DARK MODE

User-Friendliness in Mobile News Reading Application

AUGUST VINCENT CLARKFELDT

AAU CPH
MEDIALOGY
MASTER THESIS

AALBORG UNIVERSITY
DENMARK

PHOTO COLOURBOX

SPRING **2025**

AALBORG UNIVERSITY
STUDENT REPORT

Aalborg University

Department of Architecture, & Design Media Technology

http://www.aau.dk

Title:
Dark Mode User-Friendliness in Mobile News Reading Applications

Theme:
UX, UI, Dark Mode, Mobile News Reading

Project Period:
MED10

Project Group:
NA

Participant(s):
August Vincent Clarkfeldt

Supervisor(s):
Thomas Bjørner

Page Numbers: 71

Date of Completion:
June 10, 2025

Abstract:

This study examines the influence of visual mode (Light Mode vs. Dark Mode) on the usability of mobile news reading applications. The primary objective was to determine whether measurable differences exist between the two modes across four usability dimensions: readability, efficiency, ease of navigation, and overall user satisfaction. The study also assessed the role of customisation options, such as font size adjustment, in shaping user experience.
A high-fidelity prototype replicating the visual design of the BBC News mobile application was developed and tested in a controlled laboratory setting. The prototype permitted users to toggle between Light and Dark Mode and to adjust font size across three predefined levels. A total of 28 participants (aged 20–30) completed seven structured usability tasks, with data collected through combining quantitative metrics (System Usability Scale scores, task times, usability ratings) and qualitative user feedback.
The results reveal that Dark Mode outperformed Light Mode in terms of readability, efficiency, and overall satisfaction, while no significant difference was observed for ease of navigation. Participants highly valued the ability to customise font size, further reinforcing the importance of adaptive interface design in mobile news reading contexts. Qualitative analysis supported these trends, highlighting strong user preference for Dark Mode and identifying areas for improving navigation flow and settings accessibility.
The study contributes to the field of Human-Computer Interaction (HCI) under UX-UI contributions, by supporting current design recommendations advocating for user-controlled visual presentation options in content-centric mobile applications. While the study focused on Android devices and a specific age group, the results provide practical insights for designers aiming to optimise mobile news reading experiences across platforms.

Contents

Dark Mode User-Friendliness in Mobile News Reading Applications

August Vincent Clarkfeldt
aclark20@student.aau.dk

1 Introduction

In an era where digital news consumption is rapidly shifting towards mobile platforms, the way users interact with digital news is an area of increased research. Mobile news reading has emerged as a dominant practice, with a significant percentage of users relying on smartphones for daily news consumption. According to the Pew Research Center, 86% of U.S. adults report accessing news on digital devices, with smartphones being the most frequently used platform [5]. This trend is echoed globally, with the Reuters Institute Digital News Report (2022) noting that mobile devices account for the majority of news consumption in numerous countries, particularly among younger users [12].

The usage of smartphones has profoundly transformed the landscape of news consumption. Traditional print media and desktop-based news platforms have seen a significant shift as users increasingly prefer accessing news via mobile devices. This transition is driven by the convenience and immediacy that smartphones offer, enabling users to stay informed on the go. The shift to mobile-first news consumption has necessitated improvements in the usability, accessibility, and overall user experience (UX) of mobile news applications.

News organisations and content creators have had to adapt their strategies to cater to smartphone users. The Nielsen Norman Group emphasises the importance of optimising digital content for mobile interfaces, focusing on aspects such as responsive design, load times, and user-friendly navigation [17].
Furthermore, the integration of social media platforms into the news consumption ecosystem has amplified the role of mobile devices. A significant percentage of adults now receive news through social media channels, which are predominantly accessed via mobile devices [6]. This convergence underscores the necessity for news outlets to ensure their content is not

only mobile-friendly but also tailored for engagement within social media contexts.

