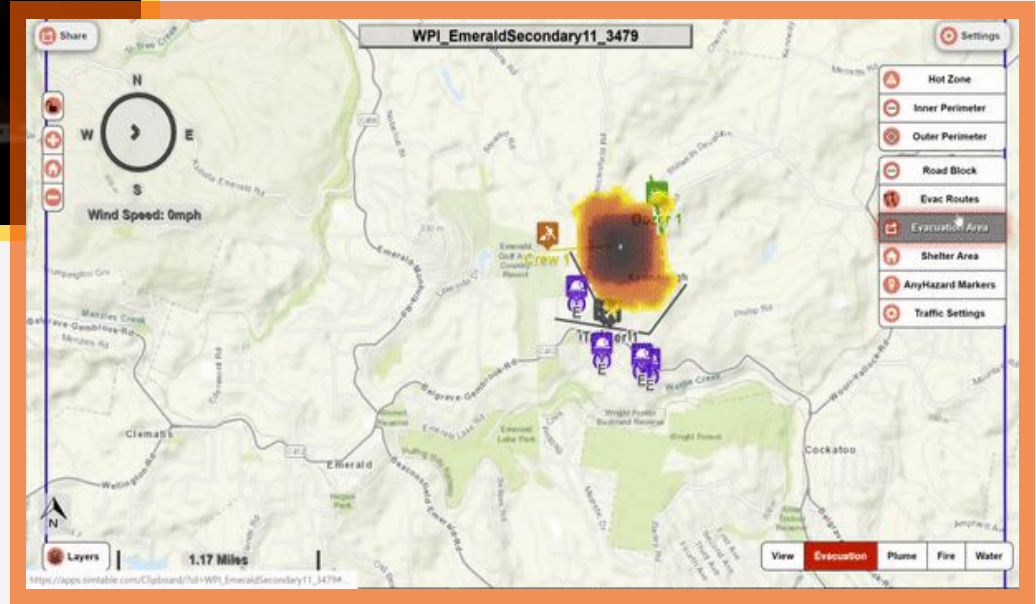
“To develop skilled and resilient communities, young learners need to understand the nature of risk in their local environment and their role in reducing exposure and vulnerability to harm.”

- Commonwealth of Australia, 2011

TECHNOLOGY MAKES THINGS INTERESTING

Simulations allow us to better reflect **real-life** scenarios.

Active learning helps students stay **engaged** and learn more.



COMMUNITY INVOLVEMENT



Australian Institute for
Disaster Resilience



AIDR is a non-profit organization contributing to disaster resilience education throughout Australia



The Country Fire Authority (CFA) provides firefighting and Emergency Services to areas in Victoria, Australia



The Australasian Fire and Emergency Service Authorities Council (afac) is the peak body responsible for fire in the Australasian region

COMBINING KEY FACTORS FOR DISASTER RESILIENCE



OUR MISSION

The goal of our project is to help **year 8 students** at Emerald Secondary College learn about bushfire **safety, knowledge, and awareness** to improve local **disaster resilience**.

EMERALD SECONDARY COLLEGE



Emerald Secondary College is a secondary school (middle/high school) located just outside the city of Melbourne in Victoria, Australia



Image Source: Emerald Secondary College

THE CLASSROOM



Gary Vear - digital technology teacher



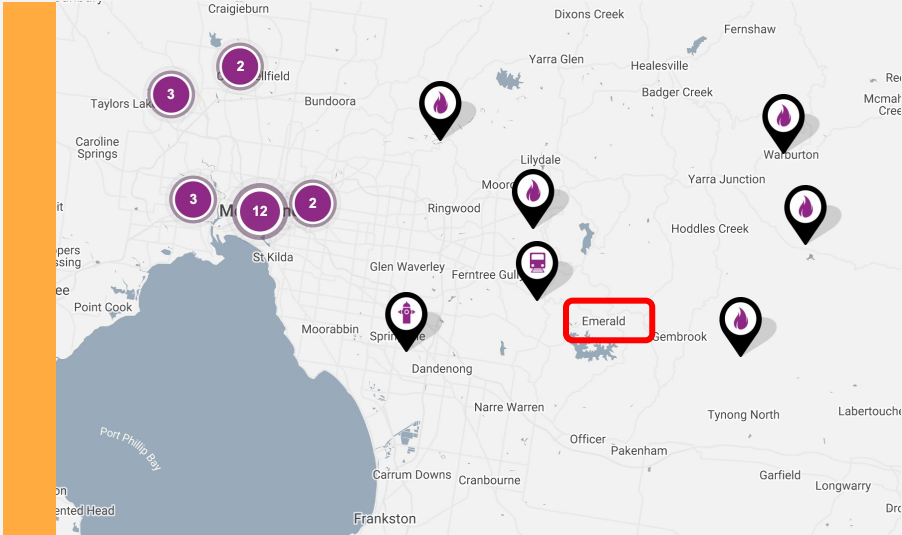
Year 8 (13-14 year olds)



3 Classes of 20 students

EMERALD IS A HIGH RISK BUSHFIRE AREA

LOCAL DISASTERS



2019 BUSHFIRE LOCATIONS

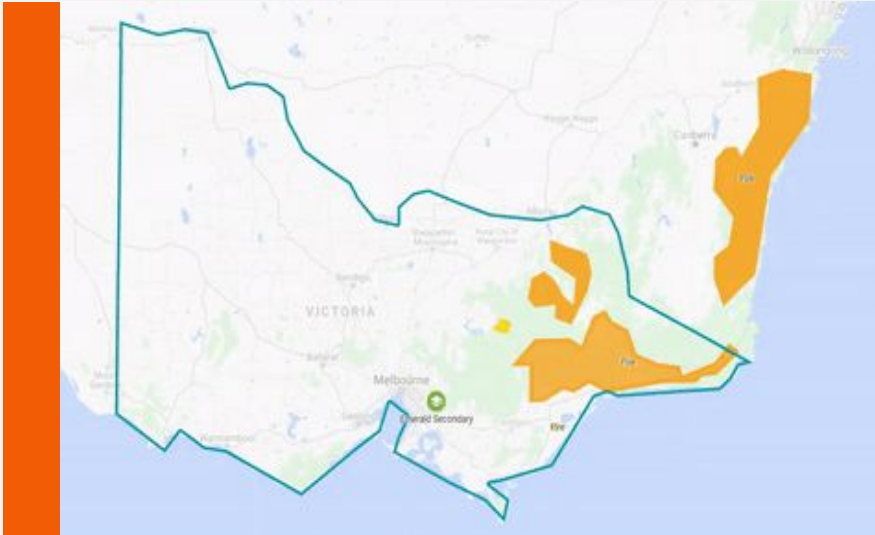
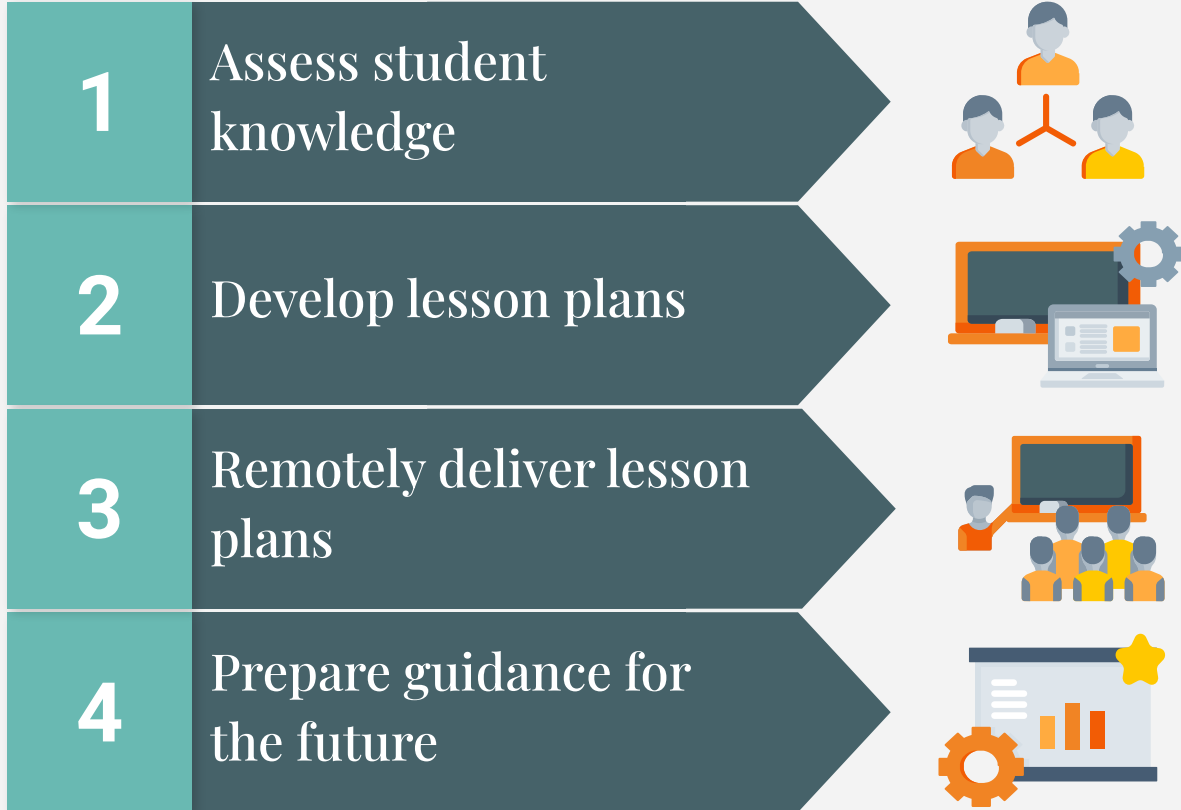
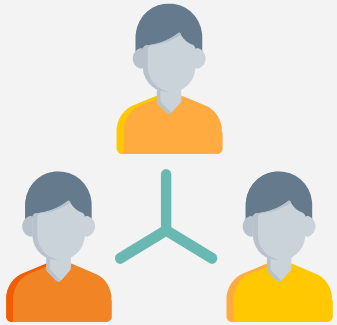


Image Source: AIDR Knowledge Hub 1870-2020

Data Source: NASA Fire Information for Resource Management System Satellite: Bushfire Data, December 2019

OBJECTIVES



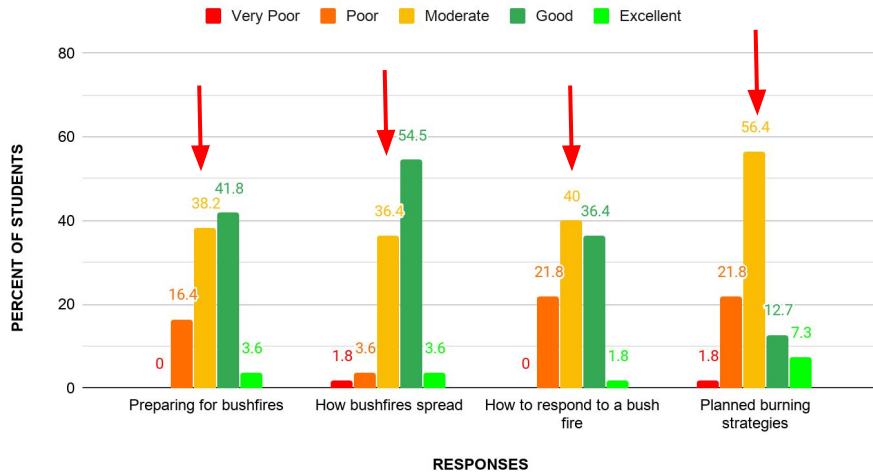


FIRST OBJECTIVE

Assessing student
knowledge

STUDENT KNOWLEDGE OF BUSHFIRES IS MODERATE

How would you rate your background knowledge of bushfires?



