

Project Title: Exploring Iceland's Climate Change Strategies for Application to Algebra I Project Based Learning

Proposal Summary: This grant proposal seeks funding to support travel to Iceland to study the country's innovative approaches to climate change, including its ambitious goal to achieve carbon neutrality by 2040, .

This grant proposal seeks funding to support travel to Iceland to study the country's innovative approaches to climate change, including its ambitious goal to achieve carbon neutrality by 2040. The purpose of this exploration is to gather data and insights that will inform the redesign of the Algebra 1 curriculum at Boston Green Academy (BGA). Specifically, I aim to develop a project-based unit on climate change action plans under development or use. I will integrate my experiences and data gathered into daily math activities to engage students in real-world problem-solving. This initiative aligns with BGA's mission to foster environmental awareness and empower students to address pressing global challenges.

Project Goals

1. Enhance Climate Change Education in Math Curriculum: Design a project-based Algebra 1 unit that uses Iceland's climate initiatives as a case study, enabling students to apply mathematical concepts to analyze and model climate data and mitigation strategies.
2. Integrate Climate-Related Content into Daily Math Instruction: Incorporate climate change themes into daily "Do Now" activities, problem-solving tasks, and assessments to make learning relevant and meaningful.
3. Promote Awareness and Empowerment: Inspire students to take action on climate issues by connecting mathematics to solutions for real-world environmental challenges.

Background and Rationale

Boston Green Academy is committed to preparing students for a sustainable future by integrating environmental themes across disciplines. As a math teacher, I have observed that students are more engaged when they see the practical applications of what they are learning. Climate change is a global challenge that offers rich opportunities for mathematical exploration, from analyzing trends in greenhouse gas emissions to modeling the impact of renewable energy adoption. As we study AI, the energy required for computing, and its impact on the energy grid, I believe that students will have an interest in sustainable energy.

Iceland is a global leader in climate action, generating 100% of its electricity from renewable sources and implementing innovative policies to reduce emissions. By visiting Iceland, I can gather firsthand data and insights to create a math curriculum that not only builds algebraic skills but also fosters critical thinking about sustainability.

Proposed Activities

Travel to Iceland

The proposed travel will include a week-long visit to Iceland, where I will explore key sites and meet with experts to study the country's climate strategies. The itinerary will focus on the following four key sites and their relevance to the project:

1. **Hellisheiði Geothermal Power Plant (ON Power):** This plant is one of the largest geothermal power stations in the world and a cornerstone of Iceland's renewable energy strategy. I will study how geothermal energy is harnessed and explore the mathematical models used to optimize energy production. This will inform lessons on exponential growth and decay, as well as data analysis.
2. **The CarbFix Project:** CarbFix is an innovative carbon capture and storage project that turns CO₂ into stone. A visit to this site will provide insights into cutting-edge technology and allow for the collection of data on CO₂ reduction rates, which can be used in student projects on linear and quadratic functions.
3. **Reykjavík's Sustainable Urban Planning Initiatives:** As Iceland's capital, Reykjavík has implemented extensive measures to reduce its carbon footprint, including public transportation initiatives and energy-efficient infrastructure. Exploring these efforts will help me design lessons on systems of equations and optimization problems related to resource allocation.
4. **Vatnajökull National Park:** The park is home to Vatnajökull Glacier, which has been significantly impacted by climate change. Observing and collecting data on glacial retreat will provide a real-world context for lessons on rates of change, slope, and statistical analysis.

Engagement with Experts and Educators

In addition to site visits, I will meet with Icelandic climate scientists, policymakers, and educators to gain a deeper understanding of the country's approach to climate action. These discussions will provide valuable insights into how mathematical modeling is used to guide decision-making and evaluate the effectiveness of mitigation strategies. I have an acquaintance that heads UNESCO and is willing to arrange meetings with directors at Surtsey Island, Vatnajökull National Park and Þingvellir: Iceland's Three UNESCO World Heritage Sites. As this is not yet firm, I'm taking this as a flexible part of my itinerary.

Data Collection and Analysis

Throughout the trip, I will collect data on energy production, emissions reduction, and climate trends. This data will be used to create authentic learning tasks for students, enabling them to apply algebraic concepts to analyze and interpret real-world data.

Anticipated Outcomes

1. Development of a Project-Based Algebra 1 Unit

The new unit will engage students in investigating climate change through mathematical modeling and data analysis. For example:

- Students will analyze trends in greenhouse gas emissions and project future scenarios using linear and exponential functions.
- Students will model the impact of renewable energy adoption on emissions reduction.
- Students will develop and present proposals for climate initiatives based on their findings.

2. Redesign of Routine Problems embedded in connected units

Climate change themes will be integrated into “Do Now” activities and other daily tasks to provide continuous opportunities for students to explore real-world applications of math.

Examples include:

- Solving equations to calculate energy savings from renewable energy installations.
- Analyzing graphs of glacial retreat to understand rates of change.
- Creating scatter plots and calculating correlation coefficients to study relationships between variables such as temperature and sea level rise.

3. Increased Student Engagement and Awareness

By connecting math instruction to global challenges, this project will foster student engagement and inspire them to take an active role in addressing climate change. Students will develop critical thinking and problem-solving skills that will prepare them for future academic and professional pursuits.

4. Sharing Findings with Colleagues

Upon returning, I will share my findings and resources with colleagues at Boston Green Academy and beyond, supporting the integration of climate-related content into other subject areas.

Timeline

Spring 2025: Finalize travel arrangements and curriculum planning.

Summer 2025: Travel to Iceland, conduct site visits, and collect data. Develop and pilot the project-based unit in Algebra 1 classes.

Fall 2025: Share project with colleagues

Winter 2025-2026: Refine the unit based on feedback and re-share resources with colleagues.

Conclusion

This grant will provide an invaluable opportunity to explore Iceland's innovative approaches to climate change and bring those lessons back to Boston Green Academy. By integrating climate-related content into the math curriculum, we can empower students to use their mathematical skills to address one of the most pressing challenges of our time. I am confident that this project will inspire students to see math not just as an academic subject, but as a powerful tool for understanding and shaping the world.

Thank you for considering this proposal.

Sincerely,

Christine Hall Brothers

Math Teacher

Boston Green Academy

Boston Public Schools