Analyzing the Efficacy of Accessibility Features in User-Generated Content Platforms for

Visually Impaired Persons

An Honors Thesis (HONR 499)

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Abstract

Traditionally, the internet has been viewed as a societal equalizer. With the advent of online businesses and technologies that have advanced education, commerce, entertainment, and most things in between, the impact of the internet as we know it has empowered users across the world to achieve beyond measure using the power of the world wide web. Yet, for visually impaired users, the ever-widening scope of content within information channels leaves key information inaccessible, excluding these users from important conversations and interactions online. This study sought to address accessibility for the visually impaired through the lens of user-generated content: a largely overlooked sphere of online content regarding accessibility. It examined four major user-generated content platforms — Facebook, Instagram, Snapchat, and TikTok — explaining their strengths and weaknesses in providing accessible user experiences for the visually impaired. This study framed the issue of web accessibility in user-generated content platforms through research of online accessibility standards and best practices and explained how interviews with visually impaired users informed a cohesive accessibility analysis and recommendation guide for the four chosen user-generated content platforms.

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Process Analysis Statement

When asked what my favorite aspect of design is, I am delighted to answer with a single word: empathy. As an aspiring user experience designer, my field is consumed with the idea of empathetic design; we strive to create new online products that provide a perfectly tailored experience for the end user. While we aim to make these products aesthetically pleasing, user experience designers believe that a product's impact should do more than look good. It should make the user *feel* good. The ascertainment of a positive user experience is cumbersome, requiring a healthy mix of research, testing, design, and careful execution. Fortunately, my senior honors thesis has shadowed the central tenets of the user experience design process, allowing me to glean key insight into my field while also delivering timely, necessary research on web accessibility. My project has been an exercise in the enduring empathy that is so crucial to the user experience design discipline.

The idea for my thesis began, like all great ideas, with a TikTok. The short video I viewed in the spring of 2021 showed a woman describing her experience on the app as a deaf person, pointing to the many accessibility features that contributed to an inclusive experience for her online. I realized in this moment that I had never considered the impact of accessible design within user-generated content platforms: the wild online hellscapes filled with unregulated content growing infinitely every second. I began to research both visual and hearing impairments, discovering many articles detailing how to make posts on user-generated content platforms more accessible for these users. To my surprise, I found few studies that examined the accessibility of the platforms themselves and almost none that examined newer user-generated content platforms like Snapchat or TikTok. I proposed my topic in the spring of 2021, narrowing

my focus to Facebook, Instagram, Snapchat, and TikTok, and began what would become a year-

long accessibility study surrounding these four platforms.

Industry research is the first step in the user experience design process. I began this

research by synthesizing accessibility design standards and guidelines from sources like W3, the

World Wide Web Consortium. The W3 releases the Web Content Accessibility Guidelines, or

WCAG, periodically as technology in web design and development advances. It is considered

the preeminent guide for accessible design worldwide, and it provided a basis for my

understanding of what makes design accessible for the visually impaired. I learned about

alternative text, screen reader compatibility, and the concept of modals in providing an inclusive

experience for the visually impaired online. Using my newfound knowledge of accessibility

design, I developed three essential questions that I sought to answer both in my study and future

research:

1. How accessible are Facebook, Instagram, Snapchat, and TikTok to those with visual

   impairments?

2. Which accessibility features are most advantageous for those with visual impairments?

3. What online content is inaccessible to viewers with visual impairments?

Using these guiding questions, I crafted a literature review that proposed key context and

preliminary answers to these questions, establishing the current state of user-generated content

accessibility online. This process taught me the importance of seeking a wide array of sources,

both formal and informal, in the research process. While scholarly articles provided hard data

about accessibility studies conducted using primarily Facebook and Instagram, online articles

and blog posts written by, or about, visually impaired users online helped to bring a distinctly

human element to my research. When a product did not work in the way visually impaired users

needed it to, I could sense the emotion that many of them would bring to their testimonies. I

sought to encapsulate this same emotion in my own original research as I began formulating

testing methodology and sourcing visually impaired participants for the study.

     User testing is the next phase of the design process. In this stage, designers seek to

identify pain points in the user experience of a given product using strategic testing methods. I

created an amalgamation of two popular test formats in usability and accessibility design: the

task-based usability and cognitive walkthrough tests. While a task-based usability test allowed

me to determine the relative accessibility of specific tasks within a given user-generated content

platform, the cognitive walkthrough portion gave participants the opportunity to speak freely

about their overall experience in these platforms, revealing key insight about components I did

not ask about directly. Together, these tests sought to form an overarching narrative about

visually impaired users' experiences within these platforms.

     At first, I had trouble sourcing subjects for my study. Without incentivization, even

visually impaired individuals I knew were hesitant to participate in the study. Using only my

personal social media and the Ball State Communication Center, I sent out recruitment messages

weekly and received no interest in participation. After a month, I reassessed my recruitment

strategy to more accurately pinpoint visually impaired users who had interest in online

accessibility. I joined Facebook groups for visually impaired individuals, contacted third-party

organizations like American Council for the Blind and The National Federation of the Blind, and

I messaged visually impaired influencers to advertise my project. It was in a Facebook group for

the visually impaired that I discovered Mississippi State University's National Research and

Training Center on Blindness and Low Vision. This prestigious institution conducts

groundbreaking research on accessibility using a nationwide database of low vision individuals

who regularly volunteer to participate in research. The Center was kind enough to allow me to

use their database for my research. After my first email in this mailing list, I received countless

emails requesting involvement in my study. Over the course of four months, I talked with 11

visually impaired users about their experiences with user-generated content, with most

interviews lasting between 25 and 45 minutes, and some well over an hour. While the

recruitment process was more troublesome than I initially anticipated, I learned the importance

of tenacity at this stage of the design process. While ideal test subjects did not reveal themselves

through readily available information channels, seeking out mailing lists and other resources

from credible institutions like Mississippi State University proved to be a crucial component for

the success of this project.

Once participants were secured, the responses I received from them were engaging, filled

with gripping testimony about blind spots in accessibility within Facebook, Instagram, Snapchat,

TikTok, and beyond. While the testing methodology I developed helped elicit quality

testimonials regarding the accessibility of these platforms, it also led to incredible conversations

about the impact of accessibility design outside the scope of this project for visually impaired

individuals. I learned about the horrors of online banking and grocery orders for the blind, the

accessibility barriers associated with language learning applications, the lifestyle changes made

because of degenerative eye diseases, the importance of modal consistencies between

applications, and so much more. Many participants in this study even encouraged me to keep

producing original research beyond this study, bringing countless examples of digital

applications with poor accessibility.

The most inspiring aspect of my conversations with these visually impaired research participants was the tenacity with which they approached everyday processes. Many study participants detailed the painstaking measures they take to do what sighted individuals might deem as simple tasks, like browsing the internet, reading a book, or even taking a walk. For the visually impaired, these things can feel insurmountable, especially when reasonable accommodations are not made. Yet, they persist. Despite the challenges, a common thread throughout all 11 interviews in this study is the refusal to be excluded from these everyday actions and activities. Their collective advocacy for the visually impaired community worldwide was beautiful testament to their commitment to a more just and accessible world.

The final phase of the design process is product development and execution. While I did not design an interface myself, the presentation of results and subsequent generation of recommendations for these platforms aims to serve as a potential guide for developers and creatives alike who do work with these applications. Following the end of the testing phase, I created a separate document which organized quantitative data, including demographic information and accessibility data scores, in tables, and qualitative data, including quotes and other adages, in paragraphs separated by platform topics and subtopics. Once my data was organized, I set out to present my results by answering the three essential questions that guided my initial research and interviews. This process presented an even blend of technical writing and storytelling. To lay the groundwork for each platform's accessibility, I sought to first understand and convey the accessibility issues presented by participants in the study, identifying patterns among respondents. Then, I wove this blend of quantitative and qualitative data into a working narrative that outlined the strengths and weaknesses of the surveyed platforms and accessibility features in providing an accessible user experience for visually impaired users. This process

demonstrated to me the importance of data organization and proper note keeping throughout both

the research and testing phase. My interview notes helped me to identify key points in user

testimonies that would serve as focal points for my writing, helping to embolden topics and ideas

introduced throughout the literature review portion of my thesis. I likewise employed many of

the data visualization skills and tools I learned throughout my time as a journalism graphics

major at the university, tying together my interests in visual communication, accessibility, and

user experience.

