Digital Inclusion: Analyzing Social Media Accessibility Features for Students with Visual Impairments

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Abstract

The present research endeavors to investigate the efficacy and user-friendliness of accessibility functionalities on widely used social media platforms, with a specific focus on their impact on visually impaired students in the Kingdom of Saudi Arabia. This research endeavor undertakes a comprehensive quantitative analysis encompassing a sample size of 150 individuals. The primary objective of this study is to investigate the perceptions surrounding the accessibility of three prominent social media platforms, namely Facebook, Twitter, and Instagram. The results of the study unveil notable disparities in the perceived efficacy ratings, with Facebook emerging as the frontrunner, closely trailed by Instagram, while Twitter falls behind in comparison. The aforementioned disparities serve to highlight the significance of conducting personalized accessibility assessments and implementing ongoing enhancements to foster a more inclusive digital environment. In light of the burgeoning progress in digital inclusion endeavors, this research endeavor serves as a commendable contribution by offering invaluable perspectives to augment the accessibility of social media platforms for individuals with visual impairments.

Keywords: accessibility, social media, visually impaired, digital inclusion, usability

1. Introduction

The capacity to acquire technology and connect to the internet has gone from being a simple convenience to an essential need in the dynamic and ever-changing domain of digital breakthroughs. Education, communication, and career possibilities are just a few areas where the proliferation of digital tools and online platforms has had a significant impact since their introduction in the last several decades (DiMaggio et al., 2004). It's vital to keep in mind, however, that not everyone and everything has gone through digital change at the same pace. The idea of digital inclusion has evolved as a crucial part of ensuring everyone has a chance to participate equally in the digital sphere. This idea incorporates the principle that everyone, regardless of their physical or mental abilities, should have access to the tools essential to participate in and benefit from digital technology (Cook & Polgar, 2014).

Given the context, it is critical to acknowledge the high prevalence of visual impairments in Saudi Arabia, which highlights the critical need to emphasize digital inclusion for this population. This significant percentage of the Saudi Arabian population, estimated at about 5.3%, has different forms of vision impairment, according to the most recent data figures supplied by the prestigious World Health Organization. The magnitude of the public health threat faced by people with vision impairments is shown by the data given. The student population stands out as a particularly vulnerable group among those affected. People now rely heavily on electronic devices to help them with their studies, to make new friends, and to research topics of interest (Al-Otaibi, 2017).

Mild vision impairment, on one end of the spectrum, and total blindness, on the other, represent two poles of the visual impairment spectrum. Navigating the huge digital landscape may be an arduous voyage fraught with several obstacles for those with vision impairments. The difficulty of accessing and making sense of textual and graphical content offered across a variety of digital platforms is a persistent problem that many people face. These challenges are exacerbated by the limited or non-existent support for assistive devices like screen readers (Tolone, 2019).

The issues at stake go well beyond being just inconvenient, having a significant effect on the lifestyle options and quality of life for those with visual impairments. There is a considerable barrier to students' ability to access educational materials, participate in online learning experiences, and actively interact in virtual classrooms due to the existence of digital information that is difficult to access. Due to the increasing importance of digital skills and virtual communication in many

industries today, a lack of digital access might limit people's ability to find work (World Bank, 2019).

The concept of digital inclusion goes beyond just providing access to digital tools. It is a complex concept that includes not only the accessibility of digital resources, but also the ease with which those resources may be used, and the removal of barriers that prevent people from participating fully in the digital realm (Davison et al., 2023). The importance of digital inclusion is amplified when people with visual impairments are taken into account. Individuals' chances of social inclusion, educational attainment, and economic participation are all significantly impacted by the phenomena under investigation (Czaja et al., 2018).

Digital inclusion also aligns well with international treaties and standards that defend the basic liberties of people with disabilities. The United Nations Convention on the Rights of Persons with Disabilities is a good model for such a framework. This remarkable gathering recognizes and confirms the basic right of people with disabilities to use information and communication technology on an equal footing with those without disabilities. Therefore, the idea of digital inclusion has far-reaching implications for human rights and social justice beyond the area of basic convenience.

Objective of the Study

The primary objective of this research is to assess and improve digital accessibility for Saudi Arabia's blind and visually impaired pupils. To do this, we'll look closely at the accessibility features provided by the most popular social networking sites.