55 students responded to the pre-assessment



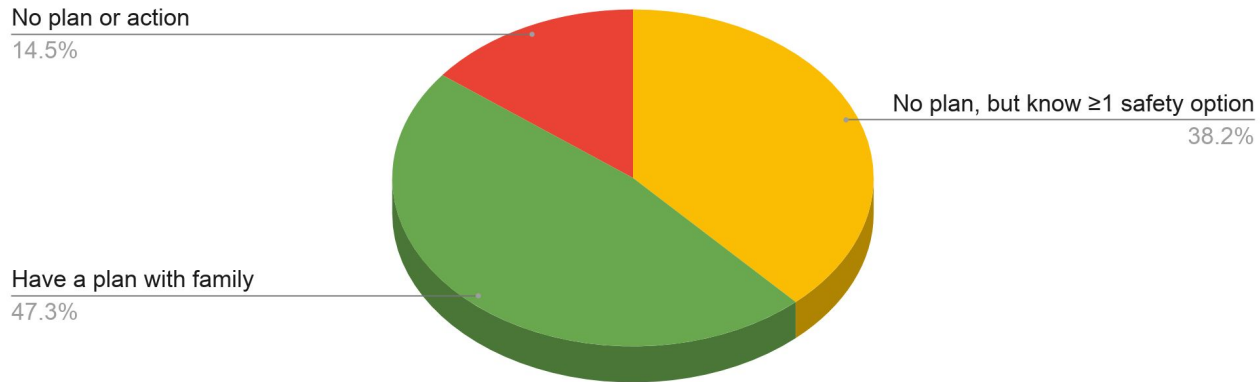
~85% of all students responded



For such a high risk area, students should be good or excellent

STUDENTS ARE UNAWARE OF HOUSEHOLD PLANS FOR BUSHFIRE

Student Pre-Assessment: What actions do you and your family take to prepare for the bushfire season?

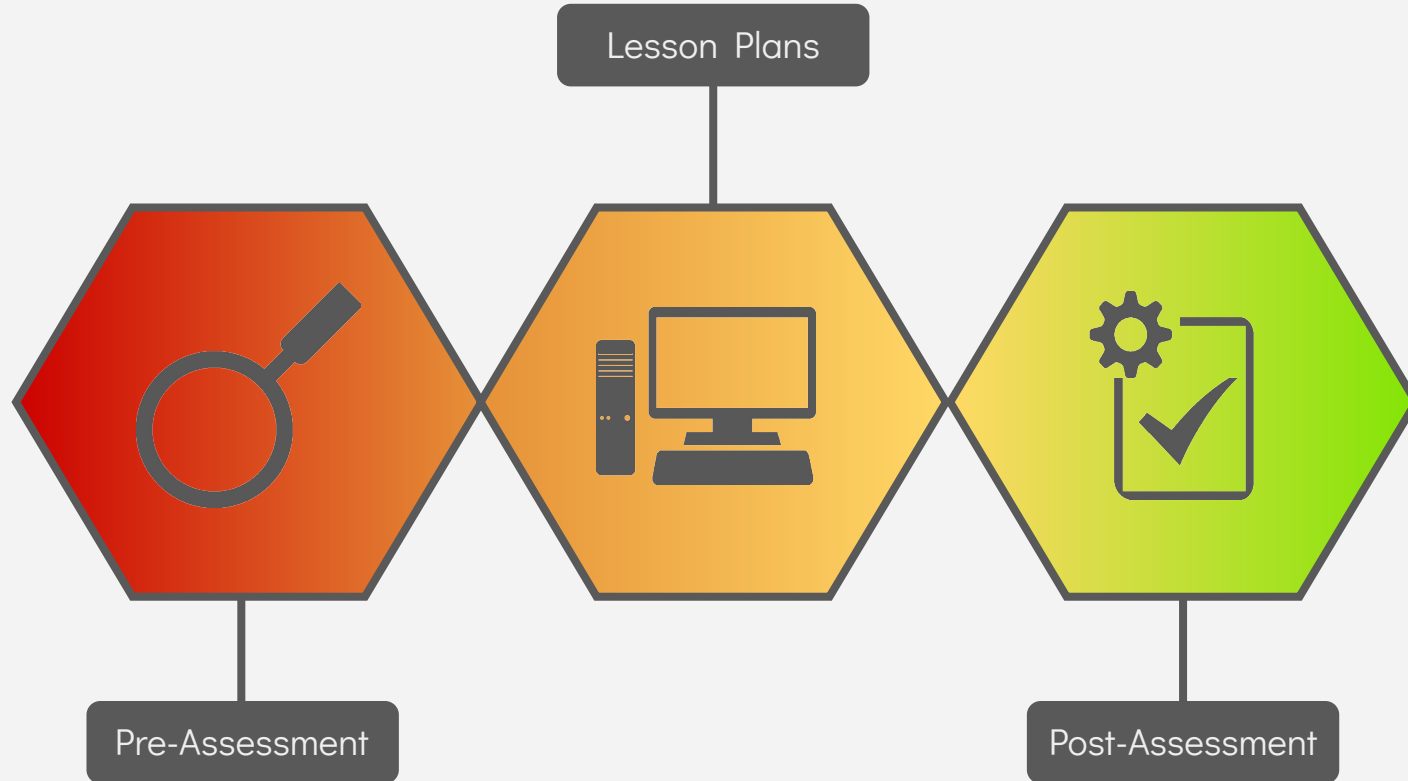




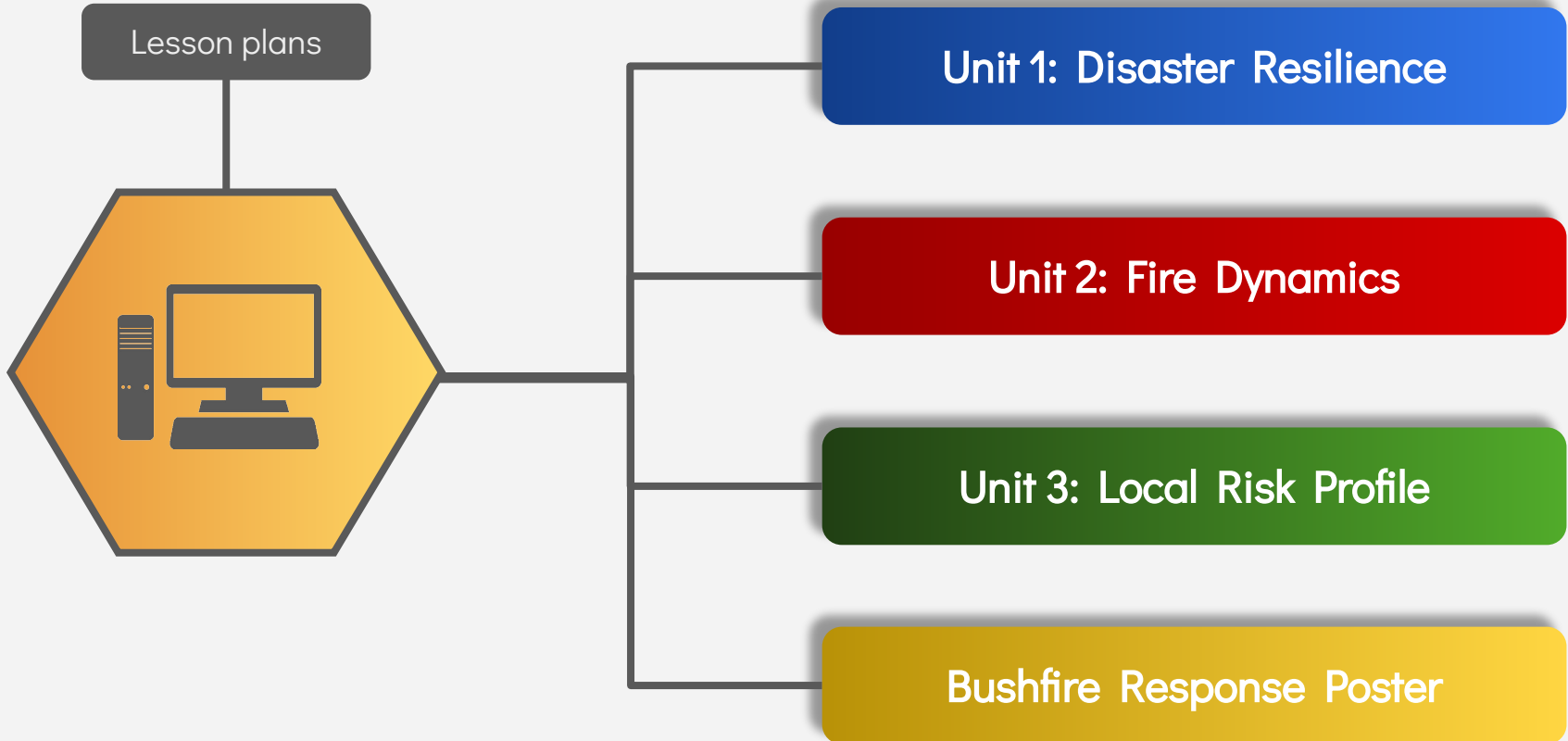
SECOND OBJECTIVE

Developing Engaging
Lesson Plans

LESSON PROGRAM

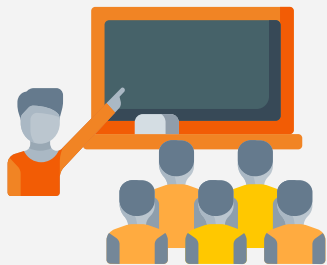


LESSON PLANS



STRUCTURE OF EACH UNIT





THIRD OBJECTIVE

Delivering lesson plans
remotely

DELIVER LESSONS THROUGH A WEBSITE



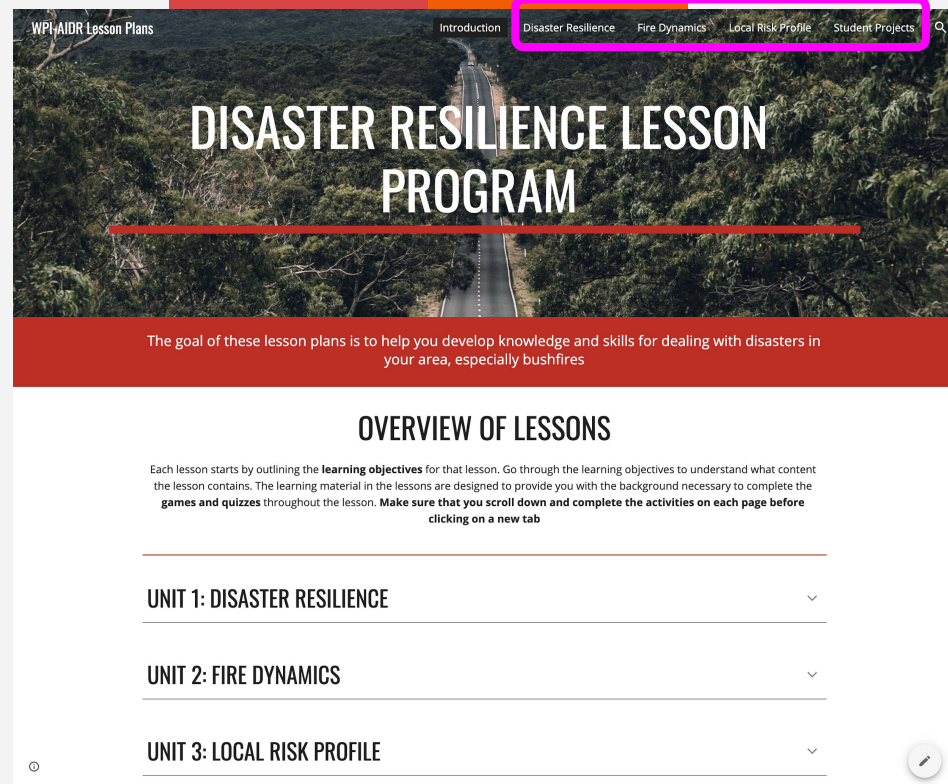
Website is accessible, intuitive, and reliable



