

# No access, no knowledge, or no interest? Examining use and non-use of assistive technologies

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## ABSTRACT

Assistive technologies can evoke both positive and negative sentiments from users. However, much of the current literature focuses only on adoption, use, and abandonment of assistive technologies, and provides only surface-level explanations for volitional non-use. We summarize a current project that has revealed valuable insights about non-use of assistive technologies by people with visual impairments in the developing world, and discuss some of the difficulties that arise when trying to recruit non-users of assistive technology.

## Author Keywords

accessibility; assistive technologies; non-use; visual impairments; ictd.

## ACM Classification Keywords

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## INTRODUCTION

Assistive devices and technologies can provide social and emotional benefits to users with disabilities. However, these benefits may be countered by negative side effects, such as stigmatization or feelings of helplessness and dependence on technology.

Research on accessibility and assistive technology primarily focuses on use patterns of assistive devices (both successes and failures) and abandonment of provided devices. Little focus has been given to other types of non-use of assistive technologies, which can be the result of excessive costs, lack of knowledge about advances in accessibility, or disinterest in assistive technologies.

In this paper, we discuss the study of technology non-use in the context of accessibility. We summarize the current research that has been done on assistive technology use and

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non-use, provide insights from a series of interviews conducted with visually impaired people in the developing world, and discuss the questions about assistive technology non-use that will guide our future research. Though our analysis of this issue comes from the perspective of accessibility research and not technology non-use research, we believe that this workshop would provide valuable insight into our future work and that we may be able to provide a new perspective on the importance of examining non-use behaviors in the field of assistive technology.

## BACKGROUND

Assistive technologies allow users with disabilities to access technology via a method that fits with their capabilities. For example, screenreaders for people with visual impairments [2] take the visual content of a computer or mobile phone screen and convert it to be perceived auditorally (text-to-speech) or tactilely (text-to-Braille). This access to technology allows users to become more independent [4, 3], experience greater feelings of security, social integration, and autonomy [1] and have higher social and economic aspirations as a result [6].

However, users of assistive technologies may fear stigmatization for using devices that identify them as being disabled [9, 10]. They may also feel overly dependent on certain devices and vulnerable if those devices fail [4], or experience frustration and feelings of helplessness and anger when assistive technologies do not function as expected [5].

These negative factors may impact assistive technology adoption, abandonment, and non-use. Users with disabilities might be reluctant to learn new assistive technologies with high learning curves, since they want to avoid perpetuating the idea that people with disabilities are less capable [10]. Research on assistive device abandonment has found that the time that the disability is acquired also impacts the use of assistive technologies. Abandonment rates are much higher among people who acquired their disability later in life [11], and use is higher among people who accept their disability than those who do not [7].

The majority of research in the assistive technology community has focused on users of assistive technology - primarily of their use of technologies [4, 9], but also on choices made in adopting or abandoning assistive devices [8, 3]. However, people with disabilities may have complex reasons for not using assistive technologies. Many papers cite the high costs

of specialized devices as a barrier to use of assistive technologies - for example, the JAWS screenreader license starts at \$895 per user. However, some users may choose not to use assistive technologies for other reasons, and glossing over these reasons will make it harder to develop appropriate tools for users with disabilities in the future. By looking further into reasons for non-use, we can learn how to develop better technologies going forward, while understanding and respecting those who decide not to use assistive technologies.

### GUIDING QUESTION

Our research has led us to an interest in non-use of assistive technology. This type of non-use can manifest in different ways - either non-use that is partially non-volitional (such as people with no knowledge of or access to assistive technologies) or non-use that is volitional (people with no interest in assistive technologies, or those who have abandoned assistive technologies they once used).

We believe that the question of why people with disabilities might not use assistive technologies will provide valuable insights for researchers, both for the development of technologies that will fit users' needs and expectations, and for the consideration of the impact that assistive technologies have on users and non-users.