The creation of this accessibility analysis of user-generated content platforms for the

visually impaired has been a fulfilling and worthwhile endeavor both professionally and

personally. The opportunity to contribute relevant industry research as an aspiring user

experience designer is one I cherish, and I hope to bring this study with me as I continue to seek

employment in the web and user experience design field. Likewise, my thesis has presented an

opportunity to help solve a deeply personal issue of inequity online. The connections I have

developed with participants in this study are meaningful and demonstrate the enduring

commitment I have to introducing empathetic design principles in my work.

Introduction

What is a visual impairment?

A visual impairment is defined by the Outreach Center for Deafness and Blindness as "a

decrease in the ability to see to a certain degree that causes problems not fixable by usual means,

such as glasses" (Understanding Vision Loss, n.d.). While there is no generally accepted

quantitative sight threshold for the term "visual impairment," the World Health Organization

classifies visual acuity worse than 6/12 in distance vision and M.08 at 40cm in near vision as an

impairment. Distance vision worse than 3/60 is considered full blindness (Vision Impairment and

Blindness, 2021). In the United States, "legal blindness" is defined as having visual acuity of

"20/200 or less in [one's] better eye with correction" (Legal definition of blindness, n.d.). It is

important to note that those with legal blindness may still have partial vision, while those with

full blindness have complete vision loss.

In some cases, the term "visual impairment" can be used synonymously with "low

vision" or "vision loss," and varying institutions define these terms differently. The National

Federation for the Blind puts forth that there is "no generally accepted definition for 'visually

impaired,' 'low vision,' or 'vision loss'" (Blindness Statistics, 2019). For the sake of this study,

the term visual impairment will be used to blanketly refer to those with a range of optical

disabilities, from mild impairments to full blindness, that cannot be fixed with standard

corrective measures.

What is the importance of studying visual impairments in online environments?

The ever-growing prevalence of visual impairments within global and national

populations underscores the importance of accessible web design, particularly in user-generated

content platforms. Globally, visual impairments are one of the top 10 disabilities among adults

18 years and older, and they are one of the most prevalent disabling conditions among children.

In fact, 3% of children younger than 18 years are either blind or visually impaired. In total, it is

estimated that 304 million people globally have a visual disability, and 36 million are totally

blind (Vision Impairment and Blindness, 2021).

In the United States, it is estimated that 3.2 million people, or about the total population

of Arkansas, are visually impaired, of which 1 million are totally blind. These numbers are taken

from the 2015 U.S. Census, which defined the term "visual impairment" as, "[the condition of

being] blind or having serious difficulty seeing, even when wearing glasses" (How Disability

Data are Collected, n.d.).

Additionally, it is expected that the number of people with visual impairments in the

United States will double by 2050. Using 2010 U.S. Census data, researchers at the University of

Southern California's Roski Eye Institute found total visual impairments are rising, particularly

among those over 80 years of age. The study projected that over the next 35 years, total visual

impairment rates will rise by 20% each decade, capping at seven million by 2050 (Visual

Impairment, Blindness, 2016).

The implications of inclusive web design for these affected populations cannot be

understated, especially as the importance of distanced interactions online is increasing during

post-pandemic life. Recent studies show that U.S. users alone spent 65 minutes daily on social

media throughout 2020, a trend that has stayed consistent through 2021. Additionally, it was

found that there was a marked increase in daily Facebook usage of one to two hours per user in

2020 and 2021 (The Statista Research Department, 2021). As the world continues to rely on

these platforms for the dissemination of user-generated content, it becomes increasingly vital that

these platforms accommodate visually impaired, or VIP, users when designing and developing

their software.

Literature Review

How accessible are Facebook, Instagram, Snapchat & TikTok to those with visual impairments?

Facebook. Facebook is widely regarded as one of the most accessible platforms for those with visual impairments. While studies about the accessibility of user-generated content, or UGC, platforms are limited, those that survey individuals with visual impairments champion Facebook as an accessible option for users. In a study of VIP persons in online social networks conducted by Voykinska et al. (2019), it was found that 100% of participants used Facebook at least once a week, compared to just 60% for Twitter and LinkedIn, the second most-used platforms (Voyinksa et al, 2019). In a similar study by Adamic, it was found that 80% of participants were regular Facebook users (Wu et al, 2014).

The popularity of Facebook among VIP people can no doubt be traced to the extensive efforts of their in-house accessibility team, founded in 2011. Among many accessibility efforts, the team worked to introduce automatic alternative text, or alt text, for images in early 2017, making Facebook the first social media network to employ the technology (Australian Network on Disability, 2019). The AI detection algorithm was improved in January of 2021, and Facebook now boasts that it can recognize up to 1,200 concepts and items that are integrated into alt text as suggestions (Coldewey, 2021). Other notable improvements in accessibility include scalable text sizes, contextual headers, auto-generated closed-captioning, and geotags.

Still, Facebook is not without issues for the visually impaired. According to Glaser (2019), the platform is notorious for leaving accessibility issues unattended for long periods of time. In 2016, when the platform released colorful text backgrounds for status updates, Facebook failed to make this text accessible to those with screen readers. Instead of extracting the text from these updates, screen readers simply reported "awesome text background," excluding impaired readers from this content altogether. Similar technical bugs have been reported with other

Facebook products, including Messenger, which blocked a text read-back feature for two weeks in 2018. Analyzing the effect that these technical glitches have on the overall accessibility of Facebook's site will no doubt be imperative to determining the relative accessibility of the site for VIP persons.

Instagram. Instagram is owned by Facebook, but the accessibility features it offers for the visually impaired differ from its parent corporation. While Facebook introduced automatic alt text for users in early 2017, Instagram waited to include this functionality on their platform until November of 2018, over a year after Facebook (Instagram, 2018). In addition, the facial recognition algorithm used by Facebook is not supported on Instagram, making it more difficult for users with visual impairments to identify or recognize friends and followers in their feed. Instagram does support more standardized accessibility features also found on Facebook, including geotags, user-generated alt text, and user tags within images.

Snapchat. Snapchat is widely considered to be one of the least accessible UGC platforms. According to the previously cited study by Voyinska et al. (2019), only 7% of all participants in the study used Snapchat at least once per week. While there is little data detailing the efficacy of accessibility features of Snapchat, one VIP user reports that Snapchat, "can definitely be used by people with low vision." This user reports that as a low vision individual, she can easily navigate Snapchat's menu architecture using the screen reader Voiceover, sending photos and messages with relative ease. Still, she notes, much of the burden for Snapchat's accessibility falls upon her friends, whom she requests to use infinite viewing time when sending photos. This allows her to view photos for longer to interpret text, images, and more. Still, this user reports that "I do not use Snapchat extremely often, maybe a few times a week." She states

that "optional alt text settings and improved Voiceover compatibility" are needed for this

platform to become more accessible for VIP users (Lewis, 2021).

While this user's testimony does somewhat clarify Snapchat's accessibility for low vision

individuals, the accessibility threshold for blind individuals is still unclear. Snapchat is

undoubtedly an important platform for study in this project, as it will help determine what

systems are excluding VIP persons from accessing content online.

TikTok. TikTok is one of the newest and fastest-growing UGC platforms on the market.

Originally released in 2016 as music.ly, TikTok has surpassed over 1 billion downloads and

quickly become a staple in social media, primarily for Gen Z users and younger. Yet, due to its

short duration in the market, there is little research into its accessibility features for VIP people

(Karizat, 2020). TikTok's public accessibility page boasts one primary accessibility feature for

the visually impaired: text-to-speech. Introduced in December 2020, this feature allows creators

to type text directly onto a video, which is then read aloud as a voiceover while the video plays.

