Badges for College Credit (BCC): Motivating learning in informal science programs through digital badge systems

OpenSTEM RESEARCH

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NSF

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Project Description
The University of Washington Bothell in partnership with three informal science learning institutions coordinate and develop after-school science programs for high school students. Upon successful completion of the programs, high school students are awarded college credit. The program design and method for issuing college credit is through the design, implementation and issuing of digital badges. The project aims to support programs that engage high school students from a broad range of socio-economic and cultural backgrounds.

Project Goals
1. Develop a badge system that supports learning in science programs for high school youth across partner institutions to award college credit.
2. Advance the field of informal science education with respect to science learning and identity formation leveraging digital badge system resulting in college credit.
3. Disseminate a model badge system to support both learning within science programs and partnerships between informal science learning institutions and higher education institutions.

Research Questions
1. How do youth and project developers interact with the iRemix platform to support learning?
2. How does the badge system interact with face to face instruction in the science programs?
3. How do badges get operationalized, from initial conception to embodiment in the badge achievement system?
4. How does participation affect STEM-related identity formation, college-related identity formation, and pursuit of STEM-related skills?
5. In what ways do badges represent social or professional capitol in the real world?

2014   2015   2016

MERCER SLOUGH ENVIRONMENTAL EDUCATION CENTER

2014 Partnership with UWB faculty formed

Spring 2014 Pilot a sub-set of badges for eleven high-school students

2015 Create a mentoring component for 3rd year interns inspired by badges

Spring 2016 Practicum program duplicates LWWIP badge program. Students will also receive college credit.

Spring 2016 First group of LWWIP interns to to receive college credit

Fall 2016 May include additional locations and cohorts

2014 Early challenge of integrating web-based platform into a traditionally offline program

2015 Soft launch of platform and two badge pathways

AEROSPACE MAKER PROJECT - Future of Flight

Spring 2015 Second pilot program launches

Fall 2015 4th pilot program reduced to two modules, material science and engineering. Six students enroll.

Winter 2016 5th pilot launch with 8 students enrolled. Program design stabilizes and badges added

Spring 2016 First set of students who complete both modules will be awarded college credit

July/August 2014 AMP pilots a three-week session with three students

Summer 2015 Third pilot program launches with 18 Goodwill students for 4-week program

Fall 2015 Program developers partner with UWB faculty to co-design program

Winter 2016 Engagement survey added to measure program activity

Winter 2016 First meeting with Seattle Aquarium to identify qualifying program

SEATTLE AQUARIUM

Mercer Slough Educational Center and Pacific Science Center (Bellevue, WA.)
The environmental educational program utilizes a project-based curriculum developed over the past 16 years. Mercer Slough recruits new high school students through an application process. Students can remain in the program for up to 3 years (sophomore through senior year). Interns pursue individual environmental science interests and learn how to teach elementary school students about environmental topics related to the center. The program also bridges connections with experts, college students in environmental science and community restoration projects in partnership with the city of Bellevue.

Institute of Flight (Everett, WA.)
The Aerospace Maker Project program recruits high school students through open enrollment. This brand new program intends to support independent and group study in material science and engineering with ties to industry partners in airplane manufacturing.

Seattle Aquarium (Seattle, WA.)
The Seattle Aquarium has two youth programs currently being considered for BCC. Program developers from the aquarium will be meeting with Mercer Slough and Institute of Flight program developers to better understand the badge design process and program development.