The nature of mobile news behaviour also differs from traditional formats. Research shows that mobile news reading often consists of short, frequent interactions—users browse headlines or summaries during brief, transitional moments rather than engage in deep reading sessions [12]. These habits emphasise a model of micro-engagement that further shapes design requirements for mobile news applications.
One important design trend that has emerged alongside this shift is the widespread implementation of Dark Mode. Originally introduced to reduce eye strain and extend battery life on OLED displays, Dark Mode has gained popularity for its visual comfort and aesthetic appeal. It is now available in most major operating systems and widely implemented in mobile apps—including news applications such as Google News, BBC News, and The New York Times [14]. However, the effects of Dark Mode on usability in content-centric applications like mobile news apps remain relatively underexplored.

In the thesis, user-friendliness refers to how effectively and comfortably a mobile news-reading application allows users to access and engage with news content. It is evaluated through four key dimensions:

- **Ease of Navigation** – The intuitiveness and clarity of movement within the app.
- **Readability** – The legibility and clarity of news articles.
- **Efficiency** – How quickly and easily users can complete typical tasks.
- **Overall Satisfaction** – The user's subjective experience and preferences.

This operational definition is informed by ISO 9241-11 (2018), which defines usability in terms of effectiveness, efficiency, and satisfaction in a specified context of use [10].

To ensure a structured investigation of these factors, the thesis poses the following **research question**:

> *To what extent does Dark Mode affect the user-friendliness of mobile news-reading applications on Android devices?*

The question is supported by the following hypotheses:

- **H_1 (Alternative Hypothesis):** There is a significant difference in user-friendliness between Dark Mode and Light Mode in Android news-reading applications.
- **H_0 (Null Hypothesis):** There is no significant difference in user-friendliness between Dark Mode and Light Mode in Android news-reading applications.

By combining performance-based data and subjective user feedback, the thesis aims to clarify how Dark Mode influences the user-friendliness of news-reading applications, and whether it contributes positively to the mobile news reading experience.

2 Previous Work

2.1 Dark Mode in Mobile UI Design

Dark Mode has become a widely adopted feature in modern mobile user interface (UI) design, offering users the ability to switch from light-coloured backgrounds to darker ones. This shift is not only aesthetic but also functional, as it aligns with broader trends in personalisation and accessibility.
Originally introduced to reduce eye strain and improve battery performance on OLED and AMOLED displays, Dark Mode is now a core feature in most mobile operating systems, including Android and iOS. Applications in categories such as social media, messaging, and news-reading have adopted Dark Mode to accommodate user preferences and usage contexts, such as nighttime reading or use in low-light environments.

From a visual design perspective, Dark Mode introduces specific challenges related to readability and contrast. While dark backgrounds can reduce screen glare, poorly implemented contrast ratios or font weights can negatively impact readability. Kohler & Zhang [14] emphasises that poor colour choices in Dark Mode can reduce reading speed and increase error rates for some users.
Furthermore, Kim & Wilcox [13] found that while Dark Mode may lead to slightly longer task completion times, it can enhance overall visual comfort and reduce fatigue in certain display contexts. These results suggest that the trade-offs between readability and visual comfort must be carefully considered in Dark Mode implementations.

Design guidelines from major platforms provide recommendations for achieving this balance. Apple [2] and Google [11] both stress that Dark Mode should not simply invert colours, but should be designed with the same clarity and usability principles as Light Mode. Appropriate use of contrast, accent colours, and typography is essential to maintain accessibility and usability across themes.
Overall, while Dark Mode offers clear benefits in terms of personalisation, visual comfort, and device power efficiency, it also presents nuanced usability trade-offs. These must be addressed through thoughtful design and user testing to ensure that Dark Mode enhances rather than detracts from the user experience.

2.2 Usability Studies in mobile UI Design

Usability is a core principle in mobile UI design, shaping user satisfaction, task efficiency, and overall engagement.

