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Conversation:

Evaluating assistive products with designers: How to understand and address user stigma around visible and invisible disability

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Abstract: At the DRS conversation held on June 24, 2024, in Boston, researchers from Brunel University engaged in a discourse with ten audience members from diverse global backgrounds on the issue of user stigma in assistive product design. The purpose of this conversation was to delve into the potential challenges faced by disabled users when utilizing assistive products and to propose innovative design strategies aimed at eliminating stigma, fostering social inclusion, enhancing understanding of people with disabilities, and ultimately promoting the construction of a more barrier-free and equitable living environment. Through this discussion, participants gained a deeper understanding of the concept of disability and how design can effectively intervene to mitigate the associated stigma.

Keywords: visibility of disability; user experience; stigma intervention

1. Context of the conversation

The background of this dialogue is deeply rooted in designers' profound understanding of disability and its visibility. The concept of disability is multifaceted and diverse, encompassing not only the physical or mental functional limitations of individuals but also the intricate interplay between these limitations and the social environment. The exploration of disability's attributes has been a subject of study for decades. The shift from the medical model, which views disability as an individual deficit, to the social model, which recognizes it as a result of societal barriers, has illuminated the fact that disability is not solely an individual's burden but a consequence of the interaction between the social environment and personal challenges. However, as theory has advanced and the forms of disability have diversified, the traditional medical/social model has revealed its limitations in



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fully explaining user awareness and behavior. Consequently, there is a pressing need to further refine and update the definition of disability.

The conversation took place in the state-of-the-art laboratory of the School of Engineering at Northeastern University in Boston. To facilitate a smooth presentation by the researchers and ensure an efficient discussion, the organizers divided the 10 professional attendees from all over the world into two groups. These participants hailed from various professional fields across the globe, including university scholars, product designers, sociologists and higher education design educators. They engaged in a detailed discussion on the definition and manifestation of disability, as well as the stigma associated with assistive product design.

Throughout the discussion, organizers Lizhou Niu and Arthi Manohar navigated the conversation, serving as a guide and discussant, respectively. They prompted participants to share their perspectives on the visibility of disability through thought-provoking questions featured in the presentation slides. The dialogue, which lasted for an hour and a half, delved deeper into how design can better serve assistive technology and address the complexities of disability. The professional audience provided invaluable insights to the researchers, enriching our understanding and fostering innovation in the concept of disability. Their contributions broadened designer's perspective on the application of design within the context of stigma and disability, and proposed potential solutions to the intricate socio-technical challenges inherent in assistive product design. These findings not only offer valuable guidance and lessons for future assistive product design but also contribute to promoting socially inclusive design and the creation of a barrier-free environment.

2. Content of the conversation

2.1 Slides presentation

At the beginning of the conversation, the researchers introduced the definition of disability and the evolution of its model through slides, as well as how the concept of disability has changed from the traditional medical model to a more comprehensive social model. The medical model mainly focuses on the physical or mental functional limitations of individuals, regards disability as an individual problem, and ignores the influence of the social environment. The social model emphasizes that disability is caused by the interaction between individuals and the social environment. The shift in the definition profoundly reveals that disability is not only an individual problem, but also a problem of social structure and attitude. Then the researchers led the conversation into the visibility of disability. Conversation pointed out that the diversity of disability is not only reflected in the type and degree, but also in the visible and invisible. The slides elaborated on the differences and specific examples of visible and invisible disabilities, and asked the audience to think about other typical cases. The researchers emphasized that the difference in visibility not only profoundly affects the social integration and mental health of people with disabilities, but also poses new challenges to the design and application of assistive products.

