

The background of the slide features a repeating pattern of four accessibility icons: an eye, a person in a wheelchair, an ear, and a mouth. These icons are arranged in a grid and are rendered in a light gray color against a dark gray background.

Accessibility in Design Education

Peter Cederberg

Person in wheelchair cover graphic
(Hendren, 2016)

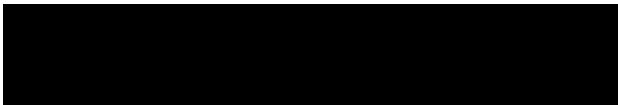
ACCESSIBILITY IN DESIGN EDUCATION

**A thesis submitted to the School of Design,
Carnegie Mellon University,
Masters of Design in Design for Interactions**

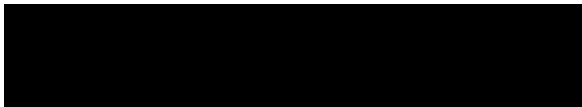
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ABSTRACT

Accessibility, while largely recognized as important, is not thoroughly explained or practiced within modern design education. This has resulted in a number of issues regarding inaccessibility and a misunderstanding of disability in the professional field as well as academia. This thesis investigates through literature/artifact reviews, surveys, and interviews in order to understand the values and impressions of designers as it relates to accessibility and the careers of the designers. Through this research I was able to identify a number of issues faced by professional designers, design educators and students who aim to work in user experience/user interface (UX/UI) or a related field after graduation. Some issues arose from the mindset of participants while others were the result of gaps in knowledge and skill that were compensated for in a variety of ways. I then synthesized the information I gathered from my research and applied it in the creation of a number of concepts for shifting designers' mindsets, as well as tools to aid in reflection/learning. I have documented a number of ways that these concepts could be applied and expanded upon in future research to further shift the design community towards considering digital accessibility.

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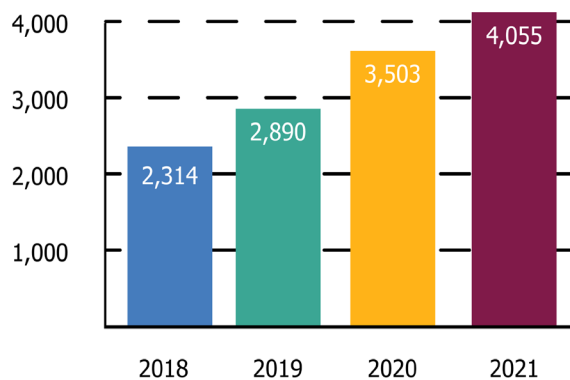


Fig. 1 Annual Number of Web Accessibility Lawsuits (Taylor, 2021).

INTRODUCTION

During the course of undergraduate students' design educations it is likely that they have been introduced to the concept of accessibility. If they have, it is likely that these students have learned that accessibility is an ethical part of the design process as it provides people who otherwise may have difficulty with or be unable to access products and services (Peters, 2010, p225). These talking points are often followed by the fact that accessibility is legally reinforced within the US and that noncompliance may lead to costly lawsuits and/or redesigns (Holmes, 2018, p127). Students may even have learned that making products and services accessible is economically wise as 15% of the world's population has some form of disability (approximately one billion people), it is good for public representation and proper tagging helps with search engine optimization (Holmes, 2018, p124) (WHO, 2011) (Kalbag, 2017, ch.3 Determine the Gap). For these reasons students are taught that accessibility is a foundational part of design that should be referenced throughout the process.

However, many students have graduated from school without the necessary skills to create accessible products or recognize situations where accessibility may be an issue (Holmes, 2018, p57). The result has been annual record breaking numbers of lawsuits regarding accessibility compliance and 98% of the top one million websites on the internet have not met full accessibility standards (Fig. 1) (Taylor, 2021) (WebAIM, 2022). It is with this foundation that I began to explore the problem space of accessibility in design education in my thesis project from August 2021 to May 2022.

CONTEXT

Accessibility can be broadly defined as, “the quality of being suitable or adaptable for use by people with disabilities.” (Dictionary, 2022) The World Wide Web Consortium (W3C) narrows this definition for the context of the internet by stating, “web accessibility means that websites, tools, and technologies are designed and developed so that people with disabilities can use them.” A list of requirements both high level and granular follow this definition to detail out their standard of excellence. This definition has been further narrowed within the context of this thesis to primarily focus on computer based, UX and graphic user interface (GUI) designs that are usable by people with disabilities (Fig. 2).

When referring to design education, this thesis is primarily focused on the education of undergraduate students who intend to work as UX/UI Designers or a closely related profession after graduation. This thesis sought to find out more about the design and human computer interaction (HCI) programs within Carnegie Mellon University as well as the working environments of professional UX/UI designers. The primary participants of this research were professional designers, design educators and undergraduate students all of which work with or intend to work with UX/UI design or a closely related field. The research involved in this thesis aimed to learn about participants’ thoughts, experiences and values regarding accessibility. These findings were then used to draw attention to the lack of accessible design practices taught in design education. I was also able to identify a number of other issues both technical and cultural in nature. These issues were developed to address the four particular problem spaces that I identify

ACCESSIBILITY

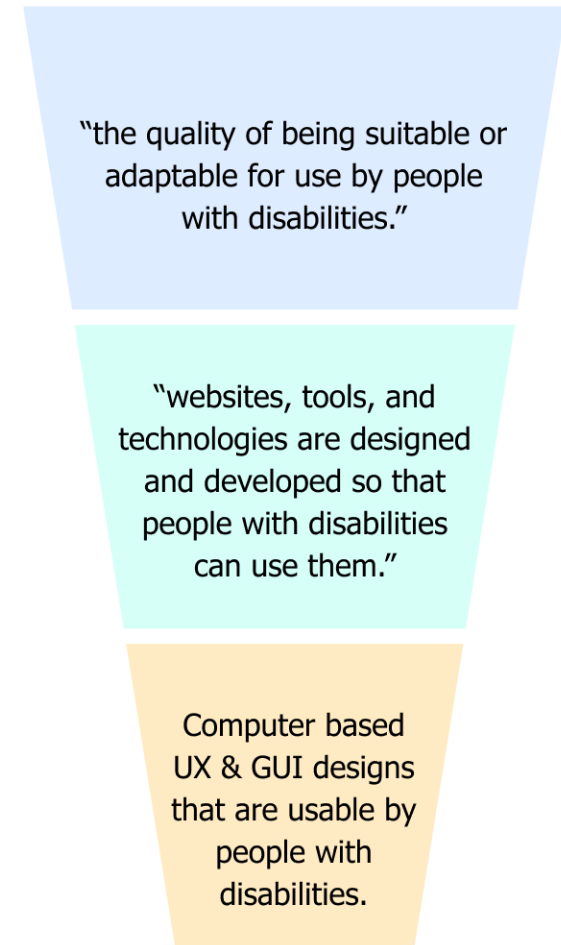


Fig. 2 The narrowing definition of accessibility for the purposes of this thesis.

as: the separation of accessibility from foundational design practices, designers' conceptions of disability being influenced by cultural stereotypes, designers feeling unsure of where to start with regard to accessibility/finding the subject intimidating due to its vastness, and the tendency to think about accessibility guidelines in binary terms such as a checklist. These findings supported the creation of various approaches and prototypes that aim to influence designers' mindsets and processes by addressing these areas.

DESIGN PROCESS AND APPROACH

Throughout my thesis, I conducted exploratory research to understand the problem space and gather the thoughts and impressions of my research participants. This was accomplished via reading relevant literature, attending industry lectures/events, as well as conducting multiple surveys and interviews. After synthesizing this information, I began the generative stage of my research, which consisted of using various frameworks to aid the synthesis of the information I gathered and inform my initial ideation. From this work, I honed in on four key pain points that warranted addressing. Then I continued the process of ideating and developing prototypes as well as approaches to shifting participants' mindsets. With these creations, I made plans to move into the evaluative phase of my work, testing these designs with users to gauge initial efficacy and impressions. Informal evaluative research was accomplished to assess initial impressions of the developed concepts to lay the groundwork for future research and testing (Fig. 3).

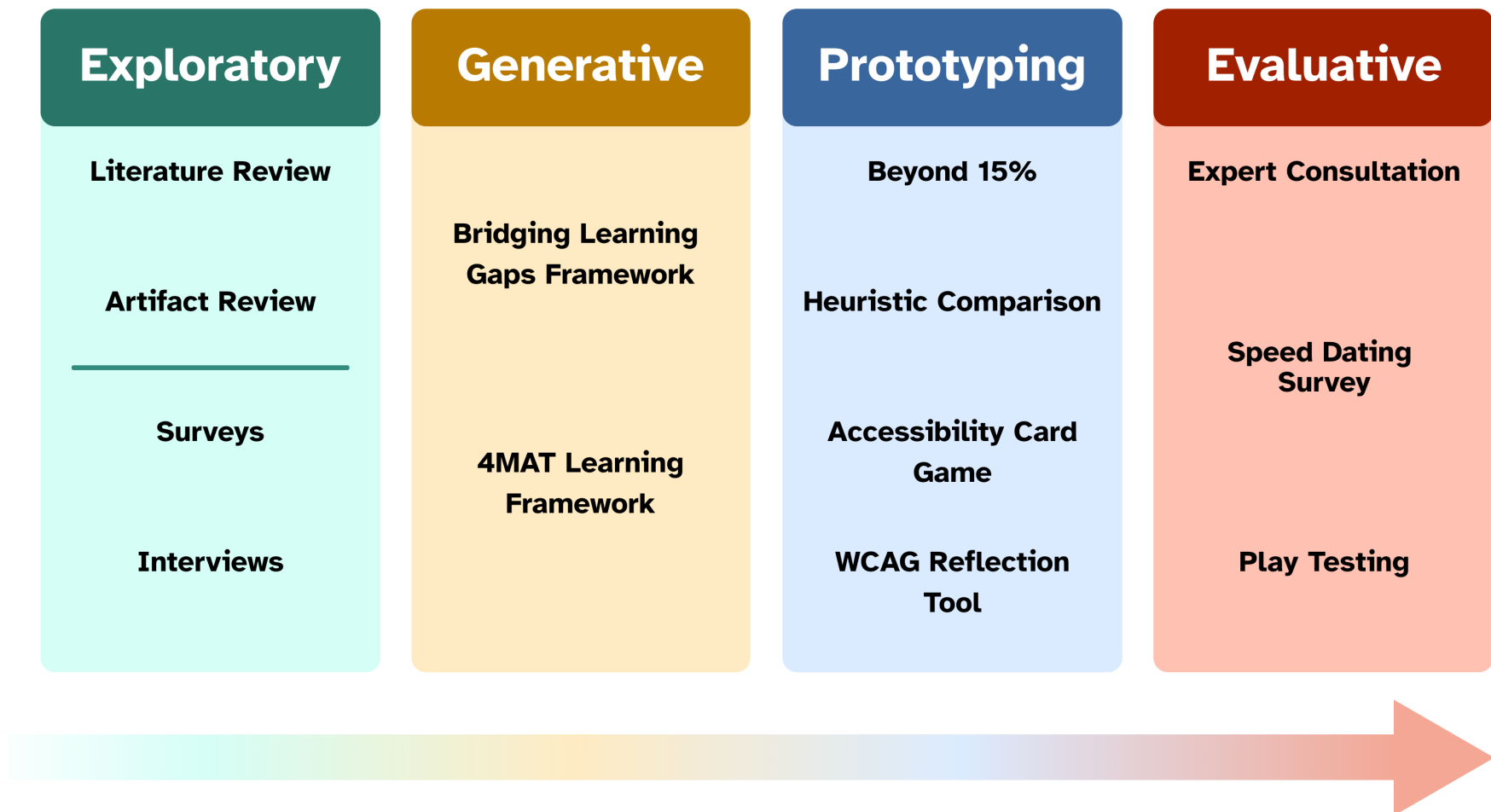


Fig. 3 The design process detailed, starting with exploratory research, next generative research, then prototyping and finally evaluative research.

EXPLORATORY RESEARCH

I conducted literature and artifact reviews as a way of building a base of knowledge from which to refer throughout this process. My inquiry consisted of books, academic articles, independent writings, lectures/events, curriculums and novel artifacts that all spoke to accessibility or education in some manner. While my reviews do not comprise an exhaustive list of everything compiled to support this thesis, they highlight resources that were particularly impactful.

Throughout this research process I was able to attend a number of lectures and conferences regarding accessibility. These resources provided exposure to the ways that speakers talk about accessibility and introduce it to designers who have limited former knowledge of the subject. These talks were often inviting in tone and remained both casual and professional as the speakers progressed. They also helped reinforce common statistics/talking points for introductory advocacy. I was exposed to many advocates that had built a distinct name for themselves in the world of accessibility. Speakers like Lainey Feingold, were pivotal to my research experience as they engaged with contentious subject matters (in the case of Feingold, it was prelitigation negotiations) in a way that made it easier to engage with. While the threat of being sued can feel daunting, Lainey presents a less combative way to resolve the issue than what is typically seen through what she has coined as, “structured negotiations” (Feingold, 2022). I was also exposed to activists such as Liz Jackson, who craft compelling arguments about disability and society. Some of her most prominent arguments have been speaking out against those who look to a future

without disability as it can be seen as a continuation of the historical trend of trying to erase people and cultures that involve disability (Jackson, 2019). Jackson is also critical of the way students are trained to create accessible products which in an academic setting have led to well intentioned but poorly researched/understood “disability dongles (Jackson, 2019).”

Throughout this thesis, I was also exposed to a number of academic papers that helped shape my thinking with regard to modern issues in accessibility and the ways that people proposed solutions in the past. A prominent theme I recognized which was also spoken to by Liz Jackson was the connection between accessibility, usability and aesthetics (Jackson, 2019) (Mbipom, 2009) (Yusof, 2010). I also valued research and documentation into the state of accessibility in education, both as a topic and as a means for students to participate (Zhao, 2020). Kristen Shinohara and her associates at RIT were especially influential in this regard given the body of papers they have published on these topics. Shinohara performed a number of studies both into students and faculty in computer science to understand their perceptions and practices as they related to accessibility. She has also researched different methods for how accessibility was taught as well as the difficulties a higher ed student with a disability is likely to face when studying topics in computer science (Shinohara, nd.)(Zhao, 2020)(Conn, 2020).

LITERATURE REVIEWS

Understanding the Motivations of Final-year Computing Undergraduates for Considering Accessibility

Paula Conn, Kristen Shinohara and Associates (2020)

Conn, Shinohara and their associates examine the many factors that may have encouraged or dissuaded senior students in computing from further pursuing the subject of accessibility. They conducted a survey of 114 senior computing students and 16 semi-structured interviews. The findings of her work indicate that there may be short term benefits gained from current educational methods and interventions but there was no correlation to any long term pursuit of developing accessibility skills. Students cited that they did not see accessibility as an essential skill in their computing degree programs (Conn, 2020, p3). They did not view accessibility as important beyond compliance when discussing furthering their skillset. Some were dissuaded from pursuing accessibility further due to a lack of emphasis on it in an internship context and the tendency to treat it as an afterthought during the design process (Conn, 2020, p10). Students were also not motivated by the theory and disability history behind accessible practices. While students recognized these topics were still important they preferred hands-on topics that could be directly applied to their work (Conn, 2020, p14). While many students had preferences for the type of teaching method or subject matter, it has been noted by Shinohara that these teaching

methods did not address the root problem of continued engagement beyond teaching (Conn, 2020, p19). A potential next step then posited by the authors is the integration of accessibility into computer science curriculum beyond a one off learning experience or lecture for further reinforcement.

This academic article has many similarities to my own research in this thesis. We have both strived to understand what students' perceptions of accessibility are as it relates to school and their careers. If the findings from this study can be applied to design students then this would help provide a broader perspective on the research that I have conducted. For the two students in this study, who were pursuing accessibility further in their careers, mentorship from experts in accessibility and extended impactful exposure to people with disabilities served as primary motivators. These motivators could prove useful in promoting accessibility education. In contrast, the factors that are motivating computer science students away from studying accessibility may need to be addressed or reframed through designed concepts. Through utilizing a balance of extrinsic and intrinsic motivations there is an opportunity to create a wide variety of tools, artifacts, and interventions that foster accessibility learning (Conn, 2020, p17).

