

## **Board 239: Developing an Instructor's Interface for FossilSketch Application to Provide Knowledge-Sharing Collaborations Between Science Educators**

### **Dr. Anna Stepanova, Texas A&M University**

Dr. Anna Stepanova is a researcher at the Sketch Recognition Lab at Texas A&M University. She holds a Ph.D., Master's and Bachelor's in geology. Anna's research interests are in geosciences, micropaleontology and education.

### **Dr. Saira Anwar, Texas A&M University**

Saira Anwar is an Assistant Professor at the Department of Multidisciplinary Engineering, Texas A and M University, College Station. She received her Ph.D. in Engineering Education from the School of Engineering Education, Purdue University, USA. The Department of Energy, National Science Foundation, and industry sponsors fund her research. Her research potential and the implication of her work are recognized through national and international awards, including the 2023 NSTA/NARST Research Worth Reading award for her publication in the Journal of Research in Science Teaching, 2023 New Faculty Fellow award by IEEE ASEE Frontiers in Education Conference, 2022 Apprentice Faculty Grant award by the ERM Division, ASEE, and 2020 outstanding researcher award by the School of Engineering Education, Purdue University. Dr. Anwar has over 20 years of teaching experience at various national and international universities, including the Texas A and M University - USA, University of Florida - USA, and Forman Christian College University - Pakistan. She also received outstanding teacher awards in 2013 and 2006. Also, she received the "President of Pakistan Merit and Talent Scholarship" for her undergraduate studies.

### **Christina Belanger, Texas A&M University**

#### **Dr. Tracy Anne Hammond, Texas A&M University**

Dr. Hammond is Director of the Texas A&M University Institute for Engineering Education & Innovation and also the chair of the Engineering Education Faculty. She is also Director of the Sketch Recognition Lab and Professor in the Department of Computer Science & Engineering. She is a member of the Center for Population and Aging, the Center for Remote Health Technologies & Systems as well as the Institute for Data Science. Hammond is a PI for over 13 million in funded research, from NSF, DARPA, Google, Microsoft, and others. Hammond holds a Ph.D. in Computer Science and FTO (Finance Technology Option) from the Massachusetts Institute of Technology, and four degrees from Columbia University: an M.S in Anthropology, an M.S. in Computer Science, a B.A. in Mathematics, and a B.S. in Applied Mathematics and Physics. Hammond advised 17 UG theses, 29 MS theses, and 10 Ph.D. dissertations. Hammond is the 2020 recipient of the TEES Faculty Fellows Award and the 2011 recipient of the Charles H. Barclay, Jr. '45 Faculty Fellow Award. Hammond has been featured on the Discovery Channel and other news sources. Hammond is dedicated to diversity and equity, which is reflected in her publications, research, teaching, service, and mentoring. More at <http://srl.tamu.edu> and <http://ieei.tamu.edu>.

# **Developing an Instructor's interface for FossilSketch application to provide knowledge-sharing collaborations between science educators**

Anna Stepanova, Saira Anwar, Christina Belanger, Tracy Hammond

## **Abstract**

We developed FossilSketch software for teaching the identification of microfossils in undergraduate geoscience classes. The FossilSketch application was used for outreach and classroom activities in various courses, including geology, paleontology, and biology. We have been continuously improving the existing student dashboard to provide more autonomy and to improve motivation and knowledge retention for students. Many instructors expressed their interest and need in the tool and associated projects and the need for broader sustainability. Based on the identified need, we are developing the instructors' dashboard to allow instructors to create, share, and customize classroom activities.

## **Background and motivation**

To provide authentic context and activities to students enrolled in geoscience courses, we developed the FossilSketch software with the support of a previous National Science Foundation grant #1937827. Results of FossilSketch testing in a paleontology course for junior and senior geology majors showed that students who used FossilSketch were able to understand the process of microfossil identification, recognize morphological characteristics, and achieve a correct identification better than those who did not use it [1–4]. Analysis of Hispanic student survey responses showed that their perception of learning micropaleontology improved with the introduction of FossilSketch, and hybrid learning mode was the most favourable learning mode for Hispanic students, when the flexibility of class mode during 2021-2022 and use of FossilSketch improved Hispanic students' attitudes to learning [5]. Additionally, we observed statistically significant improvement in all students' attitudes towards micropaleontology. Students' survey feedback after using FossilSketch showed more positive feelings towards learning about microfossils (authors unpublished data). The pilot version of FossilSketch currently can teach students the basics of specimen identification and ecological interpretations using benthic Foraminifera and Ostracoda. Foraminifera and Ostracoda are commonly used in industrial, environmental, and scientific applications [6, 7]. FossilSketch educational materials include educational videos, mini-games, and practice exercises/assessments. It provides automatic feedback and allows for self-paced learning, a list of suggested exercises are available at the National Association for Geoscience Teachers website (NAGT) [8].

