

How Do Professionals Who Create Computing Technologies Consider Accessibility?

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ABSTRACT

In this paper, we present survey findings about how user experience (UX) and human-computer interaction (HCI) professionals, who create information and communication technologies (ICTs), reported considering accessibility in their work. Participants ($N = 199$) represented a wide range of job titles and nationalities. We found that most respondents (87%, $N = 173$) reported that accessibility was important or very important in their work; however, when considerations for accessibility were discussed in an open-ended question ($N = 185$) the scope was limited. Additionally, we found that aspects of empathy and professional experience were associated with how accessibility considerations were reported. We also found that many respondents indicated that decisions about accessibility were not in their control. We argue that a better understanding about how accessibility is considered by professionals has implications for academic programs in HCI and UX as to how well programs are preparing students to consider and advocate for inclusive design.

Categories and Subject Descriptors

K.7.4 [The computing profession]: *Codes of good practice.*

K.7.1 [The computing profession]: *Occupations.*

Keywords

Accessibility, professions, inclusive design, diverse users

1. INTRODUCTION

In this paper, we present survey findings about how user experience (UX) and human-computer interaction (HCI) professionals, who are responsible for creating information and communication technologies (ICTs), reported considering accessibility in their work. While we acknowledge that working individuals may not have agency to pursue accessibility in cases where companies or clients do not regard inclusive design as an important consideration, we are interested in understanding how well the message of accessibility has been communicated to those individuals who are on the front lines of creating ICTs and how the message has (or has not) translated to action. This work therefore contributes to discussion about who makes accessibility decisions within the HCI/UX professions. This work also has

implication for academic programs in HCI and UX as to how well programs are preparing students to consider and advocate for inclusive design. In other words, if we can identify if and how UX/HCI professionals consider accessibility in their work and their specific actions, we can better identify gaps in accessibility design knowledge. Specifically, we hope to contribute insights for educators and industry leaders about the importance of accessibility design education for students and employees. We argue that indicators about which disabilities and accommodations UX/HCI professionals consider and their overall level of consideration in conjunction with their level of experience and job title may indicate opportunities for targeted instruction.

1.1 Background

The inclusion of diverse users (e.g., people with disabilities, elderly and young) when designing ICTs is more than just an altruistic ideal; it also makes good financial sense for companies who create ICTs. The World Health Organization (WHO) estimates that about 10% of the world's population lives with a disability (about 680 million) comprising the world's largest minority. It has been estimated that people with disabilities in the US control a large amount of discretionary income (\$220 billion annually according to the U.S. Census Bureau) [1]; as such, companies who do not consider inclusive design are losing potential customers. Further, this is a growing population, particularly in western societies, because people are living longer, i.e., the population is aging. Steve Ballmer, CEO of Microsoft reflected this sentiment succinctly in 2001: "As the Baby Boom generation ages, more and more people will face the challenges of reduced dexterity, vision and hearing. So enabling accessible technology is a growth opportunity" [2].

Moreover, many laws support design for inclusion; e.g., [3, 4, 5]. In the US, for example, under Section 508 of the Rehabilitation Act of 1973 (modified in 1998), Congress decreed that all information technology funded by federal agencies must be accessible for people with disabilities [3]. Additionally, the Americans with Disabilities Act (ADA), which explicitly extended civil rights to people with disabilities in 1990, requires that a "place of public accommodation" must be accessible for people with disabilities. In 1996 the US Department of Justice ruled that the Internet is such a public place [4]. Many other countries have also passed similar legislation [6].

Further, companies that do not adhere to current laws of accessibility run the risk of legal action; lawsuits have the potential to add costs associated with making websites accessible for people with disabilities. For example, the National Federation of the Blind (NFB) sued several companies, including Target and

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AOL, because their Internet presence was not accessible. Both cases were settled out of court, with the companies agreeing to make their websites accessible [7, 8].

There are also many resources to help companies and professionals learn how to make their ICTs accessible. In the US, for example, the W3C created the Web Accessibility Initiative (WAI), which provides guidelines and resources to help developers and designers create and evaluate websites that are accessible (e.g., section 508 compliant) for all users [6].

In summation, considering accessibility and diverse users in ICT design is: (1) a good decision on moral, financial and legal grounds; and (2) well supported by organizations like the W3C. However, previous work has established that many ICTs are not accessible for people with disabilities [8,9].