The System Usability Scale (SUS) is a widely used tool for measuring perceived usability across digital systems [10]. In addition to standardised scales, researchers frequently analyse metrics such as task completion time, error rates, and navigation patterns to assess usability effectiveness [16].

Nielsen & Budiu [16] emphasises that users prefer mobile interfaces that are concise, logically structured, and responsive to touch interactions. Features such as easily tappable buttons, predictable navigation menus, and clear information architecture contribute to improved usability and user satisfaction.

Eisfeld & Kristallovich [7] highlight that personalisation features, such as adjustable font size, theme switching, and content filtering, can significantly enhance engagement in mobile applications. Their qualitative study of Dark Mode adoption found that users value the ability to tailor the visual presentation of apps to their personal preferences and context of use.

Norman [17] further emphasises the importance of readability factors such as line length, font contrast, and spacing, especially for reading-intensive applications. These factors are critical in both Light and Dark Modes, where maintaining high contrast and legibility is essential for usability.

Collectively, usability research provides strong guidance for structuring intuitive, readable, and efficient mobile applications. The insights above directly inform the four usability dimensions used in the thesis: navigation, readability, efficiency, and overall satisfaction, offering a framework for evaluating how interface design choices, including colour themes, affect user-friendliness in mobile news reading applications.

2.3 Platform differences

Mobile operating systems shape how applications are designed, rendered, and experienced. While iOS and Android share core usability principles, they differ in design guidelines, customisation capabilities, and visual conventions.

Google [11] promotes flexibility and modularity in Android design through the Material Design framework. Developers are encouraged to implement adaptive colour systems and provide user controls such as manual theme toggling. Dark Mode on Android can be controlled system-wide or manually toggled within apps, giving users greater flexibility.

In contrast, Apple [2] emphasise visual clarity and consistency in iOS design. Dark Mode is implemented system-wide, with strongly recommended defaults for colour, background layers, and shadows. Dynamic system colours are used to ensure optimal contrast and legibility across Light and Dark Modes.
Cross-platform studies highlight that inconsistencies in Dark Mode implementations can negatively impact usability. S. *et al.* [20] found that some applications implement Dark Mode inconsistently across Android and iOS, resulting in usability issues such as poor contrast or incomplete theme transitions.

Although the thesis focuses exclusively on Android due to practical testing constraints, cross-platform comparisons remain relevant. Many best practices—such as high contrast text, meaningful icons, and intuitive navigation—are shared across platforms, but the degree of theme flexibility and system integration varies and may influence user perception of Dark Mode usability.

2.4 Enhancing User Experience Through Dark Mode and Mobile News Habits

The rise of Dark Mode has coincided with shifting patterns in mobile news consumption, particularly among younger, mobile-first audiences. As news organisations adapt to these trends, optimising both interface design and user experience is increasingly important.
Yadav *et al.* [24] report that mobile news reading is often a daily ritual, occurring during short, transitional moments such as commuting or morning routines. Their study identified three user profiles: Pursuers, Critics, and Skimmers, each with different engagement styles and expectations. These findings underscore the importance of adaptive interfaces that support quick navigation, content personalisation, and theme flexibility.
S. *et al.* [20] found that while Dark Mode is becoming standard in news applications, many implementations remain incomplete or inconsistent. Poorly implemented Dark Mode can un-

dermine usability by creating contrast or legibility issues, particularly for text-heavy content. Kunjir V. [15] explored automated Dark Mode switching based on usage patterns, finding that context-sensitive design can further improve user comfort and device efficiency. While automation lies beyond the scope of the thesis, their findings reinforce the value users place on visual adaptability.

Together, these studies support the central argument of the thesis: that user-friendliness in mobile news-reading applications depends not only on aesthetic or system defaults, but on how well the interface aligns with user routines, preferences, and content consumption behaviours. Thoughtfully designed Dark Mode features can enhance personalisation and accessibility, particularly for users who read news at varying times of day or in diverse lighting conditions.

