PROCEEDINGS OF SCIENCE

Enabling people with diverse abilities to Participate in the Design of Digital Mapping Tools for Inclusive Community Planning in Germany

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People with so-called intellectual disabilities are underrepresented in Citizen Science projects. The topic of urban health offers an extensive field of application for Citizen Science projects and digital methods have the potential to involve many, and diverse people. The DiMDiCi (Digital Mapping with Disabled Citizens) project integrates these three areas. The project investigates how the needs of people with so-called intellectual disabilities for movement and participation in (semi-)public space can be captured with the help of digital methods and integrated into municipal planning processes. Photovoice and digital maptables are used as barrier-sensitive digital methods and applications are further developed. Our goal is to develop methods with which more and other people can participate in society in general and in urban development and research in particular. DiMDiCi is a pilot project in the European COESO project and is being worked on jointly by the University of Applied Sciences in Bochum, the University of Twente, the Wittekindshof as an institution for people with disabilities and the city of Herne.

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1. Introduction

Citizen Science projects often exhibit an underrepresentation of individuals with diverse abilities [1]. The design of inclusive and accessible public spaces requires participation of diverse citizens to capture specific needs and foster a foundation for promoting healthy active lives for all. National and international policies and conventions, e.g. the UN Convention on the Rights of Persons with Disabilities and the Sustainable Development Goals, aim to ensure full and effective participation of all individuals in societal life, including barrier-free use of public spaces. Despite progress in various regions, inclusion remains a challenge in both, public spaces and participation processes.

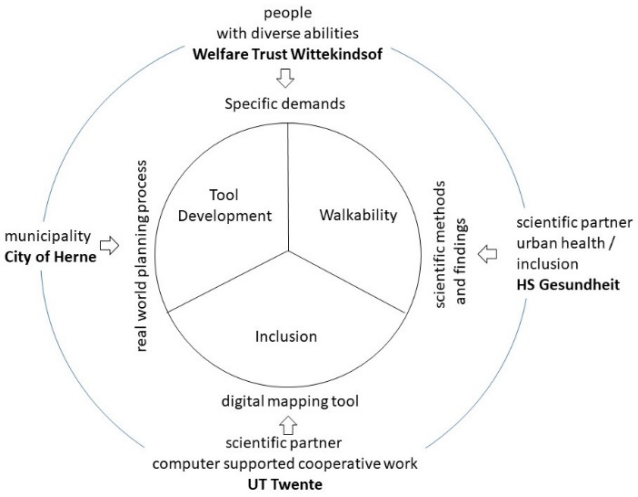

Figure 1: DiMDiCi core members

DiMDiCi (Digital mapping with disabled Citizens) is one out of ten pilot projects in the EU citizen science project COESO, addressing the shortfalls of inclusion of people with diverse abilities into citizen science projects as well as urban planning[1]. A group of individuals with cognitive disabilities in Germany collaborated and actively engaged as co-researchers alongside researchers from HS Gesundheit, Bochum (DE) and UT Twente, Enschede (NL) and professional actors, Diakonische Stiftung Wittekindshof, and Herne's city administration, to co- design an approach to elicit requirements for inclusive public space design (figure 1).

2. Design and Methods

As presented at the Austrian Citizen Science Conference 2023, the project's main methods were a photovoice approach and an inclusive participatory mapping tool on an interactive maptable. The methods were based on a co-design process that emphasized open and equal collaboration. This involved using simplified language to ensure clear communication and fostering an inclusive environment that removed any physical barriers. Whenever needed, assistants were on hand to provide support.

[1] Urban development stands for the overall progress of urban areas and cities, and includes different activities of different stakeholders. Urban planning contributes to urban development. It is a process to develop and design land uses. It employs various tools, with participation being an integral part of the processes.

2.1 Photovoice method

The project commenced by applying the photovoice method, a qualitative research approach relying on visual and narrative data, typically conducted in group settings. Participants captured photos related to specific topics and engaged in structured discussions uncovering their needs and resources. The discussions were structured by the SHOWeD approach [2,3].

Within DiMDiCi, individuals with cognitive disabilities independently captured photos. Assistance was provided if necessary. For capturing photos and collecting data, tablets were used, connected to the online survey tool Kobo-Toolbox. The application gathers supplementary data to locate images using GPS, which allows pinpointing images on a map for further analysis. Depending on the settings, the accuracy of the images may vary.