1.2 Related Literature

Several researchers have established that website accessibility standards are often unmet. For example, Kane et al. (2007) analyzed the accessibility of 100 college websites and found that many of the top universities' sites were not compliant with current standards [9]. Similarly, Loiacono et al. (2009) reported how well Fortune 100 websites adhered to WAI guidelines between the years 2000 and 2005. Though adherence to guidelines increased over the five-year period, of the 64 companies that remained in the Fortune 100, only 27% were free of any Priority 1 barriers at the end of the study [10]. While previous work (of which the above is just a small sample) has established that accessibility has been inconsistently addressed, we are concerned with factors that contribute to this inconsistency; i.e., with how HCI/UX professionals consider accessibility and diverse users in their work.

Multiple authors cite the rapidly changing nature of ICT professions as a critical reason for identifying (and re-identifying) knowledge and skills required in the industry [11, 12]. The primary focus of researchers is varied: some have specifically focused on differentiating among professional roles in ICT, e.g. [13] while others have sought to understand required knowledge and skills associated with specific roles, e.g. [11, 14].

More closely related to our research question are studies that have asked professionals about how they practiced user-centered design (UCD). Vredenburg et al. (2002) investigated the perception of the impact that UCD practice had on industry, with the goal to shape planning, adoption and training of UCD principles [15]. In an early exploration of how professionals considered users in their work, Gould and Lewis (1985) asked participants at a human factors conference to “describe approximately three to five major steps you consider good practice for designing, developing and evaluating a new computer system for users” [16]. Answers were coded for adherence to three UCD principles: (1) early focus on the user; (2) empirical measurement, e.g. usability; and (3) iteration informed by data from users. Gould and Lewis found that that only 2% of their participants mentioned all three principles and 26% did not mention any of the principles¹.

Our investigation is most directly related to studies focused on professionals who share or may share responsibility for making

ICTs accessible. For example, Nahon et al. (2012) reported on the obstacles, challenges and incentives for non-professionals (e.g. blog writers and/or creators of personal websites) to consider accessibility in their work. The authors presented a theoretical framework that described variables they hypothesized would contribute to designer intention; they found that intrinsic motivation was the strongest predictor of a positive attitude that affected the intention to make technology accessible [17]. In similar work, Trewin et al. (2010) surveyed 49 IBM web developers to explore (a) how accessibility was addressed, (b) barriers to creating assessable web sites, and (c) how evaluation tools were used and met user needs [18]. The authors found that evaluation tools were difficult to use; difficulty contributed to barriers for developers when considering accessibility. Other barriers to creating accessible sites included lack of time and lack of knowledge. Similarly, Lazar et al. (2004) reported on the perceptions of webmasters about website accessibility. They found that, while most of their respondents personally expressed support for accessibility, many reported impediments to realizing accessible sites, including lack of time and lack of managerial support [19]. Our work builds on this discussion by expanding the range of job titles considered.

2. Methods

Our research question, “how do HCI/UX professionals report considerations of accessibility in their work” was part of a larger study concerned with how HCI/UX professionals (a) define their work, (b) consider users, and (c) discuss differences in job roles and titles. The larger study involved four surveys: (1) a screening survey; (2) an empathy and accessibility survey; (3) a temperament survey and (4) a survey focused on personas. The first two surveys were piloted in earlier work [21]. We are focused on results from the second survey in this paper; however, background data and the recruitment pool came from screening survey responders.

Screening survey respondents were recruited through ‘snowball’ sampling from multiple sources that cater to UX and HCI professionals in the US, including: (a) IxDA LinkedIn message boards, (b) Puget Sound SIGCHI website, and (c) UPA message boards. Additionally, responders were encouraged to forward the screening survey link to other working HCI and UX professionals.

The original screening survey link was available between July 2011 and April 2012. We received 1079 responses to the screening survey; however, we kept only responses in which respondents (a) answered at least one of three open-ended responses and (b) responded to open-ended questions in a way we could understand. As such, the screening survey provided a filter for high quality (believable) responders. After filtering for high quality responders, we sent a link for the empathy/accessibility survey to 314 participants. In the next sections we describe (1) the empathy/accessibility survey participants, (2) the survey instrument and (3) data analysis procedures.