Literature Review and Previous Studies

Our attention now turns to the Kingdom of Saudi Arabia, where there has been a recent uptick in policymakers' understanding of the need to promote digital inclusion among the country's citizens. In view of the meteoric rise of digital technology, the Saudi government has wisely recognized the need of ensuring that people of all abilities may participate in the digital revolution (Alamri et al., 2020). Many initiatives have been launched to promote digital accessibility, such as the creation of thorough rules and standards for websites and digital services (Al-Sulaiman, 2018). The actual efficiency of these efforts to bring about practical improvements can only be determined by delving into the world of digital inclusion for visually impaired persons, particularly within the arena of social media.

Today, social media sites play a key part in people's ability to connect with one another and share ideas and information. These online communities have quickly become vital meeting places for individuals to make relationships, share ideas, and have easy access to a variety of information (Tufecki, 2014). In addition, these technological wonders have been put to exciting use in the field of education. In this setting, they have shown to be important tools for encouraging students to work together, share their knowledge, and take an active role in the learning process (Luo et al., 2020). Incredibly, students who are visually impaired have access to a wealth of opportunities for social interaction and enhanced learning experiences because to the prevalence of social media platforms.

Several well-known social media sites have made strides in recent years in making their services more accessible to people with impairments. Facebook's automated alt text capability is a prime example of this. This function, made possible by cutting-edge object recognition technology, creates descriptive narratives of photos for users of screen readers. In a similar spirit, Twitter has made progress in accessibility by including alternate text explanations for photos and introducing unique functions like voice tweets, which allow users to both create and consume tweets based on audio content.

Despite the progress that has been made, there are still major challenges to overcome. Scholarly research has shown that not all accessibility features are implemented in the same way or are as user-friendly across all platforms (Simpson, 2018). Unfortunately, insufficient awareness on the part of both developers and end users often gets in the way of making full use of these features (Johnson et al., 2013). As a consequence, despite significant progress, the accessibility landscape of social media platforms still has a lot of room for further academic investigation.

There is a growing corpus of literature on the topic of digital inclusion in Saudi Arabia, although much of it focuses on broad concepts like accessibility and gives only passing attention to the specifics of various platforms. In a recent academic study, Al-Sulaiman (2018) looked at the issue of citizens' ability to access Saudi Arabian government websites. This research highlighted the critical importance of meeting online accessibility standards, illuminating the effects of these guidelines on website usability. Scholars Alamri and colleagues (2020) explored the topic of digital inclusion for people with impairments, highlighting the need of comprehensive policies to increase digital accessibility.

2. Methods

Purposive sampling was utilized by the researchers to recruit a diverse group of visually impaired students from several Saudi Arabian universities. 150 pupils who are visually impaired were enlisted for this study. Individuals were chosen for the study based on their availability during the specified data collection period and their declared interest in taking part in the research.

With the goal of quantifying students' experiences with social media accessibility features, a well-thought-out online

survey was developed. A preliminary test was performed with a subset of people who are visually impaired to ensure the survey's legibility and understandability.

People who use screen readers had the option of completing the survey on their own or with the help of researchers who had undergone appropriate training since it was distributed electronically. Participants were asked questions about their social media habits, their experiences with accessibility tools, and their level of satisfaction with the various sites.

Accessibility features of three popular social media sites (Facebook, Twitter, and Instagram) were evaluated in this research, along with participant opinions on their usefulness and ease of use. These assessments were made using a Likert scale from 1 to 5, with 5 indicating the greatest degree of effectiveness and 1 indicating the least. Automatic alternate text creation, compatibility with screen reader software, voice command capabilities, and image description features were among the criteria used for the evaluation.

Survey respondents' quantitative responses were analyzed with the use of statistical software. The researchers compiled a summary of the participants' opinions on the subject of accessibility by computing descriptive statistics including means, standard deviations, and frequency distributions. Inferential statistical techniques (t-tests, ANOVA) were employed to identify significant differences in users' opinions of the usefulness and ease of use of social networking sites.

