F.O.R.M.

OPEN SCIENCE RESOURCES

AN INTRODUCTORY GUIDE TO CITIZEN SCIENCE

Citizen science refers to the participation of the nonprofessional public in research, often in collaboration with or under the direction of professional scientists and scientific institutions. Citizen science and Open Science both aim to make science accessible, inclusive, and participatory for the general public. Each concept handles different stages of the research process. While citizen science is about the participation of the public in conducting research, Open Science is about the availability of science to the public. They are complementary and contribute to each other.

MODELS OF CITIZEN SCIENCE

Citizen science could be categorised according to level of participation of citizens in the following ways:

- **Contributory (Participatory):** This model has the least involvement of the public, as the public's role is limited to data collection. As an example, consider Christmas Bird Count sponsored by the National Audubon Society where people volunteer and are led by a birder to gather information about local birds.
- **Collaborative:** In addition to gathering data, in this model citizens participate in data analysis, interpretation, and sometimes even in developing the research question. For example, Making Sense is a project that involved communities in co-creating solutions and gathering data on noise and air pollution using sensors.
- **Co-created (Co-produced):** In this model, citizens actively participate in shaping research objectives, designing methodologies, analysing data, and disseminating findings. For instance. NASA's The Radio JOVE project allows citizens to take measurements, analyse data, and discuss their findings.
- **Citizen-led:** In this model, citizens lead and conduct the research process. For example, the NOISE Project is a community-led research project, funded by the National Science Foundation and conducted by representatives from communities that have been historically excluded from science.

WHAT TO CONSIDER WHEN INVOLVING CITIZEN SCIENTISTS

For Researchers

Define Clear Goals and Tasks

Defining your main goal and research questions would determine if your research would benefit from public participation and help you break down tasks.

Ensure Data Quality and Validation

Make sure that the data are verified before usage to ensure the best results.

Ethical and Legal Considerations

Sort out things such as informed consent, data privacy, and Open Access policies (when applicable) to share findings.

Build Long-Term Engagement

Create discussion forums, host events, and share updates. Partner with schools, NGOs, or museums.

Choose the Right Engagement Model

Choose one of the models mentioned before that suits your research.

Select the Right Tools and Platforms

Select the tool that best suits your topic, such as mobile for easy data logging, web-based platforms for remote participation, and DIY kits and sensors (e.g., air quality monitors, water testing kits, etc.).

Encourage Communication and Engagement

Minimise barriers between the researchers and citizens by training citizens, sharing the project's progress with them, and mentioning and crediting their contributions.

WHAT TO CONSIDER WHEN INVOLVING CITIZEN SCIENTISTS

For Institutions

Adopt Open Science Policies

The availability of knowledge to the public helps engagement in research.

Raise Awareness about Citizen Science

Organise lectures and seminars about citizen science for both the public and academics.

Develop New Policies and Strategies

Develop policies and strategies that support citizen science by introducing and integrating the concept into research and teaching programs.

Create Hubs and Communities

Bridge academics and the public, host related initiatives and activities to guarantee sustained participation.

Recognise Citizen Science

Recognise citizen science as an established and dynamic research methodology, as well as its contributions to society and education.

Adapt Conventional Research Assessment Systems

Expand conventional research assessment systems to include indicators that evaluate citizen science success through measurable participation metrics.

Enforce Requirements

Guarantee that all participants adhere to ethical, legal, and privacy requirements applicable to their citizen science project, with access to expert guidance when needed.

BENEFITS AND CHALLENGES OF CITIZEN SCIENCE

Benefits

- **Expanding Data Collection:** Citizen science helps with large-scale data collection which can otherwise be challenging for professional researchers on physical and logistical levels, potentially accelerating scholarship and discoveries.
- **Raising Awareness:** Citizen science can help raise public awareness about the importance of science, scientific thinking, and scientific methods through their engagement.
- **Building Trust in Science:** When the public contributes to science, it helps build trust in science faster than when knowledge is delivered top-down.
- **Bridging the Gap Between Science and Society:** Through the public's collaboration with researchers, both parties come to gain better understanding and mutually learn from each other. Researchers gain fresh and important perspectives from the public that enrich their research and help them meet societal needs, and the public learn about and participate in creating the knowledge that is meant to serve them.
- **Increasing Accessibility:** Citizen science can democratise science by ensuring public engagement in the research process. It can also help reduce the cost of knowledge production by allowing participants to use their own devices and electronics.

Challenges

- **Data Quality:** Concerns can arise about the quality of citizen-generated data as the public is not trained for conducting research, which could lead to bias and unintended misinformation.
- **Training Time:** Since the public lacks knowledge of scientific methods, they might need training before starting, which should be a consideration for any citizen science project.
- **Sustaining Participant Engagement:** Individuals' commitment to projects is not guaranteed since citizen science is mostly based on volunteering.
- **Diversity and Inclusion:** Although citizen science leads to more engagement, certain groups might not want to volunteer their time participate.
- **Ethical and Legal Concerns:** If not closely monitored, issues could arise from unethical or illegal activities such as invasion of privacy, copyrights issues, wrong use of artificial intelligence (AI), fabricating data, etc.

RESOURCES

For further resources, guidelines, and templates, you can access the following links:

European Commission: Citizen Science

UNDP: Every Citizen, a Scientist

OECD: What is Citizen Science

Zooniverse: People-Powered Research

For some examples of citizen science, please check these projects:

CitizenScience.gov: Where Science is Collaborative

ECSPlatform: eu.citizen-science

Zooniverse Projects

SciStarter: Science We Can Do Together

ABOUT FORM:

The Forum for Open Research in MENA (FORM) is a non-profit membership organisation supporting the advancement of Open Science policies and practices in research communities and institutions across the Arab region.

Learn more by visiting us at www.forumforopen.org