Who Teaches Accessibility? A Survey of U.S. Computing Faculty

Kristen Shinohara and Associates (2018)

Shinohara and her associates at University of Washington detail a widespread survey of over 1,000 people to understand who has taught accessibility in U.S. computing areas, what were their considerations, and what were the challenges they encountered. Of all of the people who taught accessibility, educators were twice as likely to have been female, have expertise in HCI and software engineering, and to know people with disabilities (Shinohara, 2018, p197). One of the largest barriers for people teaching accessibility was the teachers' lack of knowledge on the subject. Of all the 1,857 people surveyed, only 17 identified themselves as accessibility experts (Shinohara, 2018, p201).

This article relates to my thesis in a number of ways. If mentorship and extended exposure to people with disabilities is deemed an essential part of people wanting to pursue learning about accessibility, as was discovered in *Understanding the Motivations of Final-year Computing Students for Considering Accessibility*, then there would be an issue that there were only 17 people who identified themselves as accessibility experts as it may point to a lack of mentorship in higher ed (Conn, 2020, p17) (Shinohara, 2018, p201). This is not to say that one must be an expert in order to be a mentor but that this lack of expertise paired with educators' fears of teaching students the wrong thing points to a neglect of the topic of accessibility. Additionally, the educators included in the study knew people with disabilities, which is stated as is another key factor in long term adoption of skills and requires further confirmation in my own research (Conn, 2020, p17) (Shinohara, 2018, p199).



Fig. 4 The habit forming cycle (Clear, 2018, p50).

Atomic Habits

James Clear (2018)

Clear documents the various ways that people create and break habits as well as strategies to influence them. The way that humans think and act has been impacted by any number of factors including physical environment, relationships and culture. Acknowledging these neural pathways and developing plans to strengthen or break them, has been difficult yet necessary for many to achieve long term success. A habit can be seen as a trigger, followed by a thought/craving, then the action itself and the desired reward (Fig. 4)(Clear, 2018, p50). To strengthen or weaken these habits one must be able to affect how visible the trigger is, how desirable the thought/craving is, how easy the action is to perform and how enjoyable the reward is. While it is not essential to change every one of these steps, they are the building blocks on which a habit is formed.

As previously stated, while accessibility may be introduced to design students during their education it is not integrated in the design process. Habit forming is a tool that can be utilized to aid in restructuring foundational design educations and design methods. When the design/research process is broken down into steps, (ex. exploratory, generative and evaluative) each of these steps and or unexpected changes to the design process could be considered a trigger (the first stage of a habit) where accessibility could be considered if the student is primed to recognize it.

Design for How People Learn

Julie Dirksen (2012)

Dirksen covers a variety of ways for approaching teaching based on the subject matter and people's extrinsic and intrinsic reasons for learning. When designing experiences for learning, it is important for the designer/instructor to know if their audience is encountering knowledge, skills, motivation, environment, and/or communication gaps (Dirksen, 2012, ch.1 Identifying and Bridging Gaps) as each can play a role in learners' understanding, motivation, retention, and engagement. The educator's job would then be to engage with these gaps in a manner that activates the learner but isn't so challenging as to overwhelm them (Dirksen, 2012, ch.2 What is Their Current Skill Level?). Oftentimes this can be aided by considering the motivations and goals of the learner. While extrinsic motivations certainly play a role in a learner's efforts, intrinsic motivations have shown to be more effective in lasting effort.

Recognizing and developing effective methods for educating learners about accessibility has been a core part of this thesis. Furthermore, as many designers recognize that accessibility is important but do not actively practice it in their work, it can be hypothesized that there is a motivation gap present for current designers in the field (Dirksen, 2012, ch.8 Motivation To Do). Designers who do not feel that accessibility is emphasized in the workplace may experience an environmental gap (Dirksen, 2012, ch.3 Determine the Gap). Educators who do not feel comfortable guiding students in projects that involve accessibility may be experiencing a mix of knowledge, skill, and/or communication gaps. Strategies for addressing these situations as well as resources for

further learning are made available through this reading. While I agree with Dirksen's assessment of intrinsic motivators over extrinsic motivators I believe it is essential to develop a balance of both in this problem space given the fact that there are both extrinsic and intrinsic demotivators present when considering accessibility in design education (Conn, 2020, p17).

Mismatch: How Inclusion Shapes Design

Kat Holmes (2018)

Holmes describes the various ways that the created world around is misaligned with the bodies and minds of its users. This book sheds light on many of the primary misconceptions regarding disability and introduces common pain points that people face when interacting with or considering accessible, inclusive and universal design. Common points for arguing for inclusive design include its tendency to drive innovation, a widened customer base, and increases in the amount of general feedback given (Holmes, 2018, p124). This book speaks to these benefits as helping avoid the extremely costly process of redesigning a platform that has not been not in compliance with accessibility standards. Designers have also found themselves in positions of authority and expertise when designing accessible products when a codesign approach may have been warranted. As such they often use design as a prescription, "treating," the users as people in need of saving or worse, statistical abnormalities in the process (Holmes, 2018, p76,103). There is still much uncertainty within designing for inclusion as trying to design for everyone often results in a design that serves no

one (Holmes, 2018, p96). This is exemplified in history through measuring normalcy with a bell curve and even going as far as eugenics (Holmes, 2018, p94). The balance of user needs both broad and narrow has been a key tension between universal, accessible and inclusive design that must be considered for designs to successfully support their target users (Holmes, 2018, p56)

This book was relevant to my thesis as it served as a primer for orientation and advocacy for designers working within inclusive spaces. Resources are listed to avoid exclusive design and arguments are given to aid in advocating to peers about the values of pursuing inclusive design (Holmes, 2018, p89). In terms of early orientation for designers as to the values and common mental pitfalls in designing for accessibility, this was a resource that I referenced time and time again throughout the thesis writing process (Fig. 5).













	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver
Hear	 Deaf	 Ear infection	 Bartender
Speak	 Non-verbal	 Laryngitis	 Heavy accent

Fig. 5 Different types of disabilities (Microsoft Design, 2016).

What Can a Body Do?

Sarah Hendren (2020)

Hendren speaks to many of the core tenets of accessibility and inclusion through the lived experiences of those impacted. Through these stories, various issues of balance are raised for the reader to consider. When should accessibility be visible, when should it be invisible, and what were the social implications of each depending on the context (Hendren, 2020, p199)? When does assisting someone with different needs become infantilizing or disempowering to the user when the opposite is intended? Should designers create bespoke products that are specifically tailored for a singular person or should they be designed more generally to conserve cost and time (Hendren, 2020, p89)? The point is also raised that too often designers have assumed they know what is best for the people for whom they design (Hendren, 2020, p10,77,89). Much like what is described in Mismatch, the presumed expertise of designers has led them to “treating” their users when codesign would have been a more fruitful tactic.

By raising these questions and highlighting the importance of collaboration with users, a more considerate approach to working within accessibility can be made. People with disabilities are people first and this book makes this fact abundantly clear (Hendren, 2020, p179,189). Mismatch crafts a skeleton for considering accessibility and Hendren’s book serves as the flesh that helps bring these messages to life. Both served as the foundational thoughts from which I have built my thesis with regards to general accessibility.

Accessibility for Everyone

Laura Kalbag (2017)

Kalbag offers a comprehensive breakdown of the practical things one can do to create and advocate for greater accessibility. Traditional subjects such as assistive tech and the ADA are touched upon (Kalbag, 2017, ch.7 National Federation of the Blind v. Target Corporation). Subjects such as designing for different cultures/languages and why it can be problematic to use legal compliance as the first point of argument are also highlighted (Kalbag, 2017, ch.2 Languages) (Kalbag, 2017, ch.4 Color) (Kalbag, 2017, ch.7 The Legal Landscape). While the thought process and ethics of inclusive design are emphasized in this book, the main focus is on practical actions that can be taken.

This book sheds light on a myriad of ways that people can design with accessibility as a consideration. This book has been applied in my thesis as a reference of methods and areas of need. Of a particularly unique note was Kalbag's breakdown of leveraging the legality of accessibility when advocating. While the threat of a lawsuit is often a primary driver for many companies to consider accessible design practices Kalbag offers that this assumes the heartlessness of the recipient of this message. Instead Kalbag recommends more life affirming advocacy such as the ethical and practical benefits of accessibility (Kalbag, 2017, ch.7 The Legal Landscape) (Kalbag, 2017, ch.1 Excuses, Excuses).

**The people who want to see
“the business case.”**

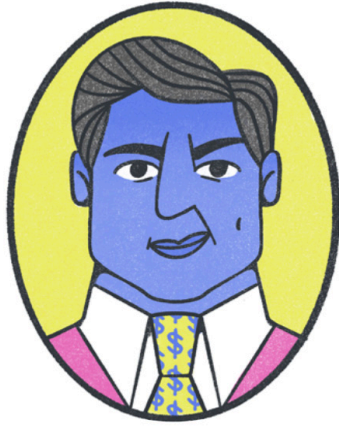


Fig. 6 Business case persona from *Giving a Damn About Accessibility* (Byrne-Haber, 2021, p11).

ARTIFACT REVIEWS

Giving a Damn About Accessibility

Sheri Byrne-Haber (2021)

Byrne-Haber created a, “candid and practical handbook for designers considering accessibility” (Byrne-Haber, 2021, p1). In this handbook, the common arguments for and against accessibility in the workplace are introduced. They are represented by charming caricatures (Fig. 6) of talking points to aid in retention (Byrne-Haber, 2021, p9). The difficulties of first beginning to design with accessibility in mind are also covered in this handbook. Most of a designer’s early attempts at accessible practices are going to have issues, which should not dissuade designers from trying (Byrne-Haber, 2021, p26). Bad accessible designs are better than designs without any consideration for accessibility so long as the designer keeps attempting to improve.

This handbook was a fantastic example of accessibility advocacy done well. The writing is grounded in facts and speaks to real issues in the workplace while remaining engaging and fun in tone. Many other resources note talking points to advocate for greater accessibility without taking into account the pushback that will inevitably happen at some point in the workplace. This novel take on accessibility advocacy helped develop the message and experience that I deemed important to share in my thesis. This was also the first example I have seen where the inevitable failure of early accessibility attempts is addressed.

How to Design for Accessibility

Liz Brown

Brown has created a 9 hour long course for UX Designers that are seeking to design for Web Content Accessibility Guidelines (WCAG) 2.2 compliance that is hosted on the website Udemy. This video course is packed with resources from many different sources regarding the technical and social aspects of accessibility. Liz Brown relates her own design experiences to the material to ground the lessons with real world examples. At the end of the course, Brown also provides a list of seven topics that aren't included in the course that serve as a good place to continue learning about the subject. While the course does provide a lot of practical information and strategies for improvement the quizzes at the end of each chapter are fairly easy, which may hinder its effectiveness as a tool to aid retention (Brown, nd.).

This course was an example of accessibility education done right. Liz Brown has a likable personality and makes the learning process enjoyable throughout. The sheer amount of material covered in her course is impressive and each topic is approached as if the learner is about to perform it in their workplace. Each chapter is also closed with a checklist of actionable steps that the learner can take with them as a tool to aid in their practice (Fig. 7). This work was referenced as a standard of clarity and polish in educational experiences throughout my thesis.

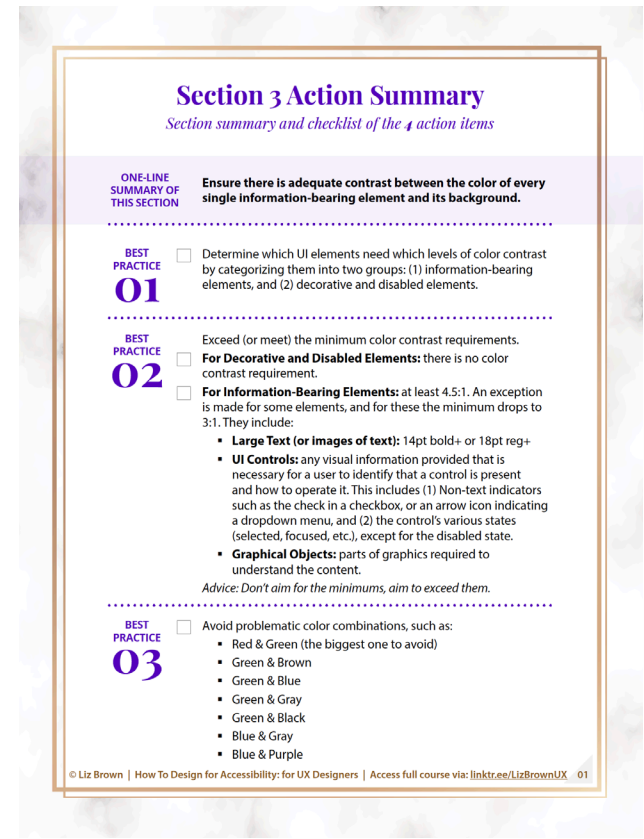


Fig. 7 Action Summary from *How to Design for Accessibility* (Brown, nd.).

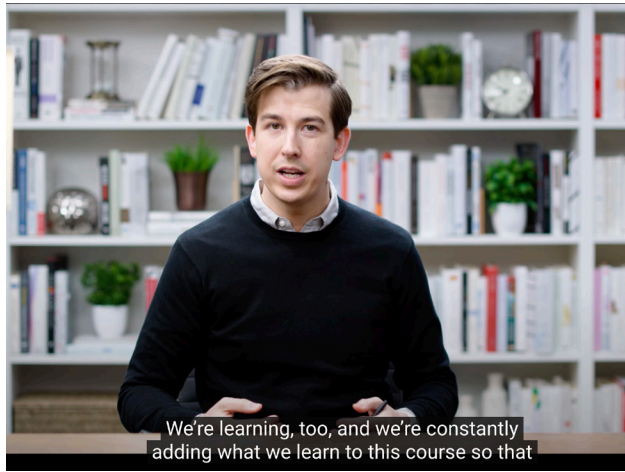


Fig. 8 Screenshot of instructor from Udemy making a disclaimer (Webflow, nd).

Accessibility on the Web

Webflow

Webflow created a 32 minute-long series of videos that guides accessibility practices on their platform. In this program they highlight the various tools within the program that can be used in design such as alt text, a WCAG contrast checker, and multiple color blindness simulators (Webflow, nd). Webflow claims that this course is a living document that will be expanded as they learn more (Fig. 8) (Webflow, nd).

This was an example of accessibility with ulterior motives, which I believe creates an ineffective learning experience. While this course does have a structure and materials that they direct users to throughout the course falls short in educating their users about accessibility, especially in comparison to the amount of material that they provide on other subjects within their university. I found this course to function more as a sales pitch of Webflows features rather than an attempt to speak to accessible design at large. While an understandable motive, this shallow teaching undercut accessibility learning as a whole and raised further questions as to what responsibility web building platforms have for educating their users on how to build inclusive websites. If a website construction and hosting platform such as Webflow or Squarespace or any competitor is making it easier for casual users to make websites, then how much responsibility does the accessibility of that website rely on the service provider versus the customer building their website?

Accessibility Maze

Ryerson University

Accessibility Maze is a short digital game created at Ryerson University that introduces players to basic accessibility principles. The game is also used as an empathy tool but may be difficult for users to empathize without experiencing barriers first hand (Karasyov, nd.). Basic concepts such as the importance of alt text, ensuring buttons and form fields are labeled properly, pausing or slowing down timed content, and interactive features needing multiple methods of operation are all touched on in a playful manner that enables users to experience and solve the barrier themselves. This game garnered a large amount of praise when it was first released and was awarded the Web For All Accessibility Challenge Award of 2021 (Karasyov, nd.).