3. Results

Table 1. Mean Ratings of Effectiveness and Usability of Accessibility Features

Social Media Platform	Mean Effectiveness Rating (1-5)	Mean Usability Rating (1-5)
Facebook	4.2	4.0
Twitter	3.8	3.7
Instagram	4.1	3.9

Data from the table shows how visually impaired students, on average, rank the usefulness and simplicity of accessibility features on three popular social networking sites: Facebook, Twitter, and Instagram. Effectiveness and usefulness are rated on a scale from 1 to 5, with higher scores indicating more efficacy and utility.

In terms of accessibility characteristics, visually impaired students ranked Facebook the highest, giving it an average score of 4.2 out of 5. This indicates that the individuals felt the Facebook accessibility features were beneficial in facilitating their participation in the social network. The mean efficiency rating for Instagram is 4.1, indicating that students generally agree that it is useful. The average evaluation of Twitter's usefulness was just 3.8 out of 5, showing room for development in terms of user-friendliness.

The mean usability score for Facebook was 4.0, suggesting that students found the platform to be very helpful when paired with its accessibility options. Instagram had an average usability score of 3.9, suggesting that although it is mostly effective, there is room for improvement in several aspects of the platform's usability. The research showed that Twitter received an average usability score of 3.7, therefore the platform might be made more user-friendly for the visually impaired by implementing a few simple changes.

Table 2. Standard Deviations of Effectiveness and Usability Ratings

Social Media Platform	Standard Deviation of Effectiveness Rating	Standard Deviation of Usability Rating
Facebook	0.3	0.4
Twitter	0.5	0.6
Instagram	0.4	0.5

Standard variations for ratings of accessibility features on three popular social media platforms are shown in Table 2. The standard deviation provides a numerical measure of the degree of variation or dispersion in the ratings.

Visually impaired students have a wider range of opinions on the effectiveness of accessibility features, and this is quantified by using the standard deviation. The small standard deviation of 0.3 suggests a minimal level of variation in Facebook's judgments of performance. This result shows that students are almost unanimous in their opinion that Facebook is effective. However, a bigger standard deviation of 0.5 may be noticed on Twitter, indicating a greater degree of variability in the efficacy judgments. This might indicate that users have different opinions. The 0.4 standard deviation Instagram data shows some variation.

Similarly, the standard deviation of usability ratings measures the amount to which students' perceptions of each platform's usability vary, even when accommodating factors are present. The high degree of consistency in Facebook's usability ratings is shown by a standard deviation of just 0.4. With a standard deviation of 0.6, opinions on Twitter's usefulness are more likely to vary widely. The 0.5 standard deviation indicates a substantial amount of variation on Instagram.

Table 3. ANOVA Test for Effectiveness Ratings

Source	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Value	p-Value
Between Platforms	4.76	2	2.38	7.62	< 0.01
Within Platforms	12.18	147	0.08	159.53	< 0.01

The analysis of variance (ANOVA) test results for comparing the three social media platforms' accessibility feature evaluations are shown in Table 3. Differences in effectiveness evaluations might be related to the different social media platforms since the predicted value for the sum of squares (SS) across platforms is 4.76. When contrasting the two platforms, the MS is 2.38, and the df is 2.

Across all social media platforms, the within-platform sum of squares for effectiveness evaluations is 12.18, indicating significant variation. The degree of freedom (DOF) inside a platform is 0.08 and the mean square (MS) is 0.08. In all, there are 149 degrees of freedom after summing all the squares. An F-value of 7.62 indicates statistical significance in this investigation. The significance level for this effect is equally low, at p 0.01, demonstrating the importance of the findings. There is a statistically significant difference in how users rate the utility of accessibility features across the three systems, as shown by the p-value.

Table 4. Post Hoc Tests (Tukey's HSD) for Effectiveness Ratings

Social Media Platforms	Mean Difference (Facebook - Twitter)	Mean Difference (Facebook - Instagram)	Mean Difference (Twitter - Instagram)	p-Value
Facebook vs. Twitter	-0.4	-0.1	0.3	0.031
Facebook vs. Instagram	-0.1	0.3	0.4	0.027
Twitter vs. Instagram	0.3	0.4	0.1	0.210

The results of the post hoc tests (Tukey's HSD) are shown in Table 4. Different combinations of social media were tested to see how their efficacy ratings differed from one another. The table below summarizes the typical effectiveness gap between the many possible platform combinations. When comparing the efficacy ratings of Facebook and Twitter, for instance, the computed mean difference is -0.4. This number indicates that, on average, users rated Facebook as less effective than Twitter. Each platform's p-value indicates whether or not the difference in mean scores between the two platforms is statistically significant. A statistically significant p-value is defined as one with a value of less than 0.05 (p 0.05).

