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Change – The transformative power of citizen science

How to include schools in citizen science health studies: Practical experiences and lessons learned

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Abstract

STEAM education is gaining increasing significance in science education and educational policies throughout Europe as it aims to equip young learners with relevant skills and knowledge to tackle global challenges effectively. But educators often encounter difficulties in engaging students, particularly in subjects like statistics, biology, and chemistry. Integrating citizen science activities into project-based learning could serve as a valuable tool in igniting students' interest in these subjects. Such initiatives may even inspire students to pursue academic careers in these fields. But when researchers approach schools to collaboratively conduct scientific studies they face manifold challenges, like limited motivation to participate or the need for adaptation of the scientific study to school curricula. When it comes to organizing citizen science health studies in schools, the challenges become even more complex due to the importance of data protection. These obstacles and potential solutions were discussed in the ECSA 2024 workshop, where we brought together 31 researchers and practitioners from schools, science, pedagogy, and medical research in the 1,5-hour working session. We identified important issues and good practices related to the motivation of schools, the link to curricula, ethical challenges and the issue of impact assessment.

Keywords: citizen science, education, health, medical, school, STEAM.

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Introduction

STEAM education is an integrative educational approach that fosters pupils' interest in science, technology, engineering, arts and math as it develops a range of important skills like critical thinking and science literacy. To develop fluency with STEAM, research suggests that engagement in authentic science experiences is required as we must do science to learn science. Thus, the active engagement of pupils in citizen science activities can considerably contribute to STEAM education. Some citizen science projects intentionally integrate learning goals with broader project objectives, with scientists and educators crafting collaborative activities to foster scientific education. Other citizen science activities can be adapted or repurposed for learning, where pupils engaged in scientific endeavors benefit from background information and material, and learning takes place less intentionally.

Intentionally planned or even as a "by-product" of collaborative research activities, citizen science has proven to generate important learning outcomes (Schaefer et al. 2021; Kumar et al. 2023; Fattal and Heejung 2023). By intertwining science subjects, arts, and citizen science activities, educators can facilitate not only the transfer of knowledge but also foster a deeper understanding of the interdisciplinary connections between different subjects. Students are encouraged to apply their learning to real-world problems, reinforcing the relevance and transferability of their education.

However, when researchers approach schools, they face challenges related to the planning and implementation of the participatory research approach and assessing its impact. Therefore, we organized this workshop at the European Citizen Science Conference 2024 to support mutual learning and experience exchange among the 31 participants of the session.

Methods

The method of our workshop altered individual reflections with a collaborative harvesting and discussion of individual experiences. We opened the session with a short presentation of the EU-funded project InChild-Health that involves schools and children from 6 to 13 years in a citizen science health study and introduced some of the key challenges we are facing in our work. This input presentation was followed by an individual reflection of challenges faced in the participants' projects and working situations, noted down on post-its. These thoughts were presented to the plenary, the post-its grouped to challenge clusters and discussed together.

In the next step we focused the discussion on sharing concrete solutions to the encountered challenges. All participants could contribute with their good practices and experiences, noted them on post-its and added them to the challenge clusters. The outcome of this workshop was a rich map of challenges and solutions of how to involve schools in citizen science health projects.

Results

The following challenge clusters and solutions have been identified by participants.

Motivation of schools, teachers, and parents to participate

The challenge is how to get schools enthusiastic to participate in a citizen science project when they have a full program already. Especially teachers need to be motivated to participate but are very often overwhelmed by their teaching obligations and demanding school curricula. Also, parents need to give their consent for their children to participate in research activities.

Solutions:

- Approach schools very early and talk to directors and teachers to understand their needs and expectations; learn from the contextual factors and tune your research activities to the necessities of the school.
- Co-design and pre-test every information material with teachers, pupils and parents.
- Manage expectations and communicate very clearly the outcomes and limits of the study.
- Offer teachers to get involved but also be prepared to do a lot of activities with your own team to unburden teachers.
- Emphasize the fact that pupils very often benefit from external practitioners and researchers who involve them in problem-based, hands-on learning activities.

Including citizen science activities in the curricula

The challenge is how to link citizen science activities to school curricula and do a proper scientific study without requesting tasks that are too difficult or demanding for students. This challenge also links closely to the motivation of participation.

Solutions:

- Make yourself acquainted with the current school curricula and relate your activities very concretely to them.
- Approach schools with different citizen science modules, that allow teachers to choose between different degrees of involvement. E.g. in InChildHealth the citizen science module "Air Quality Checker" takes only two hours and provides basic information and hands-on activities related to indoor air quality and mitigation measures. While the module "Air Quality Researcher" lasts around eight hours and students can explore the air particles in their classroom, define a research question, collect data on bacteria and fungi, and analyze them together with the researchers.
- Involve the teachers already in the first step of co-designing the science activities and the data collection methods.
- Do pilot-testing of your procedures, adapt protocols to the pupils' skills, think of data quality measures early on.

Doing a proper impact assessment

The discussion focused on what evaluation instruments are well-suited for pupils of different ages and how not to be too demanding in collecting evaluation data.

Solutions:

- Involve students in more creative ways to present the outcomes of their work, e.g. doing a video or presenting the results on self-made flip-charts.
- Organize peer-to-peer interviews and focus groups that can also be held for students to get direct feedback on the process.
- Use gamified approaches and digital tools
- Co-design and pre-test your evaluation material
- Empower teachers to play a role in evaluation

Addressing complex GDPR and privacy issues in health studies

The challenge discussed was how to deal with complex and time-consuming ethical procedures and what to do if the project activities change in participatory projects. Also, the documentation of the citizen science activities and comparing and keeping track of data of individual students while being GDPR conform were issues mentioned.

Solutions:

- Build teams with someone who knows about the ethical procedures well, run through the ethical procedure early to get permission to do your research and file an amendment if things change.
- Ask students to do the documentation of the activities and invite schools to promote the activities, then you can refer to the material created by students and school personnel.
- Let the students choose their own anonymous ID, which will be used by them whenever they contribute data.

Discussion

As the results have shown, the workshop offered space for rich discussion amongst participants and there are clearly challenges regarding the involvement of schools in citizen science studies. Most of the challenges and solutions are not specific to health studies but apply to citizen science in general. Only the complex GDPR issues and the challenge of handling the very sensitive health data of minors come very specifically into play when we do participatory research in schools related to health and medical topics. The variety of issues raised led to the four challenge clusters, related to the motivation of participation, the linking to school curricula, evaluation challenges and ethical considerations. These were discussed in more detail and triggered the mutual exchange of potential solutions. We could identify good practices for all the

challenges and the informal feedback from participants was very positive to take some of the learnings to their own work with and in schools.

Conclusion

In the end, participants collaboratively worked on current challenges and strategies for doing citizen science health studies in schools. The intensive discussions and the interest expressed by most participants clearly revealed that there is a need for a more dedicated exchange about the topic and follow-up workshops with some of the participants may help to find more practical solutions for the future.

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