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PROJECT RESULT #4

The Way Ahead to Open Roads: A Report on the Lessons Learnt and gained through the inclusion of DHH Adults & Trainers in CitSci Projects for Climate Change





PARTNERS



Citizens in Power is a Cypriot non-for-profit educational and research organization with experience in facilitating the active participating of the public in civic life through the provision of innovative material and trainings.



IASIS is a Greek NGO that is active in the fields of social inclusion, mental health and education, offering counselling and psychosocial support to marginalized groups.



IRSAM is a French Institution specializing in hearing impairments and sensory disabilities in both children and adults. It supports people with disabilities, in specialized workspaces, in mainstream settings and in learning and training centers.



IST is an Italian Institute and a non-for-profit foundation, providing a wide range of educational and training services and activities, as well as, support for the DHH and other linguistic and cognitively impaired children and adults.



RITE is a Cypriot non-for-profit organization that seeks to contribute to scientific and applied research with the purpose of reinforcing innovation, technology transfer, knowledge consolidation and policy reform.



Web2Learn is a Greek organization specializing in open education, science and policy, as well as, social connectivity. It has experience in civic engagement strategies for environmental preservation in a range of citizen science projects.



INTRODUCTION

In the context of the project, a number of DHH adults have been involved in 6 CS projects in 4 European Union (EU) countries: Greece, Cyprus, Italy, and France. These projects include "Discovering Magnolias" in Italy organised by the Institute for the Deaf in Turin, involving 40 adult DHH participants, "Wild in My Street," "Spider Observatory," and "Birds in Gardens" in France by the IRSAM Association, specialising in hearing impairment, also encompassing 40 adult DHH participants across its three projects, as well as "Observing Butterflies in Cyprus" in Cyprus co-organized by CIP and RITE associations, comprising 10 adult DHH participants, and finally "Climate Change and its consequences to our natural habitat" run by Web2learn in Greece, who involved 8 DHH.

In order to gain deeper insights into the implementation of the project, the partners organized two activities to assess the different skills of the DHH adults and DHH & CS experts who were involved in the previous phase. The first activity was 2 Roundtable Discussions per national context, which involved 49 participants who shared their experiences. The second activity was the creation of 1 video testimonials per partner. These videos were developed to allow participants in the CS projects to express their insights in a digital storytelling format.

For the purposes of the previous phase of the project, we have developed the following report, "PR3A2 Report on the Participation of DHH Adults in Citizen Science Projects," which provided insight into the results of involving DHH adults in citizen science projects. This report explores the details of their participation in activities such as data collection, as well as their comprehension of ecosystem functions and how they are impacted by environmental factors. This report offers guidance and recommendations for the DHH community's future participation in CS projects related to climate change. It also includes suggestions from DHH adults and experts on the creation of new projects and how to make them more accessible and inclusive.

Therefore, this report is divided into 4 chapters. **Chapter One, Lessons Learned and Gained**, goes into the valuable lessons learned and competencies gained during the Citizen Science project. There will be three parts to it. DHH adults' digital skills, competencies, and participation in citizen science projects. The second section is about the impact of participation in citizen science projects on the development of environmental literacy, including the ability to understand environmental problems and the motivation to pursue further action or education on the topic. The third section introduces civic engagement and examines how the project affected participants' willingness to participate in climate change and environmental protection activities, as well as the challenges they encountered and their goals for continued involvement.



The **second chapter, Do's and Don'ts Reflection on the importance of being included in CS for climate change, presents the participants'** feedback on their involvement in the project. It highlights the advantages of participating, such as gaining knowledge about the local environment and experiencing a sense of autonomy. The section also discusses ideas for improving project execution, balancing individual and group activities, and enlisting other DHH adults as collaborators on related projects.

The **third chapter, "Skills Gap for DHH Adults"**, discusses the significance of providing information and explanations in accessible formats and considers the significance of accessibility in citizen science projects for climate change. It also provides advice for future initiatives by outlining dos and don'ts when attempting to involve the DHH community in such projects.