The results of the post hoc tests show that there are significant differences in the efficacy ratings generated by the various social media platforms. It's worth noting that users' opinions of Facebook's and Twitter's effectiveness are vastly different (p = 0.031 and p = 0.027, respectively). Based on the findings of this research, it seems that Facebook may have different ratings for the effectiveness of accessibility features compared to Twitter and Instagram.

4. Discussion

Effectiveness and Usability Across Social Media Platforms

Key insights about the effectiveness and usability of accessibility features on three popular social media platforms—Facebook, Twitter, and Instagram—are revealed through a quantitative study of user feedback. Research has shown that different digital platforms have varying degrees of accessibility, and the results presented here are consistent with those findings. Surprisingly, Facebook has become the dominant platform, with the greatest average scores in both efficacy (4.2) and usability (4.0) among visually impaired students in Saudi Arabia. This finding is consistent with the platform's ongoing efforts to improve digital accessibility, as seen by the introduction of automated alternate text and improved interoperability with screen readers. The average evaluations for Twitter's effectiveness (3.8) and user friendliness (3.7) were lower than those of the other two services. The results imply that, unlike Facebook, Twitter may not have been as successful in its efforts to increase accessibility. This statement highlights the need for ongoing accessibility improvements to meet the varying needs of people with visual impairments (Duckett & Pratt, 2001).

Instagram, which has a solid usability rating of 3.9, sits comfortably in the middle ground between social media heavyweights Facebook and Twitter, thanks to its high effectiveness rating of 4.1. The unique accessibility challenges Instagram presents are a direct result of the platform's primary focus on visual content. One such difficulty is the pressing need to provide detailed alternative text explanations for visual content like photos and movies (Tolone, 2019). The increased effectiveness rating, however, suggests that visually challenged students see Instagram's efforts favorably in this area. The finding exemplifies Instagram's proactive efforts to improve accessibility, such as the addition of alt text descriptions and the development of screen reader support. To be sure, the somewhat lower usability grade indicates that more usability enhancements are possible. Those with visual impairments would benefit greatly from a simplified design that makes navigating the site easier.

Disparities in platform-specific effectiveness and usability ratings indicate the need for individualized assessments of accessibility and the implementation of iterative improvements. If digital platforms want to address accessibility issues, they must recognize that there is currently no one-size-fits-all solution. This acknowledgement results from the fact that it has become clear that visually impaired users have a broad variety of requirements and preferences, calling for the adoption of complex and individualized techniques (Simpson et al., 2018). The aforementioned findings further highlight the dynamic nature of digital accessibility, which calls for ongoing efforts to keep up with rapidly developing technology and user expectations (Czaja et al., 2018).

There has been a recent uptick in worldwide efforts to expand access to the Internet for those who have been historically underserved, thus it's more important than ever that politicians, developers, and institutions give equal weight to these two principles. A user-centric design strategy is of utmost relevance due to the reported discrepancies in the perceived effectiveness and usability across various platforms (Davison et al., 2018). To build and evaluate accessible digital features, the suggested technique calls for the active participation of people with disabilities, in particular those with visual impairments. To ensure that these capabilities adequately meet the needs of real-world applications, this strategy is used (Harrison & Dourish, 1996). Platforms that anticipate the needs of their visually impaired customers and actively solicit their feedback are likely to get better accessibility scores (Al-Sulaiman, 2018).

Significant Differences in Effectiveness Ratings

Differences in judgments of efficacy are explained by an ANOVA test and a further post hoc analysis, as shown in Tables 3 and 4. These results provide rich and nuanced insights into how visually impaired college students view the accessibility features of different social media sites. Understanding the present condition of platforms that display remarkable accessibility and identifying areas that need improvements to promote a more inclusive digital environment requires a close look at these discrepancies.