In the subsequent segment of the discussion, the focus shifted towards exploring the concept of stigma and its impact on our perceptions of disability. The organizers provided a concise explanation, describing stigma as a social phenomenon where individuals or groups are despised, excluded, or subjected to unfair treatment. The researchers informed the participants that stigma exacerbates mental health issues, particularly for those with disabilities, highlighting it as an issue that designers must address. As the presentation continued, the participants expressed a keen willingness to engage, concurring that stigma poses a genuine threat to individuals with disabilities. In the meantime, the presentation also disclosed to the participants that a pivotal problem lies in the fact that existing design solutions occasionally overlook the emotional needs of users, leading to products that fail to mitigate their challenges. Moreover, design flaws can cause individuals with disabilities to feel stigmatized by societal norms. To facilitate a more intuitive understanding of the issue, the researchers incorporated images and references to daily assistive products within the slides. The audience was highly attentive, sharing their perspectives with those around them while taking notes and recording the invaluable content presented in the slides.

Table 1 Stigmatizing Effects of Visible vs Invisible Disabilities

Term	Description
Threat to body image	Seeing a person with a physical disability creates feelings of discomfort as a result of what is expected to be “normal” and the perceive reality. A person’s own body image may therefore be threatened when in the presence of a person with a disability.
Fear of losing one’s physical integrity	When in the presence of individuals with a physical disability, a person can become highly anxious about acquiring a disability and feel extreme discomfort.
Separation anxiety	The loss of a body part or functionality (i.e., spinal cord injury – unable to walk) may exhibit levels of narcissistic concerns and infantile anxieties stemming from separation from parental figures.
Fear of contamination or inheritance	The fear of acquiring a disability when interacting with a person with a disability results in callous attitudes.
Level of severity	Negative attitudes will occur more often when the disability is more severe.
Degree of visibility	The more visible a disability is, the increased likelihood negative attitudes will transpire among persons without a disability.
Disability as a reminder of death	The loss of a body part of functionality is associated with death (i.e., the death of that body part) and creates levels of anxiety when a person without a disability comes into contact of a person with a disability.
<i>Source: Livneh (1982)</i>	

In order to further introduce how to intervene in this topic through design, the researchers introduced the role of assistive technology in assisting people with disabilities. Assistive technology refers to the products or systems that support and help individuals with disabilities, restricted mobility or other impairments to perform functions that might otherwise be difficult or impossible. These devices support individuals to improve or maintain their daily quality of life by easing or compensating for an injury or disability (GOV, 2024). Then the researcher showed the dialogue, gave a definition of assistive products/services and demonstrated several common types of assistive products on the market.



Figure 1 Common assistive products in daily life

Moreover, the researchers invited the audience to think about other assistive technologies that are widely used in life, which paved the way for subsequent discussions. The researchers emphasized that technology is important for improving the quality of life. However, if aesthetics and psychological needs are ignored, it could make people with disabilities feel different from others when using products, thereby reducing the social acceptance of products. So, in the last few slides, the researchers showed the audience the key role of design in addressing the multifaceted challenges related to user stigma in assistive product design.

First, design has the potential to empower users by ensuring that assistive products are not only functional, but also beautiful and customizable to individual needs. Second, design can significantly promote social inclusion by facilitating interaction and communication between disabled users and society at large. By creating assistive products that integrate seamlessly into daily life, designers can help break down barriers that often isolate people with disabilities. And then, design has the power to change the public's perception of disability by challenging stereotypes and promoting more positive and accurate portrayals. By showing

the abilities and potential of people with disabilities through thoughtful design, society can begin to shift perspectives and adopt a more inclusive and supportive attitude towards people facing physical or cognitive challenges. While explaining their views, the researchers also asked the audience, "We also ask you to think about what other roles design can play?" to pave the way for subsequent discussions. At the end of the presentation, the researchers emphasized that the needs of disabled users are challenging, but also a vital part of design. Only by continuously optimizing the design considerations of products/services can designers have more room to achieve inclusiveness in design.