2.5 Current Research and Identified Gap

Although substantial research exists on mobile usability, Dark Mode design, and news consumption behaviour, several gaps remain, particularly regarding user-friendliness evaluation in Android news-reading applications.

Much usability research focuses on general interaction patterns, navigation structures, and interface responsiveness [16, 17]. While this provides a solid foundation, fewer studies explore how theme-based variations, such as Light Mode versus Dark Mode, affect task performance or perceived usability in reading-intensive applications.

Studies that do assess Dark Mode often focus on visual comfort or display performance [7, 13]. Less is known about how Dark Mode influences usability dimensions such as navigation efficiency, readability, and satisfaction in mobile news apps.

Moreover, Kohler & Zhang [14] and S. *et al.* [20] note that many Dark Mode implementations treat the feature as a binary visual setting, without fully considering its impact on user tasks and cognitive load.

By focusing on the perceived user-friendliness of Dark Mode in mobile news-reading applications on Android devices, the thesis addresses a research gap at the intersection of interface design, user behaviour, and theme-driven usability assessment. In particular, the usability effects of Dark Mode in content-centric applications such as mobile news apps remain relatively underexplored, representing a need for further empirical investigation.

3 Methods

A user-centred approach was adopted, combining quantitative feedback in terms of user demographics, mobile news-reading habits, a SUS evaluation of the prototype, as well as an evaluation of the 4 usability metrics listed above, with 4 for each mode: Light mode, and Dark Mode. This was followed by collecting qualitative data in the form of an oral interview consisting of 5 questions on their user experience.

The collected data was used to compare the user interaction with Dark Mode and Light Mode within a self-designed Figma news-reading application prototype, based on the BBC News application (SOURCE). The created Figma prototype was a simplification of the BBC News App in the sense of only having two available articles, and major parts of the real application not being implemented, as they were not a part of the testing framework. The prototype aimed to evaluate whether visual theming had a measurable effect on usability and user-friendliness.

BBC News emphasises text-based content delivery with a clear layout and strong information hierarchy. The app supports Dark Mode through system-level toggling on Android, although user-specific customisation is limited. While the contrast ratios meet accessibility guidelines, the use of red accents and bold headlines remains prominent in both themes, thus keeping the brand identity of BBC. The Dark Mode implementation maintains visual consistency and readability, especially for breaking news and live feeds, but lacks in-app control or personalisation options.

3.1 Particpants

The target group consisted of adults aged 20 to 30. This demographic exhibits near-universal smartphone ownership, with 96% of U.S. adults aged 18–29 owning a smartphone, and consequently high engagement with mobile digital media [5]. The demographic also represents a tech-savvy user base that regularly personalises their digital environments, including interface theming options like Dark Mode, with younger adults significantly more likely to do so compared to older age groups [18].
The sample included 28 participants, who were recruited using convenience sampling [8], a

non-probability method where participants are selected based on accessibility and availability. The participants were either contacted via social media, or they were chosen randomly as they passed by the testing area. This way of choosing test participants was for its efficiency in accessing a suitable user pool within the available timeframe. The sample size of 28 people was deemed sufficient for the usability-focused study. Figure 1 below shows thh news reading habits questions, as well as the participants characteristics.

Table 1: *Table showing the partipants characteristics (n=28).*

Age:	Mean: 26.18 Range: 24-30
Glasses	Yes: 8 (28.6%) No: 20 (71.4%)
Operating system	Apple: 15 (53.6%) Android: 13 (46.4%)
Dark mode familiarity	Yes: 21 (75%) Don't Know: 7 (25%
Used news platform multiple selections)	Smartphone: 28 (100%) Social media: 28 (100%) Computer / laptop: 15 (53.5%) Televison: 12 (42.9%) Printed magazines: 10 (35.7%) Radio: 3 (10.7%)
Reading news on mobile phone:	Multiple times a day: 12 (42.9%) Once a day: 12 (42.9%) A few times per week 4 (14.3%)
Time for engaging with news:	Morning: 4 (14.3%) Afternoon: 5 (17.9%) Evening: 4 (14.3%) Night: 3 (10.7%) It varies/no specific time: 12 (42.9%)
Time spent per news-reading session:	Less than 5 minutes: 2 (7.1%) 5-10 minutes: 18 (64.3%) 10-20 minutes: 8 (28.6%)