2.1 Participants (and screening)

Participants that were deemed as high-quality responders ($N = 314$) from the screener were sent a link to the empathy/accessibility survey through email to an address they had provided. Participants were offered an \$8.00 Amazon gift for completing the survey and were sent up to two follow-up reminders. We confirmed that respondents were from our screener

¹ In the 2009 pilot study for this project, we found that professionals reporting user-centric job titles (e.g. usability engineer) were very likely to mention at least two principles (65% included two principles), but only 37% of those with designer-centric job titles (e.g., information architect) mentioned at least two of the principles [20].

database by a comparison of email addresses². In total we had 199 responses to the empathy/accessibility survey from respondents that we could match from the screener. Of the 199 respondents, 105 were male, 88 were female (missing information about gender $N = 6$); mean age was 35.3 years ($SD = 7.68$). While most ($N = 139$) reported that they were from the US, many ($N = 60$) were from outside the US, including the United Kingdom ($N = 4$), Brazil ($N = 4$), Germany ($N = 4$) and China ($N = 4$). Of the 139 respondents from the US, locations spanned 26 states with most respondents reporting from Seattle ($N = 30$), Chicago ($N = 27$), San Francisco ($N = 13$), and New York ($N = 10$).

2.2 Instrument

The survey explored two areas: (1) empathy profiles and (2) accessibility considerations of UX/HCI professionals.

2.2.1 Empathy profiles

Empathy, defined as “the projection of one’s own personality into the personality of another in order to understand him better” [21], is a key concept to ‘walking in user’s shoes’. As such, we hypothesized that it would be related to how professionals consider accessibility. In the field of psychology, empathy has been characterized by two broad categories of responses: (1) an intellectual response, i.e., the ability to understand the perspective of another; (2) a visceral response, i.e., the ability to feel the perspective of another at an emotional level [22]. This dual aspect of empathy has led to multidimensional approaches to measure empathetic capacity. For this study, we used the ‘Interpersonal Reactivity Index’ (IRI) to assign an empathy profile to survey respondents.

The IRI is a 28-item self-report survey created by Mark Davis that uses a multidimensional approach to explore empathy [23]. The IRI has been validated in other studies and it correlates with other measures for empathy [21]. The IRI measures four separate aspects of empathy from most intellectual to emotional: (1) perspective-taking (PT), which measures the tendency to adopt the psychological viewpoint of another; (2) fantasy (FS), which measures the propensity to transport oneself imaginatively into the feelings of fictitious characters from books, movies and plays; (3) empathetic concern (EC), which measures levels of sympathy and concern for another in an unfortunate situation; and (4) personal distress (PD), considered the most emotional response, which appraises feelings of personal anxiety and unease in response to a tense situation involving other people.

2.2.2 Accessibility considerations

After respondents completed the IRI, they were presented with two questions related to accessibility. The first question asked respondents to rate on a five-point Likert scale how important they felt it was to make technology accessible. The second question was an open-ended question that asked: “How do you consider accessibility in your work? In other words, what types of efforts/research is performed to help make the products/services you are involved in creating accessible to diverse users including people with disabilities?” Of the total 199 respondents, 185 answered the open-ended question.

2.3 Data analysis

We used an inductive approach to analyzing the open-ended responses ($N = 185$) on how accessibility was considered. First,

each member of our six-person research group independently separated answers into three segments:

Consideration. Coded if there was any indication of some sort of consideration given to accessibility.

Should. Coded if a respondent indicated that there was no consideration for accessibility but expressed regret or was apologetic.

No Consideration or Did Not Understand (DNU). Coded if the responder indicated that there was no consideration given to accessibility or if we did not understand the response in the context of the question.

Next, we met as a group to resolve any differences about the segment assignment of the responses; there were very few initial disagreements, which were resolved in discussion. We then focused on the ‘Consideration’ segment and individually identified themes among the responses that were in the ‘Consideration’ segments.

The first author then built a codebook based on the group’s themes; we used the codebook to create a scorecard for each response and rated responses on a five-point ordinal ranking of highest to lowest consideration. Next, each member independently coded the answers using the rules established in the initial codebook. To clarify some ambiguity, group members met once to refine the codebook and coded the answers independently again using the new codebook. We then assessed inter-rater reliability using an intraclass correlation coefficient (ICC). Once responses in the ‘Consideration’ segment were classified, each member of the team independently identified major themes in the ‘Should’ segment.

We also investigated associations among how the question of accessibility was answered and other respondent data, including: (1) ranking of the importance of accessibility; (2) empathy profile; (3) reported job title (from the screener); (4) professional experience (from the screener); and (5) geographic location.

3. Findings

Respondents who answered the open-ended question on accessibility (93%, $N = 185$ of 199 responses) were initially segmented into three groups: (1) Consideration (70%, $N = 129$ of 185); (2) Should (19%, $N = 35$ of 185); and (3) No Consideration (11%, $N = 21$ of 185). In the next sections we describe themes we identified in the ‘Consideration’ and ‘Should’ segments. We also report on associations we explored among the segmented groups and other respondent data, e.g., empathy profile and job titles.

