The clean ups led to a class discussion and engagement. These two选择了高中学生的利益相关者。

The program is led by a team of 15 people based at institutions scattered across the county.

The first goal of the InTeGrate project is to develop curricula that will dramatically increase Earth literacy of all undergraduate students. The second major goal is to increase the number of majors in the geosciences and related fields who are able to work with other scientists, social scientists, business people, and policy makers to develop viable solutions to current and future environmental and resource challenges.

*Opinions expressed on this poster are those of the authors and do not necessarily reflect the views of the National Science Foundation.*

**Middle Tennessee State University Implementation Project**

- One year (2016)
- PI: Mark Abolins (had been using InTeGrate modules)
- Co-PI: Judith Iriarte-Gross (had been involved in SENCER)
- Monthly pays faculty extra compensation to use InTeGrate modules in their courses.

**What is InTeGrate?**

InTeGrate is funded by a 5-year (2012-2017) STEP Center grant from the National Science Foundation. The program supports the teaching of geoscience in the context of societal issues both within geoscience courses and across the undergraduate curriculum. The overarching goal is to develop a citizenry and workforce that can address environmental and resource issues facing our society.

The InTeGrate project team is an interdisciplinary team of 15 people based at institutions across the country. The program is led by a team of 15 people based at institutions scattered across the country.

This implementation project:

- Used in a 17-student Honors Physical Science course.
- Two of the seventeen students will make a related presentation at the Tennessee Academy of Sciences meeting in November, 2016.

**Abstract**

During 2015-2016, Middle Tennessee State University (MTSU) faculty and students investigated the intersection between SENCER and the National Science Foundation’s Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate) project. A prominent outcome of combining SENCER with InTeGrate was the addition of service learning to an introductory Earth Science course. Other prominent project outcomes are not directly attributable to SENCER, but are consistent with the goals of both SENCER and InTeGrate. For example, the InTeGrate “Map Your Hazards” education module stimulated so much interest in natural hazard education that two of the 17 undergraduates in Iriarte-Gross’ class are going to make related presentations at the Tennessee Academy of Sciences meeting in November 2016. Also, use of the InTeGrate “Humans” Dependence on Earth’s Mineral Resources” module added Earth science knowledge to the exploration of mining policy, and this constituted the first use of a two-week natural science module in a non-geography mTSU social science class.

**Service Learning**

- Used in general studies introductory Earth science course.
- Partnership with MTSU Stormwater Program.
- The Stormwater Program hosted two 50-minute campus clean ups for 72 introductory Earth Science undergraduates and a few students from Iriarte-Gross’ Honors Physical Science class and Langenbach’s American Public Policy class.
- The clean ups led to a class discussion about health, personal freedom, regulation, and management of non-compliance because the most commonly collected items were tobacco-related (mostly cigarette butts) even though MTSU is a tobacco-free campus.
- After completing the clean ups and a rock weathering exercise at a nearby cemetery, the introductory Earth Science students were asked to either write (a) a 2-page mock sustainability grant proposal or (b) a 2-page mock undergraduate rock weathering research proposal, and 71 of 75 chose sustainability.
- The responses of 54 undergraduates to a clicker survey indicated that 76% thought the campus clean ups should continue and only 13% thought they should not. (The rest abstained.)

**Natural Science in the Social Science Classroom**

- Used in upper-level American Public Policy course.
- First use at MTSU of a two-week natural science module in a non-geography social science class.

**Humans’ Dependence on Earth’s Mineral Resources**

- Project/ Module Authors: Judith Iriarte-Gross (PI), Mark Abolins, Lisa Langenbach, and Lisa Iriarte
- Presented by: Lisa Iriarte, MTSU Social Science

During 2015-2016, Middle Tennessee State University (MTSU) faculty, in collaboration with the National Science Foundation’s Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate) research natural hazards in Tennessee. Using the module, Map Your Hazards, students identified natural hazards risk zones. The purpose of this research project was to equip stakeholders such as high schools, with knowledge on natural hazards and their vulnerability to these hazards. A survey was administered to locals of Murfreesboro, TN and MTSU students to obtain current statistics on public knowledge of natural hazards such as tornadoes, floods, and earthquakes. With this knowledge, the authors hypothesized methods to educate high school students, faculty and their families with useful knowledge in the event of a natural hazard occurrence. This research project concluded with recommendations for preparedness and resource allocation for a safer and more prepared community.

**Conclusion**

The purpose of this research project was to equip stakeholders such as high schools, with knowledge on natural hazards and their vulnerability to these hazards. A survey was administered to locals of Murfreesboro, TN and MTSU students to obtain current statistics on public knowledge of natural hazards such as tornadoes, floods, and earthquakes. With this knowledge, the authors hypothesized methods to educate high school students, faculty and their families with useful knowledge in the event of a natural hazard occurrence. This research project concluded with recommendations for preparedness and resource allocation for a safer and more prepared community.

**Table of Contents**

- Module Content:
  - People, Products, and Minerals
  - Beach and Bluff: How Erosion Relates to Rocks
  - Mining and Mining Impacts
  - Mineral Resources Created by Sedimentary Processes
  - Resources Created by Igneous and Metamorphic Processes
  - Mining, Society, and Decision Making

**Sample Assessment Question:**

Sphalerite is a sulfide mineral (ZnS). Zinc is extracted from sphalerite. Several zinc mines exist in Tennessee. One of the most zinc mines in Tennessee are underground mines as opposed to open pit mines. Imagine you are the project manager of a mining company that might be interested in establishing an underground zinc mine in Tennessee. Describe at least two geologic, one socioeconomic, and two environmental factors OTHER THAN ACID MINE DRAINAGE that you need to consider for locating a suitable mine site in Tennessee. Explain why each of those factors is important for establishing the mine.