The study followed a structured procedure to ensure consistency across all participant sessions while allowing for natural interaction with the prototype application. Upon arrival, the

participants were welcomed and provided with a brief overview of the study's purpose and format. Each test participant was required to review and sign a consent form that clearly outlined the study's procedures, GDPR compliance, the use of screen recording, audio recording, as well as their right to withdraw at any point. The form also informed participants of their right to request data deletion at any point during the study if they wished to do so. They were informed that the data would automatically be deleted after 12 months.

The testing was designed and conducted in accordance with ethical research practices, particularly those concerning informed consent, anonymity, and data protection. Minimal risk was involved in the testing, as participants engaged with a prototype of a news-reading application in a controlled environment. No sensitive or personal information was required or collected during the testing process or afterwards. By adhering to these measures, the thesis ensured ethical integrity in its treatment of the test participants and their data throughout the research process.

3.2 Procedure

All 28 participants were tested individually in-person in a controlled environment at Aalborg University Copenhagen during daytime conditions. The environment was kept quiet and well-lit at a threshold of 340-390 lux, which was measured via a light meter with an added diffuser. The average lux level in the room was approximately 376 lux. The test participants were individually seated at a table during the session. In front of them was a laptop used for the questionnaire, as well as a Samsung S23 Ultra mobile device, which had the prototype application preloaded. Before the test, the test conductor had selected "Light Mode start" for each uneven-numbered test participant and "Dark Mode Start" for each even-numbered test participant. This was done to eliminate a bias towards using one colour mode before the other. The test facilitator remained present but provided minimal assistance, ensuring consistency for each test and preserving the authenticity of the user experience. If the test participant had some technical questions, or if they were confused about the wording of either some of the tasks, or questions, the test conductor explained these, without influencing their test.

3.3 Material and Setup

To ensure consistent and reliable conditions for testing, the testing was conducted using a laptop for answering the questionnaire, a Samsung S23 Ultra smartphone, and a custom Figma prototype.

3.3.1 Devices

All testing was carried out using two identical **Samsung S23 Ultra** smartphones, provided by the SMILE Lab (Samsung Media Innovation Lab for Education) at Aalborg University Copenhagen [1].

Figure 1: *Samsung S23 Ultra Android phone model used as the mobile device for testing*

.

These devices were selected for their high-resolution displays, and responsiveness. Both phones were configured identically to eliminate device-based variability bias. Both of the Samsung S23 Ultra phones were running Android OS 14.
The users were given 7 tasks to complete when using the prototype. Task 1-3, and 5-7 are identical, as the users had to redo the same tasks again, but this time in another colour mode, as task 4 asked them to switch modes. The tasks can be seen below.

1 and 5. Go to Travel on the home page. Find and skim the news article on Chinese food in New York
2 and 6. Press the Back button in the top left corner. Adjust the text size in the app settings found in the footer under "More"?
3 and 7. On the Home page, find and skim a news article on the new Pope?

4. Switch between Light Mode and Dark Mode themes in the app settings found in the footer under "More"

"*To what extent does Dark Mode affect the user-friendliness of mobile news-reading applications on Android devices*?"