The Accessibility Maze is an example I enjoyed referencing as it took many core concepts of digital accessibility and presented them in a parsable way for players to understand. Accessibility has sometimes felt like a complicated or difficult subject to approach, so methods that can help with that introduction have a novel value. Based on my experience playing the game I do not believe it succeeded as a tool to help with empathy as it claimed. While it certainly did succeed in conveying digital accessibility barriers I do not believe this translates to empathy for users with disabilities in a concrete fashion. While I took inspiration from this game, the storybook delivery of the narrative and bright/cartoonish visual motif of this game came across as something well-suited to very young children (Fig. 9-10). I believe this approach may actually have hurt the game from reaching a wider design audience.



Fig. 9 *Accessibility Maze* title screen (Karasyov, nd.).

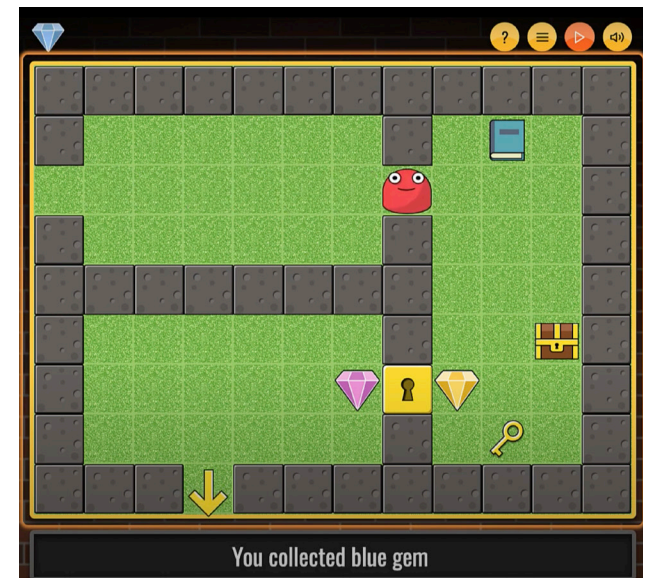


Fig. 10 *Accessibility Maze* gameplay screen capture (Karasyov, nd.).

CPACC Certification and Course

Certification By IAAP, Course By Deque

Certified Professional in Accessibility Core Competencies (CPACC) is a credential provided by the International Association of Accessibility Professionals (IAAP). This credential covers a wide range of foundational accessibility knowledge (CPACC, 2022). Topics covered include accessibility, universal design, situations calling for accommodations, and laws related to accessibility. Learners working to earn this credential can gain support through a course provided by Deque (Deque, 2013). This course takes the IAAP *CPACC Book of Knowledge* and goes further with quizzes, videos, and additional resources for reference.

For part of my exploratory research, I took and passed the CPACC exam. The experience helped me grasp what a baseline knowledge of accessibility may look like in a professional scenario as opposed to one that is purely academic. While not comprehensive, this resource helped me appreciate the interviews I had with professional designers and the maturity of their design systems in integrating accessibility. All of the information included is not relevant to the learners I targeted as some material is tied to the design of physical environments and buildings, which was not the focus of my study. *The CPACC Book of Knowledge* also only dedicates a single page to disability etiquette. After conducting my primary research this I found that this is a troubling area that needs development for designers. Being able to communicate/work effectively with people with disabilities is a key factor to success, the absence of which, has supported the creation of inaccessible products according to participant testimony.

EXPLORATORY INQUIRY

After building a base of knowledge on this topic, I began conducting an exploratory inquiry with professional designers, design educators, and design students (Fig. 13). Although the questions I sought to answer varied by research participant group, I made sure to assess familiarity with accessibility in all groups to establish a general measurement of the problem space. Every participant group was asked during a survey and/or interview if they had a close relationship with one or more people with a disability. The aim of this question was to identify a positive correlation between desire to expand accessibility skill sets and close relationships with people with disabilities. This line of questioning was to further attempt to test the correlation pointed out by Shinohara and her associates in their research with computer science students (Conn, 2020, p17).

For professional designers I aimed to learn when, if ever, they transitioned to incorporating accessibility into their practice and what that process was like for them. I also strived to uncover other experiences working professionals had with accessibility, be it good or bad. Finally, I investigated if their workplace supported accessibility and if that influenced their actions and considerations in any way (Fig. 11-12).

When researching design educators, I recorded if/how they transitioned into considering accessibility. I sought to understand how the dynamics of academia may play a role in their teaching and how educators may help students who are curious about accessibility (Fig. 14-15).

Professional Designer

Question Summary (Part 1 of 2)

Demographic Questions

What is your job title?

How long have you worked in this industry?

Did you receive education (formal or informal) that is relevant to this industry?

Would you please give me a snapshot of what you do in your current role?

Accessibility Questions

Do you consider accessibility in your design practice?

Is accessibility important to your work?

Do you personally have a relationship with anyone with a disability?

Through your education and career did you learn about accessibility?

(if they apply it to their practice) Was there a gap in time between your learning about accessibility and adopting it into your practice?

Fig. 11 Professional Designer Question Summary (Part 1 of 2)

Professional Designer

Question Summary (Part 2 of 2)

How was the process of integrating accessibility considerations into your practice?

Would you share an experience you had where you considered accessibility in your design work that went well?

Would you tell me about a time that it did not go so well?

How is accessibility regarded in your company?

Do you or others within your company practice user testing/research? If so, do you include users with disabilities?

What is some advice you might want to pass down to designers entering into the field? Ideally regarding accessibility but you could speak to something else if you prefer.

For design students, I aimed to understand their hopes and expectations regarding their future careers as UX/UI designers. What benefits/features of working life are important to them and what skills are relevant to their careers? From there, I assessed their exposure to accessibility and if they felt it related to their careers in any way (Fig. 16-17).

In order to find answers to these questions I ran a series of research activities. To begin, I surveyed twenty design students at Carnegie Mellon University and thirty six professional designers. Then I set about interviewing ten professional designers and seven design educators in 45 minute sessions. These interviews were conducted over Zoom with the exception of one, which was carried out in an educator's office.

Hypotheses

I hypothesized that for many designers, the transition from passively knowing accessibility is important to actively using it in their design practice is not conducted in a manner that was as a result of any intentional planning. I suspected that a common scenario was that designers would go into work one day and be told that they neglected something that they were never taught. Further, I hypothesized that the unplanned adoption of accessibility is a potential place where resentment or denial may set in for designers.

Fig. 12 Professional Designer Question Summary (Part 2 of 2)

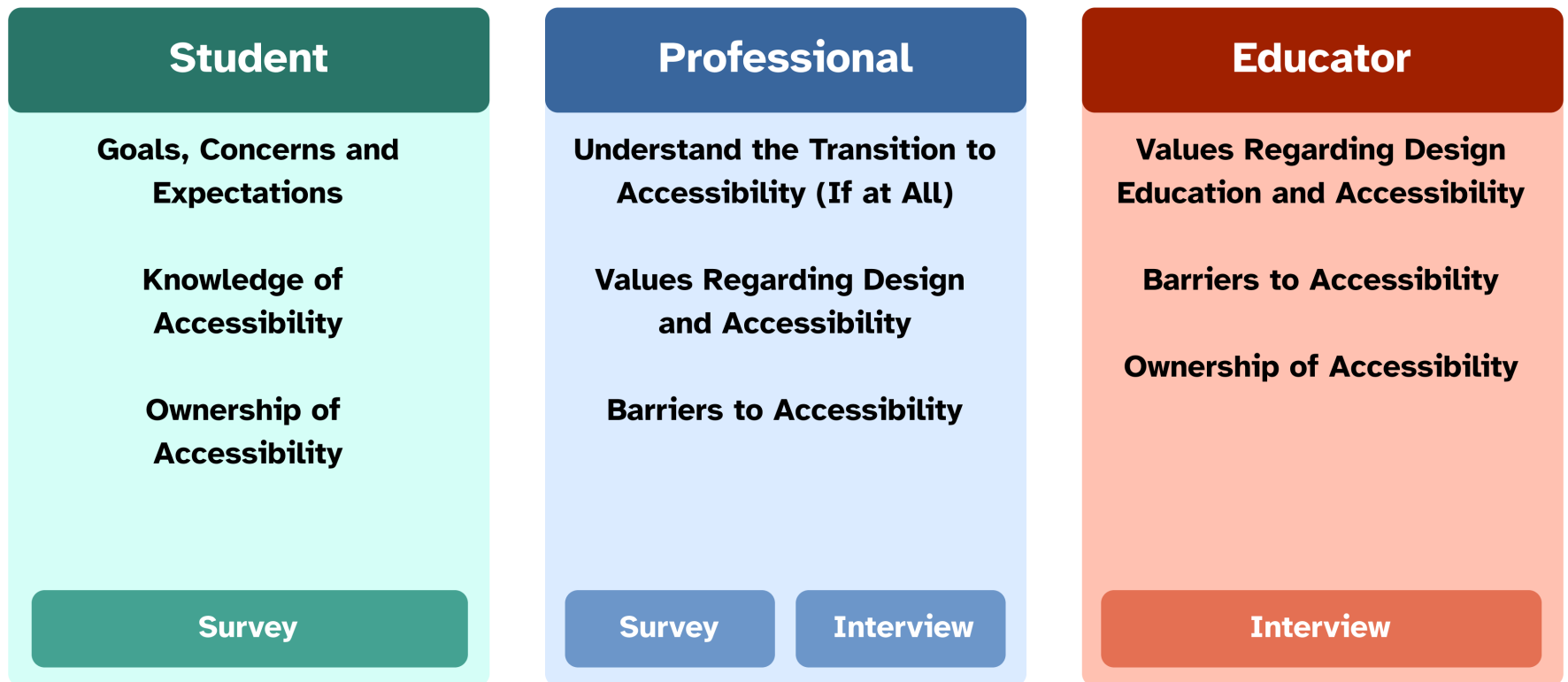


Fig. 13 The exploratory inquiry approach breakdown. Summarizing the key themes of inquiry and research methods to inquire about each type of research participants thoughts and values regarding the subject of accessibility.

Design Educator Question

Summary (Part 1 of 2)

(Fig. 14)

Demographic Questions

What is your job title?

How long have you worked in this industry?

Did you receive education (formal or informal) that is relevant to this industry?

Would you please give me a snapshot of what you do in your current role?

Accessibility Questions

Is accessibility an important component of the material that you teach?

Are there other considerations that are more important?

Do you personally have a relationship with anyone with a disability?

Through your education and career did you learn about accessibility?

For design students, I hypothesized that they may feel unsupported or lack confidence with their future careers. These feelings may lead designers to focus on aspects/skills in their jobs that they see as essential, which does not include accessibility (Conn, 2020, p10). I also hypothesized that students have had minimal exposure to, and thus a limited understanding of accessibility.

With regard to design educators, I posited that much like design students, they may not be well versed in accessibility, though they may have a firm grasp of its importance. As there is no apparent federal educational guideline requiring accessibility to be taught, I believe that the way educators' support students when discussing accessible design may warrant improvement. This cause is also echoed by organizations such as Teach Access which champion the cause of advocating to other academics of the need to teach with accessibility in mind (Teach access study away, 2022). This hypothesis is partially informed by the activism of Liz Jackson and her criticism of the, "disability dongles," that arise from class projects (Jackson, 2019). I then further posited that the feelings and actions of educators is not limited to Carnegie Mellon, but is prevalent throughout higher education as a whole. I came to this conclusion through my secondary research and exposure to programs such as Teach Access which speak to the lack of accessibility as a topic in education. My hypotheses provided me with a series of points of inquiry that I would then use to inform my later design solutions.

Fig. 14 Design Educator Question Summary (Part 1 of 2)

Synthesis Process

I began the process of synthesizing the collected data to find patterns. Using Google Forms, I calculated qualitative and quantitative information, such as which job benefits and skills were relevant to students desired futures, student majors, and exposure to accessibility. The data gathered from the surveys and the interviews was organized in Google Sheets and exported to Miro for further synthesis. This process enabled me to create several levels of affinity mapping and comparisons of different working situations. The visualizations helped me assess if the students' definitions of accessibility aligned to reality.

Design Educator Question

Summary (Part 2 of 2)

(if they apply it to their practice) Was there a gap in time between your learning about accessibility and adopting it into your practice or was it fairly seamless?

How was the process of adopting accessibility practices integrated into your practice?

Would you share an experience you had where you considered accessibility in design or teaching that went well?

Would you tell me about a time that it did not go so well?

Do you or others within your university practice user testing/research? If so do you include users with disabilities?

How is accessibility regarded in your university?

Would you say this is how accessibility is regarded in education universally? Please explain.

Fig. 15 Design Educator Question Summary (Part 2 of 2)

Design Student Question

Summary (Part 1 of 2)

What year of undergrad are you in?

After graduation do you plan to pursue a career in UX/UI or a related field?

What is your major?

What is your aspirational job title/s?

When thinking about this aspirational job, sort the following criteria from most to least important to you. (1 least - 7 most on 6 categories)

Please explain your rationale for your highest ranking criteria. (Write in)

How confident are you in being able to attain the criteria you listed as the most important? (1 least - 5 most)

How supported do you feel by others in your network and community in being able to attain the criteria you listed as most important? (1 least - 5 most)

Please rank these skills as most to least relevant to your career.

Fig. 16 Design Student Question Summary (Part 1 of 2)

FINDINGS

Professional Designers

Survey Findings

Designers new to practice (a year or less of professional experience) had a much higher percentage of considering accessibility throughout their careers than those more senior to them (Fig. 22). In terms of education, 86.1% of designers responding to the survey received some form of education before entering into this industry. 75% received this education from some form of college or university. Designers who had gone to a post bachelors program had a higher percentage of accessibility consideration than those with only a bachelors. When comparing users that have a close relationship with a person with a disability to those that do not, there was no effect on their percentage of adoption. While 91.7% of survey respondents said they considered accessibility in their work, 58.3% said that accessibility was not emphasized in their work environment.

Interview Findings

Designers interacted with accessibility on the job through training, working on a project involving disabilities or more likely, working with someone who had technical knowledge of the subject and had been empowered to uphold standards. While a small number of participants brought up the legal system as it related to accessibility and their work, this topic was not discussed at length.

There were many situations of concern reported by professional designers. The overarching sentiment was that companies did not conduct tests with users with disabilities. If they did, it was as a coincidence or result of the user group being in demographics where differing levels of ability were more common such as the elderly. When asked about the reason behind this, there was a trend of designers stating that they either didn't have any users with disabilities (externally and as employees), they couldn't find any users with disabilities or the tools being developed were internal and thus held to looser standards than a customer-facing product. One designer brought up a rebuttal to the statement that they had no employees with disabilities by stating that inside of a company, many may not feel comfortable disclosing that they have a disability. A designer asking for others to disclose this information could be an invasion of privacy.

The most prominent reasons cited by professional designers for not designing with accessibility in mind were either a lack of knowledge on the subject or accessibility not being prioritized in the workplace. The lack of prioritization was especially prevalent in interviews with designers who worked in startups: the sentiment in these workplaces was that designers needed to make the product work for their main customers first and that afterwards they could go back and add accessibility. While it was recognized that prioritization was a common point of tension, one designer did advocate for the designers' role as an intermediary in this prioritization process and suggested creating tools to help with planning and strategy. The only times mentioned where accessibility was placed as a higher priority was due to a lawsuit, buy-in from those holding higher positions in the company, or a severe technical error that forced the hands of those working at the company to

Design Student Question

Summary (Part 2 of 2)

Please explain your rationale for your highest ranking skills. (Write in)

Without looking it up, how would you define accessibility? (Write in)

Have you learned about designing for accessibility in school? Select all that apply (7 options).

Select the answer that fits your views best (5 options)

Please explain: (Write in)

Do you have a close relationship with one or more people with disabilities? (Yes/No)

Fig. 17 Design Student Question Summary (Part 2 of 2)

address it (Fig. 18-19). Buy-in from higher ups was cited as one of the most effective ways to help establish a framework for how accessibility is designed within the company. It also enables designers to dedicate time to tasks like developing a design system or going the extra mile to learn design plug-ins related to accessibility.

In terms of personal conduct there was a trend of designers feeling guilty or anxious and wanting to learn and apply accessibility concepts more extensively than was present in their practice. There were mixed responses towards the broadness of the topic of digital accessibility. Some designers saw this breadth as an opportunity that always provided something new to learn, while others felt uncertain if they were doing enough. Designers also expressed a general lack of knowledge regarding accessibility, which then reinforced the feelings of not knowing where to start.