Each unit has its own tab



Interactive games and activities are embedded



WPI-AIDR Lesson Plans

Introduction Disaster Resilience Fire Dynamics Local Risk Profile Student Projects

DISASTER RESILIENCE LESSON PROGRAM

The goal of these lesson plans is to help you develop knowledge and skills for dealing with disasters in your area, especially bushfires

OVERVIEW OF LESSONS

Each lesson starts by outlining the **learning objectives** for that lesson. Go through the learning objectives to understand what content the lesson contains. The learning material in the lessons are designed to provide you with the background necessary to complete the **games and quizzes** throughout the lesson. **Make sure that you scroll down and complete the activities on each page before clicking on a new tab**

- UNIT 1: DISASTER RESILIENCE
- UNIT 2: FIRE DYNAMICS
- UNIT 3: LOCAL RISK PROFILE

<https://sites.google.com/view/wpi-aidr-lessons/introduction>

STRUCTURE OF EACH UNIT



Learning Objectives

DISASTER RESILIENCE

If you have questions or feedback about this unit, scroll to the bottom of this page and add a comment to the bulletin board

LEARNING OBJECTIVES

The following objectives outline what you will be able to do after this lesson

1. Understand the difference between a hazard and a disaster
2. List the different types of impacts a disaster can have on people and places
3. Identify the four stages of the disaster management cycle
4. Explain how you can prepare for a disaster before it occurs
5. Identify natural hazards that occur in and around Australia and how they impact communities

Learning Material / Graphics

The goal of disaster resilience is to build strong communities who understand local hazards and how to protect themselves from harm.

HAZARD VS. DISASTER



Learning Material / Graphics

The goal of disaster resili

Hazard

An event or thing that can cause harm to people, their property, and the environment

RISK

HIGH RISK

Vulnerable

Community is not prepared and doesn't know how to protect itself.

Resilient

Community is prepared for natural hazards that are likely to occur.

LOW RISK

local hazards and how

Disaster

A really bad event, when a lot of people are hurt or killed, and their property and natural environment are destroyed

TYPES OF IMPACTS

Impacts are the **effects** or **consequences** of disasters on people and places

Flip through the cards to explore the different types of impacts that can be caused by disasters

Economic

Damage to property,
roads, services, jobs
and other sources of
income.



THE 4 STEPS OF DISASTER RESILIENCE

Prevent

Preventing future hazards from causing harm

- e.g. restricting building permits in high risk areas, land management and planned burning

Recover

Recovering from a hazard after it occurs

- e.g. repairing property, treatment for illness or injury



Prepare

Preparing for a hazard in case it occurs

- e.g. creating an evacuation plan, clearing vegetation

Respond

Responding to advice and warnings from emergency services

- Putting your preparedness plans into action

BUILDING AN EMERGENCY KIT

One of the easiest ways you can be **prepared** for a disaster is to build a family **emergency kit**.

Things you should include:

- Water
- Non-perishable Foods
- Paper Goods
- First Aid Kit
- Hygiene Supplies
- Comfortable Clothes
- Sleep Items
- Flashlight
- Batteries/Battery-powered radio
- Entertainment

Games, Activities, and Quizzes

MATCH EACH STATEMENT WITH ITS TYPE OF IMPACT BY CLICKING ON MATCHING DEFINITIONS

Click **Start** to begin this small quiz. You have **3 strikes** before the quiz ends. You can **try again** as many times as you'd like!

Disaster Impacts

0/3 NUM. TRIES

100 SCORE

00:25 TIME

Emotional

Social

Physical

Economic

Environmental

People must be evacuated from their homes and separated from their community

A forest is completely burned down, killing animals and their habitat

Millions of dollars are spent to help restore buildings and roads

Someone experiences nightmares months after a disaster

Someone is seriously injured

Once you are done, upload a screenshot of your quiz results to Compass for the 'Disaster Impacts' learning task!

Games, Activities, and Quizzes

NOW CREATE YOUR OWN EMERGENCY KIT!

Read the text on the game screen, then click **Ready?** to start the game

Note: After completing level 5, do **NOT** click "You're all set! Print your checklist." Just take a screenshot of the level 5 completion screen

* Make sure to turn on Scripts and Flash in your browser! *



 **Level 1**
Bedroom

Choose up to 8 items
and then click 'Ready'

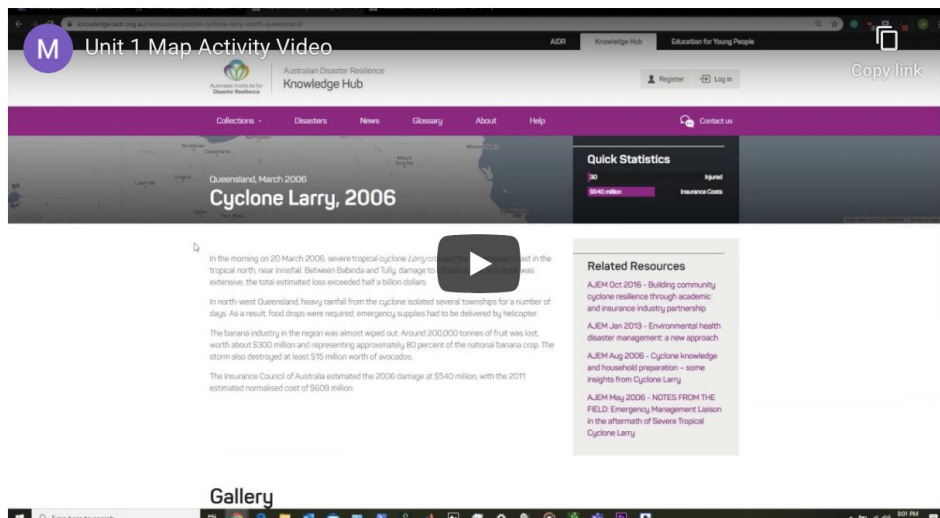
<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Ready?

Interactive Project

DISASTERS IN YOUR AREA

As a class, you will create an **interactive map** that shows **disasters** in your area and their **impacts** on those communities. Watch the **video** instructions below to add a disaster pin to the map!



The screenshot shows a web browser window displaying a video titled "Unit 1 Map Activity Video" from the Australian Disaster Resilience Knowledge Hub. The page features a purple navigation bar with links for Collections, Disasters, News, Glossary, About, and Help. A map of Queensland, Australia, is shown with a red pin indicating the location of Cyclone Larry in March 2006. A play button is overlaid on the map. To the right of the map, there is a "Quick Statistics" section showing 30 injured people and \$540 million in insurance claims. Below the map, there is a "Related Resources" section with several links to documents and reports related to Cyclone Larry.

Unit 1 Map Activity Video

Australian Disaster Resilience Knowledge Hub

Register Log in

Copy link

Collections Disasters News Glossary About Help

Contact us

Queensland, March 2006
Cyclone Larry, 2006

Quick Statistics

30 Injured
\$540 million Insurance Claims

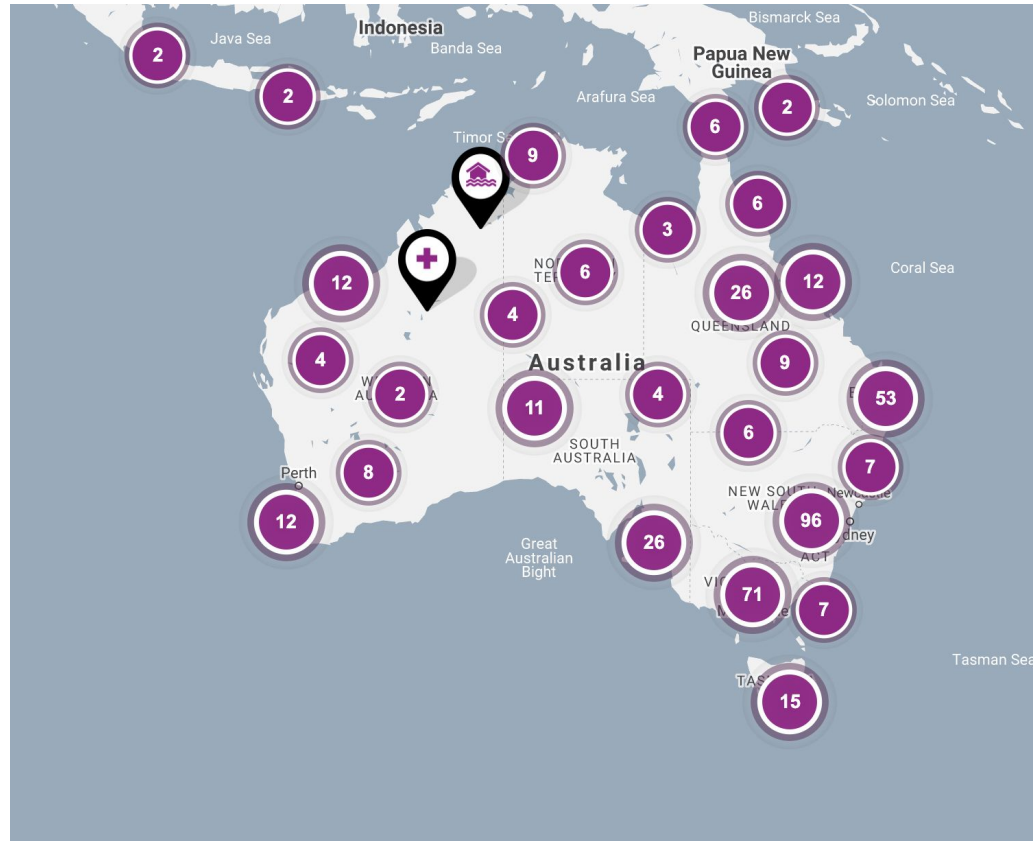
Related Resources













- AJEM Oct 2016 - Building community cyclone resilience through academic and insurance industry partnership
- AJEM Jan 2013 - Environmental health disaster management: a new approach
- AJEM Aug 2006 - Cyclone knowledge and household preparation - some insights from Cyclone Larry
- AJEM May 2006 - NOTES FROM THE FIELD: Emergency Management Liaison in the aftermath of Severe Tropical Cyclone Larry

Gallery

[Click here to go to the ADR Knowledge Hub](#)

Interactive Project



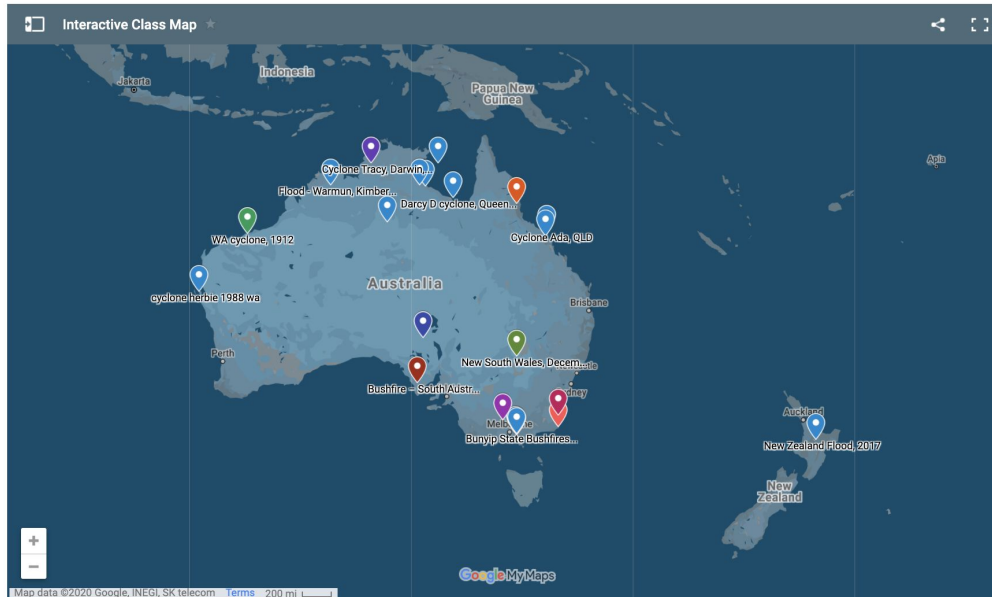
	Fire - Bushfire
	Criminal
	Cyclone
	Earthquake
	Environment
	Flood
	Health
	Industrial
	Landslide
	Maritime/Coastal
	Storm
	Tornado

Interactive Project

CLICK THE FULLSCREEN BUTTON IN THE TOP RIGHT CORNER TO EDIT THE MAP

Note: You need a **Google account** to edit the map. After you fullscreen the map, click **Sign in** in the top right corner to log in, or make a new account if you don't have one already.