Instead of using a third-party news application, a custom interactive prototype was developed using Figma. This prototype integrates features that resemble the BBC News application
The prototype includes core functionalities such as browsing a homepage, opening two news articles, and accessing a settings menu. The interface supports Light Mode and Dark Modes, which participants could toggle manually through an in-app switch in the settings menu. This configuration ensured that both visual themes were presented consistently within the same environment, allowing for direct comparison.
To minimise external variables and to focus on usability, the screen brightness on the mobile devices was fixed across all sessions. The prototype also included a font size adjustment feature within the settings, providing users the flexibility to personalise their readability experience. All other visual and interactive elements were kept constant between modes to isolate the effect of the colour theme on usability.

3.3.2 Self-reporting

After completing the tasks, the participants were asked to fill out a modified 7-item System Usability Scale (SUS) [4], which evaluated the overall usability of the prototype. All items were positively worded to enhance clarity and reduce potential response bias, as supported in usability literature [3, 21].
After the test participants completed the tasks and answered the SUS-test, they were asked to evaluate four usability metrics for both Light Mode, and Dark Mode in 4 different categories.
They were asked to rank the questions on a 5-point Likert scale, ranging from:
1. Very Poor, 2. Poor, 3. Acceptable, 4. Good, 5. Very Good.

These were the four categories that they had to rank for each of the colour modes.
1. Ease of navigation, 2. Readability, 3. Efficiency, and 4. Overall satisfaction.

While the participants were using the prototype and completing the tasks, their time spent on completing each task was measured via an on-phone screen recording. The recording started as soon as they began task 1 and concluded when they completed task 7. The time spent between tasks was not included in the calculation of the time spent.
The last part of the testing involved an open-ended interview consisting of five pre-defined questions that sought to further evaluate the test participant's testing experience, but particularly on the colour modes, and the prototype application itself. The answers were all recorded and stored locally on the Samsung S23 Ultra mobile device.
These are the 5 interview questions:

- What stood out to you when using Light Mode?
- What stood out to you when using Dark Mode?
- Were there any moments where you felt lost or unsure while navigating the app?
- If you could improve one thing about the app, what would it be?
- Is there anything else you would like to tell about your experience?

3.4 Data Analysis

To analyse the testing data, multiple tools were used. SurveyXact data was used to analyse the test participant characteristics, and for each answer the test participants noted, it was copied to an Excel sheet, in which Figure xx above was created.
To analyse the SUS data, the test participants answers were put into an Excel sheet, where each answer was then changed from, for example, "Agree" into the number "4", "Strongly Agree" into the number "5", etc. After each answer was changed to its according Likert scale value, the mean average was calculated for each test participant. The full overview of the numbered answers was then transformed into a numerical value from 0-100, where the SUS score for each test participant could be calculated. Normality of the collected quantitative data was assessed using the Shapiro-Wilk test [22], which evaluated whether the sample followed a normal distribution. A one-sample t-test [9] was conducted to compare SUS scores against the industry benchmark of 68, and evaluate whether the observed usability ratings significantly differed from the baseline.

The usability metrics answers were once again plotted into an Excel sheet, where each of the four usability metric questions was divided into Light Mode answers, and Dark Mode answers for each category. Every test participants answers were counted for each score, and afterwards the mean for each usability question and colour mode was calculated by adding their individual scores together, and dividing them by 7, as they ranked seven SUS questions. This was done for each test participant, as well as an overall SUS score for each question.
A Shapiro-Wilk test was run on each of the four datasets to check for normality [22]. Since none of the four metrics followed a normal distribution, a non-parametric Wilcoxon Signed-rank test was used to test for significant differences between the usability metrics [23].

Each test participant was timed for all seven tasks they completed, and the time stamps were all plotted into an Excel sheet. The test participants were divided into two groups, where the odd-numbered test participants started with Light Mode first, and the even-numbered test participants started in Dark Mode. All test time results were plotted as mm:ss, and later recalculated into seconds. For each tasks, the mean time was calculated, and for each test participant, the mean completion time per task was also calculated. The Shapiro Wilk test [22] was again conducted for each group. As the data was not normally distributed, a Wilcoxon Signed-Rank test [23] was conducted to see if the time was significantly different between the two starting modes.