Rather than offering a conclusion, Chapter 4 provides a broad summary of the whole project, highlighting how it promoted environmental awareness and introduced the DHH community to citizen science activities. Thus, **Chapter 4, "Aspects of Participation and Future Prospects"**, explores the world of CS projects, highlighting their potential for growth and improvement. It discusses the intrinsic rewards of community service, suggests areas for improvement, and offers techniques for persuading friends and DHH adults to embark on these projects.





GLOSSARY

Citizen Science

Citizen science uses the collective strength of communities and the public to identify research questions, collect and analyse data, interpret results, make new discoveries, and develop technologies and applications. This is done to understand and solve environmental and social problems (EPA, 2021).

Participant

The term participant is used throughout this guide instead of “citizen” or “citizen scientist” to define anyone identified as “non-expert” that is involved in a citizen science project.

Climate Change

Climate is broadly defined as the average weather conditions in a location over several years. Therefore, climate change is the marked shift in those weather conditions (United Nations, 2022).

Environment

In the context of climate change and for the purposes of this guide, the environment refers to the natural world and all that it is composed of, such as humans and animals or different natural habitats such as forests and oceans (Encyclopedia Britannica, 2022).

Environmental citizenship

Environmental citizenship is described as the positive behaviors of citizens “who act and participate in society as agents of change in the private and public spheres, through individual and collective actions”, to provide solutions to environmental issues (European Network for Environmental Citizenship, 2018).

Active Citizenship

Active citizenship is when people get involved in their communities and through democratic action and principles at all levels, promote the quality of life in a community. It is a form of active participation in political, non-political and the social affairs of a nation.

Deaf and Hard of Hearing Trainers

For the purposes of this guide, the CitSci4All consortium identifies as a Deaf and Hard of Hearing Trainer any professional that works with Deaf and Hard of Hearing adults in any capacity such as educational, supportive, or other. The acronym DHH is going to be used from this point forward in this guide instead of Deaf and Hard of Hearing.



Chapter 1

Lessons Learned and Gained



Chapter 1: Lessons Learned and Gained



Digital Skills & Competencies

During the course of the project, it was observed that the participants, including DHH adults and CS & DHH experts, possessed varying degrees of digital proficiency. The participants come from diverse backgrounds, encompassing a wide range of educational and age demographics. DHH experts noted that the DHH community already uses their smartphones for socializing and browsing, therefore they are at least somewhat proficient in using digital technologies. In the following sections, we will analyze how their digital skills were utilized and whether they were enhanced.

Digital Skills Used

DHH adults who participated in the Citizen Science project across partner countries primarily used their smartphones as cameras to collect data. They often took photos or videos of the data they wanted to examine. During the process, various applications and platforms were utilised. Experts recommended accessible and user-friendly tools such as:

- PlanNet app, which was used by the Italian Group. PlanNet is a joint "citizen science project" which aims to monitor plant biodiversity across the globe.
- Viber, which was used by the Cypriot group. Viber apart from it was used for communication purposes between partners, experts and DHH adults. It was also used as a digital tool to send pictures and the CS experts on butterflies sent further details to participants.
- iNaturalist app, which was used by both Greek Partners. iNaturalist allows you to create high-quality data for science and conservation by simply observing the plants and animals you see in nature.
- Oiseaux des jardins & Sauvage de ma rue, from the French site. Those two platforms let you send a photo to the app and add elements such as location, weather forecast, etc.

Participants were called to use their digital skills to take part in CS initiatives across the 4 countries of the consortium. According to their testimonials, the chance they were given to use their own equipment (e.g., smartphones) made their participation easier and more practical than expected. Overall, according to their testimonials, the digital skills that were mainly used were internet navigation and digital communication. According to experts, many Deaf and Hard of Hearing (DHH) adults use the internet for navigation. For instance, they might search for information about butterflies or plants and then look up further details on how these are linked to climate change. Digital communication played a central role in the implementation of the CS projects, as different groups were created for instant communication between DHH adults, experts, and partners.



