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Report on the effectiveness of science clubs

Based on Deliverable D4.4

by

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Report on the effectiveness of science clubs

The widespread adoption of citizen science relies on individuals who have a clear comprehension of scientific principles and methodologies, and can apply these skills in addressing both local and global challenges. Recognizing the crucial role of scientific understanding in citizen science, deliverable 4.4 specifically investigated the efficacy of ‘science clubs’ in promoting science comprehension and its practical application in everyday problem-solving scenarios.

A ‘science club’ is a non-formal education initiative, currently run in Uruguay, where children, youth and teachers can share and enhance their ideas and creativity through research. The clubs work as educational centers aiming at the development of scientific culture across generations. Being a distinctive initiative, the program provides participants with the chance to actively participate in science projects, spanning the entire research process from formulating research questions to showcasing and sharing their findings. Once a year, in October, the Ministry of Education and Culture organizes a national science fair at which science clubs have a chance to present their projects. In order to get to the national level, science clubs compete at regional level during summer. The regional fairs are organized by regional coordinators of science clubs. Regional coordinators are also responsible for the propagation of knowledge about the science clubs and supporting tutors from their regions. The national fair is not only a chance to compete with the best science clubs in the country, but it is also an opportunity to exchange ideas and visit the seaside.

The primary objectives of the study included assessing the program's popularity among children and adults, determining the overall recognition of science clubs within the broader population, measuring the satisfaction levels of science club participants, identifying the specific skills acquired through their involvement, and ultimately investigating the long-term impact of this experience on individuals' perception of science as they progress into adulthood. To do this, the authors collected quantitative and qualitative data on the types of practices currently in use and designed a study to test their effectiveness in terms of strengthening the participatory aspect of the clubs.

The research was conducted in Uruguay during the autumn of 2022 as part of the ISEED project. Two distinct groups of participants were involved in the research, each assigned a specific questionnaire. The first group consisted of *orientadores*, who were the teachers leading the science projects. The second group consisted of adult citizens who participated in science projects as active participants, as well as a control group that did not partake in science projects. Both groups underwent a quantitative study, further supplemented by a qualitative study involving interviews conducted with the tutors and participants of the science clubs.

a. Orientadores (tutors)

The study of *orientadores* was conducted online by a self-administered survey which took an average of approximately 10 minutes to complete. All participants were either current or former counsels of science clubs. A total of 349 tutors completed the survey and 24 of these were interviewed.

The gathered material allowed to propose several key findings. Firstly, tutors are predominantly driven by internal rewards, including job satisfaction and opportunities for professional development, their satisfaction levels were positively correlated with internal motivation. Additionally, the study found that tutors demonstrated a higher willingness to lead science clubs for an extended duration when they had the opportunity to participate in national science fairs. Their collaboration with external stakeholders, such as members of local communities, experts, or other tutors, positively influenced their engagement and commitment to the clubs.

b. Participants and non-participants of science clubs.

This second part of the study was conducted on adult citizens of Uruguay, including individuals who were members of science clubs in the past. 296 participants of science clubs responded and completed the questionnaire, and 24 of them were interviewed, while 600 individuals who had not participated in these clubs answered the survey.

Findings showed that the science clubs program was positively evaluated by participants. The participation in the program is an opportunity to learn new skills, explore solutions to local problems and collaborate with others. Participants valued science more and perceive it as crucial in the decision-making process compared to non-participants. Additionally, participants demonstrated higher resilience to uncertainty. These findings underscore the short-term and long-term positive impacts of the science clubs.

This research presented a valuable opportunity to evaluate the effectiveness of integrating scientific practices into the daily lives of individuals across different age groups, including children, teenagers, and adults. To ensure a comprehensive understanding of the impact and potential benefits of science clubs, the study was purposely designed to encompass not only participants of science clubs but also adult citizens who had not previously been involved in such clubs. This approach allowed the researchers to examine the potential influence of science club participation on individuals' perspectives, experiences, and overall engagement with scientific practices, providing insights into the broader implications of science clubs for the wider community.