Despite these feelings there seemed to be a genuine interest in the subject as it related to their work and in helping promote greater accessibility. Designers reported taking on internal advocacy within their organizations only to be ignored which was a point of friction. Since people with disabilities were often, “not encountered,” on a day to day basis, they are frequently not front of mind for companies. This perceived lack of presence made arguments to invest in accessibility more difficult.

Prioritizing Accessibility

Yes, there is a growing awareness of the need to include time within the software development cycle that specifically looks at inclusive design, code reviews, etc. Also, having more co-workers who have a visible disability has helped to put this at the forefront for more people within our organization.

We have a VP of Accessibility, 12+ Accessibility Engineers many of whom have visual impairments. I also make sure I champion it for my teams.

Yes - though I have had to fight for it. Working on internal products, many didn't see the point as we weren't required to do it. But for the use case (people working in the field in the applications I was working on), the accessibility items didn't only help people with disabilities, it helped in harsh lighting conditions too. Generally things that are more accessible are often more usable, but they can be less 'pretty' sometimes. This is usually where people struggle.

Not Prioritizing Accessibility

Not really. We worry about WCAG contrast but that's it. We do lots of quick and dirty testing to get new things out faster. We don't necessarily need to worry about specific disabilities when our software is designed for internal enterprise use

I guess that only companies aiming at wider audiences (meta etc) consider accessibility a priority

users of our app usually don't have disabilities; it is a b2b

Fig. 18 Specific selections highlighted from prioritizing accessibility testimonies.

Fig. 19 Specific selections highlighted from not prioritizing accessibility testimonies.

Discussion of Findings

Survey

Given the higher percentage of accessibility consideration in grad school students compared to undergraduates there is room for speculation as to the causes of this (Fig. 23). Accessibility was not generally taught in class but it has been a prominent subject in design research according to the examples cited in surveys and interviews.

It was surprising to find a lack of correlation between personal relationships with people with disabilities and the percentage of adoption (Fig.24). I found many examples in my secondary research of designers who created accessible products for loved ones and a small trend supporting this in the interviews I conducted but nothing beyond this. This lack of correlation also runs contrary to research done in the past by Kristen Shinohara and her collaborators when they were researching the considerations of computer science students. In Shinohara's previous work she was able to identify a link between close relationships with people with disabilities and that person's desire to continue to broaden their skillset as it related to accessibility (Conn, 2020, p17). I began wondering if there was an anchoring or availability bias affecting my judgment of the significance of these stories of designers motivated by their connection to people with disabilities. Certainly these relationships were a driver for very specific cases but since it was not supported by data what other drivers might affect the larger majority of people considering accessibility that do not know anyone with a disability?

It was encouraging to see the trend of newer graduates considering accessibility earlier in their careers. This may have indicated a trend in academia of accessibility gaining greater attention. However, as these designers were so new to the industry there is also a risk that what they thought of as accessible considerations may not have aligned with the expectations of the industry as a whole.

Interview

My initial hypothesis that the transition to including accessibility into design practice was not the result of intentional planning was substantiated through these interviews and survey. One surprising note, however, was the relative banality of this transition. While I had suspected that the transition might be an event of note for the designer as a result of legal enforcement, many couldn't remember the specific point in which they made the transition (Fig. 20).

A point of particular concern that I wanted to design for was designers/companies' perceptions that they did not have users with disabilities (Fig. 19). This perception remained a trend regardless of if the product the designers were working on was customer facing or internal. As I saw this trend emerging during the synthesis I was reminded of the rebuttal of that one designer. I agree that it is often not appropriate for a designer to ask the medical histories of their fellow employees or users. In fact if a customer or employee is put in a situation where they need to ask for special accommodations then their right to privacy is being put at risk. This is not to say that there is anything wrong with voluntarily disclosing this information should the user choose to.

What caused you to consider accessibility in your design practice?

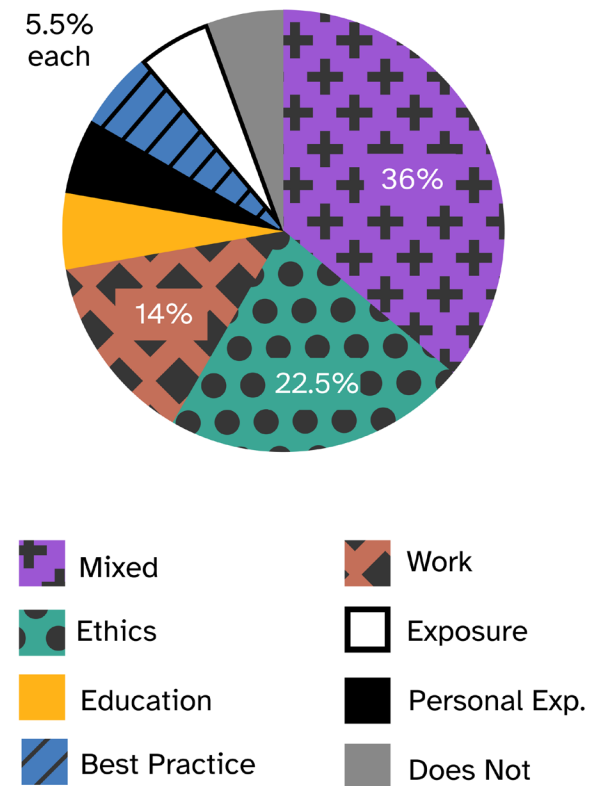


Fig. 20 What caused you to consider accessibility data visualization.



Fig. 21 Key of terms for the bar charts.

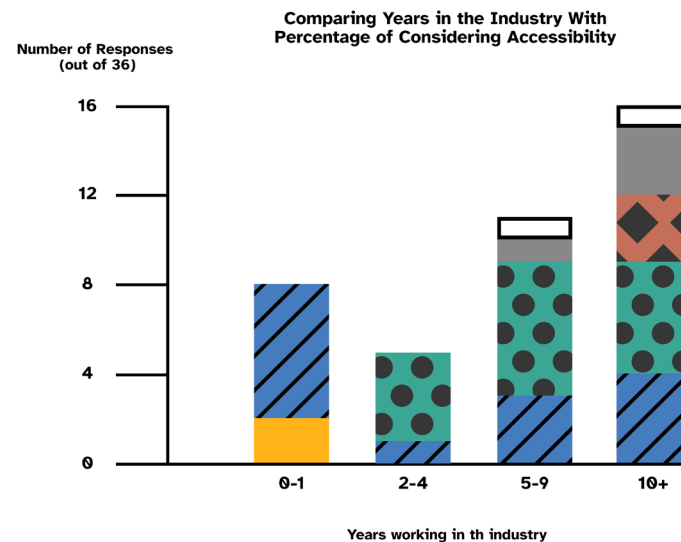


Fig 22. Comparing years in the industry with percentage of considering accessibility in the designers career.

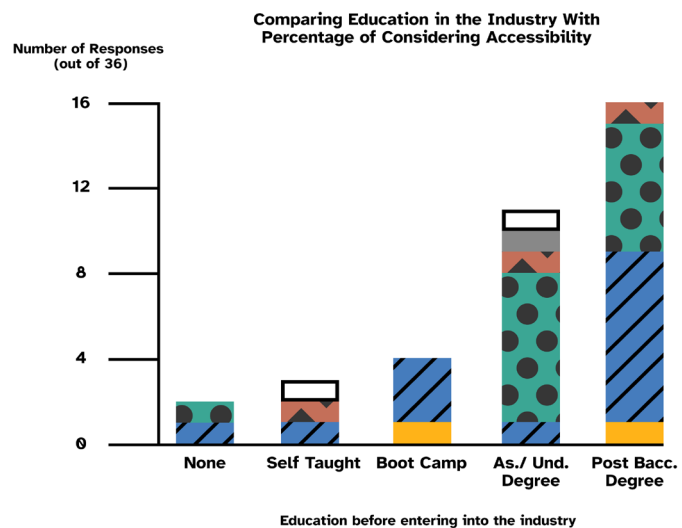


Fig. 23 Comparing relevant education with the percentage of considering accessibility in the designers career.

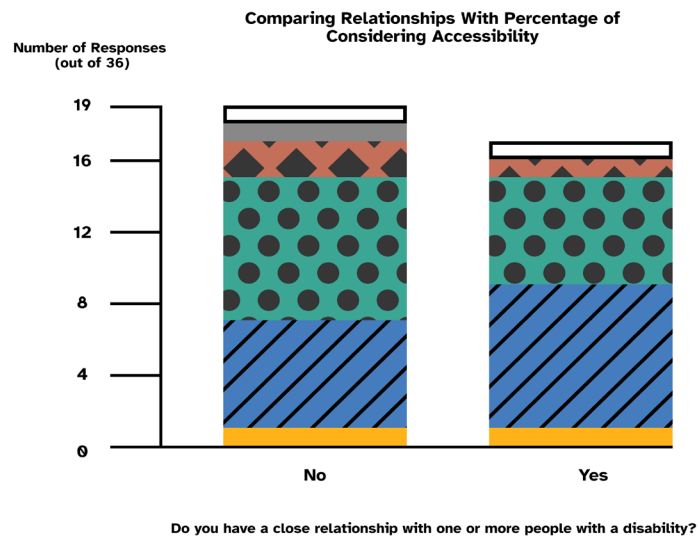


Fig. 24 Comparing relationships with people with disabilities with the percentage of considering accessibility in the designers career.

The issue is that for someone to receive aid they may need to disclose their medical history, especially to someone who is nowhere near a medical expert. Historically, situations of this type have been used to reinforce stigmatization against people with disabilities (Luc, 2022). Further, I would hypothesize that these actions unintentionally reinforce the misconceived helplessness of people with disabilities when they need to ask for the ability to access products and services that may be essential. At this point I began to draft and iterate more on how designers conceptualize disability and ability as a whole.

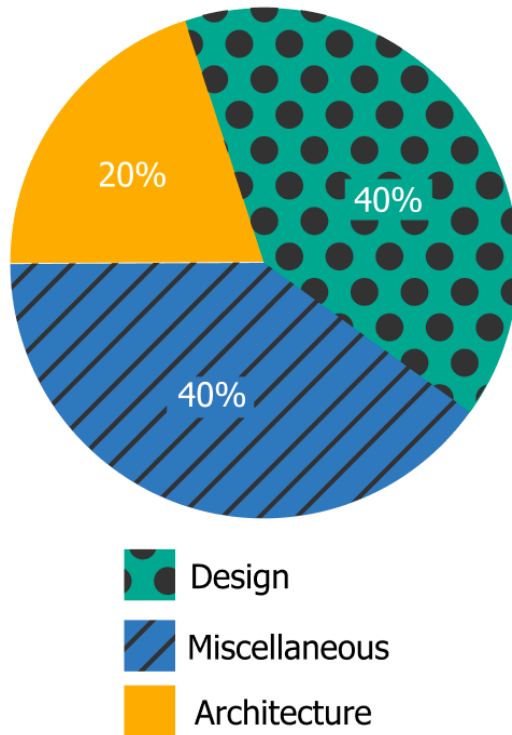
Design Educators

Interview Findings

Each educator interviewed indicated that accessibility was not a focus of the curricula that they taught. General perceptions from educators were that accessibility was not a high priority in curricula compared to other topics. In some courses, students were just trying to, “get the basics down,” while in others there was a greater emphasis on innovation. Some educators indicated that they were inheriting curricula and design methods from their predecessors, who did not include accessibility in their teaching as an additional barrier to adoption. Another trend that emerged was a lack of time, both for educators and their students, to perform the various tasks necessary in an undergraduate education, which impacts their ability to integrate accessibility or any topic deemed secondary into coursework.

This is not to say that educators don’t take action to support students even though accessibility is not explicitly taught. Some educators will make an effort to talk about accessible techniques when relevant in a

Educator Background



Comparing design educators backgrounds.

course even though it may not be in a curriculum. Some pose projects that can go in an accessible direction and let the students take it where they want. One educator said that they see their role as not an expert in accessibility but perhaps someone who can guide students to resources. Multiple educators utilize other topics as ways incorporate accessibility, such as universal design, design justice, and the way that we use different design tools. While accessibility may not appear much in the classes educators teach, there are many instances of students and faculty involving themselves in research focused on accessibility. These discoveries point to people's underlying interest in the topic even without the subject being consciously integrated into curricula.

There was a trend of educators gaining further exposure to accessibility through the accommodations needed for their students. These accommodations seemed to be related to mental health, needing extra time for projects and closed captioning for videos and Zoom calls. On the whole, educators reported that affording these accommodations were not a heavy draw of resources or effort. The educators also had support in these efforts from university departments specialized in providing accommodations. In the case of Carnegie Mellon this would be the Eberly Center and Disability Resources.

Four of the design educators interviewed explicitly said that accessibility should be integrated into the curriculum in some manner, or that tools and frameworks should be created for design rather than retrofitting frameworks that already exist. These tools should also work well with our goals of educating and designing accessible products and services, which reinforced the desire for redesigns.

Three educators interviewed also expressed concerns about the social aspects of designing for accessibility. Each of the three had examples of instances where either students or faculty had made decisions that unintentionally were problematic with regards to people with disabilities. The root cause of each of these issues was identified as a fundamental misunderstanding of the people for whom they were designing. People with disabilities were either not included until late in the design process or circumvented through simulations of the disability being designed for due to a lack of resources.

Interview Findings from Professional Designers and Educators

When both designers and educators were interviewed they were asked if they had a close personal relationship with someone with a disability. While the initial intention of this line of questioning was to determine any correlation in adopting accessible practices, I found some interesting responses. Approximately one third of the participants interviewed said that they did not have a personal relationship with anyone with a disability. Then after a pause, these participants began walking back their answers and listing various relationships they had with people who had various levels of ability. What they ended up recognizing was that when I asked that question, the participants began thinking of stereotypical depictions of disabilities. So while participants would qualify their statement by saying they didn't know anyone who was blind or in a wheelchair they did in fact know people with disabilities.

Discussion of Findings

Interview

From these findings, I began to reassess my initial hypotheses regarding educators and brainstorm ways of addressing some of the challenges that arose. While I had hypothesized that other subjects would take priority over accessibility I was surprised by the cognitive dissonance regarding teaching foundational design skills. If accessibility, as it is often introduced, is regarded as a critical component that warrants integration into the framework of design, then why is it currently separated from foundational design skills?

The exposure to accessibility that educators gain through accommodations for their students struck me as a potential opportunity for future conversations with educators about accessibility. While this line of inquiry was not further explored within the scope of this thesis I believe that it could be taken up by others in conjunction with the efforts of those at the Eberly Center and Disability Resources.

Social etiquette and inclusion of people with disabilities in the design process was a theme that I felt needed to be acted upon after hearing the problematic experiences that the educators related. Granted, recruiting research participants has always been a challenge in design projects, but in projects that include accessibility, it is more essential to the process than ever. People with disabilities have historically been the objects of design rather than the participants in the process. The disability community is a conglomeration of many groups of people whose voices have been overlooked except in the case of marketing and “inspiration porn” (Jackson, 2019) (TED, 2014).

What I found to be especially troubling was the ways that educators and professional designers' minds are being affected by stereotypes of people with disabilities. While I could not be entirely sure of the impact of this finding, I did hypothesize that common perceptions are correlated with designers' views of accessibility.

Design Students

Survey

When design students were asked to rank the job benefits that they perceived as most important to them, the two highest ranked choices were work/life balance followed by salary. There was a large gap before any of the other considerations with a small preference for developing new skills and honing old ones emerging. Students ranked themselves as a 3.5 out of 5 on being confident that they could get what they wanted in terms of benefits. Students ranked the support they felt from their community/network in reaching these goals as 3.3.

When students were asked which skills were going to be most relevant to their future careers, visual design, prototyping and communication were ranked as the highest by a clear margin (Fig. 25). Accessibility was ranked in the middle, while research, systems design, and coding trailed behind. When explaining their reasoning for their hierarchy, only one person mentioned accessibility, whereas coding being the least popular response was brought up by three different participants. Unsurprisingly visual design, prototyping, and communication were spoken about the most.