3.1 ‘Consideration’ Segment ($N = 129$ of 185)

Most (70%, $N = 129$ of 185) of respondents were classified as part of the ‘consideration’ segment. We identified seven themes that formed the basis for our scoring codebook: (1) Making or creating a special accommodation (applying a solution); (2) Research/inquiry (scoping the problem); (3) Consultation with experts; (4) Laws/guidelines; (5) Consideration for non-disability related changes (e.g. low bandwidth); (6) Personal initiative/advocacy; and (7) Organizational support. We then compiled a scorecard using our seven categories to rate each respondent in the ‘Consideration’ segment.

3.1.1 Special Accommodation

Special accommodation was scored when respondents mentioned some action(s) or solution(s) taken by the respondent or his/her company to support accessibility. For example, if they added something (e.g. alt text, subtitles) and/or changed something (e.g.

² If the email address in the second survey did not match, the respondent was sent a request to help us match the email. If we were unable to match the email, the data was thrown out.

coded differently, made text larger) in design/development to support accessibility; Respondent 145 submitted:

"We tend to take colorblindness into account a lot in video games, and even if we can't test with colorblind subjects..."

About one third (36%, $N = 46$ of 129) of 'Consideration' segment responses included some sort of special accommodation³. We further classified accommodations into five group types:

Type (A) *Vision impairments*: e.g., mention alt tags, use of headers or semantic web elements, addressing colorblind issues;

Type (B) *Cognitive disabilities*: e.g., plain language, clear text;

Type (C) *Hearing impairments*: e.g., tagging audio with search words, subtitles;

Type (D) *Physical impairments*: e.g., making targets larger, making interfaces tab-able (minimal mouse interaction);

Type (E) *Elderly*: e.g., making text larger.

The response was scored higher if accommodations were mentioned for multiple types of disabilities. For example, Respondent 034 discussed addressing visual, age-related and physical impairments:

"Awareness of color blindness and making text larger for older viewers - Larger click areas when possible for motor impairments."

Of the 46 responses coded with for 'special accommodation, about a quarter (24%, $N = 11/46$) discussed multiple types of accommodations. Accommodations for vision impairments (type A) were mentioned the most (52%, $N = 24$ of 46), followed by physical impairments (type D, 22%, $N = 10$ of 46), elderly (type E, 13%, $N = 6$ of 46), hearing impairments (type C, 7%, $N = 3$ of 46) and cognitive disabilities (type B, 2%, $N = 1$ of 46 responses).

3.1.2 Research/inquiry

We classified a response as research/inquiry if the respondent included some type of user testing, assessment or research to make their product/service more accessible. The submission was scored higher if the respondent discussed: (a) the inquiry in relationship to disability; (b) multiple types of inquiry in relationship to disability; and/or (c) direct interaction with users with disabilities. For example, Respondent 84 discussed using automated tools and usability studies, people with disabilities and direct interaction with users:

"I use some automated tools to help look for accessibility issues. I also am aware of the heuristics involved with designing accessible sites for the web. In the past, I had the opportunity to involve users with disabilities and those using assistive technology in assessment and usability studies..."

About half (53%, $N = 69$ of 129 responses) of 'Consideration' segment responses were coded to include some discussion of research or inquiry. About a third of these responses (35%, $N = 24$ of 69) discussed inquiry directly related to a disability. Only a few responses (9%, $N = 6$ of 69) included multiple methods. Mention of direct interaction with end users in the context of disabilities was also uncommon (10%, $N = 7$ of 69).

³ Numbers (i.e. percentages) are based on agreement among at least four of the six research group members.

3.1.3 Consultation with experts

Consultation was scored if the respondent mentioned any type of consultation with accessibility experts that were external to their company. This was relatively rare; we identified four (3%, $N = 4$ of 129) respondents who included consultation with experts. For example, Respondent 179 included experts as one source for information:

"...we have done a lot of research before we really begin our design by search online resources, obtaining information from the experts, getting feedbacks from targeted group of people by phone interview..."

3.1.4 Laws and guidelines

For the laws and guidelines category, we identified responses that included references to guidelines and best practices; however, this did not include references to internal policies. The submission was scored higher if the respondent mentioned a specific law or guideline, e.g., Section 508, WAI, ADA. Respondent 168 included guidelines and specifics in her submission:

"My team is currently very focused on learning more about how to translate the WCAG 2.0 standards into detailed requirements to assist development and evaluation of web applications."