### OUR RESEARCH

In the fall of 2013, we did a series of 32 structured interviews with visually impaired people in India, in order to learn about their use of computers and mobile phones. Here, we discuss the methods we used to recruit participants with various levels of technology literacy, and provide some preliminary results and insights that will guide future investigation into assistive technology use and non-use in the developing world.

#### Recruitment

In order to learn about the use and non-use of assistive technologies, we recruited participants to our interviews from two sources - members of online mailing lists focused on assistive technology use, and participants in training courses offered by a non-profit organization for the visually impaired. We hoped that dual recruitment would allow us to identify interview participants who had various levels of technology experience.

The first source of interview participants was through online mailing lists. We posted a call to participate on the AccessIndia mailing list, which is an English-speaking mailing list for visually impaired computer users in India. Members of this mailing list also forwarded the call for participation to other mailing lists for screenreader users in India (including the Visually Impaired Bankers India and the Retina India mailing lists). Potential participants emailed a researcher to arrange a time to conduct phone interviews. 14 interviews were conducted (all in English).

<http://www.freedomscientific.com/products/fs/jaws-product-page.asp>, visited January 7th, 2014  
[http://accessindia.org.in/mailman/listinfo/accessindia\\_accessindia.org.in](http://accessindia.org.in/mailman/listinfo/accessindia_accessindia.org.in)

The second source of interview participants was through in-person interviews at the National Association for the Blind (Karnataka Branch). 18 participants were recruited, from either the orientation and mobility class (5) or the computer training class (13), and were interviewed in-person at the site in either English, Hindi, or Kannada. Participants from the computer training class were asked to discuss their computer and mobile phone use prior to beginning the class.

These two distinct sources were chosen to get a range of technology experience from our participants. However, there are certainly drawbacks to our recruitment strategies. Any participants we interviewed were recruited from organizations that they joined voluntarily (be it the mailing lists or the National Association for the Blind). These participants may be more likely to use assistive technologies, since they are actively involved in disability-specific groups and have some degree of acceptance of their disability [7]. We performed our in-person interviews at the National Association for the Blind since it was the easiest way to find potential non-users of technology. Besides physically visiting participants, we could not think of an easy, large-scale way to identify and contact people with visual impairments and gain their participation.

We believe that future investigations into non-use of technology would benefit from the development of a more informed way to recruit visually impaired participants with varied levels of technology experience.

#### Participants

The 14 participants recruited from the accessibility mailing lists were, predictably, very technology-literate. Seven used touchscreen phones, two used QWERTY keyboards, and the remaining five used 0-9 keyboards. All owned at least one computer (two participants owned multiple computers). For accessibility purposes, 11 participants used JAWS, 8 used NVDA, 1 used VoiceOver, and 1 used high-contrast mode. All but one had completed education past the 12th standard (typically at age 18). Eight were totally or nearly blind, and the remaining six were low-vision.

The 18 participants recruited from the National Association for the Blind courses had lower levels of technology ownership and familiarity. One used a touchscreen phone, one used a QWERTY keyboard, and the remaining sixteen participants used 0-9 keyboards. Only four participants owned a computer - of the others, eight had used computers before but did not own one, and six had not had any previous experience with computers. Twelve of the 18 had completed education past the 12th standard. Eleven were totally or nearly blind, six were low-vision, and the remaining participant had vision in only one eye.

#### Results and Insights

Several different reasons for non-use of assistive technologies emerged from our interviews. Some of these included:

- **Not having personal access to accessible technologies.** This could be due to the perceived costs of screenreaders [P15, P19] or because the participants already had a device that was incompatible with screenreaders [P26, P27, P30].

For these participants, the cost of purchasing a license or replacing their current device prohibited them from using screenreaders.