Relevance of Skills	Out of 7
Prototyping	6.4
Visual Design	6.25
Soft Skills/ Communication	6.2
Accessibility	5.35
Systems Design	4.8
Research	4.8
Coding	3

Fig. 25 Students' ranking of skills by relevance to their career goals.

Accessibility Definition

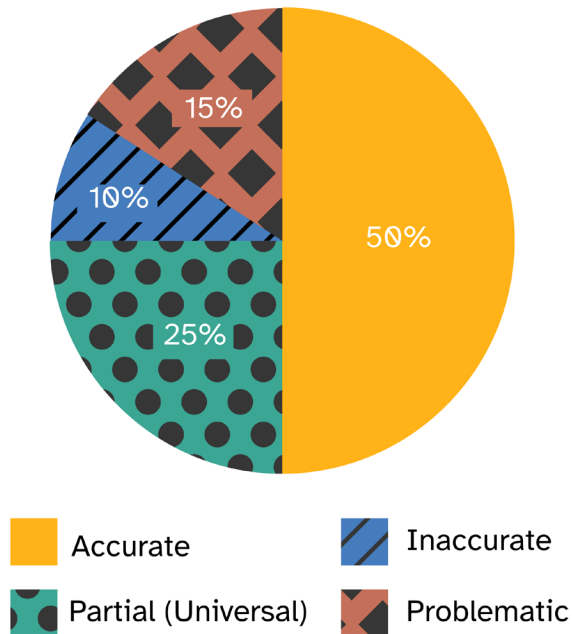


Fig. 26 Accessibility definition results from design students.

One of the activities of the student survey was for users to define what accessibility meant to them without looking it up. Definitions for accessibility have a history of being varied, so I looked for those that included designing to provide access to products and services for people with disabilities. Respondents who only mentioned one of these aspects, were given partial credit. In terms of responses, this most often showed itself in terms of participants defining accessibility as some variation of, “design for everyone.” Responses of this nature were more indicative of universal design than it was accessibility. Of the responses, 50% hit the two major points previously indicated while 25% only referenced universal design. In the remaining 25%, 10% gave answers that hit on neither of these aspects while the other 15% gave answers that included language that was problematic because they referred to people as “differently abled” or “challenged” (Fig. 26).

When asked how accessibility was relevant or irrelevant to their future careers, only one student mentioned the law/legal compliance at the time of this survey. Many responded in a vague and aspirational manner about wanting to engage many kinds of, or all users. Only two people spoke of accessibility in specifics. They referenced the legal/federal ties to accessibility and the need for accessibility in color palettes. Only one student brought up even the possibility of accessibility being unrelated to their future job. This participant stated that while in theory it would be relevant, many are often divided into separate roles which may be closer or farther away from accessibility.

Students reported designing for accessibility coming up a little in school followed by their own research as the most common scenarios. From there results tapered off as the amount of accessibility increased. Only one of the twenty students said they learned nothing about accessibility.

Discussion of Findings

While I was pleased to find that students' exposure to accessibility concepts validated my hypothesis, I was troubling to see how little students seemed to know about accessibility (Fig. 27). One thing that surprised me was how accessibility ranked middle of the pack in terms of skills deemed relevant to their practice, yet so few respondents were willing to speak about it. There appeared to be a general agreement that accessibility is important yet very little comprehension of how its value may actually take shape in their practice.

From the responses to this survey, I began to think of ways to potentially introduce students to accessibility and tie it to their career goals in terms of skills. Much like with professional designers, there existed opportunities to build off of concepts that they already knew as a way to adapt what they were learning to include techniques for greater accessibility.

Importance of Benefits	Out of 7
Work Life Balance	6.1
Salary	5.85
Honing Existing Skills	5.4
Developing New Skills	5.35
Finding Mentorship	5.1
Working at a Reputable Company	5

Work benefits ranked by design students in order of importance.

Have you learned about designing for accessibility in school?

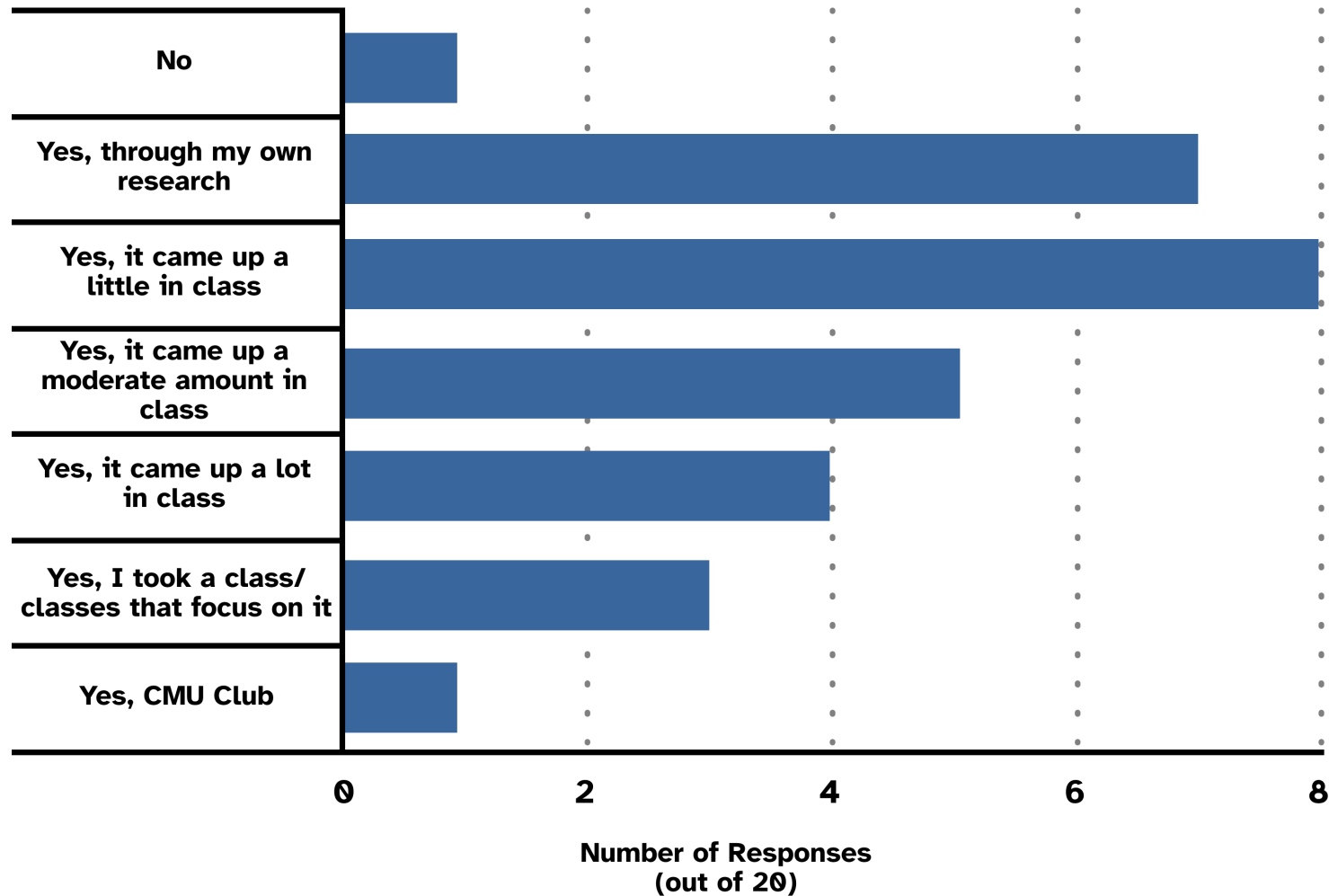


Fig. 27 Data vis describing if design students learned about designing for accessibility in school.

GENERATIVE RESEARCH AND PROTOTYPING

Using my exploratory findings as a basis for my work, I began moving into the generative research phase of research by developing prototypes and utilizing learning frameworks. Through my research I identified a number of potential issues that warranted attention. However, without narrowing down the amount of issues that I wanted to address, any prototypes or interventions may be at risk of having a weaker impact than desired. This need to narrow down then reinforced the importance of the generative research phase.

Generative Research

Bridging Learning Gaps Framework

To aid in further synthesis and ideation, I decided to use the *Bridging Learning Gaps Framework* introduced by Julie Dirksen in *Design for How People Learn*. I began by identifying the current states that I warranted improvement. Then I used these current states to inform the direction of desired future states. From there, I began brainstorming various ways that the current state could reach the desired future state, essentially bridging the gap. To aid this process, I labeled each learning gap as a gap in either knowledge, skill, motivation, environment, communication, or a mix of several causes (Dirksen, 2012, ch.1 Identifying and Bridging Gaps). Through this framework, I gained clarity of future states that held merit as well as new ideas for interventions (Fig. 28-31).

4MAT Framework

With the insights gained from the *Bridging Learning Gaps Framework*, I then moved onto the *4MAT Learning Framework* developed by Bernice McCarthy to further develop my ideas within the learning cycle (McCarthy, 2021). To begin, I mapped my findings to the four stages of learning. This included: What was the value/motivation for the learner? What knowledge did they need to gain? What skills did they need to practice? How might they continue learning and applying their learning broadly? (McCarthy, 2021). After this information was mapped, the next step was to document concrete steps to facilitate the learning experience (Fig. 32-33). Through this process I was able to take my learnings from the bridging learning gaps framework and develop them into more actionable plans.

CURRENT STATE

BRIDGING GAPS

PREFERRED STATE



Fig. 28 Bridging Learning Gaps Framework part 1 of 4.

CURRENT STATE

BRIDGING GAPS

PREFERRED STATE



Fig. 29 Bridging Learning Gaps Framework part 2 of 4.

CURRENT STATE

BRIDGING GAPS

PREFERRED STATE

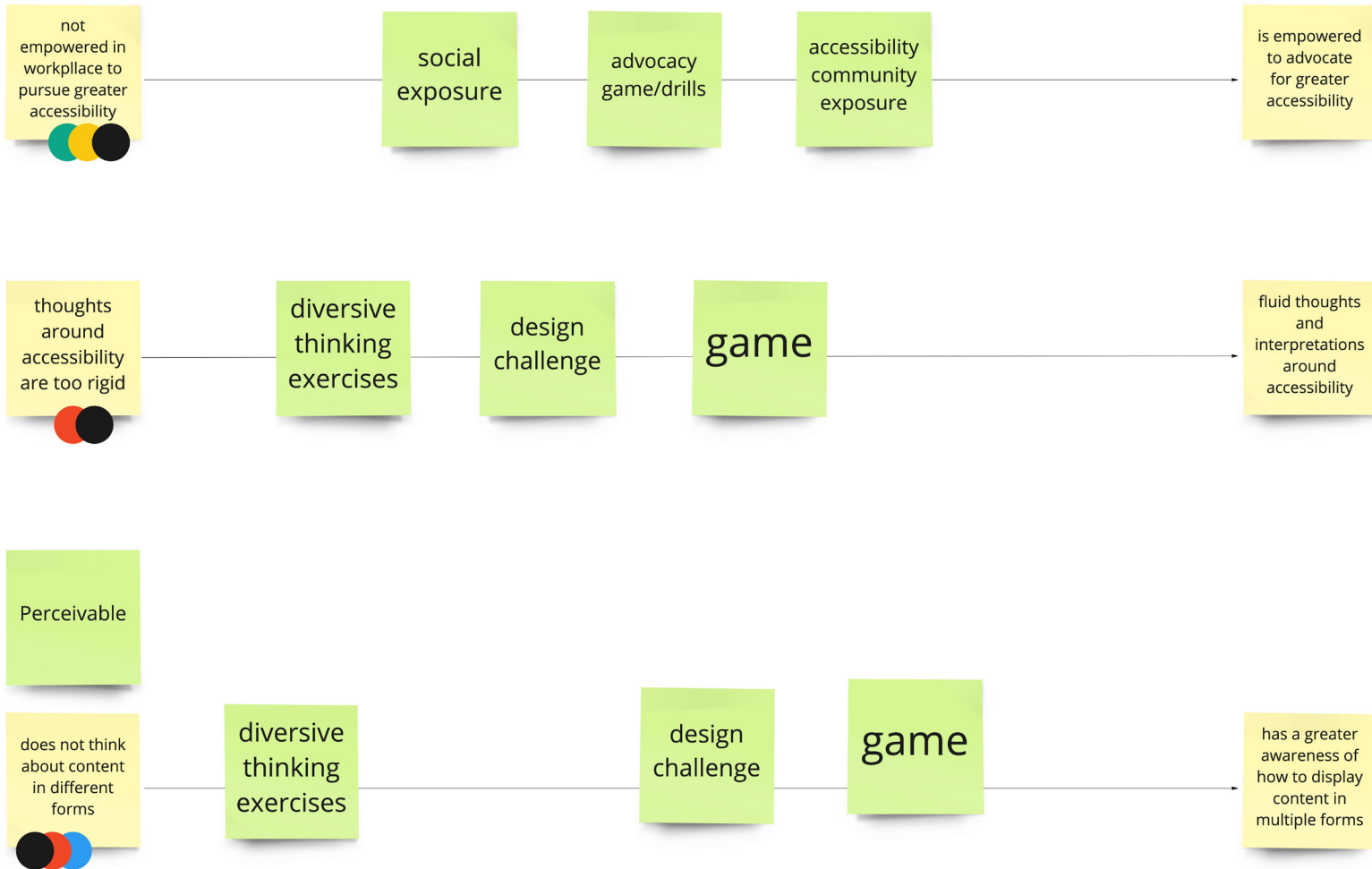


Fig. 30 Bridging Learning Gaps Framework part 3 of 4.

CURRENT STATE

BRIDGING GAPS

PREFERRED STATE

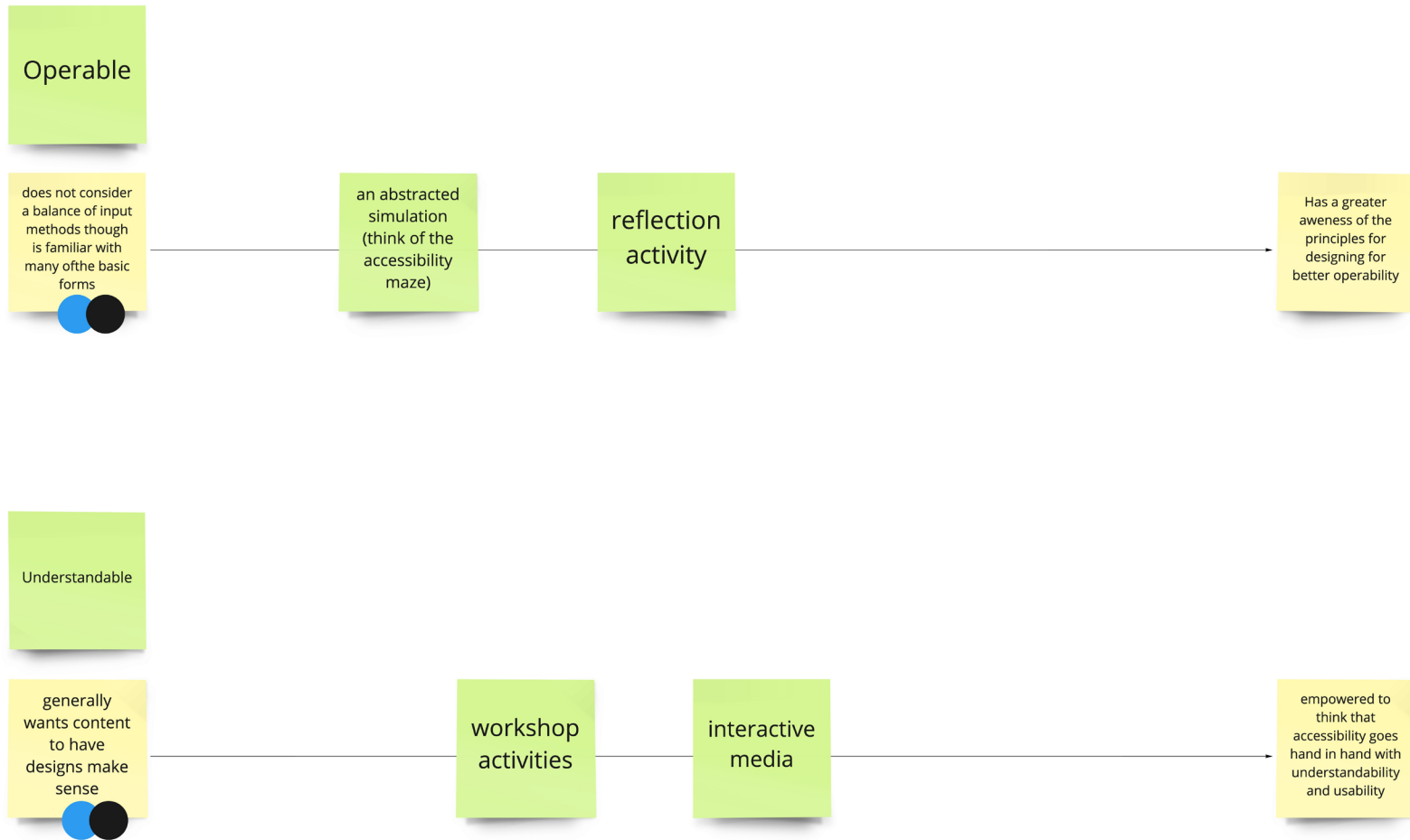


Fig. 31 *Bridging Learning Gaps Framework* part 4 of 4.