About a quarter of responses were identified (26%, $N = 34$ of 129) as including reference to a laws and/or guidelines.

3.1.5 Non-disability related considerations

Two respondents (2%, $N = 2$ of 129) expanded the definition of accessibility to address other concerns of inclusion, including low bandwidth, machine CPU and smaller screen sizes, and novice/experts. For example, Respondent 076 submitted:

"We take into account different bandwidth restrictions particularly for places where bandwidth is a premium (i.e. India). We take into account different machine (CPU, storage, screen size, etc) restrictions."

3.1.6 Personal initiative/advocacy

This was coded on a scale from one to three. The response was scored as level one if the participant indicated that they 'tried' to consider accessibility in some way (i.e. they had to write "I try"). Responses were scored as level two if the respondent suggested accessibility was personally *important* to them and/or they raised accessibility concerns to their clients/company. High advocacy (a score of three) was identified if the respondent also included specific details about how they realized their advocacy. For example, Respondent 164 suggested a high level of personal advocacy with this submission:

"As a former product owner for a number of web sites, I made accessibility compliance (section 508) a requirement in all projects. I also put together presentations to education other product managers as well as my IT development team to help them understand the basics of accessibility and why it was important to our business."

We agreed that about a quarter (26%, $N = 33$ of 129) of the submissions classified as 'Consideration' indicated some sort of personal advocacy in their response. Most were coded for level one or two advocacy: (a) level three (high) advocacy (27%, $N = 9$ of 33); (b) level two (medium) advocacy (36%, $N = 12$ of 33); (c) level one (low) advocacy = (36%, $N = 12$ of 33 responses coded for advocacy.)

3.1.7 Organizational support

We scored organizational support on a scale from one to two; one was scored if there was an indication that the organization applied resources to accessibility, even if the respondents themselves are not involved. We scored two for this category if the respondent indicated that there was a specific group or individual in the organization dedicated to accessibility, for example, Respondent 154 submitted:

“At my company, (a very large software company) accessibility is a baked into the design review process. Although I may not factor accessibility into my every day design work, I know that before any design is fully implemented, it will be reviewed by an accessibility specialist and changes will be made.”

About a quarter (26%, $N = 34$ of 129) were identified as ‘Consideration’ segment responses that included organizational support; we scored nine of those at level two organizational support.

3.1.8 Consideration scorecard

In summation, special accommodation and research/inquiry were the most commonly identified themes, followed equally by identification of laws and guidelines, initiative/advocacy and organizational support, see Figure 1 for common themes.

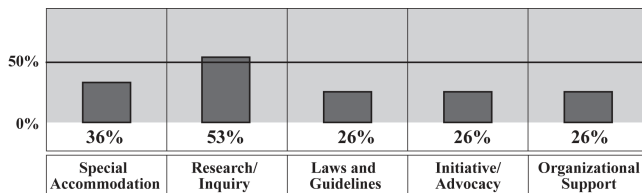


Figure 1: Common themes identified in the ‘Consideration’ segment

After coding for themes, we created a scorecard for each participant. We also subtracted a point if only one theme was identified; we reasoned that this indicated a narrow level of consideration. We reduced scores down to five groups⁴ and assessed inter-rater reliability using an intraclass correlation coefficient (ICC). We had a high level of reliability: ICC = .785, Cronbach’s alpha = .956; reliability was significant, $F_{(129,645)} = 22.84$, $p < .001$, indicating that we interpreted the codebook similarly.

3.2 ‘Should’ Segment ($N = 35$ of 185)

About a fifth of the responses (19%, $N = 35$ of 185 responses) were classified as ‘Should’. While we did not create a scoring codebook for this segment, we identified several themes including: (1) shame/guilt/regret; (2) balance; (3) conflict; and (4) signs of hope and progress.

3.2.1 Shame/guilt/regret

We identified this theme when the respondent indicated (46%, $N = 16$ of 35) that s/he was embarrassed/guilty that his/her current job doesn’t consider accessibility or make it a higher priority. For example, Respondent 103 submitted:

“Unfortunately my job is more concerned with the “gold-plating” than the accessibility of our products.”

⁴ Scores (0-1) = group 1, scores (2) = group 2, scores (3,4) = group 3, scores (5,6) = group 4, scores 7 or over = group 5.

3.2.2 Balance

We identified balance when the respondent blamed external factors or limited resources (31%, $N = 11$ of 35) for why accessibility was not considered. External forces included time, budget, and/or clients. For example, respondent 046 wrote:

“Although we consider universal design important and something we would like to consider on all projects, the reality is that most of our clients, don’t have the budget to include redundancy to ensure accessibility at all levels.”

