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# SIMuRing: Making an Interdisciplinary Project Work

*Christine Brandon, Polina Sabinin, Nicole Glen,  
Jennie Aizenman*

Working on an interdisciplinary team often feels like collaboratively building a jigsaw puzzle having never seen the picture on the box and with only a vague idea of its theme. Everyone is in it with a common goal—to build a picture of an aquatic scene, perhaps. One person thinks it’s an aquarium and begins looking for the pieces with colorful pebbles. Another thinks it’s the ocean and tries to find the wave pieces. A third envisions a lake and hunts for pieces of the shoreline. Each person brings their own assumptions about the scene, but without a common understanding and an explicit goal, the work will likely go nowhere. It is only by talking through the goal and assumptions that the team can begin to build.

The SIMuR (Shiraki International Multidisciplinary Undergraduate Research) team has spent the past two years working as such a group and has learned valuable lessons through the process, the most important being effective communication of our diverse ideas and backgrounds. For example, we have learned the importance of identifying and communicating basic assumptions from each of our fields to members of our team, as topics that may seem simple to an expert in one field are often complex to someone outside the discipline. Our team members’ openness to even the most elementary questions has allowed us to build our own fundamental knowledge of other disciplines. Additionally, it has allowed us to blend the investigative approaches of several disciplines, taking the strongest qualities of each. Along the way, we have better defined

the ultimate goals for our work and the nonnegotiable assumptions about our roles on the project. As our adventure continues, we are strengthening the project and our own professional work.

The SIMuR group is a collaboration of faculty, staff, and students from Bridgewater State University, the University of California, San Diego, Ilia State University (in T’bilisi, Georgia), and the National Academy of Sciences of Georgia. The core group of people involved come from a range of disciplines, educational and ethnic backgrounds, and personal and professional experiences. Faculty range from early career to internationally recognized experts in their field. Our fields of expertise span geological sciences, computer science, STEM education and outreach, and archaeology. We are a subgroup of a larger collaboration

of researchers (called SIMR, without the “u”) whose scholarship involves the Shiraki Plateau in the country of Georgia. SIMR researchers come from Georgia, the United States, France, Germany, Sweden, Estonia, and Italy, and have additional expertise in anthropology and biological sciences.

One of the aspirations that unites us is our desire to develop the next generation of scientists and science communicators. This is what attracted us to the National Science Foundation’s International Research Experiences for Students (IRES) grant, which funds undergraduate research in a foreign country. We were awarded financial support for SIMuR, a three-year project that will provide a total of 15 BSU undergraduate students a one-year scientific research and communication fellowship. This includes learning research methods from a variety of fields; developing a research question; spending eight weeks in Georgia during the summer collecting field samples and data; laboratory analysis/project development at BSU during the fall; and designing and implementing STEM outreach activities in both Georgia and the U.S.

BSU and Georgian faculty have collaborated for a number of years now, well before the SIMuR Project. Polina Sabinin, Mathematics department, and Nicole Glen, Elementary and Early Childhood Education department, first visited Georgia with four undergraduate students in 2016 with funding from a BSU Undergraduate Research Abroad Grant and the Shea Foundation. While Polina’s connection to Georgia goes back to her childhood in the former Soviet Union, this was a first visit for her as an adult and as a faculty member mentoring students. The students were education majors who examined the STEM and inclusion practices of Georgian schools. Two study tours by Polina and Nicole, and a sabbatical in Georgia for Polina in which she

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provided professional development to teachers for mathematics, followed that first visit. SIMR fully funded two BSU undergraduate students to attend a two-week workshop in Shiraki in 2017. This fostered connections with colleagues which developed into friendships and a desire to do more with our students within Georgia.

