



Badges for the GLOBE International Virtual Science Symposium

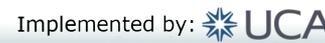
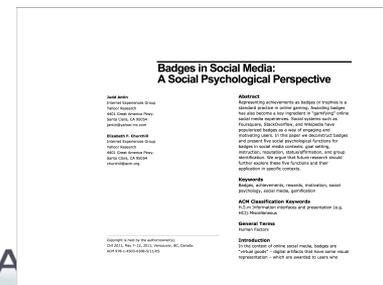
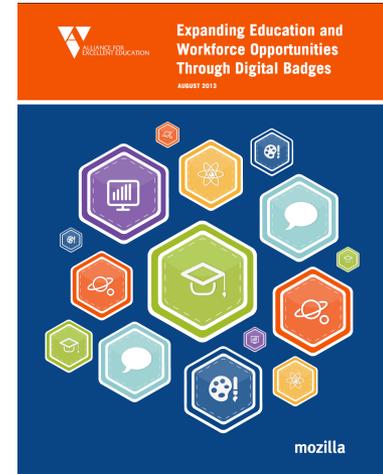
2017

www.globe.gov

<http://www.globe.gov/science-symposium>

Why use badges?

- Badges combine motivation and assessment
- Badges promote student choice in skill development
- Badges acknowledge learning in any environment
- Badges allow for multiple pathways to mastery
- Badges are used in education and for certification in industry



Merit Based Student Research Badge

- Students earn 1–4 stars*
- No limit to projects that earn top ranking



Optional Badges

- Possible for students to earn up to 3 out of 6 additional badges*
- Students describe how each badge was earned in their report document



**Projects earning a 4-star Student Research Badge and at least 2 optional badges qualify for entry into drawing for travel support to GLOBE Annual Meeting*

ADDITIONAL BADGES (UP TO 6—OPTIONAL)

B1. Collaboration	B2. Community impact	B3. Connecting to a STEM Professional	B4. Interscholastic connection	B5. Engineering solution	B6. Exploring STEM Careers
All team members are listed, along with clearly defined roles, how these roles support one another, and descriptions of each student’s contribution. The descriptions clearly indicate the advantages of the collaboration.	The report clearly describes how a local issue led to the research questions and makes connections between local and global impacts.	The report clearly describes collaboration with a scientist that enhanced the research methods, contributed to improved precision, and supported more sophisticated analyses and interpretations of results.	The report describes a carefully planned interscholastic or international collaboration that describes rationales for data collection in different regions and the advantages of comparing results.	The report describes an engineering solution to a real-world problem, based on student-generated sources of evidence, and describes the potential impact of the solution on the environment.	The report describes how the project is related to a STEM career or profession, including the ways the data gathered, skills gained, and results might be used.

Collaboration: Team members and their roles, student contributions, advantages of collaboration

Community Impact: Describes how a local issue led to the research question and what impact the students have on their community

Connection to a STEM Professional: Collaboration with a STEM professional and how it enhanced the student research

Engineering Solution: An engineering solution to a real world problem based on student research

Exploring STEM Careers: Understanding how student research relates to STEM careers

Interscholastic Connection: Describes interscholastic or international collaboration and how it benefits the research

Collaboration

Purpose

- Support “21st Century Skill” development

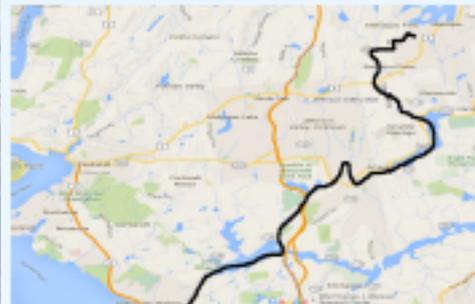
Key Implementation Ideas

- Roles for students to take, rotate roles
- Develop students’ project management and interpersonal skills

Document 1) the team members 2) the roles each student played

Research Methods

- Used YSI Pro30 Probe and Hach test kits in our pre-pond and post-pond to obtain conductivity, alkalinity, nitrate, and chloride readings over a period of 3 years
 - Inputted data into Globe visualization system
 - Analyzed trends and graphs



Three students from Mahopac High School collaborated to measure “Winter’s Impact on NYC Drinking Water”

Community impact

Purpose: To promote...