3.2.3 Conflict

Conflict was coded when the respondent (20%, $N = 7$ of 35) expressed disagreement with the organization’s current practice of ignoring or minimizing accessibility. We identified two levels: (1) the respondent disagreed but didn’t express willingness to make effort to change the situation; and (2) the respondent disagreed but reported and effort to change the current practice. For example, respondent 089 submitted:

“Oddly, when I bring up accessibility as it pertains to people with disabilities, my predominantly young co-workers barely care.....We do usability tests with 50-year-old women, and everyone just acts like the results from those tests don’t count because they are only a small segment of our target users. Actually, I think they are the majority of our users and I kind of resent my coworkers at this moment for making so many assumptions.”

3.2.4 Signs of hope and progress

Some participants (9%, $N = 3$ of 35) in this segment also conveyed signs of hope and progress towards accessibility. For example, Respondent 105 submitted:

“I work with front end developers to ensure that we meet basic accessibility guidelines. We’re working towards offering accessibility testing in-house, but this hasn’t happened yet unfortunately.”

3.3 Associations with other data

We created five (somewhat equal) response groups from our initial segmentation model of the 185 open-ended responses:

1. No consideration (11%, $N = 21$ of 185 responses)
2. Low consideration, group 1 (25%, $N = 46$ of 185)
3. Med consideration, groups 2-3 (22%, $N = 40$ of 185)
4. High consideration, groups 4-5 (23%, $N = 43$ of 185)
5. Should consideration (19%, $N = 35$ of 185).

Using univariate tests, we investigated associations among the groups and other respondent data, including (1) ranking of the importance of accessibility; (2) empathy profile; (3) reported job title (from the screener); (4) professional experience (from the screener); and (5) geographic location. For each construct we used an adjusted Bonferroni alpha when conducting multiple comparisons.

3.3.1 Ranking of importance

Consideration groups were highly associated with how respondents rated the importance of accessibility, $\chi^2 (12, N = 185) = 42.33$, $p < .001$, see Figure 2. While most respondents rated accessibility as either important (50%, $N = 93$) or very important (32%, $N = 60$), the distribution of importance roughly followed consideration groups; the Medium and High Consideration groups were the most likely to identify

consideration as very important. The ‘Should’ consideration group rated accessibility as being much less important in their work when compared to other groups.

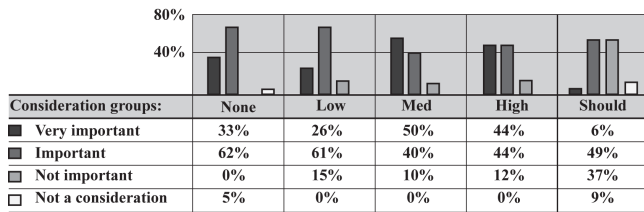


Figure 2: Rating of importance by Consideration groups

3.3.2 Empathy profile

We hypothesized that empathy would be related to how accessibility was considered by ICT professionals. We conducted ANOVA tests to investigate comparisons among the five consideration groups; we used a Bonferonni adjusted alpha for the four tests (.05/4 = .0125). Personal Distress (PD), the most emotional dimension of empathy, was significantly associated with the consideration groups, $F_{(4,177)} = 4.15, p < .0125$, see Figure 3. While not statistically significant, there was a pattern where the highest levels of empathy were associated with higher levels of consideration in the EC and PT dimensions.

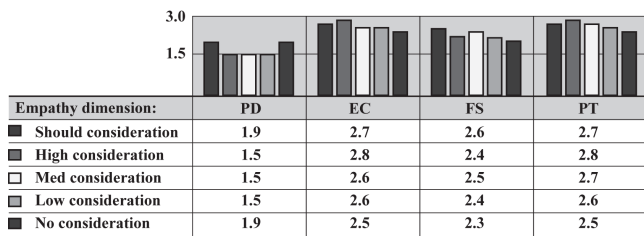


Figure 3: Mean empathy score by Consideration groups

3.3.3 Job title

We investigated if job title type was associated with the Consideration groups⁵. While not statistically significant, there were some notable findings, see Figure 4. Forty-seven percent of interaction designers fell into the ‘medium’ or ‘high’ consideration groups, and more than half of both usability specialists and user researchers fell into these groups. User experience architects were the most likely to be categorized in the ‘Should’ group and developers were most likely to be in the low or no consideration groups.