The team that eventually received funding from the National Science Foundation for SIMuR included Polina, Nicole, and others. Christine Brandon, Geological Sciences department, brought to the team her interest and research expertise in using sediments to reconstruct past environments and climates. Jennie Aizenman, Director of the Center for the Advancement of STEM Education at BSU, brought an important perspective as an expert at science communication and motivating undergraduate students to conduct scientific outreach with local communities. Michael Black, Computer Science department, worked with our students on developing software in support of the SIMR project. Nicole's expertise in developing STEM lessons to engage young learners and Polina's desire to expose as many



*Shiraki Plateau (Photo Credit: Christine Brandon)*

faculty and students to the power of international collaborations and interdisciplinary research (and to Georgia), rounded out the team at BSU.

There are many reasons why Georgia is a natural place to conduct interdisciplinary research. The country sits on an ancient Silk Road route at the nexus of Europe and Asia, nestled between the Greater and Lesser Caucasus Mountains, and the Black and the

Caspian Seas. This location is endowed with a range of landscapes and ecosystems as well as a rich and venerable culture. T'bilisi, the capital, is home to ancient churches, sulfur baths, unique and intricate nineteenth-century buildings, Soviet-era apartment blocks, and modern skyscrapers. The countryside is composed of 13 distinct biomes, each with a mix of European and Asian flora and fauna. Intriguingly, Georgia's Kartvelian language is unique and unlike any of the languages spoken in the world, however many people speak English, especially in academia.

The Shiraki Plateau in Georgia is an area elevated approximately 1300 feet above the surrounding Alazani Valley. It has an oval shape whose dimensions are approximately 20 miles by 10 miles and a raised rim that gently slopes toward its center. Today, it has a semi-arid climate, home to wheat fields and three small Soviet-era villages along the rim. However, archeological evidence suggests that approximately 3,000 years ago the climate may have been more temperate, supporting rivers and a large lake near the center, and the area was home to a bustling metropolis with several surrounding settlements. The plateau was populated for approximately

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Recognizing underlying cultural assumptions and beliefs and welcoming new approaches continues to enrich our experience. Such situations have made us pause, accept, and respect each other's differences; brought us wonder and joy in our cultures; and gave us plenty of opportunities to laugh together along the way.



BSU students doing lab work at Ilia State University in T’bilisi, Georgia. Left to right: Kevin Hill, Ian Washburn, Kaitlyn Chappell, and Doug Chamberlain. (Photo Credit: Thomas Smith)

150 years, but then was mysteriously abandoned. One of the goals of SIMuR is to discover the underlying factors that led to the abandonment of the site. Current geologic hypotheses include a change in the climate or rerouting of the river paths (possibly due to a major earthquake).

The research objectives of the project are twofold. First, to create a virtual museum of the artifacts that have been recovered from the Shiraki Plateau archaeological sites. This will ensure that these discoveries are shared worldwide and made accessible to anyone with an internet connection. It will also lay the foundation for future work at this location. And second, to understand the interactions between humans and the environment during the time of

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this ancient civilization. This involves determining the prevailing climate (amount of precipitation and mean temperature) from geologic and biologic records (such as sediment cores and types of vegetation present).

We have experienced both the rewards and challenges of working on an international and multidisciplinary team. We learned that effective communication should never be taken for granted. On the surface, all members of the

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SIMuR team speak a common language: English. Digging a little deeper, however, terms and ideas within each of our disciplines often mean something substantially different to listeners outside of them. We have become more cognizant of how frequently we fall into our professional jargon, unintentionally speaking past our colleagues. Through our SIMuR experience, each of us has become accustomed to stopping midthought to fill in discipline-specific information before continuing with the conversation.