Digital Skill Improvement

No advanced software or complex digital skills were required to implement the CS projects across the partner countries. As discussed in the previous section some applications and web platforms were used that did not require in-depth digital proficiency. DHH community already uses smartphones for communication and socializing. Thus, they easily familiarised themselves with the data collection apps used in the CS project implementation. Different tools were used in each project in every country, but participants improved their digital skills and solved challenges quickly. Insights and testimonials from each country are being examined:

- The adults with DHH used their smartphones to access and initiate the iNaturalist mobile app. After adjusting to the application, they were able to use it without difficulty. A general observation from the Greek partners was that no change in digital skills was observed, as they were already familiar with using digital technologies in their lives.
- In the case of Cyprus, the main problem is that DHH adults struggled to take photos of butterflies because they flew too fast, but as a suggestion from the CS experts, they said that video instead of photo could take place and analyse data in the same way. In terms of DHH experts, they did not improve their digital skills significantly but improved their digital communication skills as they needed to intervene to explain to DHH adults how to participate in the data collection. After sending each butterfly photo to the Viber group, the CS experts shared information, while the DHH adults browsed the internet to learn more about each species.
- In Italy, some DHH participants in the CS project had good digital skills while others faced difficulties. Having a CS expert and visual aids was vital for the participants to complete the tasks. They could identify the Magnolia plant and trace other plants using the app (PlanNet). The experts were able to apply their digital skills by participating in this project. They used their mobile phones to practice recognising various plants, not just those found at the Magnolia observation site, even in everyday life.

Therefore, it can be observed that DHH adults and DHH & CS experts who engage in the CS projects have improved their digital skills. Based on their testimonials, many of the applications that were used by DHH adults were completely new to them, so they were excited to explore them. In addition, having experts in their communication groups provided ongoing feedback and addressed any challenges that arose. DHH experts and sign language (SL) interpreters were especially helpful in boosting the motivation of the adults by creating a supportive and inclusive environment.



Environmental Skills

Many DHH adults are well-familiarized with the concepts of climate change and the ongoing environmental crisis. They have acquired much of their knowledge through internet research and have developed environmental awareness from growing up in small towns. During the implementation of CS projects, sustainability knowledge, environmental monitoring, and outreach were the primary environmental skills developed. Not only were these skills developed by DHH adults, but also by everyone who participated in the initiatives, as many of the implemented projects were unknown to DHH experts and SL interpreters. As a result of the data's conclusions, they were amazed. We will learn valuable lessons from everyone's participation in CS initiatives in the following sections.

Understanding Environmental Issues

Environmental education is still an emerging field and unfortunately, it's not taught in every school. Due to this, DHH adults have limited knowledge about environmental issues. However, with the increasing awareness of climate change and environmental crises, they have become more familiar with the concepts. Although they do not have in-depth knowledge, the experts engaged them in Citizen Science projects related to climate change to help them understand why certain animal or plant species are hard to find or are migrating. This way, we tried to help them better understand the environmental issues. The main findings, according to DHH adults and DHH/CS experts, were the following:

- France: In the French case, as DHH adults engage in various projects it gave them a chance to explore what climate change is through observation of animals and plants. It sparked the curiosity of adults and promoted ecological awareness, fostering environmental stewardship in urban settings. In addition, despite the complexity of the topic of climate change, it helped them gain a better understanding of environmental issues through these observations.
- Greece: During their participation in the CS project, it was observed that the DHH adults showed a good understanding of the urgent issue of climate change. However, there were several queries that arose regarding the extent of its devastating impact on the environment. In this way, the idea of citizen science engaged them in practical projects by gathering data and uploading it to the iNaturalist app, which improved their understanding of the effects of climate change on the ecosystem and their everyday lives.
- Cyprus: The adults in the DHH community had some understanding of climate change and its impact on the environment. However, according to the DHH expert individuals belonging to the DHH community do not have equal access to general knowledge sources. An expert in the DHH community noted that individuals rely heavily on visual cues to comprehend information, making images a particularly effective means of communication.