2.2 Group discussion

After introducing the background of the topic, the two researchers led the two groups of participants into the discussion session. In the icebreaker question "When you think of disability, which word or image comes to mind?", the researchers aimed to stimulate the participants' initial cognition and feelings about disability and listen to ideas from different perspectives. The discussion among the audience was very intense, and some valuable ideas were raised. The audience in Group 1 proposed the two phrases "situational disability" and "need for help". They believed that anyone could become disabled in some special circumstances, such as light affecting screen reading or noise affecting hearing. Disability also conveys to the outside world a request for help, indicating that one's own abilities are insufficient, even if they can solve the problem themselves. More importantly, some audience members mentioned that the sight of disability often brings to mind images of wheelchairs, symbolizing the need for assistance and implying vulnerability. Another participant shared that in Finland, disabled individuals use a sunflower badge as a marker, which not only raises awareness but also reduces misunderstandings. Yet another participant associated disability with Braille and crutches, representing their unique way of life. Furthermore, the charity model was discussed, which identifies the individual as having a problem and tends to view persons with disabilities as victims or objects of pity, with their impairment being their main identifier. They are seen as recipients and beneficiaries of services. These ideas provide valuable references for the researchers, and more reflections will be elaborated in the next section.

Following the icebreaker, the conversation turned to the relationship between assistive technology (AT) products and stigma. The researchers displayed six assistive products. Hearing aids, smart canes, personal alarm systems, Stair lifts, Raised toilet seats, Stand Assist Aid and wheelchairs. Then the question was asked, "Do you think these AT products reflect stigma? If so, how?" The two groups of audiences first evaluated the performance of these products, saying that some products are familiar and some are less common in life, so they are not sure how they actually work. Some audiences provided insights based on their own experiences, reflecting that some home assistive products may "overemphasize functionality and ignore adaptability to the home environment." The participants from different countries (Denmark, the United Kingdom, UAE and Finland) also gave examples from their countries that some disabled people would wear unique decorations or be given special care.

Participants said that Finland's move has indeed helped people with disabilities to reshape their public image and reduce personal risks, but she also said that whether other countries and regions can follow suit remains to be verified.

The researchers then invited the audience to imagine a scenario: "From the last 24 hours from arriving at Boston Logan Airport to the hotel and conference venue, imagine that you have visual impairments, hearing impairments, or mobility impairments. Please consider the specific challenges you may encounter at each step of the journey." The audience in Group 1 talked about the conference trip, saying that it was smooth for transportation and accommodation, but if you are disabled, you may encounter some challenges in school. One audience member said, "If a person with mobility impairment enters the conference building here, he may not be able to find the conference venue signs or go up and down the stairs in time." Other audience members in Group 1 added, "Logan Airport is a large and complex transportation system. I think no matter what kind of disability, you will spend more time checking in or picking up your luggage." In addition, the audience also mentioned that the DRS conference group's reminders of the time and place of different activities were not obvious enough, which may cause some trouble for people with disabilities.

More discussions focused on design interventions. The researchers invited Group 2 to discuss "Can guidelines be designed into these systems/products to eliminate stigma?" and Group 1 to delve into "How can these systems be designed so that people with disability can live in a society that does not experience stigma?" Some audience members emphasized that "design is not only used to solve the problems faced by people with disabilities, but also an opportunity to change social concepts and attitudes." They suggested designers should immerse themselves in understanding the daily challenges of disabled users and collaborate with experts across various disciplines. Other audience members stressed that "design should facilitate the seamless integration of the needs of people with disabilities into digital products and services, effectively communicating these needs through visual, tactile, auditory, and other interactive methods."

During the discussion, Group 2 proposed incorporating user-centered design principles and conducting extensive user testing to ensure that guidelines were practical and effective in eliminating stigma. Group 1, on the other hand, highlighted the importance of creating inclusive design standards and advocated for involving disabled individuals in the design process to ensure their needs were met. At the conclusion of the discussion, the researchers posed the question: "What design guidelines do we need to apply to make our communities, schools, public transportation systems, and workplaces more inclusive and accessible to all citizens?" Representatives from both groups shared concluding remarks, offering a wealth of innovative ideas and practical strategies to address this pressing issue. In the next chapter, the researchers provided a comprehensive summary and reflection on the insightful outcomes of this engaging conversation.