One example of how our different disciplines have begun to blend involves enhancing geologic research using computer engineering. During their time in Georgia, the SIMuR students helped the Georgian team members develop and install meteorological sensors in Vardzia and Uplistsikhe, cave cities that were occupied in ancient times, and David Gareja, a currently occupied cave monastery. The geologic knowledge needed for this project to succeed included determining which data to collect and correct placement of the sensors within the city to ensure accurate results. For computer engineering, the sensors needed to be built to withstand operating in a natural environment (with constant fluctuations in humidity and temperature) and have a strong enough signal to maintain an internet connection in a remote location. This generated dialog about the scientific needs of the project and the capabilities of different devices. Neither field could have accomplished this on their own and a much stronger project was created through this collaboration. Along with our interdisciplinary research, there are many times we have shed light on cultural differences with our Georgian colleagues. “I know what I am doing a year from now,” said our Georgian guide, Nugo, last year, visibly shaken by the realization. “That is 12 months, 52 weeks, 365 days from this moment. And I know

where I will be.” The Americans on our team are accustomed to planning, sometimes months in advance, the upcoming research and outreach activities. Some even take pride in being able to do so. Georgians, however, are often puzzled by such behavior. They find it presumptuous to make such a premature commitment to an event in view of the surrounding unpredictability in everyone’s personal and professional spheres as well as geopolitical and climate environments. Moreover, they worry that it will prevent them from making the most of opportunities that they cannot even begin to foresee this far ahead.

What were the most meaningful impacts from the SIMuR Project’s first year? We are certain that the list will depend dramatically on which of the SIMuR faculty you ask. But, the first one will certainly be the same for each and every one of us. It’s the impact it has had on our students – the SIMuR 2019 Fellows. While central to the project, supporting undergraduates in such an ambitious experience has its own challenges. Generally, students are most comfortable with controlled experiences where the instructor plans what is going to happen and guides them through predictable difficulties as they come up. However, this project

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Reconciling these differences involved much discussion and, on the American side, developing flexibility in the face of shifting circumstances. Recognizing underlying cultural assumptions and beliefs and welcoming new approaches continues to enrich our experience. Such situations have made us pause, accept, and respect each other’s differences; brought us wonder and joy in our cultures; and gave us plenty of opportunities to laugh together along the way.

requires students to be involved in scientific research ... informed by many disciplines ... with an extensive field component ... in a different country. Even seasoned researchers can be thrown off by having only a vague idea of what may result from an experiment and the need to embrace the possibility of surprise and disappointment. Things will inevitably go wrong (from temperamental equipment to sudden thunderstorms) and adjustments need to be made on the fly. The SIMuR team at BSU and in Georgia was deeply



*Pomegranate juice in T'bilisi (Photo Credit: Polina Sabinin)*

challenged by the task of identifying and constructing extensive measures to ensure students' safety while maximizing their learning opportunities, often designed to go unnoticed by the students. At the same time, we found the need to explicitly prepare them for the level of uncertainty in research, field work, and travel. We trusted that students would accept, adapt, and thrive in this uncertainty and they rose to the occasion.

As SIMuR faculty, through the first year, we have grown a little more confident and comfortable in the world of international and multidisciplinary collaborations. We are getting better at examining our puzzle pieces and fitting them together. With a renewed vision of the goals of the project and assumptions we bring to it, we are looking forward to what we will learn in our second year together. Entering year two of the project feels more comfortable, but as the team ebbs and flows, as students join and finish the project, the ever evolving puzzle is still being built. Eventually, we'll see what the final

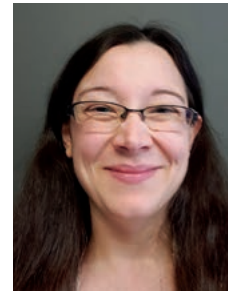
puzzle picture will look like, and we look forward to what that will be!

We are grateful to everyone at BSU who provided support and expertise, including the faculty and staff in the Minnock Institute for Global Engagement; the Office of Grants and Sponsored Projects; and members of the SIMuR Advisory Board; our Georgian collaborators Dr. Mikheil Elashvili, Dr. Nana Dikhaminjia, and Professor Kiazio Pitskhelauri; Dr. Ilya Zaslavsky and Dr. Tom Levy in University of California, San Diego; and the National Science Foundation for funding this project. We also thank our SIMuR Fellows for stepping out of their comfort zone and going on this adventure with us.

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