The test participants were all interviewed via a semi-structured interview approach, where they needed to answer five pre-defined questions, but were prompted to answer freely. Each of the test participants' answers was recorded and later transcribed into a Google Docs document. Minor corrections were made to eliminate filler words and to make their statements more comprehensive, while still retaining the original tone and wording as closely as possible. The interview techniques were informed by the principles of qualitative interviewing described by Rubin and Rubin [19], focusing on eliciting rich, descriptive responses from participants. While going through the interview answers, a list of seven general themes was counted, or put together via similar themes. For each of the themes, the number of positive and negative statements was coded into a table, where a quote exemplifying one positive statement and one negative statement was created.

4 Design

4.1 Prototype Design

The prototype developed was a high-fidelity replica of the BBC News mobile application, designed to evaluate user preferences and usability across Light and Dark Mode interfaces. The prototype maintained the original BBC fonts, layout, colours, and branding. This choice was made to ensure realistic interaction, visual familiarity, and to simulate a credible news-reading experience, thereby improving the validity of the test.
However, to ensure experimental control, the functionality of the prototype was deliberately limited to only the features necessary for the seven predefined tasks as mentioned in the methodology chapter 3. All non-essential features, such as search, live content, or account settings, were excluded for the purpose of the testing.
The prototype was developed using Figma, with the interactive prototype being preloaded and tested on the Samsung S23 Ultra devices.

4.2 Prototype Variants

To evaluate user preferences and usability impacts, the prototype was developed in six unique interface flows, based on the two colour themes. For each colour theme, a version with a small font size, a default font size, and a large font size was created.
Each of these three flows represented a completely interactable version with consistent structure, interactions, and layout, with the sole difference being the selected appearance mode in the settings menu. The users were able to switch between the modes, as well as the three font sizes within the application itself, where the changes applied globally to all associated screens within the flow that was changed to. This allowed for dynamic feedback and a real-time interaction evaluation.
Below are screenshots from the prototype, illustrating the different pages in the three font sizes, as well as the differences between Light Mode and Dark Mode.

Below in figure 2, are screenshots of the "Home" screen in both Light Mode and Dark Mode, and in the three different font sizes.

