Badges for College Credit (BCC):
Motivating learning in informal science programs through digital badge system
Award # DRL-1322512

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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. What is the motivation for youth to pursue the various types of badges and does their motivation shift over time?
2. How does participation affect STEM-related identity formation, college-related identity formation, and pursuit of STEM-related skills?
3. What does each type of badge play in the identity formation, learning, and participation of youth?
4. How do participants interact with the platform to support learning?
5. How does the badge system interact with face-to-face instruction in the science programs?
6. How do badges get operationalized, from initial conception to embodiment in the badge achievement system?
7. In what ways do badges represent social or professional capitol in the real world?

Partners*

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). Our pilot program was the final quarter of a year-long internship for eleven high-school students (spring 2014). 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.

iRemix Platform
Our platform is an instance of the Digital Youth Network social networking platform (http://digitalyouthnetwork.org/) customized for each of our informal science partners. Platform features include blogs, discussion forums, debates, ability to post digital media, and a badge system infrastructure.
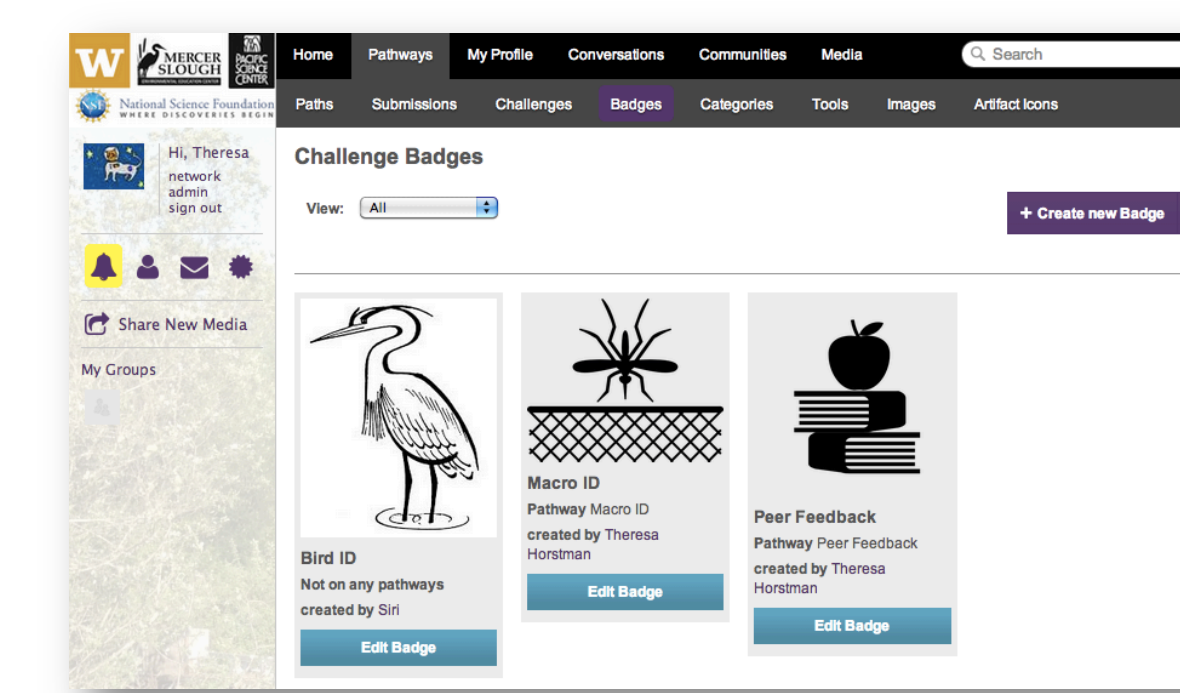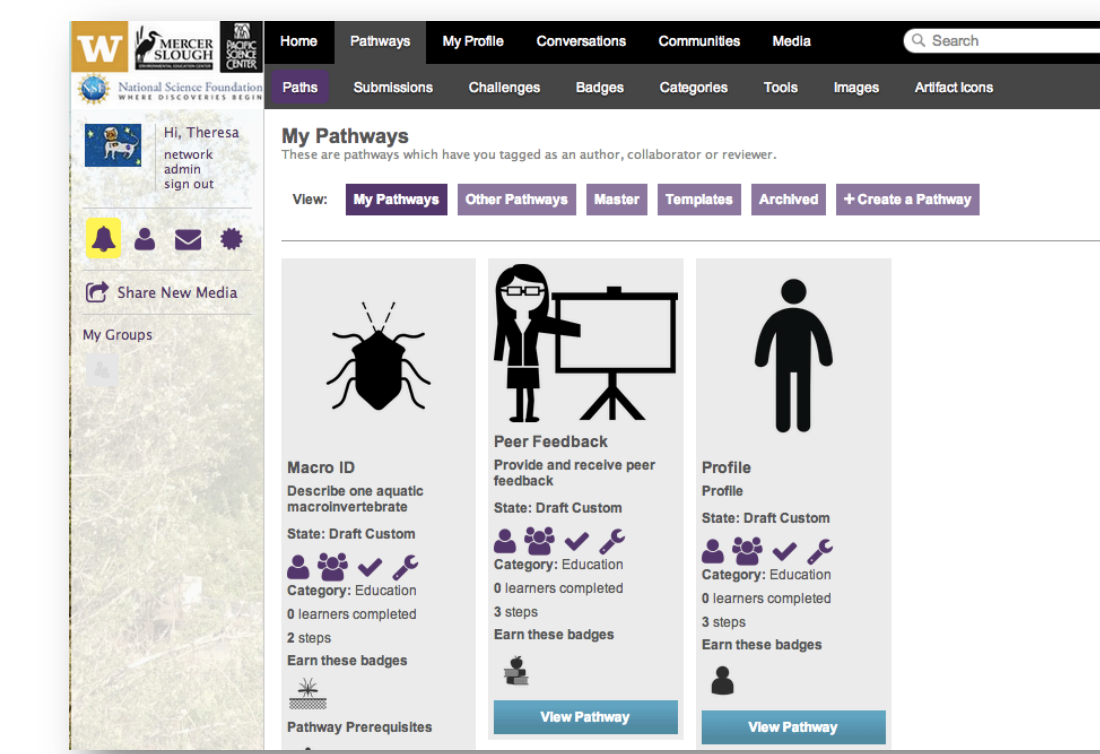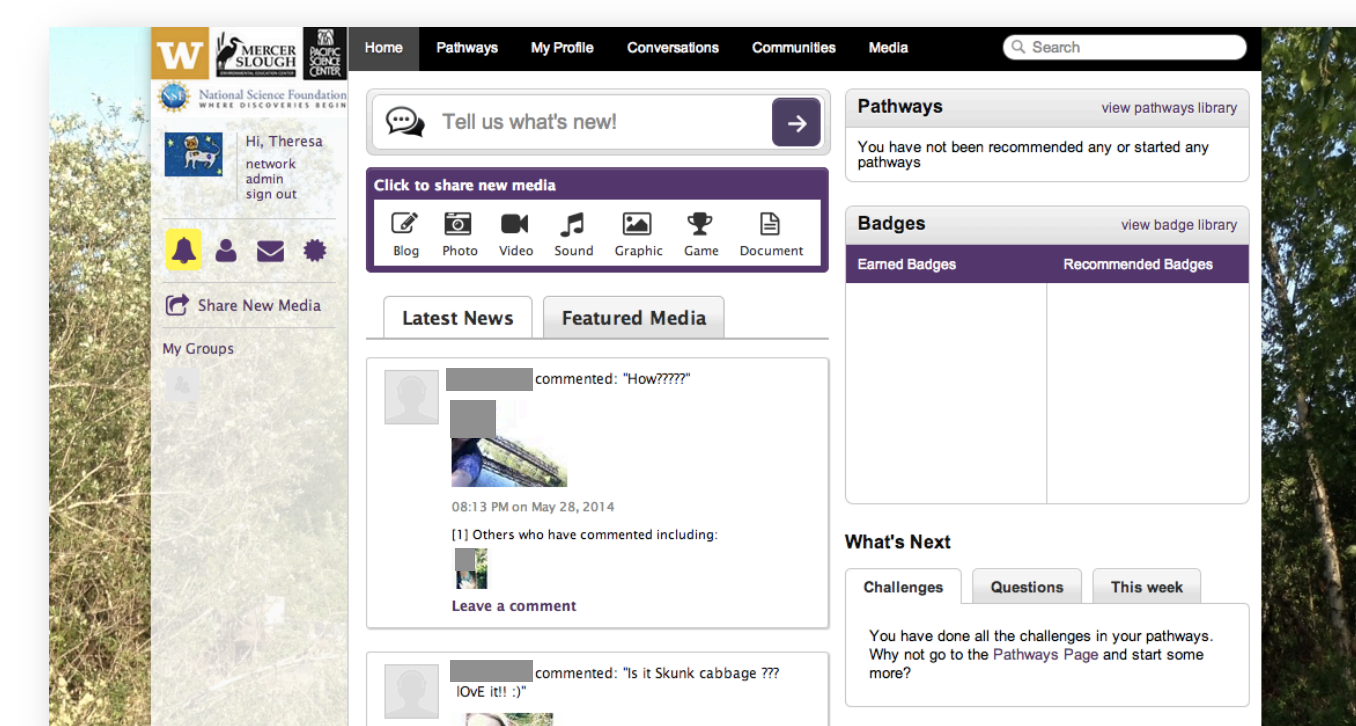
Future of Flight (Everett, WA.)
The Aerospace Maker Project program ran as a new, three-week session at an aviation museum. The program recruits high school students through open enrollment. Three students enrolled and participated in the July/August pilot. The program intends to support multiple learning pathways leading to areas of specialties within materials science and airplane manufacturing with ties to industry partners.