Studying TikTok in this project will serve to analyze how newer forms of social media are

tackling accessibility and whether their methods are successful.

Which accessibility features are most advantageous for those with visual impairments?

WCAG Guidelines Standardize Accessibility. The WCAG, or the Web Content

Accessibility Guidelines, is an international set of guidelines that governs web accessibility with

the goal of making the web a more accessible place for those with disabilities. It is widely

regarded as the baseline standard for accessibility online. The WCAG provides an updated list of

best practices every 10 years to keep up with the constantly changing worldwide web, and the

most recent of these is 2.1, released in June of 2018. WCAG 2.1 lists several best practices as

vital for the inclusion of those with visual impairments online (W3, 2018).

As previously mentioned, WCAG guidelines serve as the baseline for proper accessibility

online. It is often advantageous, if not necessary, for online content platforms, especially those

which feature user-generated content, to expound upon these recommendations to provide a

more inclusive experience for those with physical, mental, and sensory disabilities.

Facebook's Facial Recognition Feature. In the past, when a VIP user encountered a

photo within a post, their screen reader provided a list of potential subjects in a picture, including

people, environments, and common objects. This is thanks to Facebook's development of

automatic alternative text, the first technology of its kind for social media, developed in 2016

(Facebook, 2016). While this technology was a breakthrough in accessibility design, the AI

feature's visual suggestions were often too numerous and non-descriptive to accurately relay

image information to the user. One user describes the frustration of this ambiguity in detail.

> Imagine scrolling through Facebook with all the images blacked out. You can read your
>
> friends' jokes and their commentary on the links they share. But vacation photos? Visual
>
> memes? A video of an old school friend's anniversary party? All of these visuals, with
>
> their rich details and subtexts, are concealed from view (Lehrer-Stein, 2020).

With the introduction of facial recognition technology, a VIP user is now prompted with the

names of the subjects in photos posted to their feed, along with a more fully developed list of

possible objects and environments, introduced in a new Facebook algorithm in early 2021. The

feature was revolutionary for VIP users online, who just two years earlier had no way to access

photos posted through UGC platforms, much less identify the subjects in those photos.

According to Matt King, Facebook's lead blind engineer, this technology has transformed the way VIP users find, interact with, and tag friends on Facebook (Gallucci, 2017). It is undoubtedly one of the most advanced accessibility features for the visually impaired, and this study seeks to analyze its effectiveness in the user experience of VIP study participants.

What online content is inaccessible to viewers with visual impairments?

The fundamental aspect of web accessibility must first be defined in terms of professional and user-generated content. These two extremes help to define the burden of accessibility, whether placed on the creator or the consumer, and in what spaces the visually impaired are excluded from engaging in content sharing and viewing online.

Professional, or non-user-generated, content spheres are those in which businesses, organizations, or other entities create content online. For the sake of this project, professional content not only indicates that a business or organization creates the content, but that it distributes this content through an owned media channel. In this model of content sharing, the burden for accessibility is placed on the business entity, and strict regulatory practices are enforced to ensure fair, accessible web content for viewers with visual impairments and other disabilities. Professional content spheres are described as being consumption-first platforms, where great thought is given to how the end user will consume content. Examples can include search engines, corporate and organizational websites, and streaming platforms. Professional content spheres are more accessible because they are required to be accessible to all viewers, enforced under Title III (Institutions) of the Americans with Disabilities Act. Thus, these organizations can be held responsible for how they distribute content online. In a benchmark case for ecommerce accessibility, Amazon was sued for ADA incompliance in 2018 due to

numerous lapses in alt text for images and web tags on their site. The case was deemed one of

the largest modern cases regarding screen reader incompatibility for the visually impaired and

even influenced the creation of WCAG 2.1 (Cosmick Editors, 2020).

User-generated content, "is any content—text, videos, images, reviews, etc.—created by

people, rather than brands" (Newberry, 2019). In contrast to professional content, where content

creation and distribution is often handled by the same entity, UGC splits the content sharing

process between the creator, a user, and a distributor: a UGC platform. This model of content

distribution is described as "creation first," where users create quick content bites with little

accommodations for the end user's experience (Gramcko, 2019). While Title III requires that

websites be made accessible to those with disabilities, social media networks are exempt from

accessibility requirements developed in the early 1990s. W3C, the organization in charge of

creating the Web Content Accessibility Guidelines, deems user-generated content to be

"uncontrolled content," which is not strictly regulated under current guidelines (W3, 2018). In

this way, the burden of accessibility falls neither on the user nor on the distribution platform,

creating a crisis of exclusion for the visually impaired and other users with disabilities.

Images: Automatic Alt Text. When first introduced by Facebook in 2017, AI-generated

alt text for images was revolutionary for the user experience of VIP persons on social media.

Before the introduction of this feature, images were entirely inaccessible to the visually impaired

in UGC platforms without the help of a sighted person. Of course, things like captions would

help a user to understand the basic context of a photo, but too often captions would fail to

encapsulate the subject matter of an image posted to these platforms, resulting in the exclusion of

VIP users from these spaces.

While automatic alt text has helped bridge this gap in accessibility online, it is not

without issue. As previously stated, the software can only recognize up to 1,200 objects,

subjects, and environments: a staggeringly low amount given the sheer breadth and diversity of

content online. For more complex visual imagery, Facebook and Instagram, the two UGC

platforms that employ this technology, rely on user-generated alt text to provide accurate

context, but these features go unused by the average sighted user.

One user described the grueling process of scrolling through Instagram using automatic alt

text:

> Here's a sampling of descriptions I heard while I browsed Instagram with Voiceover on
>
> my phone: "red polo, apple, unicorn" (a photo of a T-shirt with a drawing of a couch on
>
> it), "may be an image of indoor" (a photo of a cat next to a house plant), "may be an
>
> image of food" (a photo of sea shells), "may be a cartoon" (almost every illustration or
>
> comic panel), and a whole lot of "may be an image of one person" (a variety of photos
>
> featuring one or more people) (Sanchez, 2021).

Not surprisingly, the inaccuracy of automatic alt text can be frustrating for VIP users on

Instagram and Facebook. The solution, one author argued, is a renewed public interest in

creating more accessible content on these platforms, starting with concise yet informative user-

generated alt text (Sanchez, 2021).

Memes. Within the UGC realm, memes have become a growing issue in the fight for content

accessibility for those with visual disabilities. As previously discussed, AI-generated alt text can

be misleading for even the most easily comprehensible photos posted on Facebook and

Instagram. Memes, on the other hand, present a nuanced intersectionality of complex humor,

graphics, and text that are undetectable by AI technology. The result, said Gleason (2019), is that

memes are virtually inaccessible to the visually impaired.

A recent study found that there are two primary solutions to the meme exclusion crisis:

including descriptive alt text or creating what Gleason (2019) described as "audio macro

memes," a systematic input wizard for a meme's context that can be read by a screen reader

(p.5). Despite the study's notoriety, the inclusion of audio-macro memes has yet to take place,

and the use of alt text by fully sighted users remains low. In an interview with Time, website

accessibility expert Alex Stine reported that he had not, "ever come across alt text on a meme"

(Time, 2020, p. 14). This project seeks to further identify lapses in content accessibility for the

visually impaired and draw attention to areas of content that are inherently inaccessible for these

users.

Capturing & Uploading Media. Despite countless emerging technologies for visually

disabled populations online, one hurdle that has yet to be overcome is the issue of capturing

photos and video. For those with low vision or blindness, there currently exists no widespread

assistive technology that helps to center, frame, and properly capture photo or video using social

media.