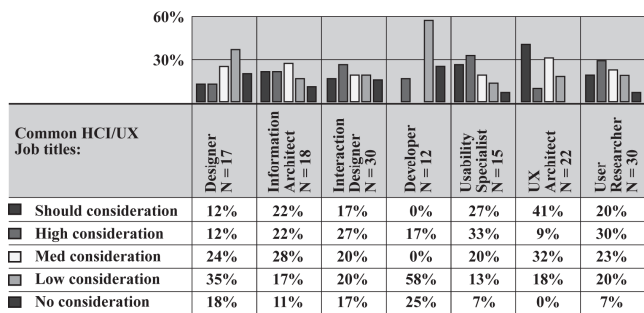


Figure 4: Common job titles by Consideration groups

⁵ We are reporting only on job titles in which $N > 10$.

3.3.4 Professional experience

We conducted three univariate tests associated with professional experience; as such, we used an adjusted alpha (.05/3 = .016). We first investigated if the number of years of experience and the number of years at the current job were associated with the Consideration groups. While not significant, there were consistent patterns, see Figure 5. The pattern indicated that the more years at a current position, the less consideration was given to accessibility. Conversely, the greater total years of experience, the more consideration was given to accessibility.

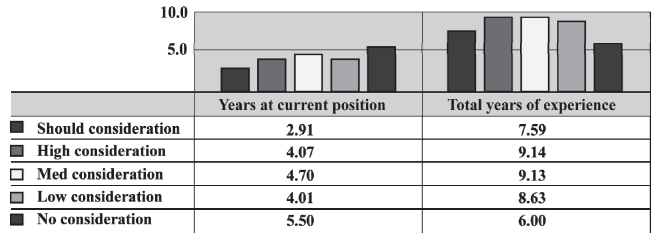


Figure 5: Number of years of professional experience by Consideration groups

We also investigated if the Consideration groups were associated with whether the respondent reported their current job as their first job. We found a significant association, $\chi^2(4, N = 185) = 20.01, p < .001$, see Figure 6.

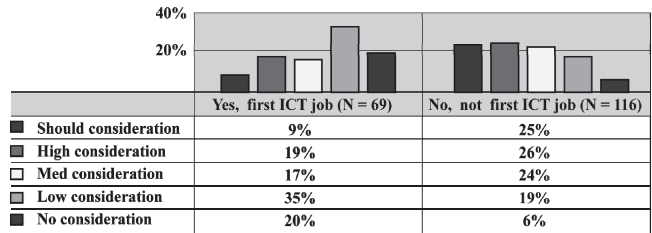


Figure 6: First job by Consideration groups

There was also a notable pattern; if the respondent reported the current job as their first they were likely to consider accessibility less but express more regret (i.e., ‘Should’). Conversely, if the current job was not their first, respondents were more likely to report a higher level of consideration.

3.3.5 Geographic location

We also investigated if there were any associations among Consideration groups and whether the respondent was from the US; we found no significant associations, see Figure 7. This indicated that there was no evidence of different levels of concern about accessibility worldwide. However, we note that although respondents outside of the US were represented, this representation was not equally dispersed across world regions.

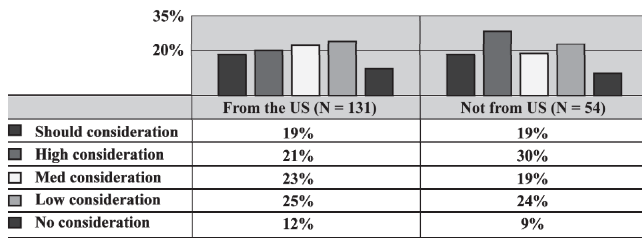


Figure 7: US v. Other location by Consideration group

4. Discussion

We found that most respondents (83%, $N = 153$ of the 185 respondents who answered the open-ended question) reported that accessibility was important or very important in their work; however, even when considerations for accessibility were discussed, scope and actions were somewhat limited. We found that the Personal Distress dimension of empathy and professional experience were significantly associated with how accessibility considerations were reported. We found that job titles and location were not significantly associated with how considerations were reported. Additionally, many respondents indicated that decisions about accessibility were out of their control.

4.1 Limited scope and limited action

We identified that 129 of the 185 open-ended responses (70%) included some level of consideration for accessibility. However, only about a fourth (23%, 43 of 185) of the total responses were rated as ‘high consideration’; all high scoring responses were those that included two or more of the most common themes. Themes included: (a) making or creating a special accommodation (applying a solution); (b) conducting an inquiry (scoping the problem); (c) demonstrating knowledge of laws and/or guidelines; and/or (d) describing personal initiative and/or advocacy.