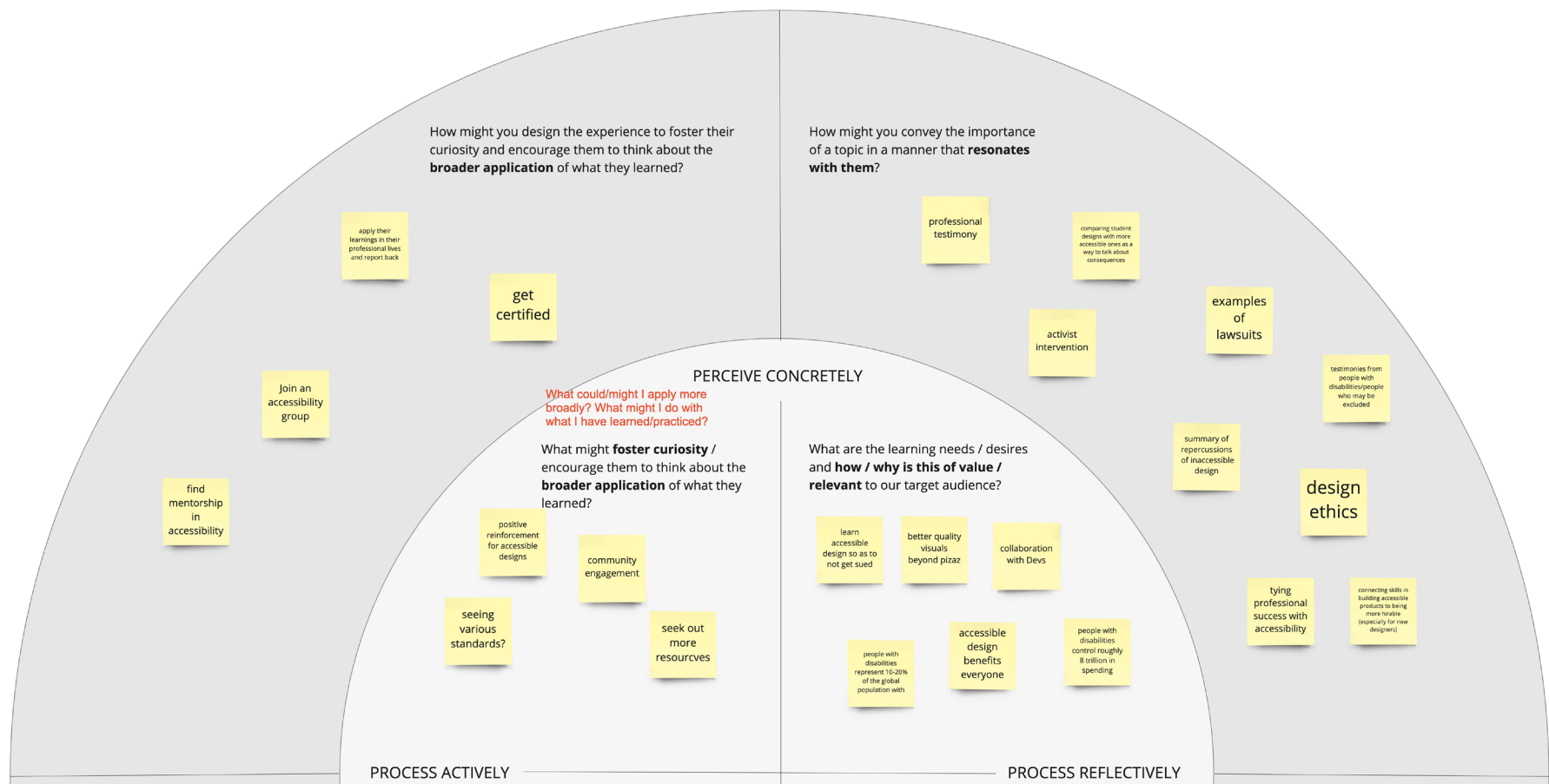


Fig. 32 4MAT Learning Framework part 1 of 2.

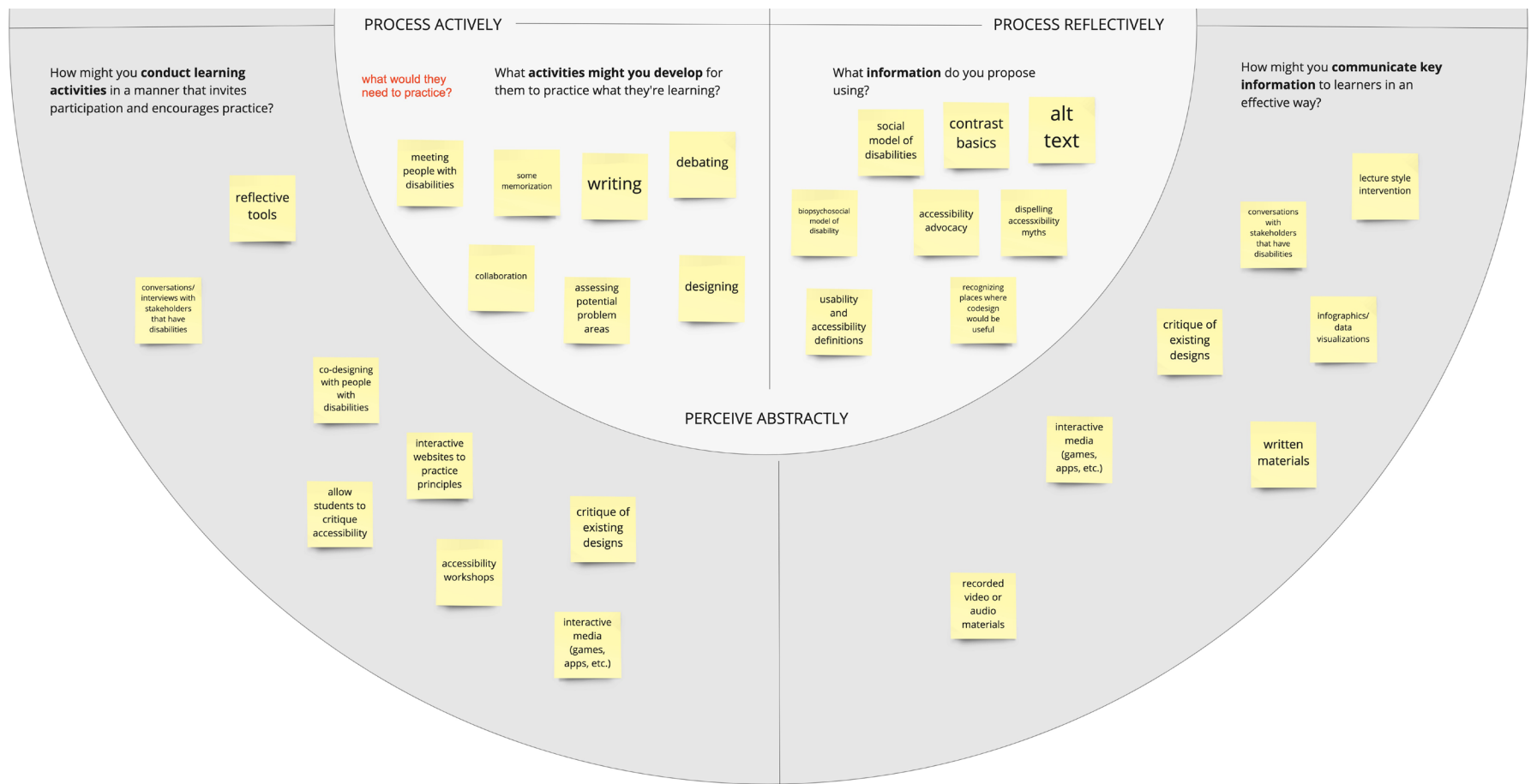


Fig. 33 4MAT Learning Framework part 2 of 2.



Fig. 34 Identified problem areas.

Problem Spaces Identified

From the research, synthesis, and generative work I conducted, I identified four areas of need that served as the basis of my future prototypes and interventions (Fig. 34). One of the first points I aimed to address was the current separation of accessibility from foundational design skills. Second, I strived to address the feelings of not knowing where to start that many were expressing during the design and learning process. Third, I sought to address the problematic views that designers and educators were expressing with regard to disabilities, namely that some of those interviewed and surveyed felt they did not have any users with disabilities. I believed that this point was also tied to participants' views that they did not know anyone with a disability. Finally, while not prevalent in the surveys and interviews, I aimed to address the rigidity and general opaqueness of WCAG guidelines with regard to reading and interpretation. The primary driver for this came from a number of secondary sources and comments made by designers and educators (Holmes, 2018, p57) (Kalbag, 2017, ch.7 Guidelines). In researching accessibility, vehicle WCAG is seen as a benchmark of quality that has helped many people through establishing a standard of quality for access, it has often been negatively associated with a checklist mindset. This mindset would have designers and businesses thinking of accessibility in binary terms as opposed to the spectrum that is available when attempting to problem solve. Finally, through the interviews conducted, designers and educators that had directed their students to WCAG as well as Section 508 and the ADA hit a wall in terms of the complexity of these legal documents. Due to the difficult to parse writing style used, many people were discouraged from pursuing

accessible learning via this resource. I began making plans to address the way WCAG is approached with the goal of making it easier to engage with as a resource as opposed to a checklist.

Prototypes

To address the problem spaces identified I began creating prototypes and iterating on social arguments. Some of these concepts manifested as approaches to shape designers' thinking while others were prototypes to aid in learning, discussion or reflection.

Beyond 15%: An Advocacy Approach

Beyond 15% is an approach I developed to shift the thinking of designers who don't think they have any users with disabilities or who don't think they have a relationship with anyone with a disability. This concept manifests as a lecture or written document but may be adjusted to more appropriately utilize other mediums such as video, or interactive media. Through this approach I aim to help people question the way that they define disability, its boundaries, and how closely everyone comes into contact with people with disabilities on a daily basis. To do so, I have taken abstract concepts and given them grounding through comparison and, depending on the medium, data visualization. The following is my current rendition of this approach (Fig. 35):

Beyond 15%

A designer who attends an introductory accessibility lecture is likely to come across the following common talking points: First, 15% of the earth's population, approximately one billion people, have a disability (WHO, 2011). Second, everyone is likely to experience situational and temporary disabilities during the course of their lives (Microsoft Design, 2016 p.41). These talking points are useful to quickly establish the impact and relevance of accessibility for an audience. However, these facts do not clearly show just how large a billion people truly is, or account for the spectrum of ability that lies between these two ends. Without expanding on these points there is a risk of giving designers the impression that disability is a concrete term that can always be thought of in binary, (those who have and those who have not) and that a billion people, while large, is where considerations for accessibility stop. This then may unintentionally strengthen a sense of otherness for people with disabilities.

When someone discovers that a billion people on earth have a disability could they ever fully understand just how large that is? A billion people is greater than three times the population of the U.S. (U.S. Census, 2021). For those more business inclined, that is also nearly half a trillion dollars in disposable income (Yin et al., 2018). And again, that one billion is only defined by those that qualify as a disability. Disability can be defined differently in different countries or cultures which adds further room for interpretation (Global disability culture 101, 2019). So while someone may have a disability in one place, they may be impaired in another place, or a different label, or not recognized at all. Further, depending on the culture that one was in they may have felt more or less comfortable reporting that they had a disability and that culture may have different techniques or resources for measuring ability (WHO,

2011, p45). This helps explain why in the U.S. there is a reported 26% of people with disabilities while in Japan there is approximately 8% and in Kenya there is only 2.2% (WHO, 2011)(CDC, 2020) (Owino, 2019).

As an example of this complexity, when a designer is told that there are 43 million people who are blind in the world, is that where that person stops considering visual disabilities (Staff, 2021)? A large section of WCAG references visual disabilities, is this the demographic they are speaking to? What if the designer was told there were 295 million people with moderate to severe visual impairments (Staff, 2021)? This is a much different number and that person might have noticed the return of the word impairment in terms of classifications. What if this same person was told that out of everyone on earth there was an estimated 2.2 billion people who would benefit from some assistance when it comes to vision (DTE, 2019)? When reflecting on the previously mentioned 15%, with this shifted perspective, the 2.2 billion people who could benefit have already more than doubled the previously mentioned one billion. This was not something that was isolated to vision either, in all of the major categories where ability has been measured there were examples like this.

Disability is a difficult term to pin down for many reasons and is used in a variety of contexts from medicine to civil rights and governmental aid. While it has proven easy for many to dismiss this one billion people as, “not one of their users,” designers have come into contact with many people who live and perform tasks in a myriad of ways that could benefit from some form of designed accommodation. The question is not, “do I have users with disabilities,” but rather, “how can I support my users’ range of abilities?”

Fig. 35 *Beyond 15%* full text.

Social Identity/Cultural Affirmation Model of Disability:

The social identity or cultural affiliation model (perspective) views disability as a community. People who identify with a particular group or culture (e.g. deaf culture) become more involved with that culture and embrace their disability as part of their identity. (digilou, 2019)

Fig. 36 Social Identity/Cultural Affirmation Model of Disability

Throughout the process of developing *Beyond 15%* I wanted to ensure that I was not unintentionally taking away from those that more strongly identify with the label of disability. For some people, disability has been a stigma, but when looking at the social identity/cultural affirmation models of disability (Fig. 36) then this label has been one that helped form identity and has been a source of community and strength (digilou, 2019). For some, disability has been how someone secures aid from the government and to remove that label would potentially cause harm (USAGov, 2022). For others it is how someone may find like minded people that can empathize with them. How people have talked about, defined and related to disability has had a fascinating history. While my main aim through *Beyond 15%* has been to widen the thought process of designers with regard to ability and labels it has never been to detract from the experiences or identities of those with disabilities.

Heuristic Comparison

The next approach I created aimed to help people who may find the subject of accessibility intimidating. This approach would also support people who are unsure where to start with regard to accessibility. While designers, students, and educators may not be familiar with accessibility, they most likely encountered it, even unintentionally through usability. So while a student may not be familiar with the seven principles of universal design or the four principles of accessible web design, they likely have been exposed to Nielson Norman's ten usability heuristics. Through the comparison of these three sets of standards I found a great deal of overlap (Fig. 37). The ten usability heuristics could then serve as a point of entry for people to begin learning about accessibility through a subject that is already familiar to them. This then could lead to further conversations to expand learning over time.