- **Not knowing that accessible options existed.** One participant expressed a desire for researchers to keep in mind blind users, as “[the] world is driven to the touchscreen, and it’s a bad thing for [people with visual impairments]” [P19]. However, touchscreen-based screenreaders have been developed for many smartphone operating systems (including iOS and Android) - this participant was just unaware of them.
- **Not having the time or resources to learn how to use the technologies.** A participant [P30] expressed a desire to learn how to use a computer with a screenreader, but worked as a teacher and did not have time to take a training class in screenreader use.
- **Difficulty installing operating systems or screenreaders.** Two participants [P17, P22] specifically mentioned the trouble they had installing the Windows operating system, since the installation of a screenreader was not possible until the operating system was set up, and they therefore required the help of a sighted companion.
- **Satisfaction with existing devices.** One participant [P31], who had an accessible mobile phone but no computer or internet access, reported being satisfied with their current assistive devices and lifestyle.

While participants were not specifically asked why they did not use assistive technologies, many were quick to volunteer their obstacles to use. Recruitment of participants only through the mailings lists would not have revealed these complex factors for non-use.

As mentioned, this research raised a number of questions about the appropriate ways to investigate technology use among people with visual impairments. Much of the current literature focuses only on the users of assistive technology and how having access to assistive technology has impacted their lives [6], and does not delve into the reasons for non-use or the impact that non-use might have.

## DISCUSSION

We believe that non-use of assistive technologies is an important area of research. These devices strive to provide equal access to people with disabilities; however there may be many reasons for individuals not to use them.

While some of the reasons for technology non-use were expected (eg. the high cost of specialized assistive devices or installation difficulties [2]), others would benefit from further investigation. One significant problem that we had not seen discussed in our search of previous research was the lack of knowledge of accessible options. Increasing the spread of information about screenreaders might help people with visual impairments avoid purchasing a phone incompatible with current screenreaders, or broaden the scope of available options if they knew about accessible touchscreen devices.

Another important result emerged from the participant who did not have time to take a training course to learn how to use a screenreader. Providing remote access to training materials or encouraging people with visual impairments to try screenreaders unassisted might enable them to overcome some of their obstacles to use, or at least allow them to make informed decisions about the benefits of use or non-use without the overhead of participating in a training course (which can span several months of time).

In submitting to this workshop, we hope to benefit from the expertise of researchers from other backgrounds as we develop further investigations into the non-use of assistive technologies. We also wish to contribute our own insights into the specific impacts that disability may have on technology non-use, and why this field of study is so important where equal access is concerned.

## ADDITION TO THE LIVING BIBLIOGRAPHY

Our recommendation for an addition to the living bibliography on non-use is *Non-use of provided assistive technology devices, a literature overview* [11]. This paper is a review of several different papers on the abandonment of provided assistive devices (including physical tools such as canes or guide dogs).

While this paper only focuses on abandonment of devices that are provided to users, it provides a comprehensive overview of factors specific to non-use by people with disabilities, be they personal factors (eg. when the disability was acquired, multiple device use), device-related factors (eg. poor quality, off-putting appearance), environmental factors (eg. legislative requirements on assistive device purchase), or intervention factors (eg. the user’s involvement in choosing the device used).

The paper also compares the study of assistive technology abandonment and the study of non-adherence to long-term medical interventions. The authors compare the factors influencing medical non-adherence to assistive device abandonment. Since medical intervention adherence is a well-studied field, the authors suggest that this field might inform the study of abandonment of assistive devices.

While this paper focuses on abandonment of assistive devices (and not the broader field of non-use), we would argue for adding this paper to the living bibliography because of its specificity to the assistive technology field and because of the relationship it draws with medical non-adherence literature. The factors influencing non-adherence and abandonment are very similar, and the authors note that:

“It is obvious that much more is known about non-adherence than there is about non-use. Theories about adherence are further developed and more detailed. The theoretical framework about non-use can profit from this.” [11]

It is our belief that this insight could be useful to the general field of non-use, and encourage researchers to seek out existing theories that might inform their own field of study.

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