- Italy: An implemented CS project in Italy helped DHH adults enhance their environmental skills by linking their daily experiences to climate change. Others also gained awareness and a more personalised perspective. The key skills gained from this project include learning how to connect personal actions to environmental impact, raising awareness through local examples, and encouraging a personalised approach to taking action against climate change based on individual interests and values. Experts deepened their expertise in climate change and its local impacts by participating in the project. They learned to monitor and understand changes in the local environment, becoming active citizens in addressing environmental challenges by engaging with local initiatives and policy advocacy

Desire for Further Learning

During the roundtable discussions, participants including DHH adults, CS/DHH experts, and SL interpreters expressed a keen interest in getting involved in more projects related to environmental issues, particularly those that utilize Citizen Science methods. This highlights the growing awareness and interest among the community in contributing towards environmental conservation efforts through collaborative and participatory approaches. In that sense many DHH adults suggested additional initiatives that are directly related to climate change. For instance, a few of them were swimmers, and they had never considered the possibility that the lack of fish in places where there used to be a lot of fish may be directly related to climate change. As a result, while taking part in the CS initiatives for PR3's purposes, people started to learn about climate change and how it impacts ecosystems. Thus, they suggested observing different species of animals or plants in order for their knowledge and understanding of climate change to be expanded. The roundtable discussion brought together experts who shared their perspectives on designing and implementing future CS initiatives. The experts emphasized the need for a collaborative approach in order to ensure that the DHH community is included and involved in all stages of future projects. This collaborative approach would help to make the CS initiatives more accessible and inclusive for all. Although the CS projects were not specifically designed for the DHH community, they helped to ignite their curiosity about climate change. The projects provided an opportunity to showcase that every individual can contribute to tackling climate change, regardless of their abilities. It is a universal problem that affects everyone, and it is essential to include and involve everyone in the solution

Civic Engagement

Citizen Science projects play a crucial role in providing access to new information for people, including DHH adults. These initiatives offer a hands-on experience that significantly enhances understanding and highlights the practical applications and importance of the subject matter. By participating in Citizen Science, individuals can gain a deeper understanding of various concepts, leading to an appreciation for the practical implications and benefits that extend to their lives and the broader community.

Impact on Civic Engagement

The project has had a significant impact on promoting civic engagement, especially among those who are willing to participate in climate change and environmental protection activities. One of the critical issues that the project has addressed is to provide accessible information to the DHH community, emphasising the importance of presenting such information in a format that is easy to understand. The DHH adults have shown great interest in participating in citizen science projects that cater to their civic engagement. The experiential learning aspect of citizen science initiatives has enabled DHH individuals to gain a profound understanding of scientific concepts, fostering an appreciation for their real-world implications and benefits. As a result, the DHH community has become more inclusive and engaged in scientific endeavours, thereby bridging knowledge gaps. However, according to their testimonials, a lot is to be done in order for all barriers to be overcome. Some of those barriers will be examined in the next section.

Barriers to Participation

While participating in the citizen science projects, the DHH community faced a significant barrier due to the projects' design not being directly catered to their needs. However, the partners involved in the project worked closely with experts to mitigate this challenge by offering alternative solutions for data collection to DHH adults. For instance, instead of taking a photo of the animal species under examination, DHH adults were given the opportunity to take a video, which boosted their confidence and encouraged their greater inclusion in the citizen science projects. According to DHH adults, they extensively use digital communication platforms such as Viber, which made it easy for them to communicate with partners and experts. This helped in organizing the CS initiatives and sharing/gathering all the data from their activities. Therefore, communication was not a barrier as DHH adults were familiar with the technologies used as communication channels. However, according to some DHH experts and SL interpreters, some of the DHH adults had private conversations to feel certain of how they would say something before posting a message to the common channel. DHH adults typically do this when speaking with someone they do not know well, as the DHH specialist pointed out. However, this did not demotivate them from participating in the process.

One of the main challenges we faced was the lack of easily accessible information regarding climate change and the environmental crisis. Despite the increasing awareness of this issue, many resources were not available in our partner languages and were not provided in accessible formats for the Deaf and Hard of Hearing (DHH) community.