Additionally, the type of disabilities considered was largely focused on visual impairments. While obviously this is a very important emphasis, respondents’ limited discussion of considerations for other types of disabilities and a narrow consideration of accessibility indicated potential gaps in current education about the wide range of inclusionary concerns.

4.2 Empathy

We hypothesized that individual empathy would be related to how consideration for accessibility was considered. While we saw a possible pattern in EC (empathetic concern), and PT (perspective taking), where higher consideration followed higher empathy, it was only in the PD (personal distress) dimension that the differences among groups were statistically significant. (We hope in future work to investigate this further with a larger sample for more statistical power.) Within the PD dimension, respondents in the ‘Should’ segment scored higher than those in the ‘Consideration’ segment. We hypothesized that their high level of personal distress was in part responsible for their expression of guilt or regret about not considering accessibility. (We were somewhat flummoxed about why the ‘No Consideration’ segment also scored high in PD.) While these findings do not directly affect pedagogical decisions, it does suggest that some students may be more naturally receptive to accessibility concerns.

4.3 Experience

The patterns we saw with level of experience were consistent but not always statistically significant. Professionals who had greater number of total years of experience reported higher levels of accessibility consideration; however, this was not a statistically

significant finding. Professionals reporting that they were in their first job in ICT reported lower levels of consideration; 75% ($N = 52$ of 69) of respondents who reported that this was their first ICT job were classified in lower consideration groups (this was a statistically significant finding). We hypothesized that these related patterns were present because people with greater experience had more control; i.e., a greater agency to actualize inclusive design and therefore reported higher rates of consideration. This may have indicated people new to the workforce are powerless to consider accessibility and therefore, do not. This finding may be related to the ‘lack of control’ theme.

4.4 Lack of control

Respondents expressed a lack of power/control about how accessibility was considered with both positive and negative ramifications. Many respondents (26%, $N = 34$ of 185) indicated that their considerations for accessibility were a requirement because of laws, guidelines, or organizational practices; we considered these positive ramifications of exterior forces. On the other hand, some respondents while aware of accessibility concerns, reported little or no control over how accessibility was considered at a higher level in their workplace and discussed trading/sacrificing accessibility for time, budget, and client/company needs. This was expressed in two themes among respondents we categorized in the ‘Should’ segment ($N = 35$): (1) the theme of balance when the respondent blamed external factors or limited resources (31%, $N = 11$ of 35) for why accessibility was not considered and (2) the theme of conflict when the respondent (20%, $N = 7$ of 35) expressed disagreement with the organization’s current practice of ignoring or minimizing accessibility. Lack of control is also a theme established in other related work [19, 20]. This may be an opportunity for educators who prepare future UX/HCI professionals to coach students in developing cost-based arguments for promoting consideration of accessibility issues.

4.5 Conclusions

We argued that considering accessibility and diverse users in HCI/UX professions is (1) a good decision on moral, financial and legal grounds and (2) well supported by organizations like the W3C. Previous work has established that many ICTs are not accessible for people with disabilities. We were interested in exploring how HCI/UX professionals consider accessibility in their work to identify gaps in accessibility design knowledge and contribute to the discussion about who is responsible for creating and advocating for accessible ICTs. We feel that this understanding has implications for academic programs in HCI and UX as to how well programs prepare students to consider and advocate for inclusive design. The absence of an association with geographic location and job titles indicates that these implications may generalize to a wide range of education and training programs.

4.5.1 Limitations of the current study

While our respondents were from a variety of locations and companies, they did not represent a random sample. Additionally, we assessed the levels of consideration primarily from the quality of an open-ended response. While the quality was significantly associated with an independent rating of importance, we acknowledge that low levels of consideration could be in part due to busy professionals lacking time to write a thorough answer. Our findings are also somewhat limited to web-based technologies; most respondents discussed accessibility in the context of the Internet. Moreover, only a few respondents indicated that they considered accessibility in other types of

computing technologies, e.g., videogames (2%, $N = 3$) and touch screens (1%, $N = 1$).

4.5.2 Future work

Since this work did not specifically address why considerations for accessibility were often limited in scope, we would like to explore reasons in more depth, this includes an analysis of how accessibility is addressed in current HCI/UX academic programs. A better understanding about how academic programs handle teaching accessibility concerns has the potential to expose barriers that currently prevent academic organizations from implementing accessibility in their programs.

Additionally, we plan to expand our sample to include a greater number of professionals who work in non-web-based ICTs. While the Internet is a vital consideration, applications for touch screens and mobile computing devices will be increasingly important.

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