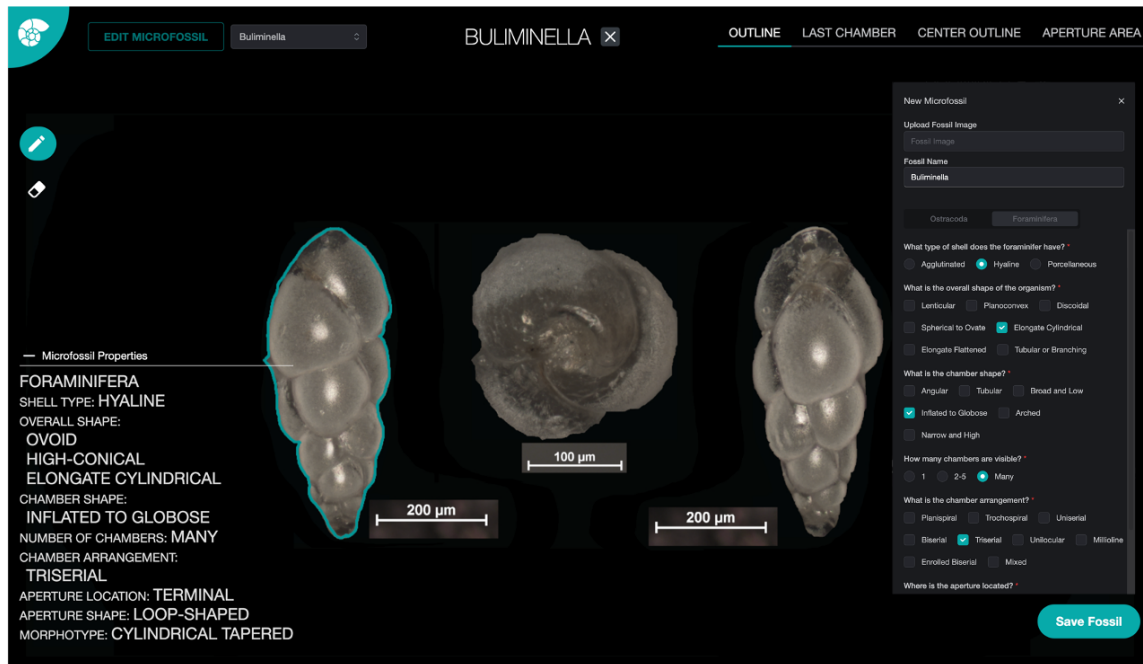


Figure 1: Mock-up of the screen that will allow instructors to upload new microfossils and/or edit existing microfossil properties

Instructors expressed their interest in the tool and associated projects and expressed the need for enhancement for broader sustainability. Post COVID-19 pandemic, faculty have recognized the need to provide technology-mediated learning environments with online components that could enhance students' learning experiences. Based on the identified need, with this project, we propose to advance the features and capabilities of FossilSketch by: 1) developing an instructor dashboard to help them create, share, and customize classroom activities (Fig.1); and 2) improving the existing student dashboard to provide more autonomy to users and to improve motivation and knowledge retention.

### Study Goals and Future directions

The overarching research goal for this project is to enhance the existing FossilSketch software by adding the instructor's interface, as well as novel features for the student's interface to improve and assess students' learning and knowledge retention in geosciences, and create a platform for instructors to collaborate and share their educational resources to enrich student classroom and research experiences.

The project team will assess the effect of the FossilSketch in three courses taught in the Department of Geology & Geophysics, and in several courses at TAMU Galveston at Texas A&M University. Additional testing will be done by instructors and micropaleontologists at other universities who expressed their interest in using FossilSketch for their classes or research projects, both experts and non-experts in micropaleontology.

## Methods

We propose an explanatory sequential mixed methods research design to develop and evaluate the effectiveness of FossilSketch. The approach will allow us to use both qualitative and quantitative data for the convergence of FossilSketch results on both students and instructors. Specifically, the data will help us to triangulate students' self-regulation, as well as instructors' perceptions on the use of FossilSketch.

## Broader Impacts

FossilSketch will be introduced and evaluated at Texas A&M University, an HSI with a diverse student population. As the core principle of the tool relies on an interactive interface, with authentic context and activities, it will help to engage students effectively. The tool will help students better understand, retain, and engage with the topics they learn. Students will learn valuable skills that may open job opportunities and inspire research interests. Approximately 300 undergraduate students will participate in our study and once the novel software features are fully developed, many students will be potentially affected through secondary effects, including outreach activities.

FossilSketch will transform the geoscience community by providing a resource to share and collaborate between geoscience educators for lessons, activities, assessment, outreach, and pedagogical practices. It will enable instructors to teach students in their courses and assign research projects. We envision that virtual learning will continue to be in high demand. In the future, the FossilSketch can be implemented across the nation in undergraduate science, biology, and paleontology classes. This application has great potential to be developed into an online version of the course (MOOC).

## 1 Acknowledgements

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