

USE OF PARTICIPATORY ACTION RESEARCH FOR TECHNOLOGY TRANSFER AND KNOWLEDGE TRANSLATION OF MOBILE APPS FOR PUBLIC BUILDING ACCESSIBILITY

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INTRODUCTION

The creation of the Americans with Disabilities Act (ADA) in 1990 and update in 2010 (ADA-ABA) allowed many thousands of people with disabilities to gain access to formerly inaccessible community buildings [1]. However, studying the literature or speaking with a person with a disability (PwD) easily reveals that ADA Accessibility Guidelines (ADAAG) remain limited for several reasons: a) the ADA provides only minimal guidelines for building features; b) older buildings are exempt from the ADAAG; and c) accessibility is relative to an individual's functional capabilities where one set of generic guidelines will not ensure accessibility for all individuals even with the same medical diagnosis [2]. Interviews by Hammel, et al. [2] of PwD exemplified this problem. The literature describes a significant secondary barrier to community participation: people do not have access to reliable and sufficient information regarding community buildings' accessibility [3,4], ultimately resulting in their partial or full exclusion from community activities.

Our team recently conducted a cross-sectional survey on the accessibility of public buildings, personal accessibility experiences, and the role that accessibility information may play in assisting PwD with their community participation [3]. This survey generated 109 complete responses from PwD whose ages ranged from 24-84 years. The results revealed that 70% of respondents experienced arriving at an establishment only to encounter a barrier that prevented them from accessing the building, and 60% experienced being unable to complete a task in the building due to an environmental barrier. Eighty-seven percent of respondents believed knowing about building accessibility would assist with planning community activities. Seventy-one percent of participants responded being "probably" or "definitely" interested in an app designed to provide accessibility ratings about buildings. The data and qualitative responses corroborate many of the frustrations reflected in the literature. Some examples of qualitative comments include:

"I called ahead to a restaurant to ask whether it was accessible for wheelchairs. They said it was. I wheeled the two miles to the location to find only steps into the place. I phoned them to ask where the accessible entrance was and they said to meet them at the side door where there was a step of about 7 inches high. They came out and told me to "tip back in the chair" (a power wheelchair) and they would get me in. I told them "No way!" and left."

"[It] confuses me why I and others with mobility issues who use accessible entrances would be embarrassed by a public buildings' noncompliance with the ADA and Rehab Act. [It] feels incredibly foolish racing around a large building in the dark and never uncovering the hidden accessible entrance".

Furthermore, Smith et al. explain that "while it may seem obvious that PwD experience barriers to full participation, this has not been reported" and many issues in the disability community go unreported, making it difficult to determine how to solve accessibility issues [4]. It is not surprising that access ratings for buildings might seem helpful to PwD. Plus, given the varied accessibility of buildings, a public rating system should be an empowering strategy for PwD as they decide where to go in the community.

The Rehabilitation Research Design and Disability (R2D2) Center team have completed five apps as an ARB App Suite. The **AccessPlace** app elicits and documents community building use experiences by PwD and provides personalized accessibility information by prioritizing ratings by other participants with similar disabilities [5]. The app, **AccessTools**, was created for assessors with varying accessibility knowledge, and to measure and document the complete accessibility of ten building elements such as parking, main entrances, restrooms and seating [6]. In addition, three mini-apps were created and embedded in

AccessTools to assess specific building elements and reduce the assessment time (**AccessSlope** [7], **AccessSound** [8], and **AccessRuler** [9]) to enable an assessor to use an iPhone or iPad to quickly measure inclines, decibels and distances in the context of accessibility. Figure 1 shows screenshots of the ARB suite.