Figure 2 The scene of the panel discussion

3. Outcome of the Conversation

3.1 Optimized definition and understanding of disability

Researchers and audiences discussed the understanding of disability. Traditionally, the public often regards disability as an individual impairment and only occurs in a specific group

of people. The different insights of the audience in this dialogue helped researchers realize that disability is the result of the interaction between social environment and individuals, and it also occurs at different stages of each person. Researchers realized that disability is no longer a characteristic of certain people, but a common situation faced by social groups. Everyone may experience "situational disability" at a certain time or in a certain situation. This change in thinking helps the public better understand the universality and diversity of disability, so as to be more inclusive and understand the needs of people with disabilities. In addition, the "charity model" proposed by the participants in the discussion emphasized that the psychological care for users cannot be ignored. If designers blindly regard people with disabilities as objects in need of rescue and pity, this perspective not only ignores their abilities and potential, but also further exacerbates their social marginalization.

A new interpretation of the concept of disability provides a good reference for auxiliary design practice. Designers and researchers realize that they need to pay more attention to the "disabled people" themselves in the design process, and they also need to put themselves in the role of disabled people to ensure that the design can meet their actual needs. At the same time, the dialogue also realized the need to advocate for society to be more inclusive and accepting of disabled people, eliminate the long-standing prejudices and misunderstandings of the public, and create a more equal living environment for them.

3.2 Personalization of assistive product design

The second set of findings is that in this conversation, researchers and the audience discussed in depth the possible design problems of assistive products and put forward practical suggestions for improvement. The feedback from the audience clearly shows that the current assistive product design seems to generally ignore the user's expectations for aesthetics and concealment. Some home assistive products, especially wearable devices, can meet the daily needs of users at the technical level, but if they lack sufficient appeal, it will be difficult to motivate users to use them for a long time. Furthermore, with the popularization of digital devices, users are facing increasing technical requirements, which often means that they need to constantly learn and adapt to new technologies to use these assistive devices, which undoubtedly increases the difficulty and threshold of use.

In order to effectively solve these problems, a series of valuable insights and suggestions emerged in the conversation. The audience generally believes that designing concealed and beautiful assistive devices will become an important trend in the future. Such devices should cleverly combine design features in the digital or fashion fields to meet the psychological needs of users in daily travel, so that they can feel confident while maintaining fashion and comfort when using assistive devices. At the same time, most of the audience also strongly emphasized the importance of user customization, believing that this is a powerful measure to ensure that assistive products better adapt to the unique needs and preferences of each user.

Through these ideas and insights generated in the discussion, the researchers have a clearer and more systematic understanding of the design direction of assistive products. In future

design practices, researchers not only need to continuously explore and improve the upper limit of technology, but also need to pay close attention to the user's experience and feelings, and try to avoid designing products that users abandon due to excessive usage requirements. The needs and preferences of people with disabilities are unique and diverse. Designers need to have a deep understanding of their specific circumstances and conduct personalized design to ensure that the product can truly bring them a convenient and comfortable operating experience. In addition, conversation also deeply recognized the importance of self-confidence for people with disabilities. Therefore, future assistive devices need to not only provide practical functional support, but also help them build confidence, better integrate and participate in social activities, and enjoy the same quality of life and social experience as healthy people.

3.3 Design strategies for user participation

The third result is that the conversation promoted the intervention of design on user stigma. Based on the previous discussion on improving assistive products, the participants once again focused on the optimization of products for user needs and contributed unique insights on eliminating stigma. They believe that improving the social acceptance and self-identity of disabled users is the core of eliminating stigma, which requires the society to work together to break the inherent prejudice and misunderstanding of disability. The participants unanimously agreed that stigma not only affects disabled people themselves, but also affects all people related to disabled people. Therefore, it is imperative to strengthen the public's awareness of stigma. This discussion revealed a current situation: not everyone has a full understanding of the far-reaching impact of stigma. Therefore, getting more users involved in the action of eliminating stigma is seen as a key task in the future.