The KoboToolbox incorporates user-friendly attributes to address a wide range of needs. For the participants, audio recordings (including spoken questions) and tailored pictograms (coloured thumbs in green and red) were added. This accessible platform fosters engagement while minimizing significant barriers like, for example, reading. Insights from the DiMDiCi project notably highlighted the uneven distribution of digital participation, underscoring the importance of digital device training before photovoice application.

The SHOWeD questions were tailored for people with diverse abilities and maintained a coherent essence. Executed in small groups of three to four individuals, facilitated by two researchers as moderators and recorders, the method yielded numerous pivotal insights (see results) and lively exchanges pertaining to their immediate surroundings.

2.2 Participatory mapping processes

One goal was to develop a participatory mapping software. The software application OGITO (Open Geospatial Interactive Tool), developed by University of Twente, is an open-source tool for participatory mapping. It runs on digital maptables. Within DiMDiCi, OGITO was used and developed further by co-design.

The engagement process began with familiarizing co-researchers with the maptable, including introductory exercises for zooming, navigation, and screen interaction. Workshops then delved into various mapping tasks and discussions. Standing around a big screen lying flat on a table all co-researchers could interact with the screen and with each other, explore spatial content visualized on the screen and capture information (figure 2).

The choice of utilizing a maptable for these activities stems from its ability to stimulate collaborative dialogues among stakeholders, whether citizens or professionals [4]. When participants are placed in a planning context and tasked with activities such as designing, sketching, or discussing locations, the interactive environment fosters communication. This exchange of ideas leads to discussions, debates, and informed decision-making about spatial qualities. People start explaining to their group members and people around the maptable.

In the context of the DiMDiCi project, efforts were directed towards enhancing user-friendliness, particularly for individuals with cognitive disabilities who may have limited map literacy.

Figure 2: Workshops in the DiMDiCi Project - photovoice and interaction among co-researchers.

In the DiMDiCi project, one lesson learned was crucial towards developing a more user-friendly software. Visualization of the third dimension by including a 3D photorealistic visualisation of space on the maptable was helpful for the participants. The diversity among co-researchers, each with varying levels of map literacy, underscores the importance of tailoring software for inclusivity. The insights gained from this project have led to continuous refinement, and the research team at the University of Twente committed to further development of the OGITO software beyond the scope of this study.

The new software version will include 3D visualization with photorealistic images allowing people with diverse abilities to better orientate and describe or experience spatial dimensions.

3. Results

In terms of content, both methods yielded a variety of results, including:

- Public cleanliness issues such as litter, broken glass, and the need for less litter on the streets, along with repairs for damaged benches.
- Safety concerns due to poor lighting, dark areas, and the presence of intimidating groups creating an unsafe environment.
- Noise pollution from busy streets.
- Obstacles like e-scooters, bicycles, and motorcycles obstructing sidewalks.
- Dirty green spaces, prompting a call for more pet-friendly and well-maintained parks.
- Lack of spaces for communal activities, highlighting the desire for seating areas in parks.
- Enhanced perception of public space

Both methods underscore the multitude of significant urban development issues that individuals can contribute to. The findings emphasize the importance of including diverse perspectives in urban planning processes and the necessity to create and develop inclusion- oriented methods granting the equal participation of people with diverse abilities.

4. Conclusion and lessons learned from the engagement

In summary, both methods have facilitated collaborative research and evaluation of the city with people with diverse abilities. Both methods show potential for integration into participatory planning processes. Beyond testing and further development of these methods, the researchers have witnessed an empowerment process among individuals with disabilities. Increases in self-efficacy and changes in self-perception as well as external perception have been experienced within and beyond the project.

It became evident how crucial approaching life experiences with openness and empathy is. Establishing respectful working relationships and nurturing soft skills proved to be pivotal factors for successful collaboration. Recognizing and accepting individuals' experiences and stories hold significant importance and should not be underestimated. People with diverse abilities are experts of their own life journey and surroundings. Customizing interventions demonstrated effectiveness in addressing diverse needs. The principles of transparency, openness, and equity were deemed fundamental and played a significant role in the process's success. A relaxed and joyful atmosphere not only fostered teamwork but also heightened participants' engagement and positive experiences [5].

Citizen science projects should continue to embrace the inclusion of diverse individuals in their research during all steps and remain open to the outcomes. The insights gained from this project, along with the co-design approach that led to an inclusive research team where everyone is included as co-researchers, have paved the way for the initiation of subsequent projects.

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