UPDATE: Please don't create a new layer with your name. You can just add a pin to someone else's layer. Then write your name in the description of that pin.



Feedback Message Board

HELP AND FEEDBACK

If you are **stuck**, need **help**, or want to provide **feedback**, please post in the bulletin below!

padlet SIGN UP LOG IN SHARE ? ...

MPC AIDR + 3 14d

Unit 1 Feedback

We would love to hear your thoughts about the unit you just covered. Let us know how you found the lessons, your favorite part, and if you faced any difficulties completing them.

Anonymous 14d
i can't find the login part for the map...
3 likes 0 dislikes
1 comment
MPC AIDR 19d
We just fixed the link. You should be able to edit now.

Anonymous 20d
i cant edit the map
5 likes 0 dislikes
1 comment
MPC AIDR 19d
We just fixed the link. You should be able to edit now.

MPC AIDR 14d
If you create a new pin, put it under someone else's layer, and put your name in the description!
There is a limit on the number of layers in a Google Map, so it will not allow new layers.
0 likes 0 dislikes
Add comment

Anonymous 20d
i cant edit the map? I like the activities so far though.
3 likes 0 dislikes
1 comment
MPC AIDR 19d
We just fixed the link. You should be able to edit now.

MPC AIDR 14d
Press the plus button in the bottom right to post a question or feedback!
We will respond to any of your questions in the comments.
6 likes 0 dislikes
Add comment

FINAL STUDENT PROJECT

COMMUNITY INVOLVEMENT

Anonymous 8d

if your house is behind the fire and the wind is blowing it away from your house should you still leave?

1 0

2 comments

Anonymous 8d

Yes, as the wind can change direction suddenly and cause the fire to change direction and increase in fire activity (Deb Sparkes - AFAC)

Anonymous 8d

Hello, Great question! My understanding of your question, is that the fire has either passed your house, or the wind is pushing the fire away from your house, so I will answer to that. If you feel like I have misunderstood, please let me know and I will do my best to re-answer. Most fires in Victoria start under a hot northerly or north westerly wind, this means that the wind is coming from the north and blowing in a southerly direction or from the northwest blowing in a south easterly direction. If a home has not been impacted by a nearby fire, it is in no way an indication that you are out of danger. In Victoria, hot, dry, winds are often followed by a south westerly wind change, when the wind changes and begins to blow from the southwest to the northeast (also known as the cool change). If the fire is still burning when this wind change comes through, the side of the fire can be pushed and can quickly become a much larger fire front, now blowing towards the north east. The wind change is when we see many people lose homes and their lives, as they have thought the fire has missed them, or didn't anticipate it to change direction. The safest option when there is fire in the landscape is to be as far away from it, in a lesser or non-fire risk area as

Anonymous 8d

how fast would it take a fire to spread 1km on a dense hill

Savannah G

1 0

2 comments

Anonymous 8d

This would depend on a number of factors - the wind speed, the steepness of the hill and how dry the fuel is (Deb Sparkes - AFAC)

Anonymous 8d

Hello, Thanks for your question! There are many variables on how fast a fire will travel, including Vegetation, Weather Conditions, Temperature and Wind. In general terms, a fire will burn faster uphill. This is because the flames can easily reach more unburnt fuel in front of the fire. Radiant heat pre-heats the fuel in front of the fire, making the fuel even more flammable. For every 10 degrees in slope, the fire will double its speed. (For example, if a fire is travelling at 5 km per hour along flat ground and it hits a 10 degrees slope it will double in speed to 10 km per hour up the hill.)By increasing in speed the fire also increases in intensity, becoming even hotter.The opposite applies to a fire travelling downhill. The flames reach less fuel, and less radiant heat pre-heats the fuel in front of the fire. For every 10 degrees of downhill slope, the fire will halve its speed. (For example, if a fire is travelling at 10km per hour and hits a 10 degrees downslope it will halve in speed to 5km per hour downhill)Fires tend to move more slowly as the slope decreases. Bushfires are unpredictable and vary greatly according to weather conditions. They often start on hot, dry, windy days.It is therefore difficult to predict how long it would take for a fire to spread 1km, because unless you know the

Anonymous 8d

what is the best way for people living in the area/the community to help?

3 0

3 comments

Anonymous 8d

Before a fire- ensure your property is clear of flammable materials

Anonymous 8d

During - Listen to the warnings and Respond according (Deb Sparkes- AFAC)

Anonymous 8d

Good Morning, Good question! There are many things the community can do to help. - People can help by just doing their part on their own properties, keeping them clear and cleaning up vegetation. - They can join local groups or attend a CFA bushfire information sessions (run each season in local communities) to gain a better understanding of fire and what they can do to prepare. - People can join or start up a local CFA Community Fireguard Group to get to know their neighbours and work with them to ensure their street and surrounding streets are aware of the fire risk and know what to do. - Some community members decide to join their local CFA as a volunteer fire fighter or as a member to help out with fundraising or community education. There are many other things people can choose to do to help their community even the smallest effort can have larger and impactful results, what I have mentioned is just a few examples. Taryn Campbell Community Engagement Coordinator - CFA

Add comment

Anonymous 8d

how wide would fire breaks have to be to affectively stop fires in our area?

2 0

1 comment

Anonymous 8d

Hello, Good question! I am going to interpret that you meant a fuel break, as in a cleared area that is aimed to slow or stop the spread of fire to unburnt areas. Weather conditions and fire behaviour (especially whether embers are being produced) influence the effectiveness of a fuel break on any given day. Fuel breaks will be made in a variety of sizes, dependent on where they are, the vegetation and what the conditions are expected to be. A fuel break will need to successfully disrupt the continuity of fuel, thereby reducing the fire intensity. A fuel break would have to be substantially wider if there are trees adjacent (next to) to the break. There are a range of fuel breaks that can be created including: - Bare earth breaks - Burt breaks If you would like more information on this, please let me know and I am happy to elaborate on any of the above. Taryn Campbell Community Engagement Coordinator - CFA