	NN 1	NN 2	NN 3	NN 4	NN 5	NN 6	NN 7	NN 8	NN 9	NN 10
UD 1	YES	YES	---	---	YES	YES	YES	YES	---	YES
UD 2	---	YES	YES	---	YES	---	YES	---	---	YES
UD 3	---	YES	YES	YES	YES	YES	YES	YES	---	---
UD 4	YES	YES	YES	YES	YES	YES	---	YES	YES	YES
UD 5	YES	---	YES	---	YES	YES	YES	---	YES	---
UD 6	---	YES	---	YES	---	YES	---	YES	YES	---
UD 7	---	YES	---	---	---	---	---	---	---	---
WA 1	YES	---	YES	---	---	YES	---	YES	YES	YES
WA 2	---	YES	YES	YES	YES	---	YES	---	---	---
WA 3	YES	YES	---	YES	---	---	---	---	YES	YES
WA 4	---	---	---	---	YES	---	YES	---	---	---

Fig. 37 Chart comparing the heuristics of the seven principles of universal design, the four principles of web accessibility and the ten usability heuristics.

Accessibility Card Game

As a way to support people's use of the *Heuristic Comparison* approach and further their learning, I designed an accessibility card game. This game introduces players to the four principles of accessible web design (Perceivable, Operable, Understandable and Robust also known as POUR) as well as situations that may call for accessible design. While this game does require some knowledge of design and accessibility, it is not overly technical so beginning designers should be able to easily play. This game is designed for two to four players and is akin to the games *Phase Ten*, *The Worst Case Scenario Survival Game* and *Bucket of Doom*. Each round players take turns attempting to solve a situation that calls for accessible design. In order to solve the situation, players lay down the appropriate cards as indicated by the situation card and make a case for why their solution matches the scenario. If all of the other players agree with the argument that is put forward then that player has solved the situation(Fig. 38-39).

The main goals of this game are to make accessibility more approachable as a subject that is present in current approaches, introduce users to accessible techniques and situations so that they are primed to recognize them in a real world situation should they arise, and help players think about and articulate arguments for design decisions independently.

Rules for The Accessibility Card Game

Set Up

2-4 players

Get a paper and a writing implement to keep score

Each player is dealt 3 cards.

Extra cards go into a deck for later use.

Beginning the Game

A situation card is drawn from the deck. Players then go in order from the left of the dealer clockwise either drawing a card or attempting to solve the situation.

Solving a Situation

A situation happens when a player puts down the cards needed to solve the situation as shown on the situation card AND can explain how they would use the skill card in that given situation. Not all skill cards will be applicable to all situations. Each player must approve the other players solution before they are awarded a point. Cards with a white star can be used to take the place of any card.

Finishing a Round

After a player has solved the situation then each player will get one final chance to also solve the situation. Once that is finished and the scores are recorded then all cards are returned to the deck. Players are then dealt a new hand and a new situation card is dealt.

Winning the Game

The player that solves 3 situations first is considered the winner. Alternatively players may choose their own score to achieve if they so wish.

Fig. 38 Rules for *The Accessibility Card Game*

Situation Card

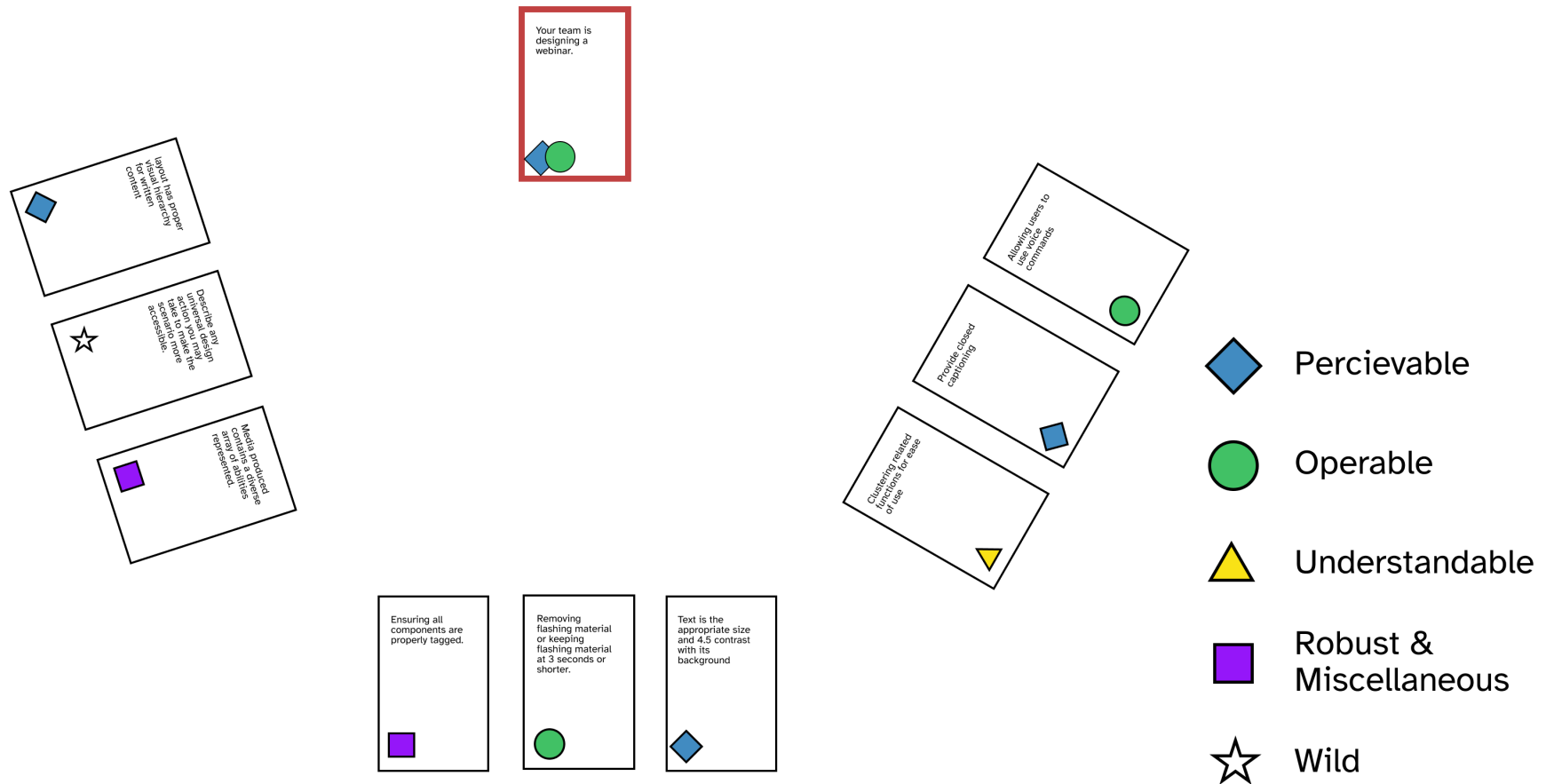


Fig. 39 A digital mock up of an Accessibility Card Game round with a key of the types of player cards.

WCAG Reflection Tool

Lastly, I created an artifact to help those who view WCAG as a checklist to broaden their thinking. While this concept was primarily created for professional designers, it may also be useful for students, educators, or anyone who is new to accessibility that may feel discouraged by the “legalese” writing style of WCAG, Section 508 and the ADA. This prototype manifests as a deck of cards with which users interact, though there is no reason that a future digital version of this concept could not exist.

Each card represents one of the different techniques/steps present in WCAG’s 2.1 guidelines. These techniques are then translated from their legal language to common English on the front of each card. On the back of each card the technique is expounded upon in a number of ways (Fig. 40). Types of elaboration would be identifying common pitfalls, providing advice on how to integrate the step into the designer’s workflow, as well as providing interesting facts and questions to help users think beyond instructions and see design decisions within the larger accessibility landscape. To further aid people in this I also created a number of cards that are not mapped to WCAG but may help designers reflect on accessibility and disability as larger concepts.

Designers can choose to engage with this tool in a number of ways. They may select cards that they deem relevant to current projects in an effort to learn and discuss with others as a conversational tool. Designers can also use this deck as a daily reflection tool, pulling a card or two each day to gradually grow a body of knowledge.

Another potential use case for this deck is to shuffle the deck and see what steps designers are willing to apply to a given project. This may help users think outside of the confines of A AA and AAA to see if there is anywhere they might go beyond the recommended list of standards at a given level and if their natural instincts fall short anywhere.

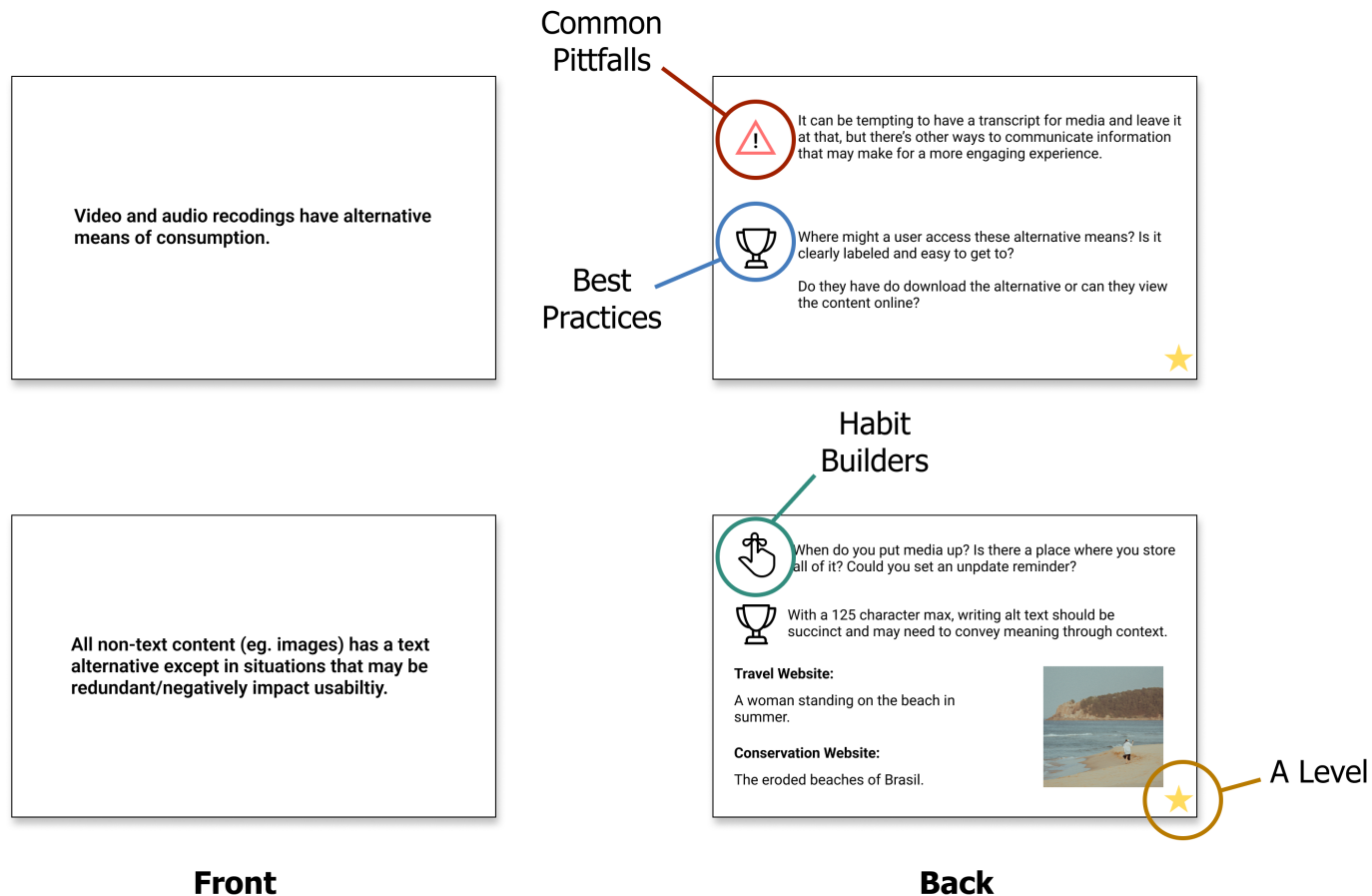


Fig. 40 WCAG Reflection Tool showing the front and back of the cards.

Academic Framework Hypothesis

This next creation is not so much an approach or prototype as has been previously described but rather a framework for the application of the previously mentioned concepts and further academic reform. While each of the prototypes and approaches listed address my previously stated pain points in a scattered manner, I strived to hypothesize ways that they could be applied in an academic setting, along with further reform to the ways that accessibility is taught in academia (Fig. 41).

Looking at the way design education is scaffolded, while there has been a variety of ways to teach design depending on educational goals they have been mirrored and enumerated upon with potential opportunities to include accessibility (Fig. 42). This academic reform also presents a number of opportunities for the approaches and prototypes I have created to be integrated.

On a high level I have looked at three different paths for teaching design, broken them down into learning stages/scaffolding and identified places where each subject could be expounded upon to further integrate accessibility. These three paths include a balanced design foundations path, a path that more heavily emphasizes graphic design and a path that more heavily emphasizes interaction design. Each of these paths has unique aspects where accessibility could be integrated. Some aspects that were common among all of these classes were the integration of accessibility into design workflows, a greater emphasis on disability etiquette, identifying and reinforcing the prevention of common pitfalls in the design

process that could create inaccessible products, scoping the design process to include accessibility without overly taxing resources and finally the designer ability bubble.

While an in depth critique of design education curricula as they relate to accessibility may have been outside of the realm of this thesis the potential merit of future research into this subject should not be understated. In the same manner as Kristen Shinohara and her associates have worked to experiment with integrating accessibility into computing curricula, further experimentation along these lines within the school of design is likely to produce compelling findings.

Artifacts Issues	Beyond 15%	Heuristic Comparison	Accessibility Card Game	WCAG Reflection Tool	Foundational Design Reformation
Accessibility Foundations	---	YES	---	---	YES
Stereotype Influenced	YES	---	---	---	YES
Where to Start?	---	YES	YES	---	YES
WCAG as a Checklist	---	---	YES	YES	YES
Spring 2022					Next Steps

Fig. 41 Artifacts v. Issues Chart.

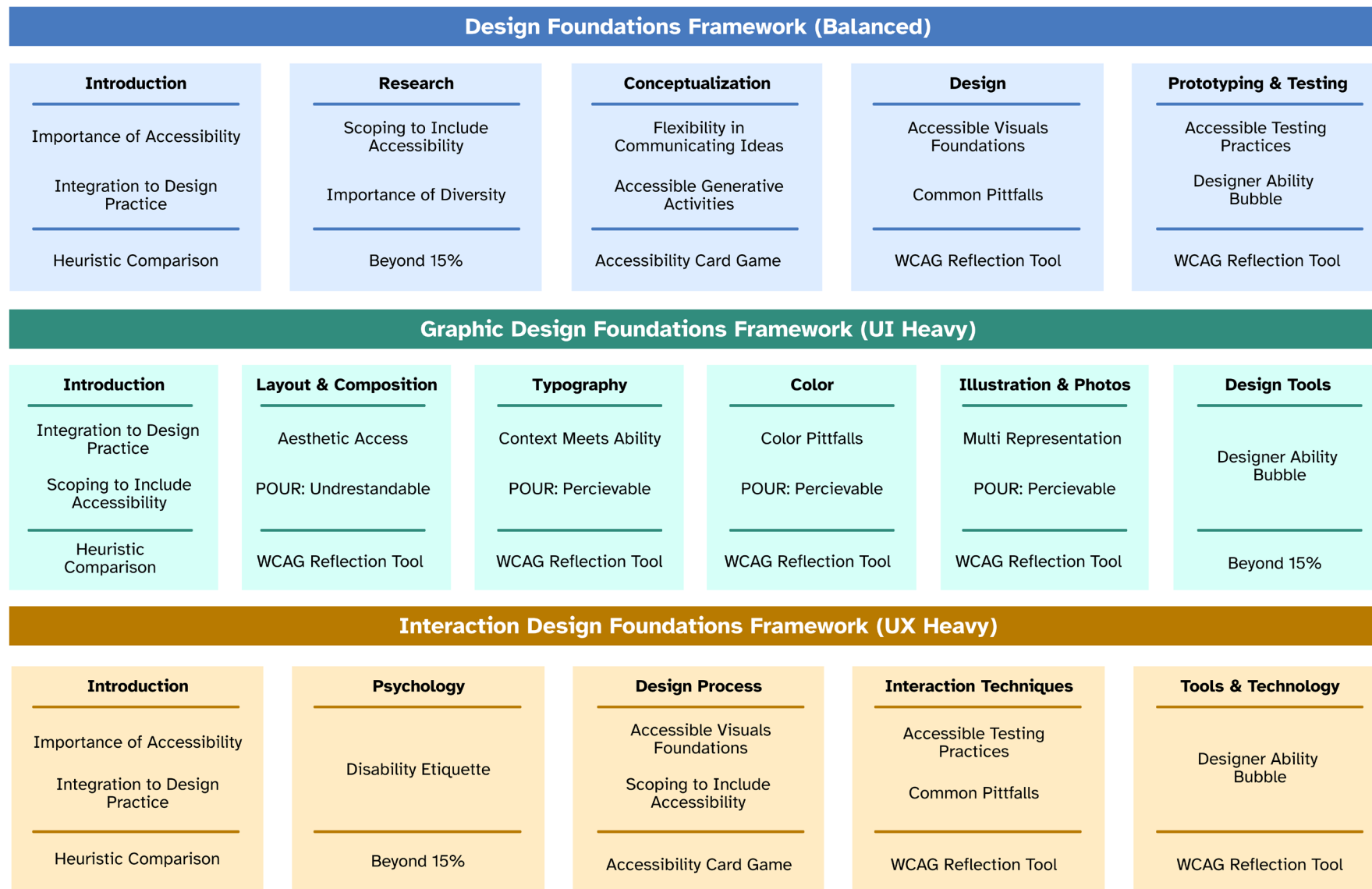


Fig. 42 Academic Reform Chart.

