Citizen science as interdisciplinary working

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Abstract

Citizen science is a growing trend in involving the public in different types of collaboration with scientists. The growth of this activity has consequences for data collection, data analysis and the way in which science is carried out. It also has a potential impact on what, and how, citizen scientists learn about science when engaged in such activities. The purpose of this research is to explore the practices adopted by participants in citizen science projects, and in particular the influence on learning for the participants in these projects which rely on technology to support collaboration.

The growth of citizen science projects is occurring at the same time as a growth of interest in informal learning and both are supported by technology enhanced learning.

To make best use of the rapidly growing area of citizen science in the development of learning, it needs to be studied as a newly developing interdisciplinary area, with the consequence of unravelling the mechanisms by which interdisciplinary collaboration takes place in these settings, and the identification of conditions which encourage or thwart learning.

Keywords

Citizen science, informal learning, interdisciplinarity

Research Context

This paper explores citizen science as part of interdisciplinary working and at how this may influence learning of participants involved in citizen science projects. At first, the research context that relates to the participation of citizens which has been facilitated by communication technologies is presented. The aims and objectives of the project are discussed. Aspects of learning in citizen science projects and on interdisciplinarity in citizen science teams are presented.

The growth of citizen science has consequences for the way in which scientific activities are carried out. Wyler (p2) notes some recent trends

1. Increasing coordination and collaboration between citizen science practitioners from different fields, resulting in sharing procedures and best practices, and creation of networks and associations.
2. Emergence of platforms that support a variety of citizen science projects, creating broader public awareness and encouraging greater retention of volunteers.
3. Expanding the role played by citizens in the projects beyond simple tasks to include greater participation in all phases of the research process from conceptualisation to publication.

Participation of citizens has been made easier by the growing availability of advanced communication technologies. This growth has been supported by the development of new technologies, and in particular by the development of citizen-cyberscience [Curtis, 2013] where computers are used both for data collection, data analysis and collaboration on tasks; some of these tasks are becoming complex. Foldit, an online puzzle game about protein folding being an example where the volunteer citizen science contributors were credited in a 2010 paper in the journal Nature [Cooper et al., 2010].
As well as being an important method for contributing to the development of science knowledge [Bonney, 2014, Cohn, 2008], citizen science also has a potential impact on what, and how citizen scientists learn about science, both in terms of understanding the process of science, and learning about some area of science content. This requires a novel approach combining a reflection on, and exploration of the links between formal and informal

learning, the growth of such learning opportunities, and the approaches that have been taken in order to enable the public to crossover from participation in citizen science to achieving learning objectives.

Aims and Objectives

The ambition of this project is to explore the concepts of interdisciplinary citizen science, and incidental, informal and inquiry learning in citizen science settings in order to construct a new understanding of how the learning which occurs in citizen science settings can be encouraged. Theories and frameworks of Networked learning will also contribute to how learning takes place.

Design

The project is currently in the first stage of scoping with a literature review and the conduct of pilot observations and interviews. At the next stages of this project, Wyler's (2016) trends will be used to guide the analysis of the data that will be gathered from observations and interviews with participants involved in citizen science projects.

Learning in citizen science projects

Our approach to citizen science activity is citizen science inquiry where the learner takes centre stage. In this approach ' inquiry learning and large- scale collaborations between members of the public come together' [Herodotou et al., 2017]. Most current citizen science initiatives engage the general public (e.g. in the role of volunteers, non-expert individuals) in projects generated by scientists such as species recognition and counting. The public contributes to data collection and analysis tasks such as observation and measurement. The 'citizen inquiry' paradigm shifts the emphasis of scientific inquiry from scientists to the general public, by having non-professionals (of any age and level of experience) determine their own research agenda and devise their own science investigations underpinned by a model of scientific inquiry. Additionally, the profiles of non-professionals may vary depending on their educational background or their age (i.e. children and adults will have different approach on how they are involved on scientific inquiries. Further, the paradigm makes extensive use of web 2.0 and mobile technologies to facilitate massive participation of the public of any age, including youngsters, in collective, online inquiry-based activities. Citizen inquiry aims to leverage the pedagogical potential of inquiry-based learning – a productive approach to the development of learners' knowledge of the world and the enhancement of higher-order thinking skills – through opening-up massive participation in inquiry-based activities. Such collaborations at scale require high risk interdisciplinary working and work on this research area would provide insight into most effective structures for working in this faction.

Interdisciplinarity in citizen science teams

The participation of citizens in projects led by scientists has been growing over the past ten years. Our OU work on our citizen science and inquiry teams, has resulted in the development of a number of classification schemes of types of this activity [see Aristeidou et al., 2017; Curtis, 2015; Author1et al., 2014] These classification schemes are often related to the role of the internet in enabling these activities. Like other forms of technology enhanced learning, this is an interdisciplinary activity [Author1 and Taylor, 2016]. The participants involved in such collaborative projects range from experts to complete science novices. Therefore, if these participants can be considered as a team, such collaborative activities can be considered both as an example of extreme interdisciplinarity, and an example of open research. The engagement of scientists with the public represents engagement with a wider audience, often one on a massive scale. The goal of many citizen science communities is to help scientists make scientific discoveries, but increasingly interest is growing in the possibility of learning both science concepts and processes in these settings. The work of Lemke et al. [2015], and Säljö [2010] offer an approach to examining learning in these technology-enabled informal settings.

While there is a growing recognition of the need for interdisciplinarity in solving complex research problems in many areas of science, the situation in the multidisciplinary arena of learning from science projects which use technology is worthy of exploration, and essential to underpin both as a new research area, and as an arena in which the contribution of practical solutions based on technology are developed to educational problems such as maintaining motivation in the study of science and technology. Finally, the time and the ways that networked learning scholars can rely on the use of citizen science should be investigated further.

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