Add comment



Students ask any questions about bushfire behavior/safety

Local and national fire experts answer their questions

Introduces a connection between students and experts

LOCAL FIRE SIMULATION

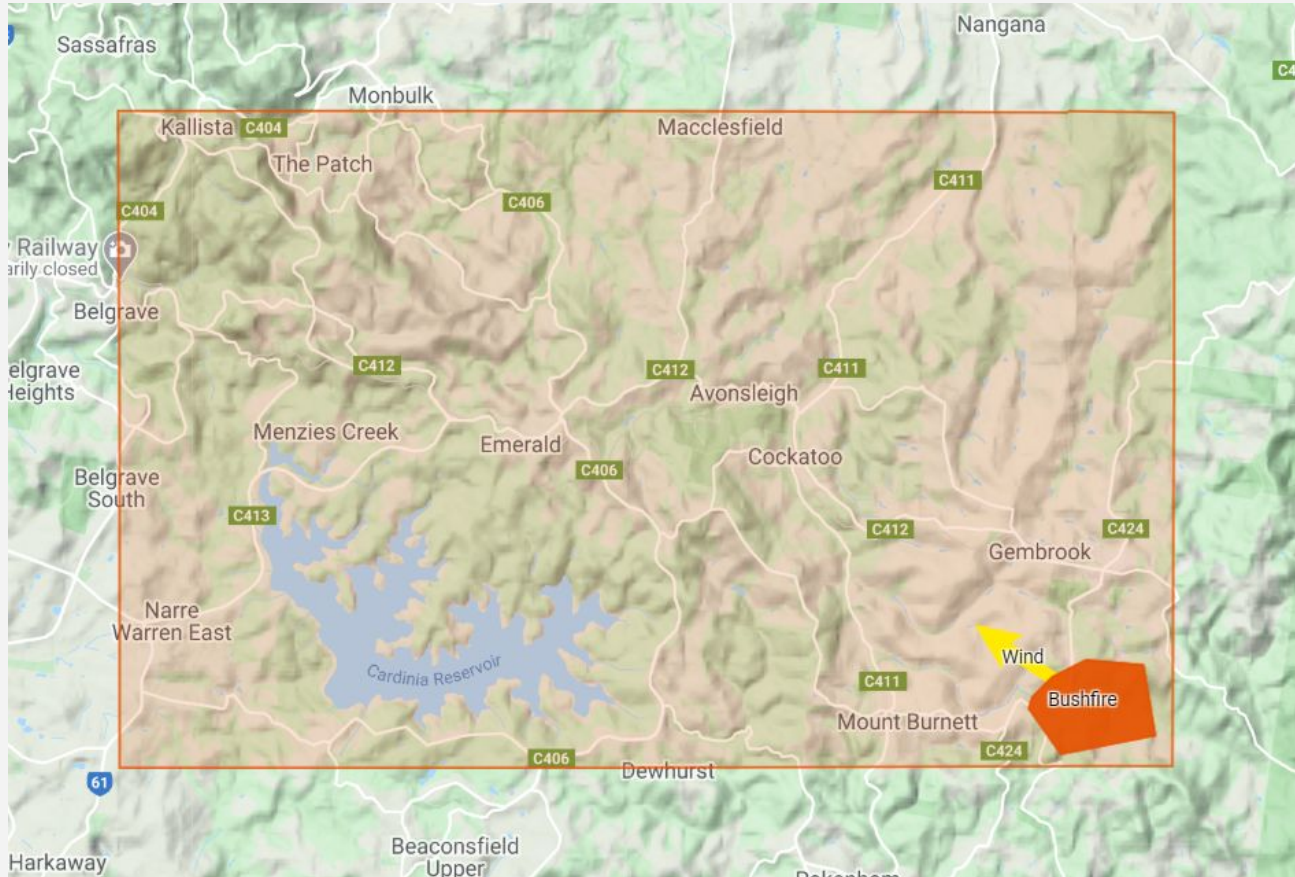


AnyHazard software simulates fires

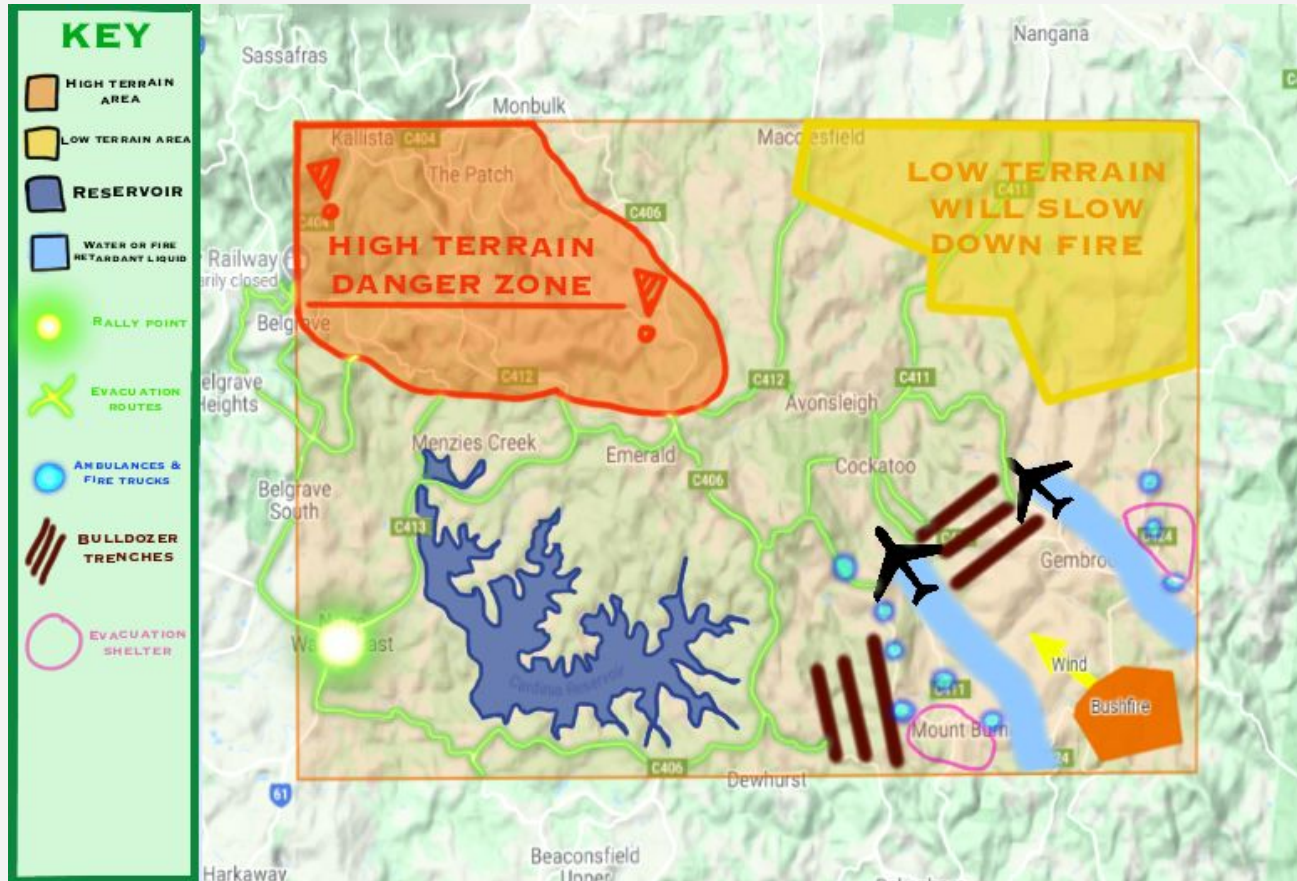


Created interactive H5P videos for students to watch

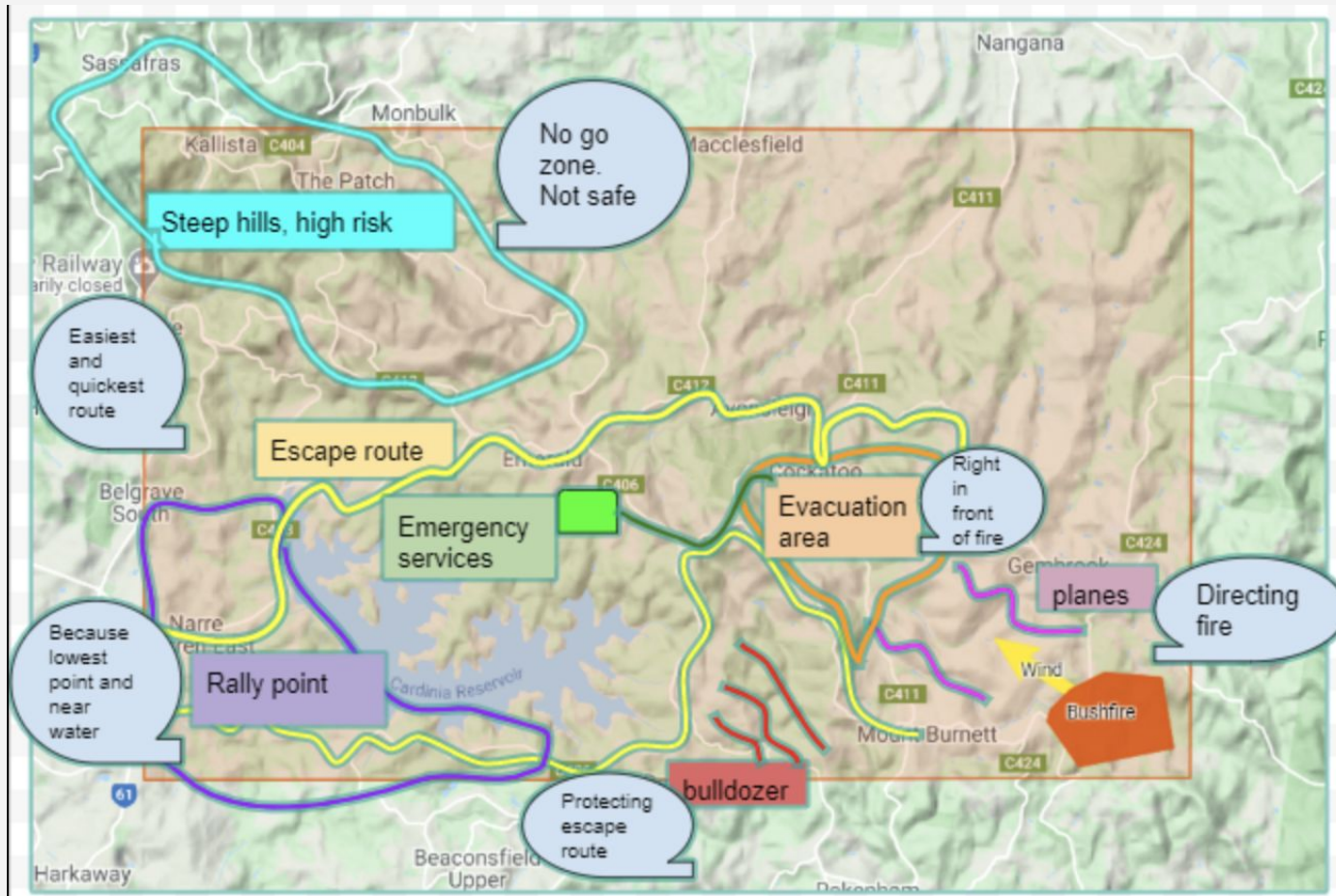
WE PROVIDED STUDENTS WITH A MAP SCENARIO