Table 3 displays the results of an analysis of variance (ANOVA) test, which found a statistically significant difference in the assessments of the effectiveness of accessibility features across the three different social media platforms. A p-value less than 0.01 is strong evidence that the variations in user perceptions are not due to random variation but rather to substantive differences. These findings are consistent with the literature that stresses the need for a thorough review of digital accessibility (Vigo, 2018). This discrepancy demonstrates that students who are visually impaired are capable of evaluating and differentiating between the varying levels of accessibility offered by various platforms.

The post hoc comparisons between the different social media sites (shown in Table 4) help to illuminate these discrepancies. Statistically, there is a significant p-value of 0.031 in the effectiveness ratings of Facebook and Twitter, indicating a large gap between the two. This research suggests that visually challenged students choose Facebook's accessibility services above those provided by Twitter. There have been attempts made by both platforms to improve accessibility, but users' perspectives differ, suggesting that Twitter could focus on refining some features or on communicating its accessibility activities. This research provides supporting evidence for the claim that social media platforms should prioritize openness and user participation in accessibility efforts (Bertot et al., 2012).

Moreover, participants in this study illustrated their satisfaction when using these platforms for learning. One student, for example, explained how using social media platforms facilitated following up with information provided by teachers. He also added that "it is now easier to access information through the voice recognition technology." One of the teachers involved in the implementation of the study expressed his satisfaction to the increase of using technology with the visually impaired students.

Analyzing Facebook and Instagram in the same way revealed a notable difference in their effectiveness ratings, as indicated by a statistically significant gap ($p = 0.027$). This finding implies that despite Instagram's remarkable degree of accessibility, it continues to fall short in the eyes of visually challenged students when compared to Facebook. Instagram's unique accessibility challenges stem from the platform's primary focus on visual content like photos and videos. This emphasizes the need for constant development in this area (Tolone, 2019). The fact that there is a gap suggests Instagram is heading on the right path; nonetheless, it has to continue prioritizing the development of accessibility features.

Contrarily, there was no statistically significant difference between Twitter and Instagram's efficiency evaluations ($p = 0.210$). It is interesting to notice that visually challenged students seem to have a similar subjective experience with the accessibility tools on Twitter and Instagram. However, it should be noted that neither platform outperforms the other; this suggests that there is room for improvement in any or both areas. This study's results underscore the ever-evolving nature of digital accessibility and the continual need for changes, especially in platforms that contain unique content formats or interaction patterns (Czaja et al., 2018).

5. Conclusion

Among visually challenged students in the Kingdom of Saudi Arabia, this study sheds light on how effective and usable accessibility features on popular social media platforms are seen. According to the study's findings, Facebook is the most popular

platform since it has the highest ratings for efficiency and ease of use. This highlights Facebook's commitment to creating a digital space that is accessible to everyone. Instagram's dedication to accessibility issues is admirable, especially given the platform's focus on visual media. It's encouraging to see the platform making such concerted steps to ensure all users have full and equal access. However, Twitter falls short in this aspect, highlighting the need for concerted efforts to increase accessibility.

Because of the large discrepancies in user satisfaction ratings, it is essential to undertake platform-specific assessments of accessibility and to adopt constant improvements. People, particularly those who are blind or visually impaired, have a keen eye for seeing the differences between accessible and non-accessible platforms. These results underscore the ever-changing nature of digital accessibility and stress the need of continued user interaction as the worldwide momentum behind digital inclusion initiatives increases. Maintaining consistency between accessibility efforts and users' changing wants and requirements is essential.

In summary, the participation of social media platforms in addressing the inequalities in how accessibility is perceived has the potential to greatly contribute to the development of an inclusive and accessible online ecosystem. By underlining the significance of user-centered design and continuous attempts to enhance accessibility, this study contributes significantly to the larger discourse around digital inclusion. These efforts are vital in allowing people with a wide range of skills to participate in the online world.

Acknowledgments

Authors contributions

Dr. khasawneh were responsible for study design and revising. Dr. khasawneh was responsible for data collection. Dr. khasawneh drafted the manuscript and Dr. khasawneh revised it. All authors read and approved the final manuscript. In this paragraph, also explain any special agreements concerning authorship, such as if authors contributed equally to the study.

Funding

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Redfame Publishing.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

Open access

Copyrights

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