In 2018, a team of researchers presented a newly developed Facebook bot to solve this

problem, named Accessibility Bot. Accessibility Bot helped users to frame a photo, and for the

first time, presented the capability to tell a user the number of subjects in frame, their identities,

and even their facial expressions. When tested, a majority of blind and low vision users found the

technology to be helpful but cited technical malfunctions as a concern. Accessibility Bot has

remained in development since its introduction at the 2018 CHI Conference due to functionality

and privacy issues (Zhao, 2018). While the technology is not yet public, it points to an exciting future for the inclusion of VIP users in the capturing and publishing of media online.

Methodology

Cognitive Walkthrough & Accessibility Guidelines

To determine the relative usability of the four surveyed user-generated content platforms, this project approached the accessibility of a given platform referencing the cognitive walkthrough method, a fundamental testing process for online applications. A cognitive walkthrough provides the user with short problem descriptions posed as tasks, designed to test the usability of the most vital functions of an interface.

The cognitive walkthrough method is derived from Lewis and Polson's (1990) CE+ theory of learning, which states that users have three distinct phases of acquisition when encountering novel problems within interfaces:

1. Problem-solving: the user defines their goal and chooses an action most closely related to their intended goal.

2. Learning: the user determines the effectiveness of the given action on the outcome of their goal, whether achieved or failed.

3. Execution: the user employs past knowledge of an attempted problem-solving situation to determine if it can be applied to a present one.

As a user is guided through the tasks provided by an evaluator, the interface is examined using the following criteria, reflective of the information processing model developed by Lewis and Polson (1990):

1. The user achieved their goal in an efficient manner.

2. The interface's actionable item(s) was accessible to the user.

3. The interface's actionable item(s) was relevant to the intended goal.

4. The interface's quality of feedback provided after the goal is acted on.

For most evaluators, the goal of a cognitive walkthrough is to determine information

scent for a site's main functions, or the user's estimate that a particular control, button, or other

interactive element will deliver a desired result. The idea of information scent relies heavily on

the nesting of content visually within a system, assuming that a particular action is considered

complete after bypassing the system's control (Rieman et al., 1995). Yet, for the visually

impaired, information scent is just one of the many usability criteria challenges presented in a

cognitive walkthrough. For example, a VIP user is directed to access an image on their Instagram

home feed window. The user easily finds an image and plays the alt text using their screen

reader. While the usability of this feature is adequate, accessibility considers the accuracy of this

image description and the impact of that text on the user's experience. Yes, the VIP user might

be able to complete a task that requires accessing images, but their user experience is still vastly

inferior to that of a sighted person if the alt text does not accurately convey the meaning of the

image.

For this reason, this study considers the Web Content Accessibility Guide, or WCAG,

2.1, which provides four overarching guidelines that assess the accessibility of a system or a

given operation within it: perceivability, operability, understandability, and robustness

(Kirpatrick et al., 2018).

Perceivability	A system is perceivable if information and user interface components are presentable to users in ways they can observe. For VIP users, this means that input and controls should be clearly narrated aloud within screen reader software. Elements like images, text, CAPTCHA, and others should present alternative experiences for these users or describe the visual element using text.
Operability	A system is operable if users can navigate it successfully and healthily. Nesting content in groups and maintaining a consistent site architecture is key for ensuring operability. This guideline also considers the physical health of users, including epileptic users who may be adversely affected by flashing or bright colors.
Understandability	A system demonstrates understandability if it is readable, predictable, and provides input assistance: helping a user when something goes wrong. Understandability is considered one of the most subjective measures of

	accessibility, given that each user may interpret information differently given their prior exposure to other online experiences.
Robustness	A system is robust if it is adaptive to present and future assistive technologies. This ensures that screen readers can successfully and accurately interpret a website for VIP users.

The amalgamation of a usability test, based in cognitive learning theory, paired with accessibility criteria established by the WCAG seeks to identify and analyze gaps in the user experience for VIP individuals.

Interviews

While there are many software applications that analyze websites for accessibility issues, UGC platforms present a challenge: uncontrolled content created by users worldwide. How does one assess accessibility in a platform with an ever-changing landscape of online content?

For this study, interviews with VIP individuals were determined to be the optimal method for solving this issue. By drawing on subjective experiences, interviewees can identify gaps in accessibility they find in these platforms and relay key information about how these things affect their user experience. Additionally, testimony from VIP individuals can help to uncover accessibility needs developers may not have considered when creating evaluative software.

Interviews for this study were designed to last between 45 and 60 minutes, depending on

the richness and depth of responses. Interviews commenced with the cognitive walkthrough

usability test, outlining 12 key tasks a user may complete in any of the four platforms being

evaluated: Facebook, Instagram, Snapchat, and TikTok. These tasks included processes such as

liking and commenting on posts, accessing stories and videos, and navigating through site

architecture. Interviewees were then asked to list the platforms that were most and least

accessible, along with a brief explanation for their answers. Finally, interviewees were asked to

rank common accessibility features, like automated alt text and geotags, within common UGC

platforms on a scale from one to five, with one being least helpful and five being most helpful.

It must be noted that not all participants had experience with all four platforms. For the

sake of this study, any interaction with a given platform is considered experience.

Participant Demographics

In this study, 11 VIP individuals participated in accessibility interviews. Seven

participants identified as male and four as female. Participants spanned a diverse range of ages

and professions, including author, web designer, college student, translator, and more.

Additionally, participant exposure to the platforms surveyed in this study varied. The

chart below shows the breakdown of participants and their respective experience with these

platforms.

	Facebook	Instagram	TikTok	Snapchat
Participant A	X			
Participant B	X		X	

Participant C	X	X	X	X
Participant D	X	X		
Participant E	X		X	X
Participant F	X	X	X	
Participant G	X	X		
Participant H	X			
Participant I	X	X		
Participant J	X			
Participant K	X	X	X	X

Recruitment

Most study participants were sourced from the Mississippi State University National Research and Training Center on Blindness and Low Vision participant registry, which sources participants through national consumer conferences for people who are blind or have low vision and ads on websites geared toward people who are blind or have low vision.

Other recruitment tactics included social media callouts on Facebook in low vision and blind groups as well as callout messages through Ball State University's communication center.

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Results

</div>

How accessible is Facebook to those with visual impairments?

Facebook was the most-used platform surveyed in this study, with 100% of participants having used the platform at least once, and 73% of participants using the platform two to three times per week or more. Throughout the cognitive usability walkthrough test, Facebook was overwhelmingly considered the most accessible platform among participants for its ease of use in common tasks. In fact, when asked to describe which platform makes common tasks like liking posts, commenting, and uploading files the easiest, 80% of participants defaulted to descriptions of Facebook and its accessible interface. Even among participants who had experience with multiple platforms, Facebook reigned supreme as the most accessible platform with 91% of these individuals listing Facebook as the most accessible platform for this study.

Still, even with Facebook's many accessibility features, the application is not without fault. Participants cited several issues with Facebook's accessibility, including issues with their automated alt text service, interface changes from software updates, and the finding friends process.

Automated vs. User-Generated Alt text for Images. Automated alt text for images received a 3.8 in relative effectiveness as an accessibility feature within Facebook, deeming it the second lowest in overall effectiveness for surveyed accessibility features in user-generated content platforms. Reasons for automated alt text's low ranking vary, but one salient pattern among participants was its ineffectiveness at answering two key questions:

1. Why is this image relevant to the viewer?

2. What does this image mean?

Participant D outlined the irrelevance of image descriptions clearly in the following quote:

You will find things such as 'male person, adult, white hair, book.' So that roughly tells

you the topic of the image. It does not tell you... what the image is all about. It's not

sufficient for you to have an idea of the relevance of the image.

Participant D went on to describe this further.

In a news app, it is a little bit more useful because, if it's a photo of Biden, it will tell you

'Biden,' which is very topical. But, if you are on Facebook, and you are informed that

there is 'male, female, cat,' the level of information is not sufficient to judge if it is

interesting or not.

Participant H built on this sentiment.