- Use of data to solve problems
- Students' agency in problem solving

Key Implementation Ideas

- Connect to a real community issue—either at the outset (go to the community first to see what is of interest) or after you have collected data
- Request to share data and results with community members

Document 1) impact or potential for impact 2) any presentations made to community groups 3) if possible, their response



Students in Trinidad and Tobago examined surface temperatures to understand effects of urbanization.

Connecting to a STEM professional

Purpose:

- Students engage a STEM professional for input
- Students observe skills needed
- Students receive encouragement in their role as young scientists

Key Implementation Ideas

- Find a STEM professional through the GISN or in your local community
- Explain what you are seeking to learn

Document 1) the professional with whom the students interacted and 2) what students learned from the interaction



Students in Dearborn Heights, MI connected with and received encouragement from NASA scientists and STEM professionals at Tenum (manufacturer of the Calitoo) to understand aerosols and photometers.

Interscholastic connection

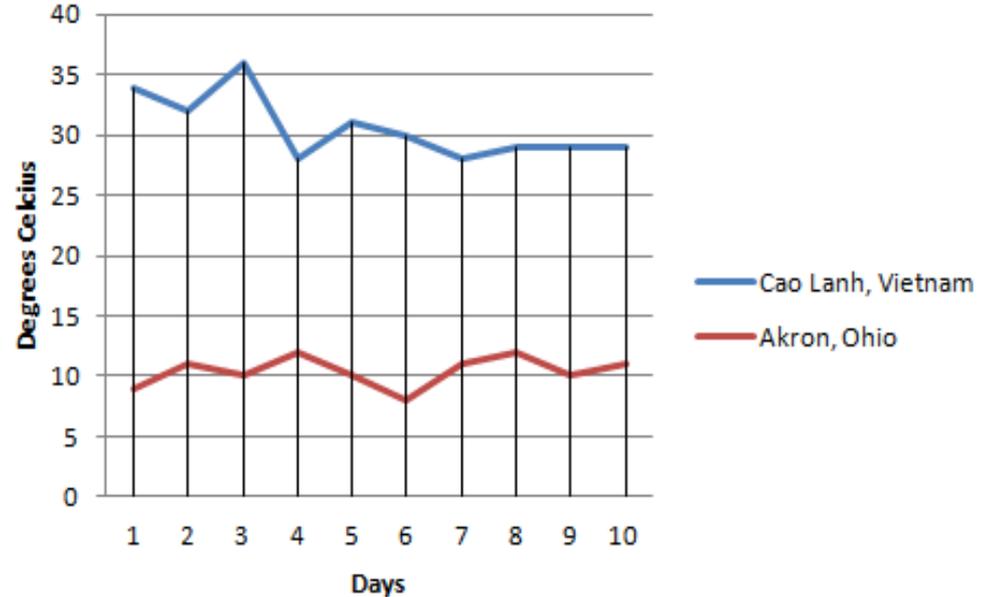
Purpose

- Compare data across sites
- Connect with peers and share excitement for learning
- Inter-community and inter cultural exchanges
- Connection to social science

Key Implementation Ideas

- Make contact with another school early in the project
- Explore what can be learned through the exchange

Document 1) what was learned about the data 2) what was learned in addition to insights about the data comparison



Students in Ohio and Vietnam compared air temperature data.

Engineering solution

Purpose

- Focus on solutions to problems
- Using engineering design processes

Key Implementation Ideas

- Creative problem solving: brainstorming, prototyping, and testing

Document 1) the problem and solution
2) the process and tools used



Students in Croatia assessed the level of heavy metals in air pollution using GLOBE protocols for aerosols, conductivity, and pH.

Exploring STEM careers

New in 2017!

Purpose

- Focus on how STEM is used in the real world
- Include STEM career exploration in projects
- Expand understanding of role of STEM in careers

Key Implementation Ideas

- Discuss STEM education and career paths

Document 1) how skills used in project relate to different careers
2) other aspects of these careers 3) discussion with at least one STEM professional



Addressing combinations of badges

- Collaboration and interscholastic connection
- Community impact and connecting to a STEM professional
- Community impact and exploring STEM careers
- Connecting to a STEM professional and exploring STEM careers
- Engineering solution and exploring STEM careers
- These are just the obvious ones—encourage students to think of other creative approaches!

