An AI-Assisted Wildfire Preparedness Lab

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INTRODUCTION

Today, I'd like to share with you a digital solution to a very important and difficult educational challenge: teaching our students how to make the necessary connections between the scientific concepts that they are taught in the classroom and real-world problems affecting their communities and lives in general.

Wildfires are one of the biggest environmental and public-safety concerns in Greece, especially during the summers that are known for long, very hot and dry periods.

Although our schools teach students about temperature, heat transfer, graphs, ecosystems, and computer programming separately, they do not always offer them opportunities to use these concepts in combination with each other in order to better understand a real-world problem that may be seriously affecting their lives.

In this video I propose an AI-assisted Wildfire Preparedness Lab, which is an interdisciplinary STEAM learning activity, centered on the combination of scientific simulations, mathematical data visualisation, artificial intelligence, and interactive programming.

Let me show you how we can create this learning experience with already available and easy-to-use digital tools.

IDENTIFYING THE PROBLEM

The educational problem is not how to teach students about wildfires, but how to enable them to transform what they learn into a deeper scientific understanding, critical thinking, and eventually, action. Let's study an example: although students know that high temperatures and dry vegetation are among the main factors behind dangerous fires, they may not be able to interpret data properly, to understand and present scientific relationships, and to communicate reliable preparedness information.

We aim to build a virtual learning activity that will allow students to gain a very deep understanding of wildfires, without coming into any kind of contact with real fire or conducting dangerous outdoor experiments.

TOOL ONE: PHET INTERACTIVE SIMULATIONS

The first tool I will use is PhET Interactive Simulations, which provides interactive simulations for exploring science and mathematics concepts. A simulation relevant to energy, heat, or

temperature will be ideal for our activity. It will allow students to study the way in which thermal energy moves between objects. They will also exchange theories and opinions on why understanding heat transfer is very important for environmental science.

I will ask them questions such as:

What happens when energy is transferred?

How can temperature measurements help us to better understand environmental conditions?

Why and how is a scientific concept different to a prediction about a complex real-world event?

The goal of this activity is the development and fostering of students' scientific curiosity. It will also lay the foundation for further investigation.

Please note that a general heat-transfer simulation is not enough for the accurate prediction of wildfire behaviour. We just use it to help students understand underlying scientific concepts better.

SCENE 4 — TOOL TWO: GEOGEBRA FOR MATHEMATICAL THINKING

The second tool that I will use is GeoGebra, which is great at visualizing data.

For this demonstration, I will create a small fictional dataset of temperature measurements recorded at different times during a sample day.

When using this tool at school, the students will be allowed to enter the values, plot the data, and observe if and by how much the temperature changes over time. They should be able to successfully identify the highest measurement as well as to make comparisons of different intervals, to calculate differences, and to present us the information on the graph.

In order to help and guide the students I will be asking questions such as:

"How can a five-degree rise in recorded temperature between two measurements be represented mathematically?"

This leads students to study and analyze the data and to present their conclusions in great detail.

I should note again that the dataset will be created by me and it should only be used for mathematical practice since it is not based on official weather records or the actual level of wildfire danger.

This combination of mathematics and environmental questions is essential for enabling students to gain a better understanding of how data can support scientific reasoning, even if it can't provide all the answers.

SCENE 5 — TOOL THREE: CHATGPT OR GEMINI FOR AI-ASSISTED INQUIRY

This is the part where Artificial Intelligence comes into play. ChatGPT or Gemini will be used for the preparation of differentiated inquiry questions which will guide students through the interpretation of their sample data.

I would use a prompt like this one:

“Act as a secondary-school STEM teaching assistant. Create five inquiry questions about the relationship between temperature, dry vegetation, ecosystems, and wildfire preparedness. Use age-appropriate language. Include questions that will task students with interpreting a fictional temperature dataset, presenting and explaining scientific concepts, separating evidence from assumptions, and identifying the limits of their own conclusions. You should not attempt to make predictions regarding real wildfire events. The invention of official safety guidance is also strictly prohibited.

The AI can generate questions with a wide variety of difficulty levels. It can also make valuable suggestions about activities, and it can offer alternative explanations for students who need additional support.

It should be noted however that AIs still make mistakes, which is why AI-generated information must always be double checked. Students should be able to successfully separate the statements that are supported by evidence from those that need to be investigated further.