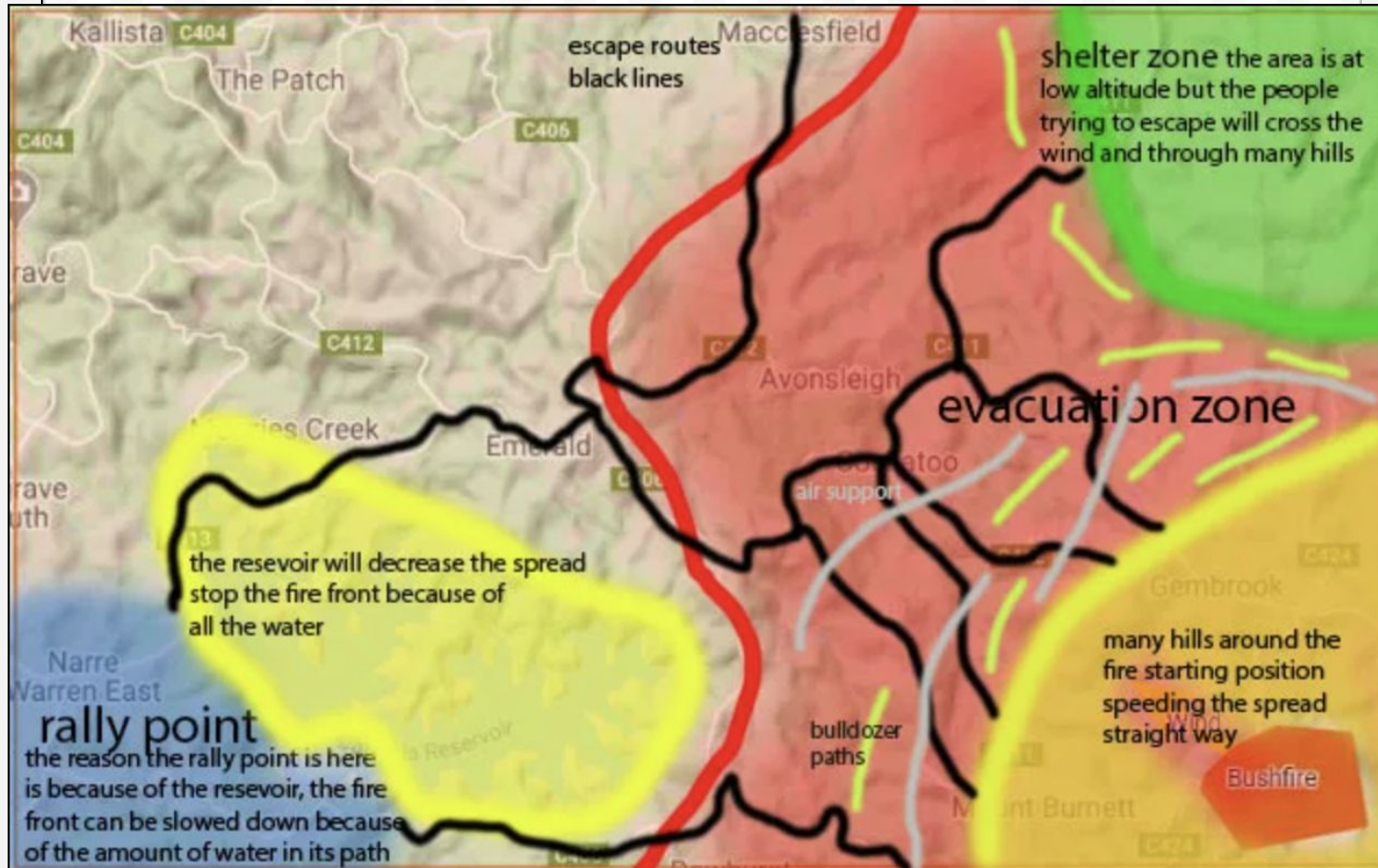
STUDENTS CREATED RESPONSE POSTERS



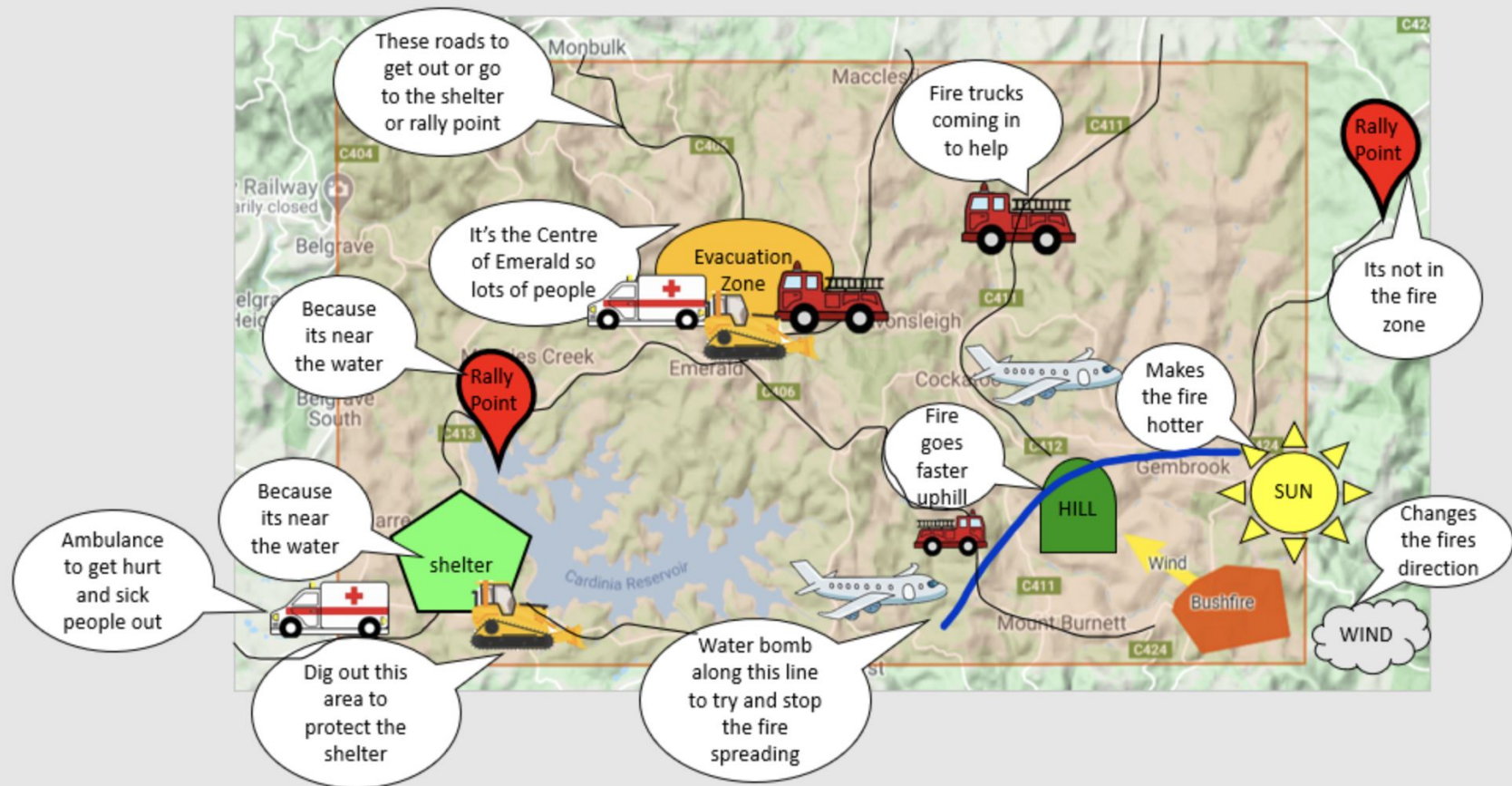
STUDENTS CREATED RESPONSE POSTERS



STUDENTS CREATED RESPONSE POSTERS



STUDENTS CREATED RESPONSE POSTERS



COMMUNITY INVOLVEMENT

COMMUNITY RESPONSE

The CFA has made a video in reaction to your questions and posters! Watch this video to see what your local experts have to say about living in a high risk bushfire area and how you can manage that as a community.



Students post their projects online for experts to view



Fire experts provide feedback and answer student questions



Fire experts create a video response to student projects

CFA VIDEO

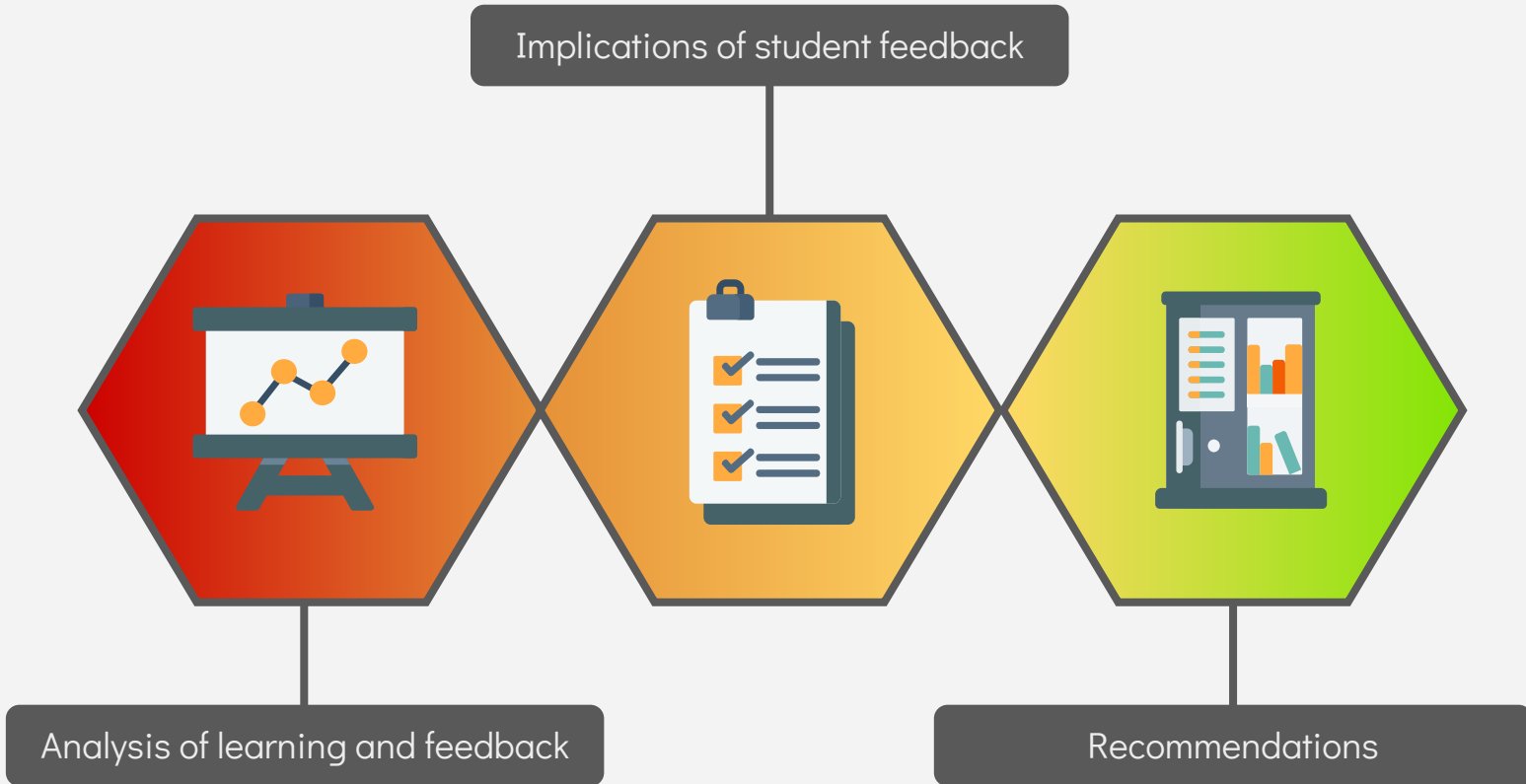




FOURTH OBJECTIVE

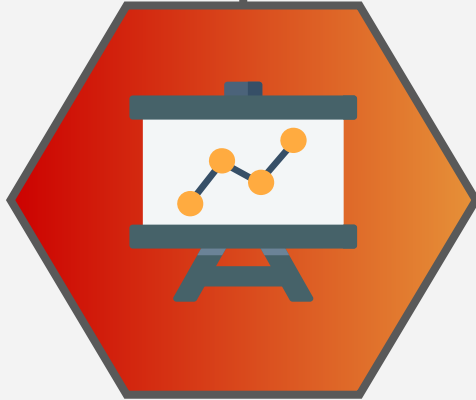
Prepare guidance for the
future

PREPARE GUIDANCE FOR THE FUTURE



ANALYSIS

Analysis of learning and feedback



Analyze long responses via coding

Conduct statistical analysis of learning metrics

Interpret successes and failures

POST ASSESSMENT ANALYSIS

Decrease of responses (36)



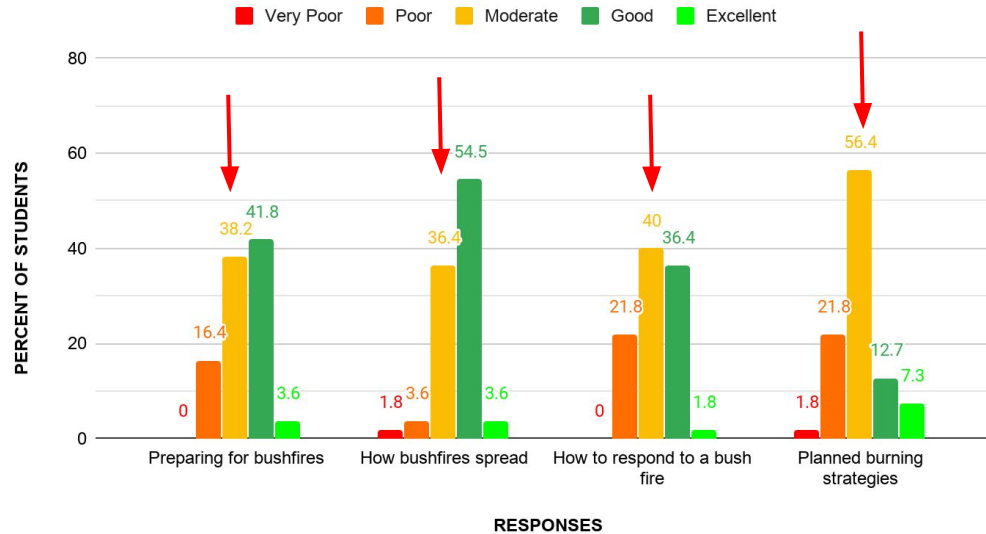
Learning fatigue

Rapid time frame



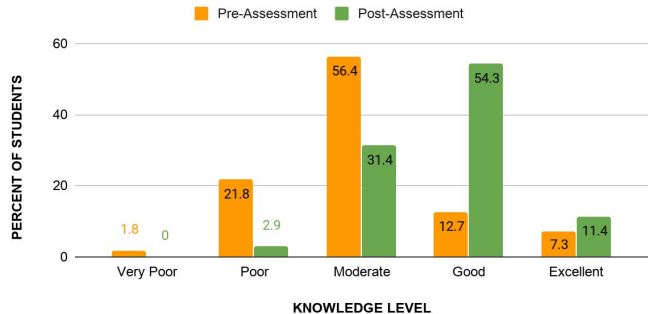
RECALLING BACKGROUND KNOWLEDGE OF BUSHFIRE

How would you rate your background knowledge of bushfires?