I find [automated image descriptions] a little intrusive. They're vague, not totally

specific. As a blind person, I don't really care about the photos too much unless they're

specific to me. If it's a picture of someone I know and what they're doing, that I care

about. If it's just a picture of somebody on a list, I don't care about that.

The non-specificity and irrelevance of automated image descriptions within Facebook is

compounded by what Participant D described as a lack of aesthetic value within these

descriptions, leading to an overall loss of meaning for most images on Facebook.

On Facebook, an image has both semantic value and aesthetic value. These automatic

descriptions will give you possibly a semantic value, a very surface denotational value, of

what is shown, but will tell you absolutely nothing about the aesthetics of it. What the

technology does not do is convey the emotional value of vision.

Participant J conveyed a similar message and said, "what's going to be meaningful from a

sighted person's perspective? That's what I want to know."

For most participants, features like image captions or user-generated alt text help them to

ascertain both the relevance and meaning of an image, but both features have limitations. Non-

descriptive captions, or those with many emojis, can leave visually impaired users more

confused, and user-generated alt text for images is rarely utilized by fully sighted users.

Interface Changes. Another commonly lamented aspect of Facebook's accessibility is

constant interface changes, particularly for mobile devices. Multiple respondents expressed that

they would no sooner learn a given aspect of Facebook's user interface than it would be changed,

hiding certain functionalities within the app or moving them to a new menu sequence entirely.

Participant H described that in a recent update for Facebook, the 'Groups' tab, originally

listed in the main navigation menu, was removed from this section, forcing her to use the

general-purpose search functionality to find the feature. Likewise, Participant C described

Facebook's interface as, "constantly changing," making navigation of the site for low vision

users, "more confusing than ever," and for blind individuals impossible.

As Facebook does not release tutorials for VIP users after updating its interface,

participants in this study said they were forced to learn the new site architecture themselves or

seek help from outside sources. Participant H noted that tutorials for Facebook updates are

available from third-party sources, but typically these tutorials are expensive. Given Facebook's

constantly changing interface, Participant H utilizes a more cost-effective option. She said, "I

know the Apple Accessibility line as well as I know my home phone number. I call them so

much because there's always someone there and they can explain [changes in user interface] to

you."

Finding Friends. Another commonly cited issue with Facebook, identified during the

walkthrough usability test, is finding friends in the application. Both low vision and blind users

alike expressed frustration that many users within Facebook have the same first and last names,

making it difficult for them to determine which users are their friends. Participant G stated,

> I have to be careful...there are a number of people who have multiple accounts. Or it
>
> could be three people with the same name. If there is more information available in the
>
> 'About' area, then I can determine, 'okay, this is the person I want to friend.' Not being
>
> able to see the pictures, it's difficult to determine who is whom.

Participants I, J, and K echoed this sentiment, describing how on multiple occasions they

resorted to sifting through multiple profiles before selecting the correct user. The solution to this

problem, argued Participant K, is looking for mutual friends. She described how the application,

"will tell me that we have so many mutual friends, so then I typically know that's the one that I

want."

Facial Recognition. While early research for this study indicated that facial recognition

technology was considered vital to the user experience of VIP individuals on Facebook, results

from this study indicated the opposite. When polled about the role of facial recognition

technology in a VIP user's experience on Facebook, most participants who replied were either

unaware of the feature's existence or apathetic about it entirely. Participant I stated, "I have not

encountered Facebook facial recognition that I am aware of, so it is not important to me."

Similarly, Participant F stated, "I've never encountered facial recognition on Facebook, so I

don't feel that I can appropriately answer these questions." While Participant K stated that she

had encountered facial recognition, its importance is trivial in her overall user experience on

Facebook.

> It tells me who's in photos, so that's helpful so I can kind of see where my friends are in
>
> photos...I don't think it would matter either way [if it were taken away] because I don't
>
> use it too often. When I do, it's helpful.

How accessible is Instagram to those with visual impairments?

Instagram was the second most-used platform surveyed in this study, with 54% of users

having had experience with the platform. While Instagram is owned by Meta, the parent

company of Facebook, participants in this study indicated a vast difference in user experience

between the two platforms, citing numerous interface challenges and an overall lapse in

accessibility when compared to Facebook. Of the 54% of participants who used Instagram, 33%

left altogether after one negative experience with the application.

Interface Challenges. Participants reported numerous interface challenges within

Instagram over a wide range of activities, from setting up an account to commenting on posts. At

the outset of her interview, Participant I stated that she had been unable to set up an Instagram

account, even with the use of both her screen reader and optical aid. During the interview,

Participant I reattempted this process, succeeded in creating an account, but struggled to navigate

the application's main architecture while toggling between her screen reader and optical aid.

Similarly, Participant D succeeded in creating an account but found that the presentation of

content within the home feed was confusing.

I created an Instagram account about two weeks ago and I made absolutely no sense of it,

except for the fact that I started to receive Instagram notifications about content that was

being added by somebody, which seemed to be totally irrelevant to anything under the

stars.

Participant K builds on this statement, describing a home feed that is less intuitive than

Facebook's. She found that, "Instagram's a little harder to navigate for me. Facebook has a

smoother integration for scrolling through posts versus Instagram. It's harder for me to like and

comment on posts." This ineffective modal structure for interaction with individual posts is

further worsened by the presentation of elements within the post structure on Instagram,

Participant C detailed.

The way Instagram works; you have to get to the bottom of the image. Then, if there's

any kind of description, then it'll say the description. So, if you're not adept at using

Instagram, you'll miss the audio description.

Alt Text for Images. Yet another striking difference between Instagram and Facebook's

accessibility is the auto-generated alt text for images. While participants expressed discontent

with the irrelevance and lack of meaning conveyed in auto-generated alt text within Facebook's

application, they indicated an even worse user experience with these descriptions on Instagram.

Participant K described, "I don't feel like [Instagram] implements much accessibility for photos

and whatnot. It says, 'images may contain...', but it's not as detailed as Facebook."

The issue of image accessibility on Instagram begins with less intelligent automated alt

text software and is compounded by an overall lack of captions and image descriptions

throughout the platform. Multiple participants indicated that posts with no captions, short

captions, or those with many emojis are common. All of these are inaccessible to VIP users on Instagram. Participant F said, "that's why I don't look at Instagram a lot because a lot of times there's not a photo description or people don't leave a caption for their photos..." Participant C echoed this sentiment, expressing frustration at the little-used accessibility features for images on Instagram. "The features are there for you to actually fill [alt text and captions] out for me. 90% of the [sighted users] don't bother because there's nothing to remind them." As a result of poor image description on Instagram, most participants who had experience with the platform demonstrated hesitancy when asked about interacting with posts. Participants' fear of misunderstanding the content displayed in posts was a key factor in this decision. Participant F said plainly, "I can't comment on a photo that's not well described."

How accessible is Snapchat to those with visual impairments?

Snapchat was the least-used platform surveyed in this study, with only 27% of participants having used the application at least once ever. Unanimously, all 27% of participants in this study viewed Snapchat as the least accessible platform of those surveyed, citing a myriad of navigability issues, modal inconsistencies, and a lack of accessibility features to describe visual content on the app. All 27% of participants left the application after one negative experience.

Snapchat Navigability. At the heart of Snapchat's accessibility crisis is its widespread incompatibility with screen readers. Before even accessing essential functions of the application, VIP users are met with a user interface that is inaccessible, forcing them to either seek help from a sighted individual, or more commonly, to abandon the platform altogether. Participant K

described Snapchat's navigability issues in her first encounter as a beta-tester for accessibility

online.

> I had downloaded it because I wanted to try it for accessibility because I'm a beta-tester
>
> for a lot of things, so I find all the glitches and whatnot and then report back to the
>
> developers. It wasn't accessible, so I ended up deleting it. I never posted anything. It
>
> didn't have the buttons labeled on it within the navigation system.

Participant C built on this narrative, citing an overall lack of usability on the application given

poor navigation accessibility.

