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Inquiry Skills Help Citizens Learn More about Wildlife from Citizen Science Projects

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OVERVIEW: Citizens who started their participation in a citizen science (CS) project with more profound scientific reasoning skills had more knowledge about urban wildlife at the end of the project than citizens with fewer profound skills.

AUDIENCE: Initiators, researchers, and managers of citizen science projects; Informal educators and instructors.

KEY POINTS

- Citizen science projects provide individuals with opportunities for inquiry-based learning.
- Scientific reasoning skills are not only a learning outcome of citizen science projects, but also a prerequisite.
- At the end of a citizen science project on urban wildlife, participants had better knowledge about the topic when they had more profound scientific reasoning skills than when they had fewer profound skills.
- Citizen science projects may need to facilitate learning from inquiry or provide training in advance.

INTRODUCTION Citizen science projects provide opportunities for inquiry-based learning about the research topic and methods. In order to learn from scientific inquiry, participants may need scientific reasoning skills such as skills to form hypotheses, to test hypotheses, and to analyze data. We tested this prediction in a project in which citizens participated in research on urban wildlife ecology. Before and after the project, 144 participants filled out a questionnaire that assessed their scientific reasoning skills, their knowledge about the topic of urban wildlife ecology, and their beliefs about scientific knowledge. We tested the influence of participants' scientific reasoning skills and beliefs about knowledge on their topic-specific knowledge and vice versa, in a statistical path model.

FINDINGS If participants had more profound scientific reasoning skills before participating in the project, they demonstrated higher levels of topic-specific knowledge after participating in the project. Participants with higher knowledge levels, however, did not have more profound scientific reasoning skills at the end of the project. Therefore, we concluded that participants' scientific reasoning skills positively influenced their topic-specific knowledge. Furthermore, if participants more strongly believed that scientific knowledge was dynamic and changing at the start of the project they also had higher levels of topic-specific knowledge at the end of the project. This relationship, however, was only weak. Participants with higher levels of topic-specific knowledge at the start of the project did not believe more strongly that scientific knowledge was dynamic after the project. Thus, we concluded that there was a weak influence of participants' beliefs about scientific knowledge on their topic-specific knowledge.

TAKEAWAYS Educators and initiators, who offer citizen science projects, could incorporate scientific reasoning skills into their design for learning as a learning outcome and also as a prerequisite for learning. In order to facilitate learning about the topic for all participants, the inquiry-based learning opportunities of a citizen science project may be adapted to participants with lower scientific reasoning skills. Alternatively, skill-building trainings could be offered before the research project begins. Such training should focus on several aspects of the inquiry process, that is, data collection skills and more sophisticated skills such as reasoning from data.

Full Title: Scientific Reasoning Skills Predict Topic-specific Knowledge after Participation in a Citizen Science Project on Urban Wildlife Ecology