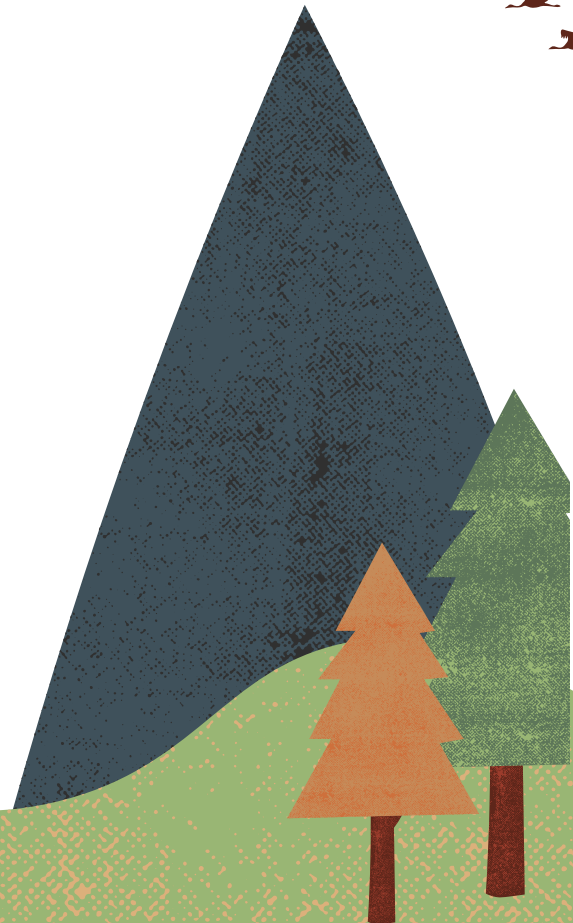
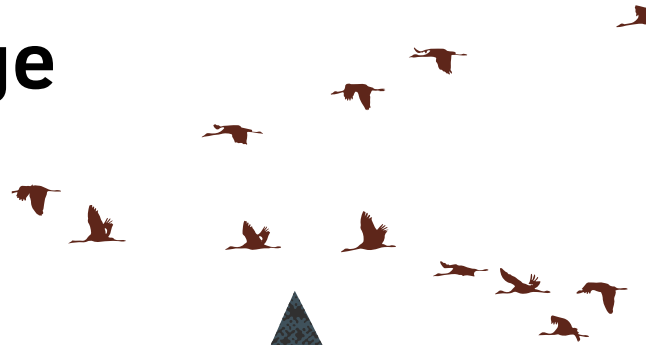
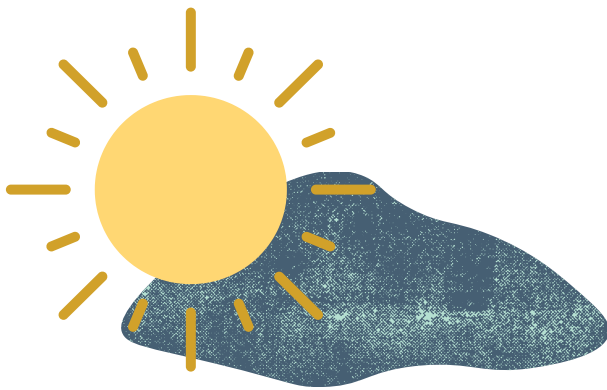


The main source of information that DHH adults engaged before implementing their CS project was through the toolkit that partners developed for the purposes of the PR2 in all partner languages: Greek, Italian and French, including all national sign languages: Greek, Italian, French and Cypriot.



Chapter 2: Do's and Don'ts

Reflections on the importance of being included in CS for climate change



Chapter 2: Do's and Don'ts Reflections on the importance of being included in CS for climate change

Citizen Science provides a distinctive opportunity for DHH adults to participate in scientific research, particularly research on climate change. This helps raise awareness among vulnerable groups who may not have had the opportunity to engage in related activities. Throughout implementing the CS project with DHH adults, we have identified some good and some bad practices that need to be kept in mind when designing and implementing those kinds of initiatives. In this chapter, we will explore how CS projects can involve DHH in the fight against climate change and describe optimal ways to get them more involved.

The Importance of Accessibility

The selection process for CitSci4All, PR3 phase included existing citizen science projects that were ongoing. However, these projects were not fully accessible or designed to cater to the needs of individuals belonging to the DHH community. To enhance this in future projects, DHH adults have highlighted the importance of having as many visual aids as possible. Additionally, as they noted, the Citizen Science Toolkit (PR2) gave them valuable and accessible information on citizen science and climate change, but the absence of accessible specific information for each CS project that was implemented made it more difficult for DHH adults to understand the aims and goals of each project fully.