Describe how your project addresses each optional badge you selected

Concise Title of Less Than 15 Words That Summarizes the Study

School Logo **Collaboration Team Names**
School Name


THE GLOBE PROGRAM
Global Learning and Observations to Benefit the Environment

Abstract

Concise (less than 300 words)
Context of research
Research questions
Objectives set
Brief methods description
Results
Conclusions
Recommendations for a way forward
Key words that emphasize key ideas in the paper (3-5 words)

Research Methods

There is a direct link provided between the datasets and research question(s)
Study site: A map and description of the study site. It should mention area of study, climatic characteristics and basic aspects of land cover
Data collection: A description of GLOBE protocols used to answer the research question as well as where and how data was gathered in the field (sampling method: Where, how many samples were measured)
Print screen of data entry in the Web page of GLOBE.
Data analysis: Mention what kind of mathematical calculation was applied to analyze the data
The data presented are sufficient to answer the research question(s)




Field Photos (requires release forms)



Site map

Results

Tables and graphics applying statistical analysis of data to show mean, dispersion or grouping data.
Data support the conclusions
Print screen of GLOBE visualization page

Discussion

interpretation of results
possible sources of error
comparison with similar studies
discuss whether results support the hypothesis or not, and why

Research Questions

Include why they are important and are of scientific interest
Concern some aspect of Earth's environment (local or global issue)
Include a well-written description of background information
Provide significant insight into both the topic of investigation and the research process
Answering them requires an advanced understanding of the subject matter
Requires a thoughtful research plan
Are answerable through scientific research appropriate to the scope of the report.

Introduction

Description of the problem
State of the science
Importance
Community relevance

The review of the literature can be a separate document
Thorough (250-500 words)
Citations in text (at least 3-5 references, including at least one primary source in a peer-reviewed journal. Do not include wikis or Q&A sites such as answers.com. Look at The Purdue "OWL" for guidance and resources: owl.english.purdue.edu)

Conclusions

Gives a thorough and insightful explanation as to how the conclusion was reached
Put findings in context, why it's important/relevant, impact, with regard to the science
What improvements in methods
What follow-on research/actions to be taken, future protocols that could be added
Impact of working with a project mentor

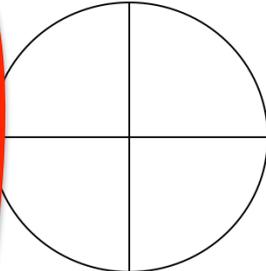
Bibliography

Materials correctly cited
GLOBE materials used
Sources beyond those provided by GLOBE

GLOBE BADGES Possible for students to earn up to 3 out of 6 additional badges. Students describe how each badge was earned in their report document

- **Collaboration** All team members are listed, along with clearly defined roles, how these roles support one another, and descriptions of each student's contribution. The descriptions clearly indicate the advantages of the collaboration.
- **Community Impact** The report clearly describes how a local issue led to the research questions and makes connections between local and global impacts.
- **Connecting to a STEM Professional** The report clearly describes collaboration with a STEM professional that enhanced the research methods, contributed to improved precision, and supported more sophisticated analyses and interpretations of results.
- **Interscholastic Connection** The report describes a carefully planned interscholastic or international collaboration that describes rationales for data collection in different regions and the advantages of comparing results.
- **Engineering Solution** The report includes all of the components for Level 3, and: Describes the relative priority of the criteria for solving the problem, and Describes tradeoffs considered in designing the solution.
- **Exploring STEM Careers** The report describes how the project is related to a STEM career or profession, including the ways the data gathered, skills gained, and results might be used.

Figure #1



printed by **MegaPrint Inc.** www.megaprint.com

Timeline

- Entries accepted starting in early 2017 (look for announcements)
- Projects Due: 03 April 2017
- Scoring & Comment Period: 23-29 April 2017
- Badges Announced: 15 May 2017
- Live Drawing: 15 May 2017*
- GLOBE Annual Meeting: July/August 2017

**Qualifying projects: 4-star student research badge and at least 2 optional badges*

Find info Online

<http://www.globe.gov/science-symposium>

GLOBE.gov → News & Events → Meetings & Symposia → Virtual Science Symposia

Stay tuned for future webinars on K-4 projects and a more in-depth look into the badges



Implemented by:  UCAR