> I just can't use it... It's more frustrating than anything else. My experience is that it's
>
> thumbs down... I can only add friends, and maybe access a message or two, but other
>
> than that it's totally useless.

Participant E framed this issue simply and said, "I was just lost. It was very hard to get [my]

bearings on where I was."

Snapchat Accessibility Features. In addition to its screen reader incompatibility,

navigation inaccessibility, and modal inconsistencies, Snapchat offers no accessibility features

like automated alt text for images to describe visual content on the app. This is one of the most

important features for VIP users who want to participate in creating, sharing, and viewing

content on the application.

While blind users are entirely excluded from Snapchat due to overall inaccessibility, low

vision users with high visual acuity can still navigate the basic functions of the application, albeit

with some difficulty. Participant C described how the application's current architecture hinders

platform accessibility specifically for low vision individuals. For example, before a user receives

a Snapchat, the sender has the option to set a view-time limit for that post before it disappears, a

feature inherent to the platform since its debut in July 2011. For low vision individuals,

Participant B said, this time limit eliminates precious seconds they need to establish "visual

clues" about the image they have received, including subject matter, surroundings, and overall

aesthetic value. While Snapchat did update this feature in May of 2017 to include an option for

infinite viewing time, the time limit for Snaps remains an obstacle in achieving accessible design

for low vision individuals (Molina, 2017).

'Share the Moment.' In an early blog post about Snapchat, founder Evan Spiegel

described the novelty of Snapchat in the realm of new social media apps as being emulative of

specific moments for a given user.

> We're building a photo app that doesn't conform to unrealistic notions of beauty or
>
> perfection but rather creates a space to be funny, honest or whatever else you might feel
>
> like at the moment you take and share a Snap (O'Connell, 2020).

Indeed, Snapchat has built its application around these fleeting visual moments, designed

to be captured and shared instantly with friends and family. Yet, the instantaneous visual quality

of Snapchat is the central issue underlying the host of accessibility issues presented in this study.

So long as considerations for VIP individuals are not addressed, Snapchat will continue to host

funny, honest moments only accessible to fully sighted users.

How accessible is TikTok to those with visual impairments?

TikTok was the second least-used platform surveyed in this study, with only 45% of participants having used the application at least once. Out of all five participants who used this platform, only one deemed TikTok the most accessible, citing the application's high contrast interface as a crucial accessibility feature for his photophobia. Yet, for blind individuals, TikTok borders on total inaccessibility. These users cited screen reader incompatibility and a lack of overall accessibility features for video content as central issues for TikTok accessibility.

Low-Vison Vs. Blind User Experience. Participants in this study indicated a vast difference in user experience dependent on visual acuity. While TikTok's user interface for low vision individuals is accessible, the application's central content is often inaccessible for most blind individuals.

Participant B, a low vision user with photophobia and a narrow visual field, described how TikTok's user interface helps him identify and read content and said, "TikTok seems to be set in a not-so-bright format. The whole color scheme is not so bright; the whole background is not so bright, which makes it easier for my particular visual issues." Participant B further explained how he is more willing to spend time on TikTok solely because the user interface is easier to view. He stated, "given my particular sensitivity, TikTok is easier for me. That's why I spend more time on TikTok." Yet, as Participant B's recent vision loss worsens, he wondered about the implications of his vision loss on viewing content on TikTok and questioned, "how useful even is TikTok for someone who is totally blind?"

Blind participants in this study presented an answer to this question. Participant C described how many videos found on TikTok are not created to be viewed by blind users. He

detailed how text-to-speech, a central accessibility feature for VIP users on TikTok that narrates

descriptive text applied on video, is not well utilized by creators on this platform.

> 90% of the people you see won't fill out [text-to-speech] for me... if there was some way
>
> that [an app would say] 'if you fill this out, you would be more inclusive to the blind
>
> community,' then maybe people would be more inclined to click on the feature.

Participant K built on this idea, describing her confusion while perusing content within the

application. "There's no real description for all the videos that are being posted. Most of the time

I don't really know what's going on." Participants argued that unless this text-to-speech feature

is more widely utilized throughout TikTok or video descriptions are implemented, the app will

continue to be exclusive to fully sighted or low vision users with high acuity.

AI Video Descriptions: Helpful or Harmful? To standardize accessibility across video

content on UGC platforms, some companies, like Facebook, are working toward automated alt

text for video. In theory, this technology would radically change how VIP users interact with

video on UGC platforms, giving them total access to content that might currently be

incomprehensible without descriptive audio narration.

While participants expressed enthusiasm for professionally curated audio description for

movies, television shows, and other such productions, multiple participants in this study were

apprehensive about the effectiveness of an automated audio description algorithm for video.

Participant H described professional audio description as, "an art," arguing that this level of

description is difficult to produce, even for humans.

If you listen to real, professional video description and compare that to what you might

see on [YouTube], you won't believe the difference. You won't believe it. A real movie

with real audio description is totally different. It's hugely helpful, but it has to be

professionally done.

Similarly, Participant J expressed hesitancy at the idea of fully automated video descriptions. "I

would love to see [audio description for video] ... it's going be tricky to get right at first,

especially if it's automated." Participant K built on this sentiment, emphasizing the unique

empathy human writers possess when writing audio descriptions. "I think it would be better done

by humans because they can better relate to the object or person who is acting in the video."

Reconciling a Visual App for the Visually Impaired. TikTok presents a challenge in

the pursuit of accessibility for the visually impaired within user-generated content platforms. As

there is currently no automated VIP accessibility feature for video content within these

platforms, the burden of accessibility falls on the end user, who is neither required nor likely to

include text-to-speech in their finished video. Without an automated audio description service or

automatic text-to-speech, TikTok's content is relegated to fully sighted users only.

Which accessibility features within user-generated content platforms are most

advantageous for those with visual impairments?

Participants were asked during interviews to rank a list of accessibility features in user-generated

content platforms by effectiveness on a scale from one to five, with one being ineffective and

five being optimally effective. While ranking criteria for these features were subjective,

participants were encouraged to justify their rankings by discussing the feature's impact on a

user's overall experience within the platform. The goal of this questioning was to determine how

well these features serve visually impaired users, and whether changes need to be implemented

to improve accessibility. Cells labeled as 'N/A' indicate that the given user either did not have

experience with the given feature or that the user's level of visual impairment did not require the

user to interact with the feature. The results of this interview portion are listed in the table below.

	Auto-Generated Alt Text for Images	High Contrast Text Mode	Enlargeable Text	User-generated alt text	User-generated captions	Geotags
Participant A	N/A	5	5	N/A	3	N/A
Participant B	N/A	5	5	N/A	5	3
Participant C	5	5	5	5	3	N/A
Participant D	3	N/A	N/A	3	4	N/A
Participant E	4	N/A	N/A	5	3	2
Participant F	5	N/A	N/A	5	5	1
Participant G	4	N/A	N/A	3.5	3	2
Participant H	2	N/A	N/A	5	3	2
Participant I	3	5	5	5	4	2
Participant J	4	N/A	N/A	5	5	4
Participant K	5	N/A	N/A	3	4	2
Total	**3.8**	**5**	**5**	**4.4**	**3.9**	**2.3**

High Contrast Text & Enlargeable Text: Low Vision

Both high contrast text and enlargeable text received a cumulative rating of five among users who had experience with these features. Participants who rated these features cited that both aided in overall readability of text across a variety of platforms.

Participant B detailed that his extreme photophobia prevents him from reading plain black text on a white background, even in print formats. The dark background and white text associated with high contrast text helps him to center his focus more clearly and prevent glare. Participant I presented a similar optical condition to Participant B, describing the glare associated with traditional black text on a white background.

> Black on white is so blurry. My eyes are completely dilated all the time; I have no iris. So, it's fully dilated. The black on white just glares and washes everything out. I have to have high contrast, so that's a five.

Participant I further added that she would rate both high contrast text and enlargeable text at a 10, but the scale for this study stopped at five.