- The significance of providing materials and explanations in accessible formats
- The role of accessibility in making citizen science projects more inclusive and engaging for the DHH community

Practices to succeed (Do's)

The roundtable discussions and video-testimonials conducted during the CS projects left a lasting positive impression on all the participants, especially when it came to the issue of climate change. The DHH adults who took part in the project displayed a remarkable interest in climate change-related topics. They expressed that they had not encountered much information on the subject before their involvement in the CitSci4All project. As they learned more about it, they found it to be extremely fascinating and relevant to their everyday lives, as well as to all the other living species on our planet. The enthusiasm displayed by the participants in the project regarding the issue of climate change is something that can be emulated in future projects. Therefore, more in-depth resources and accessible material should be developed in the topic of climate change and especially audio-visual and multimedia content to convey information effectively.

Additionally, for future prospects and CS initiatives in order for DHH participants to collaborate with experts and peers more effectively, accessible software can be developed. However, this will require resources and technical experts within a collaborative environment between relevant stakeholders such as Information Technology (IT) specialist, accessibility experts, inclusion experts, SL interpreters and representatives from the DHH community.



To summarize the most optimal practices that were identified and can be utilize in future prospects are the following:

- Use of digital tools and communication channels that the DHH community is familiar with and are user-friendly to people who are DHH. For example, Viber, iNaturalist app, PlantNet etc.).
- It is good to always have alternative options of reporting or gathering information and data when implementing Citizen Science projects. For example, video instead of taking photos boosted the motivation of DHH adults in participating in the monitoring scheme of butterflies in the case of Cyprus.
- In scientific research, utilizing everyday observations such as planets that can be seen from urban cities, butterflies, and commonly found animal species can be a valuable resource. These observations can be easily made by individuals while going for a walk or spending time outdoors for example, allowing for the collection of data without requiring the search for more complex and rare observations. This approach can be particularly helpful in engaging more DHH people in scientific research and promoting a greater understanding of the natural world and how climate change affects it.
- It was fascinating to provide immediate feedback and additional research details to adults with DHH (Deaf and Hard of Hearing) during our study. To facilitate communication, we included CS experts who provided relevant information on the topics being examined by each group. This allowed us to learn new information about the subject matter quickly.

Potential Pitfalls (Don'ts)

Citizen Science (CS) projects have been successful in promoting environmental awareness and civic engagement with the participation of Deaf and Hard of Hearing (DHH) adults. However, it is important to consider the potential challenges and pitfalls that may arise. Some of the challenges include difficulties in communication between hearing and DHH individuals, lack of appropriate accommodations, and limited access to auditory information. These factors can hinder the ability of DHH individuals to fully participate in CS projects and may also impact the quality of data collected. Therefore, it is crucial to address these challenges and ensure that DHH individuals are provided with the necessary accommodations and support to enable their full participation in CS projects. Thus, when designing future CS projects for the DHH community should bear the following points in mind to guarantee success:

- According to experts in the field of DHH education, it is recommended to avoid using complex software that DHH adults may not be familiar with. This is because such software can be overwhelming and confusing, which might discourage these individuals from using it all together.
- It is important to recognize that a lack of understanding about environmental issues can impede the ability of DHH individuals to comprehend climate change, which can impact their engagement and accuracy. While there is a willingness among DHH adults to learn and take part in environmental issues, there are potential obstacles that need to be overcome, such as limited access to educational resources and a lack of information. It is crucial to continuously address these barriers to ensure ongoing engagement and participation in environmental issues. Providing accessible materials can be a helpful step in this direction.



Chapter 3: Skills gap for DHH adults



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During the roundtable discussions with DHH adults in the partner countries, it was revealed that participants had varying levels of digital skills. Some individuals faced challenges in using specific apps for the Citizen Science projects. While the level of environmental awareness varied, the interest in civic engagement was evident. However, limited accessibility in mainstream information channels posed challenges. To bridge these gaps, it is recommended to provide ongoing training in digital skills, create accessible materials like sign language videos and infographics, engage with the community, and advocate for increased accessibility. The overall feedback from the roundtables highlighted the need for diverse communication methods and inclusive activities to ensure a positive experience for all participants. By implementing these strategies, Citizen Science projects can be more inclusive and impactful for the DHH community, fostering continued participation and engagement.