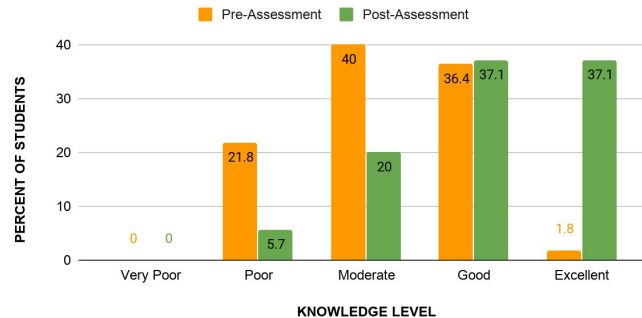


SELF-REPORTED BUSHFIRE KNOWLEDGE IMPROVED

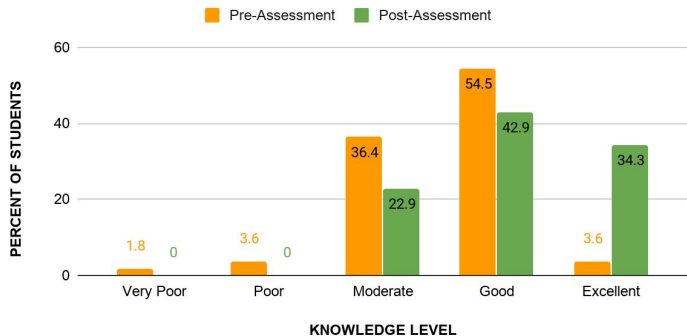
Student Self-Reported knowledge on Planned Burning Strategies



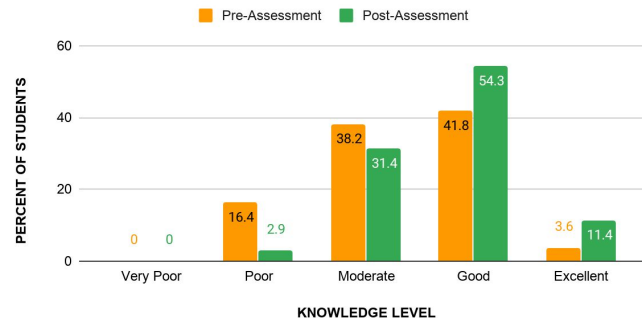
Student Self-Reported knowledge on Responding to a Bushfire



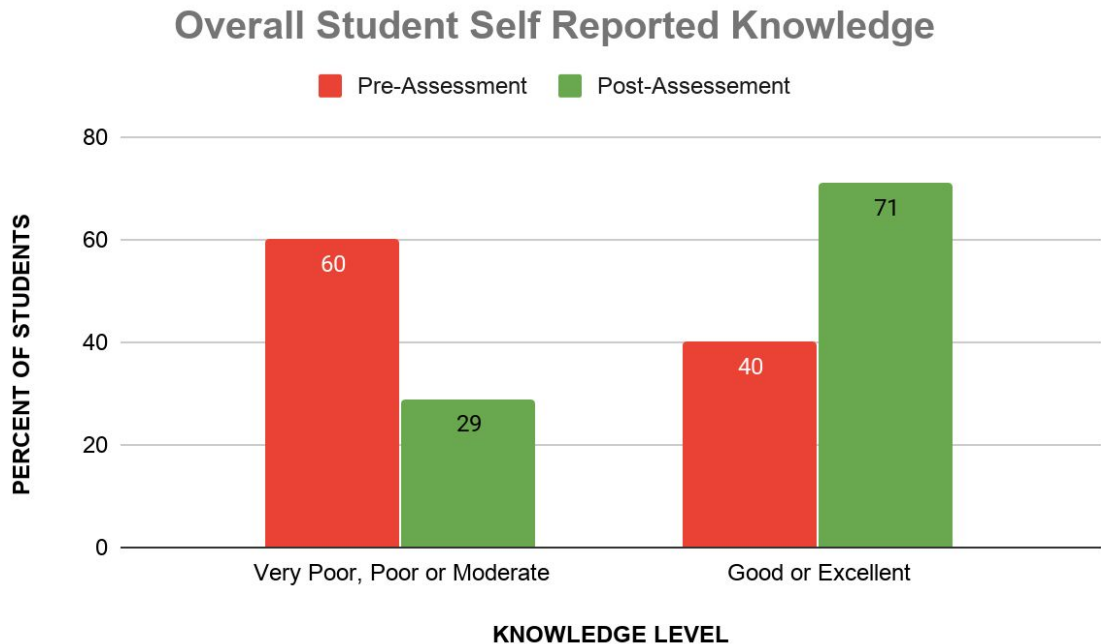
Student Self-Reported knowledge on How Bushfires Spread



Student Self-Reported knowledge on Preparing For Bushfires

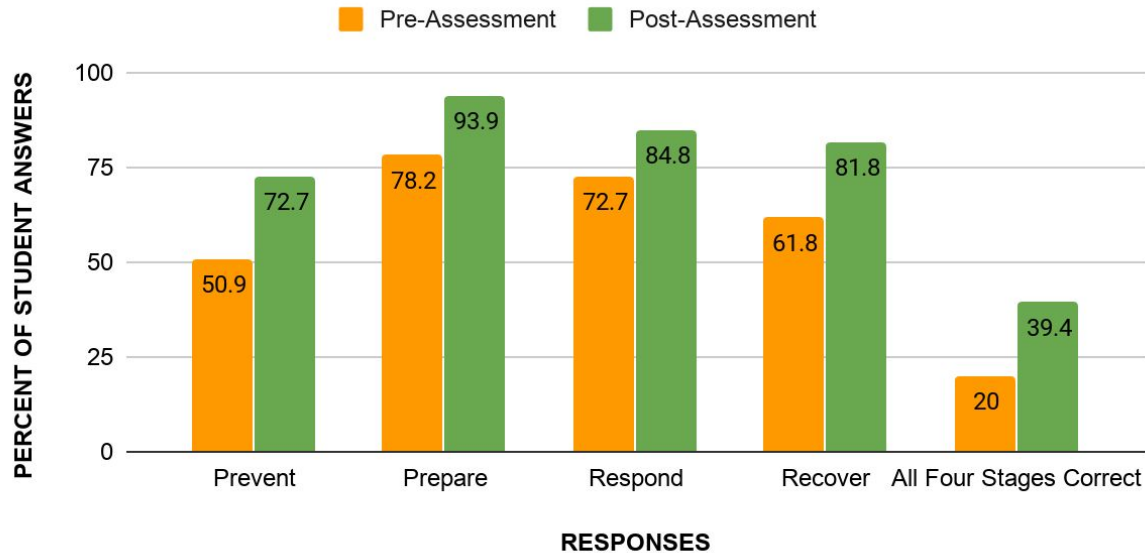


SELF-REPORTED BUSHFIRE KNOWLEDGE IMPROVED



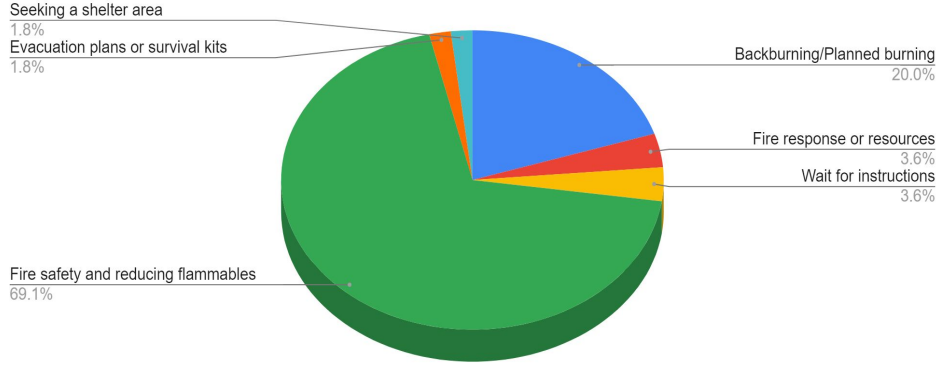
KNOWLEDGE ABOUT DISASTER RESILIENCE IMPROVED

Assessing students on stages of Disaster Resilience before and after Lesson Plans



MEASURED IMPROVEMENT IN STUDENT KNOWLEDGE OF BUSHFIRE

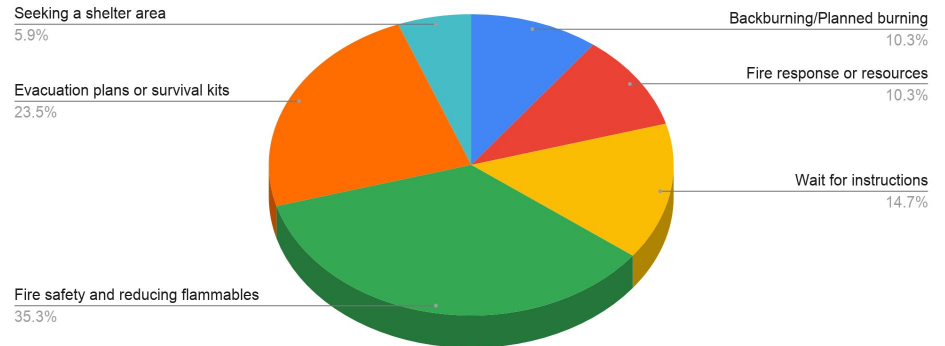
Student Pre-Assessment: What actions can be taken to prevent bushfires?



Pre-Assessment
 $\sigma^2 = 0.85$ responses

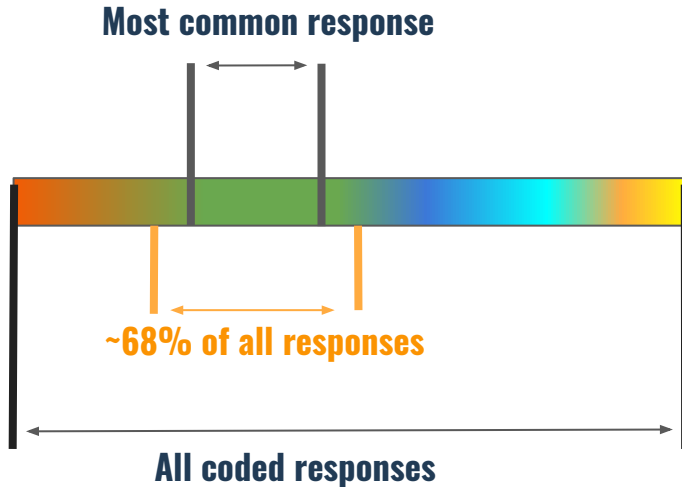
Post-Assessment
 $\sigma^2 = 1.88$ responses

Student Post-Assessment: What actions can be taken to prevent bushfires?

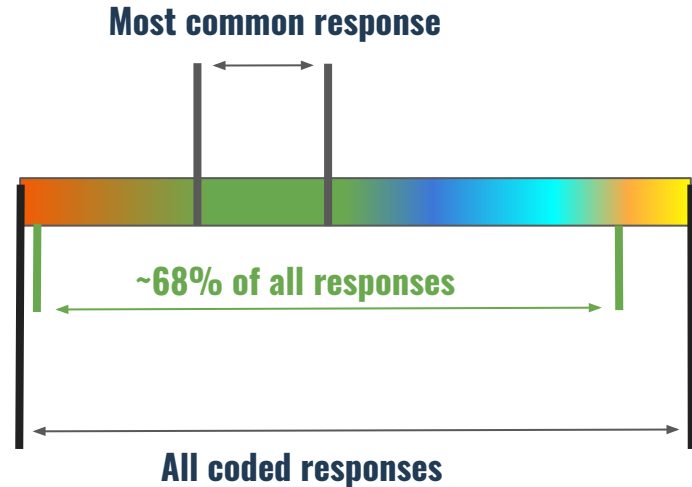


STUDENTS KNOW MORE ANSWERS: VISUALIZING THE IMPLICATION OF VARIANCE (σ^2)