INFORMAL EVALUATIVE REVIEW

Following the development of these approaches, I began collecting feedback as a form of evaluative research. The thesis timeline allowed me to perform informal evaluative research with a smaller pool of participants. This provided a good starting point for future research outside of the context of this thesis. I describe the impressions collected and point out potential future methods of evaluative research that I believe would support holistic research.

Expert Consultation

To evaluate the potential impact of these designs, I presented them to experts in the field of accessibility and accommodations. This process enabled me to gather a number of impressions. On the whole participants responded quite positively and began relating the concepts to work that they had previously done. This was particularly the case with *Beyond 15%* and *Heuristic Comparison*. Multiple participants commented that *Beyond 15%* may benefit from further data visualization to support the arguments being made rather than solely spoken word. While these insights provided value for the evaluative process it should be noted that experts in education should be consulted in future efforts as well.

	Positive Impact	Clarity of Information
	Out of 7	
Beyond 15%	4.2	4
Heuristic Comparison	4.5	4
Accessibility Card Game	5.8	5
WCAG Reflection Tool	4.5	4.4

Fig. 43 Speed dating results for each artifact rating them out of 7 on potential impact and clarity of information.

Speed Dating Survey

I created a survey that briefly introduced each of my concepts via video in order to further assess users' impressions and the clarity of the message that I was trying to convey. One copy of the survey was distributed throughout a number of design communities while another was sent specifically to communities that specialized in accessibility and disability activism. I then synthesized the findings (Fig. 43).

Overall the survey participants from the accessibility community gave responses that were longer and more detailed than those in the general design population. *The Accessibility Card Game* was ranked highest by both communities in terms of potential impact and clarity of information. *Beyond 15%* was ranked the lowest in terms of impact but tied with the *Heuristic Comparison* in terms of clarity of information. When referring to *Beyond 15%* and the *Heuristic Comparison*, some participants noted challenges associated arising from the abstract nature of these concepts, which may be linked to their lower ratings. Other impressions indicated that *The Accessibility Card Game* should be collaborative as opposed to competitive, given that ensuring that a product is accessible is usually pursued as a group effort. A participant from the accessibility community also critiqued *Beyond 15%*, stating that statistics related to disability are often highly varied as many will not report themselves as having a disability.

Play Testing

In order to assess the impact of *The Accessibility Card Game*, I tested this prototype with design students (Fig. 44). While more testing is warranted, some early impressions did manifest. To begin, I set up the game, explained the rules and also handed the written game rules card to one of the players. It became clear quite quickly that these methods of communication were not enough to surmount the initial learning curve. Participants also expressed a desire for the game to be more collaborative rather than competitive. Suggestions that may warrant further design iterations and testing included adding different game mechanics for further complexity and simulating an experience more closely aligned with reality. These changes could potentially better prepare players to recognize situations that could call for greater accessibility. Another potential benefit of adding further complexity that emulates real life scenarios would be to strengthen designers abilities to collaborate with others in a team. This could be potentially afforded through having players take on the roles of professionals within a multidisciplinary team (eg. Designer, developer, product manager, business analyst, etc.).



Fig. 44 A photograph of *The Accessibility Card Game* set up for playing.

REFLECTION & NEXT STEPS

While I am pleased by the amount of progress I made in this thesis, it does not change that I was unable to conduct substantive formal evaluative research beyond collecting impressions. As I reflect on the interviews I conducted, in interviewing I have found it useful to listen to both the content of what is being said as well as the tone and delivery of the content. This may be a somewhat common sentiment but it holds especially true with this subject matter as many of the people that were interviewed were operating under a privileged view of not needing to think about disability or accessibility on a regular basis.

My conversations with educators also surfaced questions about whether the ways people are introduced and educated about accessibility may partly be at fault as well. Certainly we must teach more about accessibility that is currently present in education, but is the way we are currently teaching perpetuating the problem? This question holds especially true when reflecting on Beyond 15% as it is essentially a critique of common talking points.

In terms of next steps, the most immediate need would be to perform in depth evaluative research to inform design revisions. I would also like to then experiment with further developing my plans for academic reform to integrate accessibility in lesson plans. With the testing and refinement of these prototypes and approaches could be done outside

of academia, the academic reform framework would prove challenging to accomplish outside of these institutions. A potential work around for this would be to approach organizations that champion online learning resources. Further, as many of the concepts I have developed touch upon concepts within WCAG, attempting to seek further collaboration with activists and organizations that work within these areas would also be potentially fruitful.

CONCLUSION

Accessibility is often referred to as a fundamental aspect of the design process yet lacks proper follow through in academic activities to substantiate this claim. This gap in education then prepares classes of design students to enter into the working world without the proper skills to design products and services that are accessible or to even recognize situations where accessibility may be an issue. By shifting designers' and educators' mindsets to approach accessibility thoughtfully, and providing tools that foster effective practice and reflection, I believe that the design community may begin the process of closing existing learning gaps. In closing these gaps, design students may enter into the design industry better prepared for the demands of their positions and thus reduce the chance of negative outcomes that are associated with creating inaccessible products and services.

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FULL DESCRIPTION OF GRAPHIC REFERENCES

Fig. 18 Prioritizing Accessibility Testimonies

1 of 3:

Yes, there is a growing awareness of the need to include time within the software development cycle that specifically looks at inclusive design, code reviews, etc. Also, having more co-workers who have a visible disability has helped to put this at the forefront for more people within our organization.

2 of 3:

Yes - though I have had to fight for it. Working on internal products, many didn't see the point as we weren't required to do it. But for the use case (people working in the field in the applications I was working on), the accessibility items didn't only help people with disabilities, it helped in harsh lighting conditions too. Generally things that are more accessible are often more usable, but they can be less 'pretty' sometimes. This is usually where people struggle.

3 of 3:

We have a VP of Accessibility, 12+ Accessibility Engineers many of whom have visual impairments. I also make sure I champion it for my teams.

Fig. 19 Not Prioritizing Accessibility Testimonies

1 of 3:

Not really. We worry about WCAG contrast but that's it. We do lots of quick and dirty testing to get new things out faster. We don't necessarily need to worry about specific disabilities when our software is designed for internal enterprise use

2 of 3:

users of our app usually don't have disabilities; it is a b2b

3 of 3:

I guess that only companies aiming at wider audiences (meta etc) consider accessibility a priority

Fig. 22 Comparing Seniority with Percentage of Accessibility Consideration

Out of 36 responses (0-1 years of experience: 2 pre-career, 6 whole career) (2-4 years of experience: 1 whole career, 4 roughly half career) (5-9 years of experience: 3 whole career, 6 roughly half career, 1 less than a quarter career, 1 no consideration) (10+ years of experience: 4 whole career, 5 roughly half career, 3 roughly quarter career, 3 less than quarter career, 1 no consideration)

Fig. 23 Comparing Education with Percentage of Accessibility Consideration

Out of 36 responses (no education: 1 whole, 1 roughly half) (self taught: 1 whole, 1 roughly quarter, 1 no consideration) (bootcamp: 1 pre career, 3 whole) (associates or undergraduate degree: 1 whole, 7 roughly half, 1 roughly quarter, 1 less than quarter, 1 no consideration) (Post Baccalaureate: 1 precareer, 6 whole, 8 roughly half, 2 roughly quarter, 1 less than quarter, 1 no consideration.)

Fig. 28-31 Bridging Learning Gaps Tools

Bridging Learning Gaps Framework parts 1-4. Information format: entry number, current state, future state, bridging gap methods. 1. Current no technical knowledge of accessibility, future basic knowledge of accessibility principles, bridges, game to introduce principles, flash cards, video presentation, design challenge. 2. Current vague knowledge of accessibility importance, future able to act on the knowledge of accessibilities importance, bridges, intervention event/workshop, community engagement. 3. Current does not talk to people with disabilities (consciously), future actively seeks out the opinions of users with disabilities, bridges, local accessibility community engagement, activity to show how different disabilities are everywhere, education on where to hire people with disabilities for testing/interviews. 4. Current survivalist career goals, future able to work towards goals without panicking, bridges, mindfulness, goal scaffolding. 5. Current familiar with usability heuristics, future familiar with heuristics and accessibilities role in it, bridges, reference chart, video, teaching activity. 6. Current nervous about how much accessibility is “enough,” future recognizes that accessibility and disability are in a spectrum, bridges mindfulness, goal scaffolding, accessibility community exposure. 7. Current does not know where to source information, Future has an idea where to look for resources, bridges, guide on how to find good information, a centralized source to help, accessibility community exposure. 8. Current creates disability dongles, future recognizes their known unknowns and seeks help,

bridges, mindfulness, goal scaffolding, accessibility community exposure, social exposure. 9. Current not empowered in workplace to pursue greater accessibility, future is empowered to advocate for greater accessibility, bridges, social exposure, advocacy game/drills, accessibility community exposure. 10. Current thoughts around accessibility are too rigid, future fluid thoughts and interpretations around accessibility, bridges, diverse thinking exercises, design challenge, game. 11. Current does not think about content in different forms (Perceivable), future has a greater awareness of how to display content in multiple forms, bridges, diverse thinking exercises, design challenge, game. 12. Current does not consider a balance of input methods though is familiar with many of the basic forms (Operable), future has a greater awareness of the principles for designing for better operability, bridges, an abstract simulation (think of the accessibility maze), reflection activity. 13. Current generally wants content to have designs make sense (Understandable), future empowered to think that accessibility goes hand in hand with understandability and usability, bridges, workshop activities, interactive media.

Fig. 32-33 4MAT Learning Framework

4MAT Learning Framework parts 1 & 2. This framework is divided into 8 parts. The first 4 parts are why is this learning of value to the learner, what knowledge do they need to learn, what skills do they need to practice and how might you foster curiosity and further learning? The following 4 are the proposed real world applications of the first 4 parts.

Part 1:

What are the learning needs/desires and how/why is this of value/ relevant to our target audience? Ideas: learn accessible design so as to not get sued, better quality visuals beyond pizzazz, collaboration with devs, people with disabilities represent 10-20% of the global population, accessible design benefits everyone, people with disabilities control roughly 8 trillion in spending.

Part 2:

What information do you propose using? Ideas: alt text, contrast basics, social model of disabilities, biopsychosocial model of disability, accessibility advocacy, dispelling accessibility myths, usability and accessibility definitions, recognizing places where codesign would be useful.

Part 3:

What would they need to practice? Ideas: debating, writing, some memorization, meeting people with disabilities, collaboration, assessing potential problem areas, designing.

Part 4:

What could/might I apply more broadly? What might I do with what I have learned/practiced? Ideas: positive reinforcement for accessible designs, community engagement, seek out more resources, seeing various standards?

Part 5:

How might you convey the importance of a topic in a manner that resonates with them? Ideas: professional testimony, comparing student designs with more accessible ones as a way to talk about consequences, activist intervention, examples of lawsuits, testimonies from people with disabilities/people who may be excluded, summary of repercussions of inaccessible design, design ethics, tying professional success with accessibility, connecting skills in building accessible products to being more hireable (especially for new designers).

Part 6:

How might you communicate key information to learners in an effective way? Ideas: lecture style intervention, conversations with stakeholders that have disabilities, infographics/data visualizations, critique of existing designs, written materials, interactive media (games, apps, etc), recorded video or audio materials.

Part 7:

How might you conduct learning activities in a manner that invites participation and encourages practice? Ideas: reflective tools, conversations/interviews with stakeholders that have disabilities, co-designing with people with disabilities, interactive websites to practice principles, allow students to critique accessibility, accessibility workshops, critique of existing designs, interactive media.

Part 8:

How might you design the experience to foster their curiosity and encourage them to think about the broader application of what they learned? Ideas: get certified, apply their learning in their professional lives and report back, join an accessibility group, find mentorship in accessibility.

Fig. 40 WCAG Reflection Tool

Card 1 Front:

Video and audio recordings have alternative means of consumption.

Card 1 Back:

Common Pitfalls:

It can be tempting to have a transcript for media and leave it at that, but there's more factors that can be easily forgotten.

Best Practices:

Where might a user access these alternative means? Is it clearly labeled and easy to get to?

Do they have to download the alternative or can they view the content online?

WCAG Ranking: A

Card 2 Front:

All non-text content (eg. images) has a text alternative except in situations that may be redundant/negatively impact usability

Card 2 Back:

Habit Builders:

When do you put media up? Is there a place where you store all of it?
Could you set an update reminder?

Best Practices:

With a 125 character max, writing alt text should be succinct and may need to convey meaning through context.

Travel Website:

A woman standing on the beach in summer.

Conversation Website:

The eroded beaches of Brazil

WCAG Ranking: A

Fig. 42 Academic Reform Chart

Design Foundations Framework (Balanced)

Introduction

Importance of Accessibility, Integration to Design Practice, Heuristic Comparison

Research

Scoping to Include Accessibility, Importance of Diversity, Beyond 15%

Conceptualization

Flexibility in Communicating Ideas, Accessible Generative Activities, Accessibility Card Game

Design

Accessible Visuals Foundations, Common Pitfalls, WCAG Reflection Tools

Prototyping & Testing

Accessible Testing Practices, Designer Ability Bubble, WCAG Reflection Tool

Graphic Design Foundations Framework (UI Heavy)

Introduction

Integration to Design Practice, Scoping to Include Accessibility,
Heuristic Comparison

Layout & Composition

Aesthetic Access, POUR: Understandable, WCAG Reflection Tool

Typography

Context Meets Ability, POUR: Perceivable, WCAG Reflection Tool

Color

Color Pitfalls, POUR: Perceivable, WCAG Reflection Tool

Illustration & Photos

Multi Representation, POUR: Perceivable, WCAG Reflection Tool

Design Tools

Designer Ability Bubble, Beyond 15%

Interaction Design Foundations Framework (UX Heavy)

Introduction

Importance of Accessibility, Integration to Design Practice, Heuristic Comparison

Psychology

Disability Etiquette, Beyond 15%

Design Process

Accessible Visuals Foundations, Scoping to Include Accessibility, Accessibility Card Game

Interaction Techniques

Accessible Testing Practices, Common Pitfalls, WCAG Reflection Tool

Tools & Technology

Designer Ability Bubble, WCAG Reflection Tool

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