Addressing Skills Gaps

The roundtable discussion illuminated potential skills gaps among DHH adults participating in CS projects. While participants showed that they were proficient in using basic digital tools, there were some challenges in capturing flying butterflies which hinted at potential gaps in their digital photography or video recording skills. Participants demonstrated different levels of environmental knowledge, which suggested that there is a need for more comprehensive education on climate change and its local implications. The participants' reliance on visual cues also pointed to potential gaps in written or verbal communication skills, as they preferred visual communication. To bridge these gaps, tailored digital training programs, inclusive environmental education initiatives, and communication workshops could be implemented in the future. Additionally, the creation of visual learning resources may enhance comprehension.

The lack of accessible tools in diverse languages, limited accessibility in mainstream media, and the challenge of introducing unfamiliar and advanced digital tools were identified as barriers to active participation. To address these barriers, recommendations include advocating for accessibility features in mainstream media, gradually introducing technology, and addressing language diversity. Overall, a multifaceted approach is necessary to enhance skills and overcome barriers for meaningful inclusion of DHH adults in climate-related CS projects.



Conclusion – Chapter 4: Aspects of Participation and Future Prospects



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The DHH community has the potential to be greatly involved in scientific research, especially on environmental and climate change concerns, thanks to the implementation of the CitSci4All initiative. Their testimonies indicate that even if a large number of them lacked prior knowledge or education related to environmental concerns or the particular theme areas of the CS project, they demonstrated a strong desire to get more involved in the battle against climate change especially through future citizen science initiatives.

Positive Aspects of Participation

The participants were given the opportunity to participate in scientific research that they previously did not have access to. They learned about citizen science projects and how they can be related to climate change. The initiatives aimed to demonstrate that everyone can contribute to the fight against climate change and become part of a scientific community by collecting and analyzing data using simple methods and user-friendly digital tools.

·The participants delighted in cooperating both virtually and in person, sharing thoughts on their discoveries and the information they gathered. The DHH experts and adults cited the prompt feedback provided by the CS experts who participated in the groups on Viber or other communication platforms, or who were present in person when the initiatives were implemented, as one of the most beneficial aspects of the CS initiatives. That provided DHH participants with a thorough approach since they heard information straight from the subject matter experts of each CS project, browsed more material, and shared their opinions.

Additionally, each member served as a motivator by encouraging others to get more active in the initiative. In that regard, SL interpreters who had close relationships to DHH adults were first a little dubious about our initiatives since they highlighted, but as the implementation began to show signs of success, they encouraged DHH adults to participate even more. Therefore, it was identified that through a collaborative setting the implementation of the CS project was successful and boosted the civic engagement of DHH adults.

·The finding of native animal and plant species was another advantageous feature that DHH participants and experts emphasized. To their surprise, they did not know how many butterflies live in Cyprus or how many Magnolias exist in Turin. During the DHH program in France, participants began to ask themselves questions about how climate change affects birds and how much water plants growing in the city need. Meanwhile, in Greece, participants in the CS initiatives explored the cities of Thessaloniki and Athens, learning and collecting data about plants that grow in an urban setting and how they are impacted by climate change. The link between climate change and the daily environmental issues faced by animals and plants has led to a growing desire to comprehend the effects of climate change on our lives. This has brought attention to the extent of its impact on our surroundings, serving as a significant motivation for DHH to gain further knowledge on the subject of the environment.



Suggestions for Improvement

During the implementation of the CS project in Greece, Cyprus, France, and Italy, it became evident that there is room for improvement in designing future CS projects in a more accessible and inclusive manner. Valuable input was received from the direct target group, which consisted of DHH adults, as well as from DHH and CS experts, who highlighted specific areas where future projects can be enhanced.