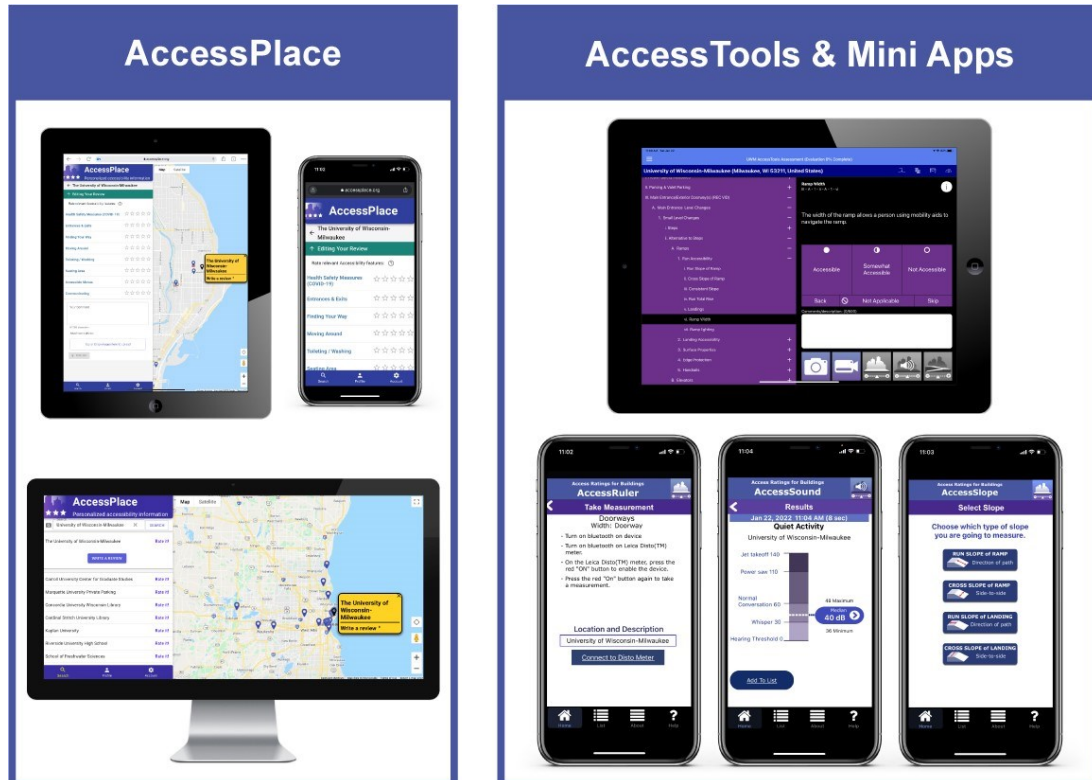


Figure 1: AccessPlace and AccessTools Screenshots

However, moving forward into knowledge translation and the community integration of the apps, we require a new phase of methodology. Projects conducted by the R2D2 Center and partners regularly use participatory action research (PAR) as a critical methodology, during all R&D activities. The PAR process is an approach used across a spectrum of health research, including mental health, epidemiology, psychology, health policy, physical medicine, and rehabilitation [10-12]. PAR enables mutual learning, relationship building, action, checking results, reflection, and strategy; and has individuals of varying perspectives to consult in an iterative reflective process [13]. We employ PAR across all our project activities to actively engage diverse stakeholders early in the process and integrate their perspectives throughout all aspects of the project [14]. The purpose of this paper is to describe the PAR process used for the ARB project and the key findings that resulted in this phase of structured process.

METHODS

PAR methodology was employed as a qualitative methodology to obtain continuous, regular, and contextual feedback on the ARB project R&D, technology transfer, and knowledge translation activities. PAR members (N=10) representing a range of disabilities, including lower limb, upper limb, vision, cognitive, and behavioral impairments, engaged in formal quarterly meetings. PAR members contribute to problem-solving of barriers to app rollout and the development of marketing materials to support widespread community adoption. Each PAR meeting was conducted virtually via Zoom. After a general overview of meeting, updates, and review of meeting objectives, the PAR members were split into zoom subgroups for discussion.

We use a Modified Nominal Group Technique (MNGT) to structure discussions for the PAR meetings. This is a strategic and effective means to harness social facilitation processes so that group productivity on a given task is optimized [15]. Nominal group techniques aid in community decision-making and are

particularly helpful in generating ideas and priorities in situations where participants are likely to have diverse views on a subject and where the investigators seek new ideas [16]. There is evidence that MNGT enhances the value of groups by generating data about a specific topic and prioritizing issues through group discussion. The collaborative nature of MNGT increases the members' ownership of the ensuing research [17]. We used the MNGT for discussion of topics where we wanted the team to think expansively including how end-users would use the ARB apps, how to engage the community in using the apps for expanding accessibility in the community, what tools could be used to engage the community, and how to create community engagement resources that could be used in different settings. A standard 5-step protocol was used for the MNGT procedures: 1) Introduction and explanation of the purpose, 2) Silent generation of ideas, 3) Sharing ideas, 4) Group discussion and 5) Ranking and prioritizing.

RESULTS

The “Look-Think-Act-Review” process facilitated through MNGT procedures contributed to major decisions regarding technology transfer. Our projects have recently completed their first year of implementation and we have conducted two formal PAR meetings. The discussions and feedback from PAR members have already led to significant additions to the project that will enhance our outcomes and truly serve the needs of PwD. See table 1 for feedback from PAR meetings and action steps the project team is taking.

Table 1: Feedback from PAR Meetings

Feedback	Action Steps
1. Suggested developing corporate partnerships and contributed to initial connections. 2. Provided strategies for pitches to corporate and community partners 3. PAR members also encouraged the development of strengths-based marketing materials where buildings are rewarded for accessibility strengths (e.g., excellent for low vision), instead of highlighting only limitations. The PAR members highlighted that emphasizing excellence in certain areas of accessibility might motivate business owners to want to improve accessibility in areas where limitations are noted.	1. The team has already begun reaching to corporations that are housed in public buildings to ascertain interest and motivation towards improving accessibility of their public spaces. 2. The team has begun developing marketing materials and signage for business owners to highlight the accessibility of their facilities.

Last, PAR members are closely working with the team to develop strategies to transfer the knowledge and technology from our previous work into the community. We have been brainstorming adoption methods for the app, implementation methods for community outreach, and translation of findings into change for the lives of people with disabilities.

CONCLUSION

The highly engaged PAR process has been catalytic in that it is accelerating the technology transfer and knowledge translation of the Access Ratings for Buildings mobile and web apps. Our PAR processes and outcomes highlight the value of engaging stakeholders as critical team members throughout project activities and not just as study participants.

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