

## Navigating online learning environments in the classroom

Caitlin K. Martin and Brigid Barron, Stanford University  
ckmartin@stanford.edu, barronbj@stanford.edu

**Abstract:** Possibilities and challenges inherent in networked learning environments call for ways of looking at teacher use of online spaces. We share mixed method research of two teachers and their students in a citizen science program. Although the teachers had similar levels of success with the program, they interpreted the purpose of the online environment differently. One used it as a space for students to publish perfected work while the other used it alongside students to build knowledge and foster community.

### Introduction

Online learning environments are rapidly becoming part of the education landscape for K12 (Queen & Lewis, 2011), including customizable platforms that incorporate social network forums. And although more research is needed, studies suggest that interactions online in both formal and informal environments can lead to outcomes related to learning and engagement (Fredericksen et al, 2000; Pawan et al, 2003; Guzzetti, 2006). However, there is also a growing concern that new information technologies may contribute to further inequalities along economic, cultural, or gender lines because of differential use, attitudes, or skill (DiMaggio et al., 2004; Hargittai, 2008). Given these potential outcomes and challenges, we need more ways to explore interactions, learning, and engagement online.

In this work, we use a blend of automated and qualitative data to look at middle school teachers and their students within Vital Signs, a networked citizen science platform specifically designed for use in classrooms around Maine. Online citizen science environments have the potential for collaborative knowledge sharing and community building around ongoing data collection and analysis. As such programs are incorporated into classrooms, can teachers broker global collaborative possibilities or are they simply gatekeepers of usernames and passwords? What types and patterns of online interactions create opportunities for and evidence of learning across multiple levels of analysis, including teachers, students, and community? This work is part of a larger research effort to learn more about teacher and student practices and engagement in cyberlearning environments. We use mixed methods to look at classrooms across space (school and online), time (multi-month) and scale (community, class, and individual).

### Methods

During the Vital Signs unit students go into the field and use digital cameras and GPS receivers to collect data on native and invasive species in their local ecosystem. The website is designed to help users organize and submit their own observations, analyze existing data, and view and comment on the work of others. Professional and citizen scientists, considered species experts, confirm or question investigation data.

We recruited two teachers (A and B) who had used Vital Signs in the classroom for two years and were highly engaged with the program. We followed two classes for each teacher (N=98 students) monitoring online activity and observing classroom and outdoor activities. Students of teacher A submitted individual work (48 accounts) while students of Teacher B submitted work as teams of four (12 accounts).

Online data. Participation data from the Vital Signs site was collected for each teacher, including personal investigations submitted and missions (investigation foci for students), resources, and comments posted. All comments made to or by students in the focal classrooms were captured and a visual representation of the commenting patterns for each teacher and their students was created (see Figure 1).

Teacher interviews. A semi-structured interview protocol was designed to provide teacher reflections on their history as a science teacher and their personal and classroom experiences with the Vital Signs program. The teachers were interviewed (35-55 minutes) at their schools.

### Results

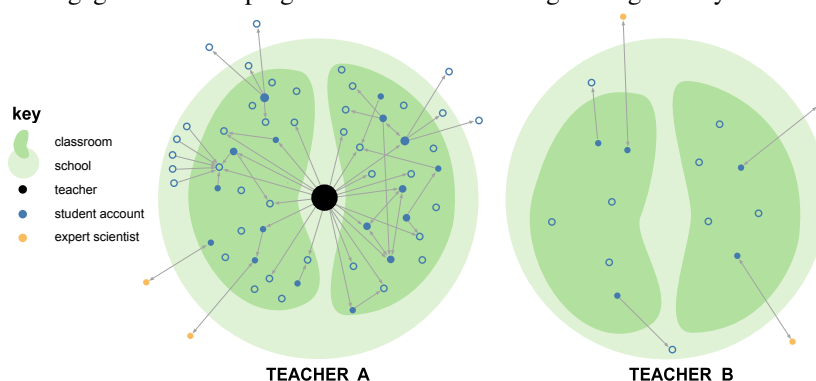
Teacher perceptions and participation. For teacher A, the Vital Signs site was an informal window into scientific practice for both him and his students to post work, receive feedback, ask questions, and explore. He submitted seven observations of his own and created ten different missions on the site to guide his students' observations. Teacher B, in contrast, saw the Vital Signs site as a formal public presentation space for students to post polished scientific work that had been critiqued, revised, and perfected in the classroom. She had not submitted her own investigations and used missions predefined in Vital Signs.

Teacher comments. Teacher A was a central hub of activity connecting to the students in the online environment through encouraging comments on their work: *"Your field notes are well detailed and tell the whole story. I noticed that others have avoided the sketch as part of their submissions. Maybe you could be a*

*sketcher for hire. You have some artistic talent for sure.*” He commented on 44% of the submissions from the focal classes, while teacher B did not comment on student work (see Figure 1).

**Student comments.** Teacher A offered class time for students to view the work of others and leave comments. Across his classes, 29% of user accounts posted comments on other students’ work (including those in other classes and schools) and 35% received peer comments on their own work: “*Jamie! Nice job. I love your pictures there really pretty :).*” Teacher B did not introduce commenting in the classroom. Two user accounts (17%) posted comments on work submitted from another class and none received peer comments. Although Figure 1 does not show all expert scientist comments, it does show when students responded to an expert scientist, which was the most frequent type of interaction for Teacher B classrooms (three instances, 25%), which were often more formal in tone.

**Student science learning.** We are in the process of coding the quality of student work submitted online from both classrooms and looking at data from student survey measures to compare the classrooms in terms of submitted work and engagement in the program and science learning more generally.



**Figure 1.** Visualization of comments to and from student Vital Signs accounts for teachers A and B. Filled nodes indicate at least one outgoing comment. Size of node indicates number of outgoing comments.

## Summary and future plans

In this preliminary study, we find that teachers interpreted the public and scientific framing of Vital Signs differently. One saw it as an opportunity for students to publish professional and depersonalized scientific observations during a fixed classroom assignment and formative feedback was not public. Another saw the site as a portal for himself and his students engage in a citizen science community of knowledge sharing and building. He expected student work to improve over time and across multiple investigations and used online comments to provide formative feedback and encouragement. Comparing investigation artifacts and survey data from students in these classes is a next step in this work in order to explore potential implications of different teacher approaches to online communities used in the classroom.

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