- It is of utmost importance to introduce each thematic area of a project when implementing it. By doing so, DHH adults can easily identify the key areas and concepts of the project and become familiar with its thematic areas before joining a scientific community or a project. This recommendation was given to DHH experts who are typically responsible for providing educational materials and resources to DHH adults. By providing clear and comprehensive introductions to each thematic area, experts can ensure that DHH adults have a solid foundation to build upon and are better equipped to engage with the project.
- Including accessible technology in the design of new Citizen Science projects or initiatives is an important consideration. Some participants for example encountered difficulties as a result of restricted access to specific technologies or issues with their digital literacy. Future projects should aim to accommodate a wider variety of technological skills in order to make Citizen Science more accessible. This might include creating new techniques for gathering data or helping individuals who might require it with technology so that everyone can meaningfully contribute, regardless of technical ability. Furthermore, it is important to include in all the project SL interpreters in each national language while also having translated the material in the native language of the DHH adults. Language can become a huge barrier and thus ensuring that having all material prepared before the beginning of a CS project it is important.
- To promote inclusivity, it is important to strike a balance between individual and group activities. Collaborative efforts are necessary for achieving a collective impact, but the diverse needs and preferences of participants should also be acknowledged. While some individuals may thrive in group settings, others may feel more comfortable contributing independently. Future projects should adopt a flexible framework that allows participants to choose between individual and group activities, creating an inclusive environment where everyone can contribute according to their strengths and preferences. This approach recognizes the varied nature of participants and ensures that the benefits of Citizen Science are accessible to all. Furthermore, during the roundtable talks, it was noted and emphasized that each citizen science project should include alternate methods of participation for data collection. This strategy recognized that DHH participants felt discouraged and wanted to give up on the projects, but it kept them involved and even increased their participation and efforts to contribute to the goals of each individual project.



Recommendations for Future Projects

As a final part of this report, we will be sharing some of the most important testimonials that experts in the field of Citizen Science (CS) and Deaf and Hard of Hearing (DHH) adults highlighted about future projects. These testimonials can be used by stakeholders who are interested in observing how the primary target groups of the CitSci4All project view their potential in designing and implementing future projects. One common comment that was noted in all the discussions is that the DHH community can play a crucial role in the fight against climate change, especially in scientific research. According to DHH experts, this can have a huge impact on developing digital skills and 21st-century skills that can help DHH adults in their everyday lives. Furthermore, we will discuss techniques that experts and adults who are Deaf and Hard of Hearing have identified as being influential in increasing DHH involvement in these types of projects.

To encourage DHH adults to engage in CS projects, it is important to use strategies that align with their interests and values. Within the DHH community, word of mouth is a powerful tool for persuasion. Personal testimonials from fellow DHH individuals who have participated in CS projects can be particularly effective, highlighting the positive experiences, sense of contribution, and unique perspectives they brought to scientific endeavors. Sharing success stories and showcasing the impact of their involvement can help to generate interest and motivation among potential participants. This outcome came from our roundtable discussion with them, as DHH adults and DHH specialists/SL interpreters informed us those participants discussed the outcomes of their involvement with non-participants, and the latter suggested they should engage as well and inquired about upcoming initiatives. Relationships between specialists such as the scientific community, SL interpreters, and the DHH community may be quite effective in addition to word of mouth. The community gains confidence and trust when professionals actively support and advocate for citizen science projects. Forming alliances with specialists who are well-versed in DHH culture and capable of clearly conveying the importance of their participation is crucial. This might aid in filling up any comprehension or anxiety gaps. Additionally, using SL interpreters in the communication process can assist in overcoming any language-related obstacles and guarantee that information on CS initiatives is communicated correctly and inclusively.

DHH adults had contributed significantly to future project planning suggestions. Even though many of them were involved in these kinds of scientific initiatives for the first time, they were inspired to create and take part in further projects. For instance, several of them stated that they had noticed a decrease in the number of some bird species sighted in the consortium nations. One of the most often recommended ideas that came up during the roundtable talks was to create accessible citizen science projects for a wider variety of animal species. One valuable suggestion that was put forward was to replicate the CS projects that were executed in the previous months but with better preparation, in order to maximize their impact. This can occur through engaging additional DHH target groups such as DHH children and adolescents making it a broader in the DHH community. Hence, creating and executing additional citizen science projects is likely to be highly appealing to the wider DHH community. As most of the participants in the DHH discussions have pointed out, they would willingly take part and learn more if the materials and explanations were provided in an accessible format.





<https://citsci4all.eu/>