User-Generated Alt Text

While both high-contrast text mode and enlargeable text topped the rankings at a perfect five, user-generated alt text boasted a 4.4 and featured a larger sample size with nine total participants. Study participants who scored this feature highly argued that user-generated alt text often describes two key components of an image outlined earlier in this document: meaning and relevance. Participant I expressed this idea in a quote about her experience with user-generated alt text. "I love those! They are fantastic! [The user] can actually tell you what [the image] is. If that's there, it's a 5, because it tells me how the creator wants me to see it." Participant H

furthered this narrative, discussing how her close friends catered to her disability by making

images inclusive on Facebook. "[My Facebook friends] are aware that I'm blind. So, when they

put a photo up and they go in and say what the photo is, it's very descriptive."

Still, one prominent theme throughout participant responses is the conditionality of user-

generated alt text. While Participant H has Facebook friends who know how to include this

custom alternative text in their images, many other participants were not so lucky. Even when

user-generated alt text is included in images, one critic of user-generated alt text argued that it

misses a key component found in automated alt text: consistency. Participant D described that

the value of both user-generated alt text and captions is determined entirely by the poster's

quality of writing, which varies from user to user. "If [the alternative text or caption] is written

by a human who feels professionally responsible for the content... then it can be useful."

Geotags

Ranked lowest on the list of accessibility features surveyed in this study were geotags:

location markers listed on Facebook and Instagram posts that indicate where a user shared a post.

While participants relayed that geotags served their function by indicating this location marker,

many questioned the importance of this feature. Participant F, who rated geotags as one in

overall effectiveness, expressed this sentiment in a discussion about her user experience on

Facebook. "I don't really care where they're at. At the time, I just want to know what's in the

picture." Participant K furthered this idea, saying that without vision, she found it trivial to

include place markers in posts or images that presented heavy visual imagery. "Typically, I don't

pay too much attention to those because it says where [my friends] are at, but I can't really relate

to most of the places my friends have been." At best, Participant J, who scored geotags as a four

in overall effectiveness, argued that the importance of geotags is a personal preference, being

helpful to visually impaired users who are more active on social media and interested in the

whereabouts of their friends online.

> For me, it's really not that important personally. I know a lot of people really like to get
>
> that information, and I know some people are kind of into checking in. They like to see, if
>
> they're at a concert, that all my friends are here and checked in... I don't find it that
>
> helpful for me personally. I like that it's there, I like that it's accessible... I don't do much
>
> socialization for the most part, so while I'm glad it's accessible, I just don't care
>
> personally.

What online content is inaccessible to viewers with visual impairments?

While companies like Meta have invested more than ten years of funding into

accessibility research for their UGC platforms, the struggle to create a fully accessible

experience for visually impaired users online through automation continues. Even with features

like automated alt text for images, participants in this study identified many visual content

categories as being inaccessible throughout UGC platforms. With some exceptions, there is no

current accessibility architecture to support the following content categories.

Emojis

Emojis present a unique challenge for the visually impaired online. These icons, often

used in captions throughout Facebook, Instagram, Snapchat, and TikTok, add a decorative

quality to text within these platforms that is easily comprehensible for most sighted users. Yet,

for some participants in this study, the use of emojis prohibits understanding of posts, images,

videos, and captions. While sighted users can derive the implied meaning of emojis visually,

study participants indicated that such content is often incomprehensible using a screen reader,

which reads the alt text containing a denotative definition associated with each emoji. For

instance, the practice of using multiple emojis in a row to communicate a particular feeling or

situation has become commonplace online. One such combination is the eye, lips, eye string: a

popular strand of emojis used to communicate discomfort or shock.

Figure 1: Eye, mouth, eye emoji string. This image displays the commonly used emoji string eye, mouth, eye, to demonstrate shock or disbelief (Literally Media Ltd., 2015).

While a sighted individual can clearly see that the crude face created by these three

emojis appears in shock or awe, for a VIP user, the meaning of this emoji string would be lost

completely using only the alt text "eye emoji, lips emoji, eye emoji." Even when emojis are used

sparingly and the denotative meaning of these icons is used within posts and captions, one study

participant detailed that this content may still be inaccessible to VIP users online. Participant C

described that errors in the hypertext markup language, or HTML, that hosts alt text for emojis

can cause a screen reader to narrate an unintelligible string of characters where an emoji's alt text

should be.

Where you have an emoji of a dog or an emoji of an animal, my screen reader just says

ampersand, hashtag, 1, 2, 3, and a lot of people put seven or eight [emojis]… I might

miss something, but I can't stand the screen reader going through each emoji saying all

this stuff. I'll push the down arrow to bypass [emojis] because I can't handle it.

Participant C went on to say that emojis should be used sparingly, if ever, on social media, and

developers of these applications should ensure that the alt text for emojis is utilized properly

within their platforms to ensure accessibility for VIP users.

GIFs

Yet another blind spot in accessibility for VIP users online is GIFs: short, soundless,

animated clips that automatically loop after each playthrough. As previously described in this

study, no UGC platform currently offers an automated or user-generated option to include alt

text for videos. Yet, GIFs are neither images nor video. While GIFs do often contain tens or

sometimes hundreds of frames, Participant C argued that most are short enough to be easily

described in a few sentences or a short paragraph. Yet, as an avid GIF creator, Participant C

described that when posting his finished GIFs to both Facebook and Instagram, there exists no

way to add alt text to this type of content.

> In a website, I have...alt text that tells me, 'This is an animated GIF doing this,' but
>
> Facebook and Instagram, all of them don't give you a chance. They just upload an
>
> animated GIF as if it's a movie or something; there's no way to describe it. I create
>
> awesome animated GIFs, but when I use them for social media, unless I put [the
>
> description] … in the [caption] of the post, [blind users] are not going to know what it is
>
> or what's going on.

A quick check of the advanced settings in both Facebook and Instagram revealed that Participant C's claim rings true. While both platforms do offer the option to include closed captioning for the deaf using subscript files, neither Facebook nor Instagram allow a user to include user-generated alt text for GIFs.

Memes, Recipes, & More: Images with Text

Initial research for this study indicated that memes posted across various UGC platforms were inaccessible without proper user-generated alt text. After conducting interviews with VIP users, many participants echoed this idea, citing numerous examples of memes that were incomprehensible even with descriptive alt text generated by content creators.

Yet, the inaccessibility of memes is the symptom of a larger issue within UGC accessibility for the visually impaired: images with text. None of the four platforms surveyed in this study provide automatic alt text for images with text. This means that any image with text posted online is inherently inaccessible unless a content creator provides descriptive alt text for the image themselves. This accessibility blind spot further reduces the amount of readily accessible content for visually impaired users online. Participant H thoroughly detailed her experience with text-filled images in a variety of online environments.

> If you take a picture of a recipe and you post that, we can't read that. So, that's really a big one. If [developers] would make those legible, that would be awesome. I take a French class, and I have this issue where the teacher will take a picture of a page out of a book and send it to us and tell us to do these exercises. Nothing will read that. Nothing.

Inclusion of text within images is likewise one of the central issues behind Snapchat's

accessibility crisis, precluding visually impaired users from accessing image captions and textual

elements in filters. While Snapchat could easily fix this by making captions or textual elements

compatible with screen readers, no plans are currently in place to improve the accessibility of

this platform for VIP users.

Video

As previously described in this study, video content posted online through any of the four

surveyed platforms is inaccessible to VIP users. While accessibility features like text-to-speech

are helpful in making video content more accessible, the utilization of this feature still does not

guarantee that a video on TikTok will be fully accessible for VIP users. Additionally, text-to-

speech remains a feature that must be selected by a creator when posting in the application,

meaning that many videos on TikTok remain entirely inaccessible. Without proper audio

description for videos posted across all platforms surveyed in this study, VIP users will continue

to miss key visual cues that aid in overall understanding of videos on social media.