I should stress one more time that we are not asking AI to predict fires. The AI is used as a learning assistant that supports inquiry, reasoning, and critical evaluation.

SCENE 6 — TOOL FOUR: SCRATCH FOR AN INTERACTIVE LEARNING EXPERIENCE

My next goal is to turn the things that the students have learned into an interactive digital product. This can be achieved with the use of Scratch, which is a specially designed visual programming environment in which students can create animations, stories, and interactive projects.

They will be tasked with creating and developing a simple scenario called “Prepare, Learn, Protect.", which will be focusing on a fictional community undergoing preparations for a predicted long period of hot and very dry weather.

The students will be able to perform a wide variety of actions, like checking official announcements, talking about preparations with other family members, or sharing messages and posts on social media. The program will then process and assess these actions and inform the students which of them were responsible or potentially misleading, and therefore possibly harmful. It will also explain the reasoning behind each assessment and ruling.

For example, if a user chooses to check official Civil Protection information, the program will let them know that their action was responsible and it will present the reasons why verified information is important and very valuable. If however another user chooses to share a rumour immediately, without verifying it first, the program will inform them that this action is irresponsible. It will also explain the harm that unsubstantiated rumors can cause and why it is crucial to check any information before sharing it.

It should always be noted that this is a learning scenario and thereby completely fictional. It should never be considered or used as a real-time warning system. All instructions in case of an emergency must come from official Greek Civil Protection sources.

This activity will allow students to practise computational thinking, decision-making, and digital citizenship.

SCENE 7 — TOOL FIVE: CANVA FOR PUBLIC AWARENESS

The final step is teaching students how to clearly and effectively communicate their findings and conclusions and their work in general.

I will use Canva for the creation of a digital infographic titled “Wildfire Preparedness: Know the Facts, Follow Official Guidance.”, which will consist of three sections:

The first, will present the knowledge and information that students have gained about heat, temperature, and environmental conditions. The second will focus on the interpretation of the sample dataset without any unverified information and predictions. The third will inform citizens about where they can find verified information and official safety instructions. Since the program will be taking place in Greece, the source of this information will be the official Civil Protection website at:

Once completed and created, the digital infographic can be shared with classmates, families, or the school community. It can even be made available in physical form by printing posters or flyers.

This final step aims to connect digital creativity with environmental awareness and responsible communication.

SCENE 8 — EVALUATING THE IMPACT

How can the impact or the success of this digital solution be evaluated?

Teachers can evaluate their students' understanding of the scientific concepts, their ability to correctly interpret graphs, whether they are able to ask important and relevant questions, whether they can tell apart unreliable claims from reliable ones, and finally, whether they can work together to develop a functioning interactive project.

They can also ask students to explain to them the ways in which each tool helped achieve the final result. This will inform them on how well the students understand the tools.

The purpose of this project is not to just familiarise students with the use of the five aforementioned digital platforms. It aims to help students gain a better understanding of different tools and how they can be combined to find a solution to an educational problem.

This approach could be adapted to be used with any other of the many environmental challenges that Greece is facing. Some of these challenges are water scarcity and conservation, frequent long heatwaves, the reduction of biodiversity, and sustainable energy.

SCENE 9 — CONCLUSION

In conclusion, the AI-assisted Wildfire Preparedness Lab proves that digital technology can be used to make STEM education more meaningful and reinforce its interdisciplinary character.

PhET fosters scientific exploration.

GeoGebra allows students to visualise and analyse data.

ChatGPT or Gemini can provide valuable help with inquiries and differentiated learning.

Scratch can be used to transform ideas into interactive experiences.

Canva allows students to communicate their findings to the wider community in a clearer and more effective way.

When the aforementioned tools are combined, they can turn classroom learning from a very passive process founded on information consumption into an active and very exciting and interesting investigation. In other words, instead of fostering rote memorisation, classroom teaching will promote and support students' creativity, and responsible action.

As teachers, we should not be solely focusing on teaching students how to use technology. We should be encouraging them to question and to check information, to study and understand evidence, to work together as a team, and to use the knowledge that they have gained to find answers and solutions to real-world challenges.

Educational innovation should not aim simply to make learning more digital. It should be focusing on making it more meaningful, more inclusive, and more connected to life.