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Fostering discoveries in citizen science

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Fostering discoveries in citizen science

TREO Talk Paper

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Abstract

With the proliferation of collaborative and mobile technologies, online citizen science has become a booming approach to research and public engagement. Citizen science refers to various forms of engaging non-credentialed volunteers (citizens) in different aspects of scientific research, such as data collection, analysis and, more rarely, development of research agenda and publications. Among the key benefits of citizen science is the ability to facilitate discoveries (Cooper, 2016). A discovery is a finding about something that was not known before. Citizen science promises a particularly unique opportunity for fostering discoveries. Ordinary people often discover something new, due to being more numerous than scientists, ability to sense the environment and detect anomalies and change, as well as think outside the box, given their lack of entrenchment in prevailing scientific paradigms (Cooper, 2016; Lukyanenko et al., 2019).

Despite the great potential, the theoretical and design knowledge for how to develop citizen science projects to make discoveries is nearly entirely absent. Much of what is known about what makes a particular citizen science project conducive to foster discoveries remains anecdotal. Furthermore, we continue to lack a systematic understanding of the nature of discovery in citizen science.

In our research we developed data driven as well as theory grounded principles for fostering discoveries in online citizen science. We conducted a literature search on existing theoretical frameworks for discovery and synthesized these findings with a systematic review of over 200 citizen science discoveries. We then developed a theoretical framework for understanding discovery in citizen science, which then permitted us to develop the design principles.

Our framework conceptualizes discovery along two dimensions: global and local. Global discoveries involve the generation of an entirely new knowledge, unknown to science. Discoveries in citizen science can also involve a local discovery, wherein a community, individual, or an organization learn something new for itself (e.g., Cooper, 2016). Based on the analysis of existing discoveries, we formulate a set of design principle, mapped to the two discovery dimensions (some principles apply to both dimensions). For example, to enable both local and global discoveries, projects should develop *liquid information networks*, whereby information flows without friction between citizens and scientists (something which many existing projects fail to realize). Likewise, to foster global discoveries, projects should promote *hunch development* by allowing citizens to document their train of thought and guesses while posing questions in an open-ended manner. To stimulate local discoveries, projects should personalize tasks and interfaces to the varied interests and expertise of citizens.

Our work contributes to the theory and practice of online citizen science by providing a much-needed practical guidance for the projects interested in fostering discoveries. We also contribute to the theories of discovery, innovation, and platform design.

References

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