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Recommendations

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Facebook

1. Expand the capabilities of the auto-generated alt text feature to include descriptions that

     more clearly relay the relevance and meaning of images in Facebook to the user.

     As a UGC platform, Facebook's primary accessibility issue, determined by an

     overwhelming majority of study participants, is the non-specificity of auto-generated alt

     text for images. This study recommends training the artificial intelligence behind this

feature to identify more clearly the aesthetic components of an image over basic semantic

information, which would further contribute to the relevance and meaning of an image's

auto-generated alt text for VIP users on this platform.

2. When interface updates occur, release tutorials for visually impaired users detailing

changes in navigation and overall application usability.

Without tutorials for updates, VIP users are often left confused when key site elements

are eliminated or moved elsewhere within the user interface. VIP users are then either

forced to pay for third-party tutorials or simply attempt to solve for the new site interface

themselves, a cumbersome and unnecessary process that thwarts the overall usability and

accessibility of Facebook.

3. Introduce user-generated alt text for GIFs posted on Facebook.

Facebook currently supports user- and auto-generated alt text for images, but GIFs are

inaccessible on Facebook without a clear description of this content in the post caption.

Given that GIFs are short enough clips to be described by alt text, it is the

recommendation of this study that user-generated alt text compatibility for this feature be

made available on Facebook.

4. When searching for and adding friends, create a feature that suggests the match potential

of a given user to eliminate profile sifting.

A major theme apparent throughout participant responses about Facebook's accessibility

is the issue of finding friends. Without the visual cue of a profile picture, many visually

impaired users were forced to sift through profiles to determine which user is the one

they want to friend. Even profile features like mutual friends do not guarantee that a

visually impaired user will find the person for which they are searching. A match

potential feature could easily solve this issue, presenting a percentage after the narration

of a user's name corresponding to the likelihood that a given user is the correct profile.

Instagram

1. Improve modals within the home feed to be more interactive and user friendly.

   Many participants cited issues with interactivity and scroll haptics within Instagram as a

   central accessibility issue. Making modals more clearly distinguishable between a user's

   overall home feed versus interaction with a single post is paramount in ensuring an

   inclusive experience within the application.

2. Introduce more sophisticated auto-generated alt text descriptions for images.

   While Facebook's auto-generated alt text for images is far from perfect, many

   participants in this study cited that it is far more advanced than the rudimentary algorithm

   in place within Instagram. Updating this technology to be on par with Facebook is key in

   creating a better user experience for VIP users on Instagram.

3. Remind users to include descriptive captions with few or no emojis.

   Accessible captions are essential for a VIP user to understand the context for an image

   posted on Instagram. By reminding users in the post set-up wizard to include descriptive

   captions with few or no emojis, Instagram would ensure that more posts are readily

   accessible for VIP users on the platform.

TikTok

1. Make text-to-speech a standard component of every video posted in the application.

   Text-to-speech is TikTok's only accessibility feature for the visually impaired. This
   feature is not yet standardized across all videos on the application, leaving gaps in
   accessibility throughout TikTok. By standardizing this feature, VIP users can toggle text-
   to-speech on and off, depending on their acuity and viewing preferences.

2. Develop an audio narration feature for videos in the application.

   Even with text-to-speech, all content on TikTok cannot be truly accessible until audio
   narration for video is supported. While study participants warn that development of an
   automated audio description feature could prove precarious, the ultimate implementation
   of this technology could ideally solve one of the largest remaining gaps in content
   accessibility online.

Snapchat

1. Make the application's architecture compatible with screen readers.

   At its core, Snapchat is inaccessible for visually impaired users because they cannot
   navigate the site with a screen reader. Without proper navigability, all other functions
   within Snapchat can and will not be utilized by VIP users on Snapchat.

2. Introduce alt text for images sent in snaps and posted to stories.

   For Snapchat to become accessible as a UGC platform, the application must support alt
   text for images in both snaps and stories. Without this alt text, VIP users cannot engage
   with the central functionality of the application.

3. Eliminate time limits for snaps.

For low vision individuals, time limits on snaps reduce the chance these users have to

glean key context using optical aids or other methods. Giving users unlimited time to

view snaps within Snapchat helps to ensure low vision individuals are not excluded from

content that vanishes after a specified time limit.

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Office of Research Integrity
Institutional Review Board (IRB)
2000 University Avenue
Muncie, IN 47306-0155
Phone: 765-285-5052
E-mail: orihelp@bsu.edu

DATE: October 6, 2021

TO: Robin Blom, PhD

FROM: Ball State University IRB

RE: IRB protocol # 1812781-1

TITLE: Analyzing the Efficacy of Accessibility Features in User-Generated Content Platforms For Visually Impaired Persons

SUBMISSION TYPE: New Project

BOARD DECISION: APPROVED
PROJECT STATUS: ACTIVE
DECISION DATE: October 6, 2021
REVIEW TYPE: **Expedited:** This protocol had been determined by the board to meet the definition of minimal risk.

The Institutional Review Board has approved your New Project for the above protocol, effective on October 6, 2021. Your project falls into the Expedited Category indicated below. As such, there will be no further review of your protocol, and you are cleared to proceed with the procedures outlined in your protocol. As an expedited study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record. All research under this protocol must be conducted in accordance with the approved submission and in accordance with the principles of the Belmont Report.

Your project falls under the indicated Expedited Categories:

	Category 1: Clinical studies of drugs and medical devices
	Category 2: Collection of blood samples by Finger stick, Heel stick, Ear stick, or Venipuncture
	Category 3: Prospective collection of biological specimens for research purposes by noninvasive means
	Category 4: Collection of data through Non-Invasive Procedures Routinely Employed in Clinical Practice, excluding procedures involving Material (Data, Documents, Records, or Specimens) that have been collected, or will be collected solely for non-research purposes (such as medical treatment or diagnosis)
	Category 5: Research involving materials that have been collected or will be collected solely for non-research purposes.

	Category 6: Collection of Data from Voice, Video, Digital, or Image Recordings Made for Research Purposes
x	**Category 7:** Research on Individual or Group Characteristics or Behavior or Research Employing Survey, Interview Oral History, Focus Group, Program Evaluation, Human Factors, Evaluation, or Quality Assurance Methodologies
	Category 8: Continuing review of research previously approved by the convened IRB
	Category 9: Continuing review of research, not conducted under an investigational new drug application or investigational device exemption where categories 2-8 do not apply but the IRB has determined and documented at a convened meeting that the research involves no greater than minimal risk and not additional risks have been identified.

Categories where the IRB has decided to downgrade protocol to Expedited review:

	Category 1: Continuing review of research previously approved by the convened IRB, where research activities are limited to data analysis only.
	Category 2: Continuing review of research, not conducted under an investigational new drug application or investigational device exemption where categories two (2) through eight (8) research involves no greater than minimal risk and no additional risks have been identified.
	Category 3: Protocol modifications have resulted in the protocol becoming minimal risk and qualifying for Expedited review.

While your project does not require continuing review, it is the responsibility of the P.I. (and, if applicable, faculty supervisor) to inform the IRB if the procedures presented in this protocol are to be modified or if problems related to human research participants arise in connection with this project. Any of these notifications must be addressed in writing and submitted electronically to IRBNet (www.irbnet.org). Please reference your IRB protocol number 1812781-1 in any communication to the IRB regarding this project. Be sure to allow sufficient time for review and approval of requests for modification or continuation. If you have questions, please contact Sena Lim at (765)285-5034 or slim2@bsu.edu.

In the case of an adverse event and/or unanticipated problem, you will need to submit written documentation of the event to IRBNet under this protocol number and you will need to directly notify the Office of Research Integrity (http://www.bsu.edu/irb) **within 5 business days**. If you have questions, please contact Sena Lim at (765)285-5034 or slim2@bsu.edu.

Please note that all research records must be retained for a minimum of three years after the completion of the project or as required under Federal and/or State regulations (ex. HIPAA, FERPA, etc.). Additional requirements may apply.