Further, this conversation emphasized the importance of intervention with user participation, that is, allowing designers and disabled people to contribute to product development together. This approach can not only ensure that product design is closer to the real needs of disabled users, but also promote understanding and trust among different user groups. The popularization and development of digital technology platforms are promoting multicultural exchanges, which is a feasible suggestion for eliminating stigma. For researchers, feedback from professional audiences provides them with an opportunity to better understand the inner activities of disabled users when accepting or abandoning assistive products, so as to better incorporate emotional needs into future design practices.

Finally, the dialogue also looked forward to the future design research direction of disabled user experience, especially emphasizing the importance of interdisciplinary cooperation. Experts in fields such as designers, engineers, psychologists and sociologists need to work closely together to explore how to use their respective expertise to understand and solve the unique challenges in disabled user experience. This cross-border research path is expected to develop more sophisticated solutions that are closer to the actual needs of users. In future academic conferences on assistive technology and stigma, researchers look

forward to seeing more innovative research results that can provide reference for this conversation and apply personalized and humanistic products and services to the market.

4. Reflection on the Conversation

In this conversation, the researchers conducted in-depth discussions around disability and assistive products. Although the entire discussion process was full of vitality and collision of insights, there are some areas that could be further improved. The following are the three main reflections of the researchers on this discussion.

First, the number of participants could have been more diverse, especially in terms of industry representatives, third sector players, and most importantly, the target audience. Most of the participants in this conversation came from a design background, which is valuable, but it also limits the range of perspectives to a certain extent. Although this discussion successfully brought together more than 10 participants from different schools and institutions, there is still room for improvement in the diversity of professional fields. If professionals with deep field knowledge and practical experience can be included, they will enrich the discussion with unique insights and expertise, and provide new perspectives on disability and stigma issues. In addition, the conversation can set up more groupings, inviting audiences from professional and non-professional groups to think about different types of topics, and the diversity of participants can promote a more comprehensive understanding of hot issues. Therefore, in more DRS discussions in the future, we recommend expanding the scope of participant recruitment to ensure that a wider range of views and deeper insights are captured.

Secondly, we should consider how to design the co-creation process to better integrate technology. In the realm of assistive product design, technology serves as a crucial tool for fulfilling user needs and addressing stigma-related issues. In the future, we suggest more deeply integrating technological considerations into the co-design process. Utilizing data collection and analysis technology to precisely capture the genuine needs and pain points of disabled users at the outset of product development would be an excellent starting point. This data can not only provide a quantitative foundation for design but also assist designers in identifying shortcomings and areas for improvement in current assistive products. At the same time, we recognize that various technologies are being applied to products and services. Technologies such as artificial intelligence (AI) and virtual reality (VR) should be taken into account to predict user behavior, optimize product performance, and offer personalized services. We recommend involving more technical personnel in the design process. When collaborating with professionals from different fields, researchers should ensure the effectiveness of all technical tools. Additionally, we should be mindful that product development should adhere to the fundamental design principle: technology should not only be efficient but also user-friendly for all, regardless of their abilities or disabilities.

Finally, we need to reflect on how to foster empathy for users and the application of inclusive design through technology. There is no doubt that technology is a means to achieve

design goals and a driving force behind innovation in design concepts and methods. In discussions of design education, researchers should introduce more topics related to user-computer interaction and user experience, so that participants can understand and master the application of technology in barrier-free design. We encourage using innovative technology platforms (such as online collaboration tools and virtual laboratories) for conversation sessions to facilitate communication between researchers and participants and jointly explore the potential of assistive product design. Similarly, designers should immerse themselves in experiencing the needs and challenges of disabled users in their daily lives and cultivate empathy for them. To achieve this goal, we recommend incorporating more questionnaires and participatory activities into the process. Recording reflections and insights through technical means will provide valuable experience for the entire design discussion. Therefore, we also hope that more designers will establish long-term partnerships with disabled users in the future and jointly participate in the product development and testing process.

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