*Seattle Aquarium (Seattle, WA). Beginning in 2015/2016.

Challenges

Mercer Slough (MS)
- Program activities are typically hands-on and outdoors. Integrating web-based platform into a traditionally offline program is a challenge without compromising the authenticity of the program activities and retaining the "close to nature" culture of the program.
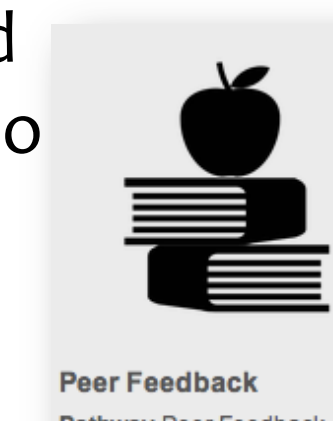- Limited experience with badges or achievements systems.

Future of Flight (FOF)
- Limited resources and limited familiarity with the potential for badges supporting learning restricted development of college-level program in time for pilot. Specifically, badges were considered an "add on" rather than being integrated within the curriculum design process from the beginning.
- Incomplete curriculum plan prior to pilot launch. The curriculum plan could not support comprehensive badge design or to fully integrate platform functions into the program.

Emerging Stories:
The constraints and affordances of…

The pedagogical perspectives that inform program design
- Identify methods for introducing badge and achievement systems design.
- Programs familiar with project-based curriculum lends itself to integrating achievement systems because learning is recognized as an iterative and interdisciplinary process rather than solely procedural. Not having this experience makes educational badge system design work more challenging.
- Documenting program design and development is essential for building shared understandings of program purpose and goals and for integrating the platform and badges. Without documentation program goals and learning objective shift making it difficult to plan appropriate platform use or design and develop a meaningful badge framework.
- Definition of learning impacts the flexibility in thinking how badges can support participant learning.

Design strategies for creating badge systems to foster identities associated with college- and science-focused learning trajectories
- Use badges as *metacognitive cues* to supplement the learning experience. Prompting participants to reflect on their own learning and how they progress through the program. In the case of Mercer Slough to emphasize the culture and practice of the group in addition to environmental science education.
- Include badges that are related but not typically central to the associated content domains. For example, *Bog Bounce* badge (MS) is a key activity to help students see the difference between wetland and other habitat and *Peer Feedback* (MS) helps students develop skills in giving and receiving constructive criticism.

Integrating a social networking platform with traditionally offline curriculum
- Evaluate which activities can be online without taking away from lab or project time.
- Ensure platform functionality is meaningfully integrated to the program and enhance authentic experience.
- Successful platform integration is unique to each program. How the platform is used in the curriculum can reflect the norms and practices of the program and user preferences of those enrolled.
- Address issues of access by ensuring participants have enough time within the program sessions to use the platform.

Formalizing informal learning spaces
- Retain the culture of the program and meet the criteria required (including assessment) to award college credit.
- Balance the potential of badge systems to align with rubrics while maintaining playful participant engagement.
- Observe to see if programs adapt to recognize participants out-of-school activities as legitimate forms of science participation, or if programs trend towards standardizing their practices to replicate in-school learning.

Peer Feedback
Pathway Peer Feedback

Evaluation

Collaboration: Designing & implementing a badge system
- MS has actively and effectively integrated multiple external partners. FOF is internally testing their program: little external collaboration exists.

Badge System Model: Proof of concept, efficacy, effectiveness, and dissemination
- MS data shows improved science attitudes, increased knowledge, and new teaching skills. FOF suffered participant attrition; data from two students shows positive impacts.

Primary Research Agenda: Learning and identity formation research
- Learning sciences research commenced at MS and FOF. Attendance issues at FOF resulted in incomplete permissions and a shift in research plans.

Measures
- Pre/post interviews
- 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

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