iRemix Social Learning Platform
Our platform is an instance of the Digital Youth Network social networking platform customized for each institution. Platform features include blogs, discussion forums, debates, ability to post digital media, and a badge system infrastructure.
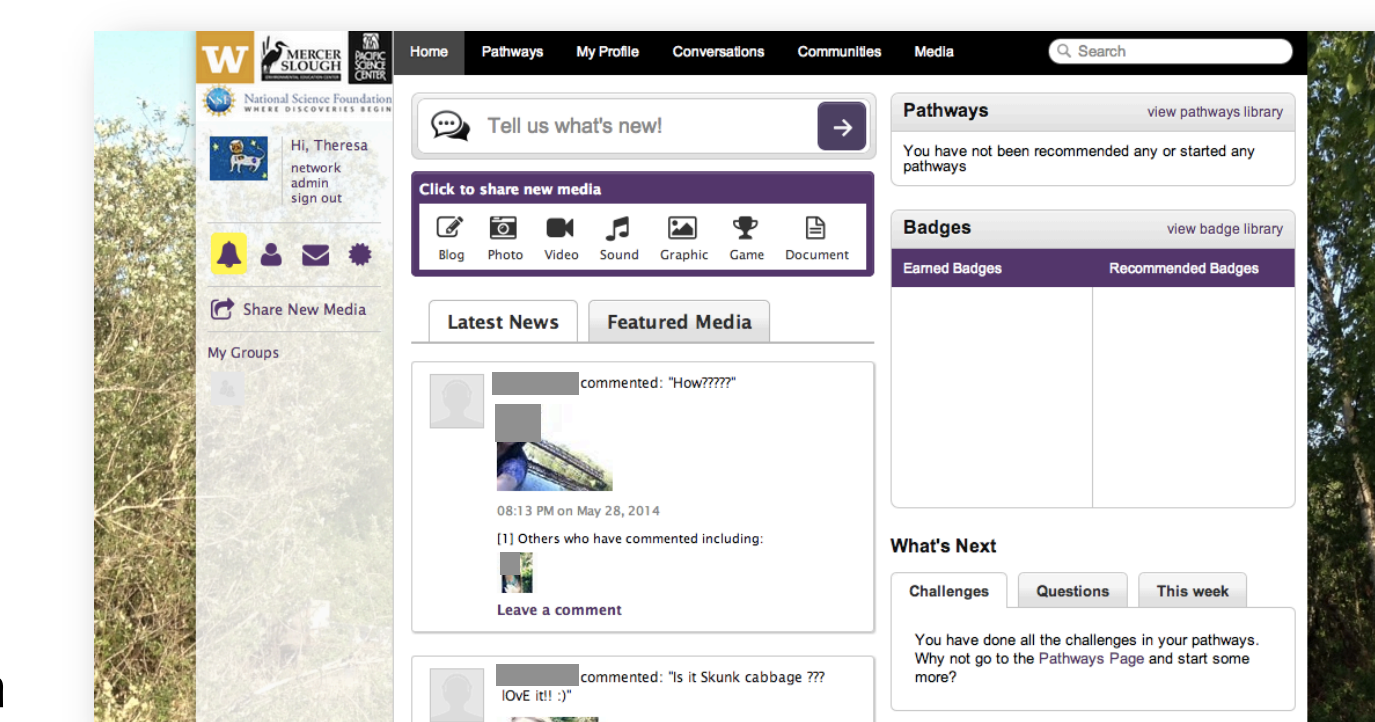
Evaluation

Collaboration: Designing & implementing a badge system
Mercer Slough expanded their collaboration with UWB Environmental Sciences by initiating a second badges-focused program called Practicum. Additionally, Mercer Slough and UWB are building further connections with a grant proposal to expand the program to the Northshore School District using UWB campus. The Institute of Flight is collaborating with UWB STEM faculty to co-design and implement a badges program for summer 2017. Preliminary meetings with Seattle Aquarium, designated as a third-year expansion site for the BCC project, includes Mercer Slough staff with learning scientists to build on the lessons learned from the first-level implementation.

Badge System Model: Proof of concept, efficacy, effectiveness, and dissemination
Students are completing Badge work at Mercer Slough and the Institute of Flight. Incorporating badges has changed how program developers approach the design of their programs. Awarding credit in spring 2016 will contribute to understanding how program design changes effected the students. Project staff are disseminating the model and research findings at conferences and online. UWB learning scientists and staff from both institutions participated in a Digital Media and Learning Conference in Spring 2015. While CAISE has highlighted the NSF AISL 2014 poster and AISL 2015 presentation. Researchers will also lead and present a poster session on digital badges for AERA 2016. Planning is underway for UWB learning scientists to co-sponsor a conference session at ASTC 2017 with the students and staff from the Mercer Slough program to feature the independent research done by students as part of their culminating badge.

Primary Research Agenda: Learning and identity formation research
Research on badge design and use by students is successfully underway at Mercer Slough. At Institute of Flight, the changing program format and other challenges have hampered consistent onsite data collection. A new research protocol will be implemented to address challenges of scheduling issues, the narrow focus on individualized computer work by students and corresponding dearth of classroom interactions, and incomplete parental permissions for research. It should be noted however, the differences in curricular designs by Mercer Slough and Institute of Flight will afford a comparison of badge use and implementation between a classroom-based instructional program and a technology-delivered instructional program.

Measures
- Pre/post interviews with students, staff and learning researchers
- Online platform observations
- Videotaped meetings of the program
- Videotaped badge design team meetings
- Learning and platform analytics analysis
- Case studies of focus group of youth
- Pre/post surveys
- Annual follow-up surveys