Pre-Assessment
 $\sigma^2 = 0.85$ responses

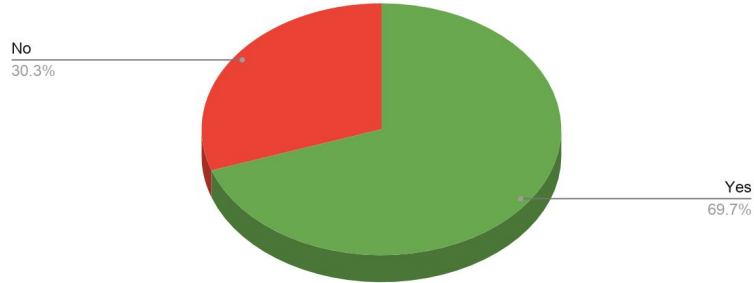


Post-Assessment
 $\sigma^2 = 1.88$ responses

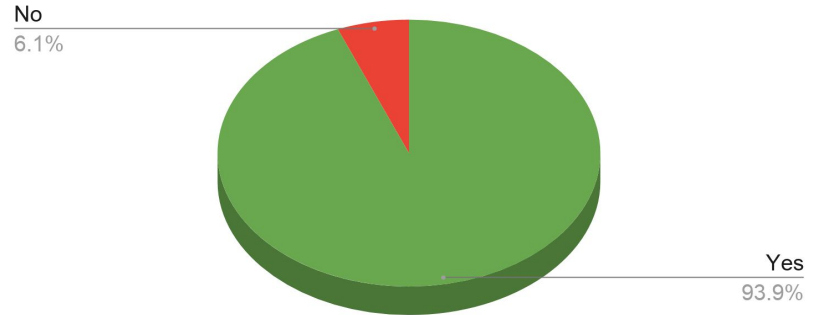


TECHNOLOGY AND COMMUNITY INTERACTION IMPROVED STUDENT LEARNING

Student Feedback: Did communicating with your community experts (CFA, AIDR, AFAC) help you learn

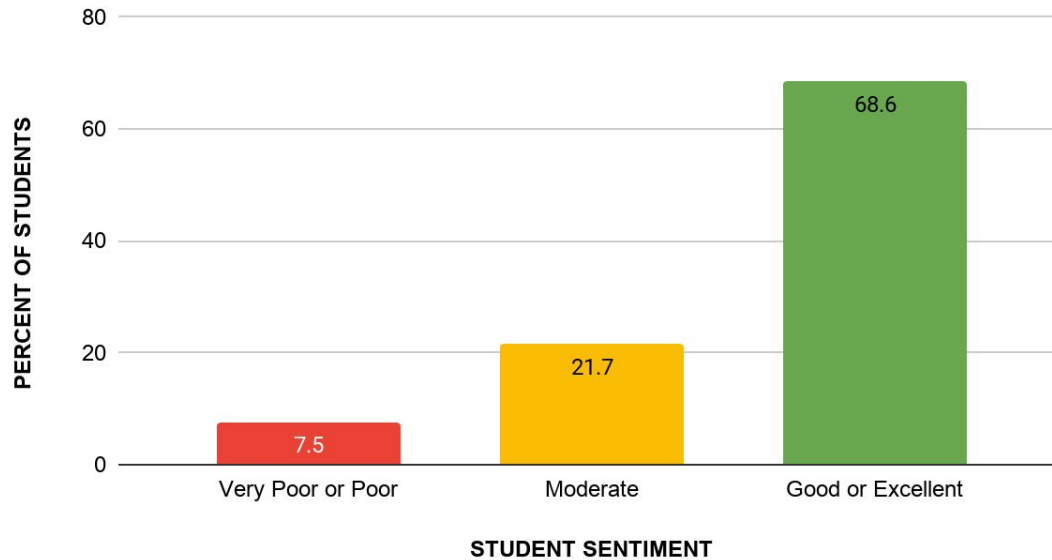


Student Feedback: Did using technology (games, simulations, etc.) help you learn more?



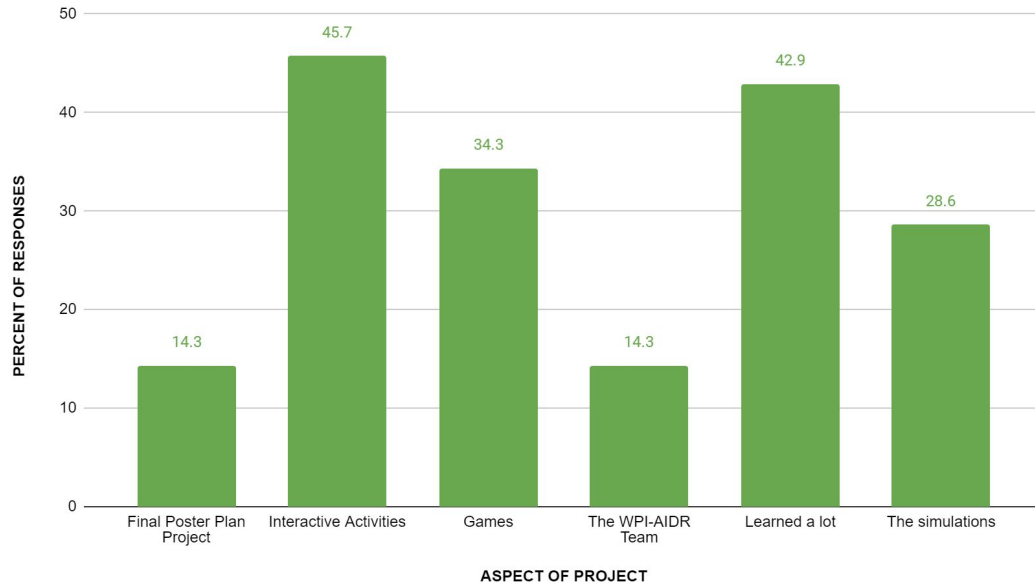
STUDENT FEEDBACK: OVERALL POSITIVE SENTIMENT

Overall student sentiment about the Lesson Program



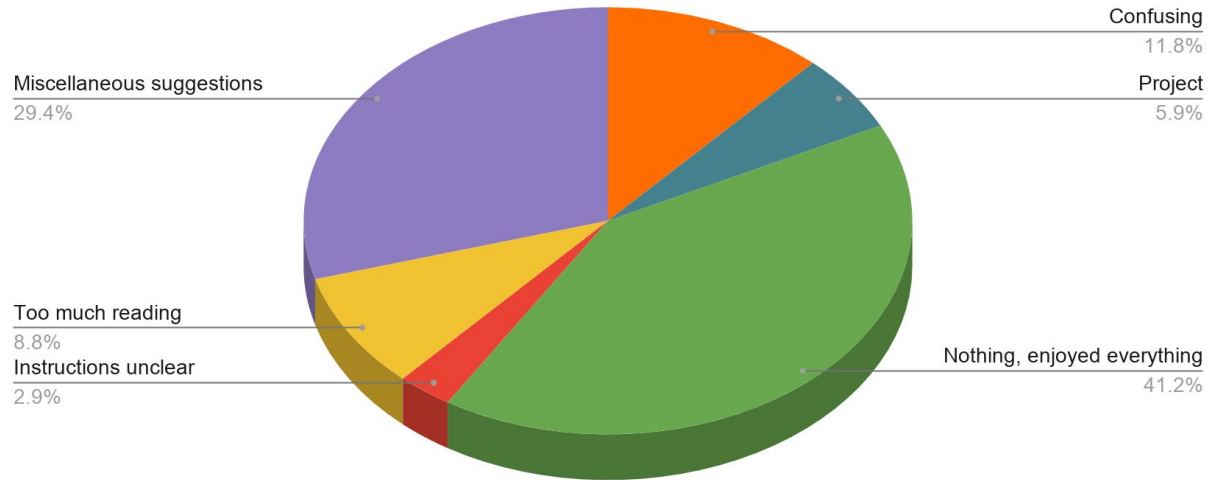
STUDENT FEEDBACK

Student long response: Identify two aspects of the project you enjoyed



STUDENT FEEDBACK

Student long response: Identify aspects of the Lesson Program you dislike

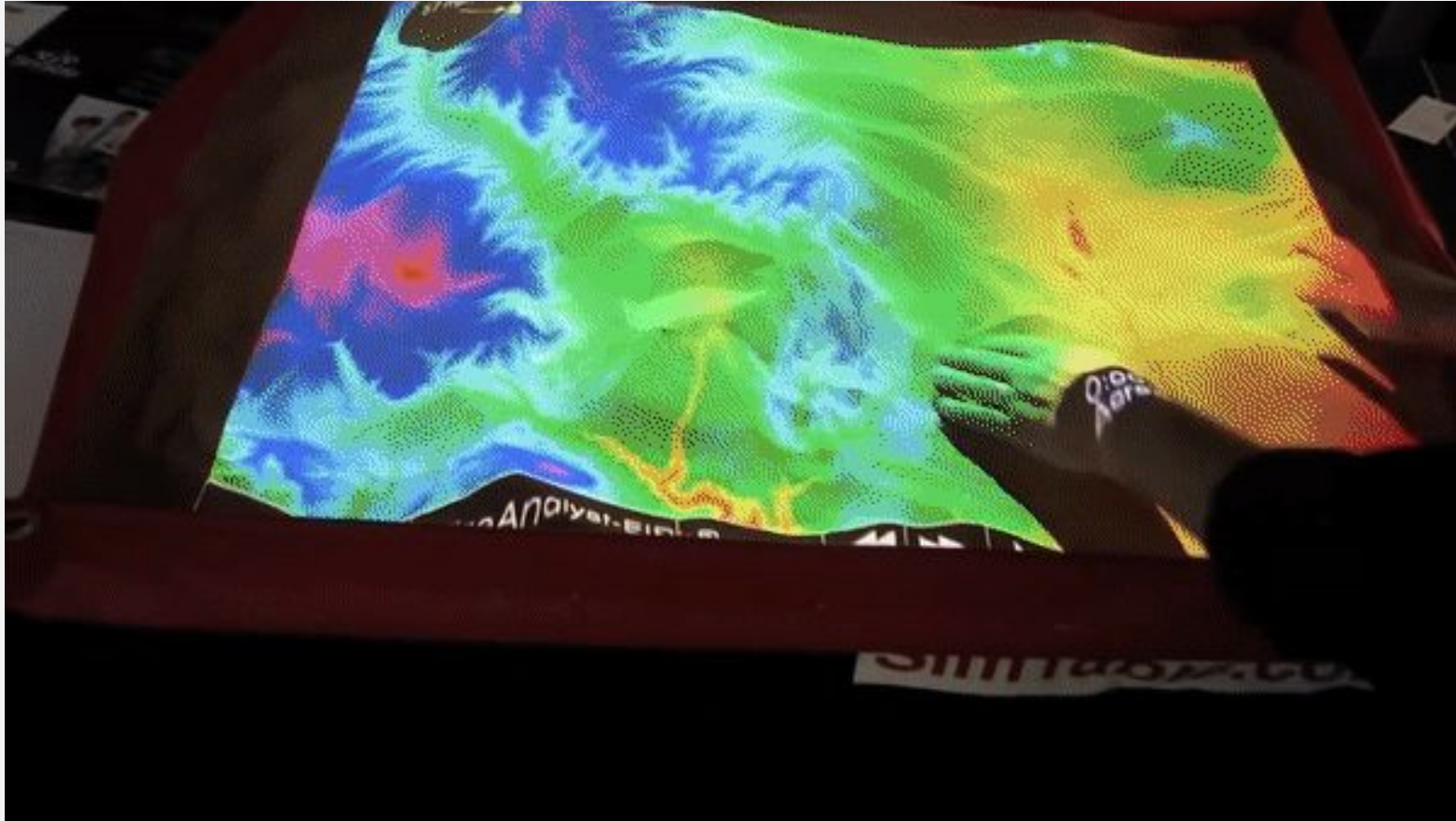


RECOMMENDATIONS FOR THE FUTURE

PRIMARY RECOMMENDATIONS

1. More concise information/instructions
2. Use a better website creation platform to have better results with activities that rely on Java/Flash/HTML5
3. Enable navigation and feedback on H5P interactive videos
4. Integrate with a learning management system (Compass, Canvas, Blackboard etc.)
5. Create a more effective and thought out Final Project

ANYHAZARD AND SIMTABLE



**NORTHERN
New Mexico
College**



Video Source: Wildfire Today, SimTable Demonstration

WEBSITE DEMO

<https://sites.google.com/view/wpi-aidr-lessons/introduction>

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Local fire experts in Victoria

Dr. Stephen Guerin

Founder and CEO of Simtable

**Professors Stephen McCauley and
Fabio Carrera**

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