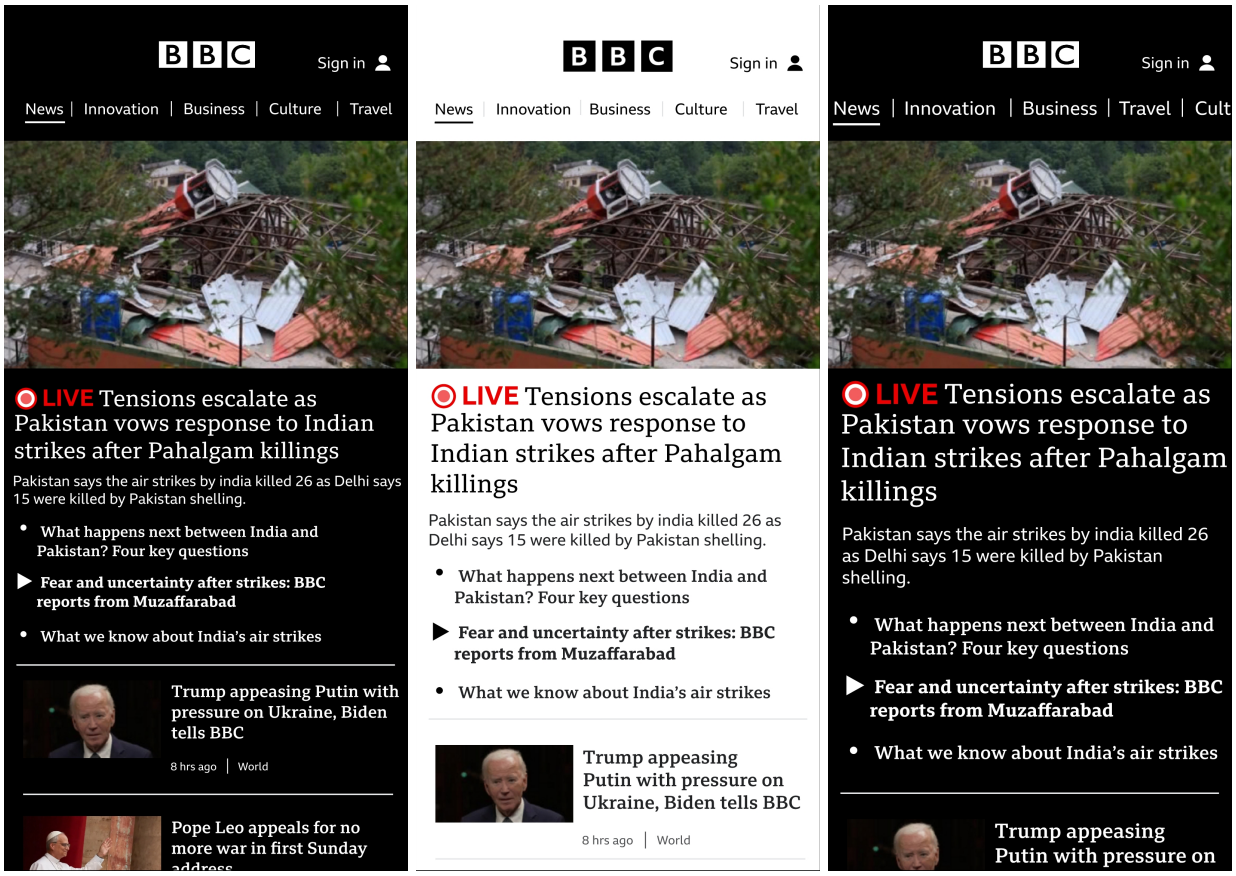

Figure 2: The Home screen, 1. Small text size in Dark Mode. 2. Default text size in Light Mode. 3. Large text size in Dark Mode.

On the "Home" screen, the user was able to scroll the page, and select and skim the article about the new pope. In the header, they were able to select a subpage on "Travel", which enabled the user to access a second article about Chinese food in New York City. In the footer, the user was able to select the "More" page, which would bring them to the page where they could change the visual settings for the prototype. The reasoning behind choosing the article about the new pope is based on relevance and a common interest among the majority of people in major events taking place in the world. The second article about Chinese food in New York is an article that has less major relevance, but serves as an example for a sparetime activity article, for those who are interested in culinary experiences in foreign countries. The two very different articles were chosen deliberately to make the users explore the application further, and with different article lengths as well.

On the "Home" screen, users were able to scroll the page and select an article about the new pope. In the header, they could also select the "Travel" subpage, which provided access to a second article about Chinese food in New York City. The footer included a "More" page, where users could access visual settings for the prototype, such as theme switching and font

size adjustment.
The two articles were deliberately chosen to reflect different types of news content and reading contexts. The article about the new pope represents a globally relevant news topic that many users are likely to find interesting, reflecting typical engagement with major current events. In contrast, the article about Chinese food in New York serves as a lifestyle feature, illustrating spare-time and interest-driven reading behaviours, such as culinary exploration. The articles also varied in length and complexity, encouraging users to interact with different parts of the prototype and to experience varying levels of reading effort. This diversity in article selection was intended to prompt broader exploration of the application and to test usability across distinct content types.

4.3 Design elements and Branding

The designed prototype adheres as closely as possible to the BBC News app's visual identity. Creating a high-fidelity prototype allowed the study to evaluate the prototype's usability in a realistic context without relying on generic or self-designed UI elements.

4.3.1 Colour and typography

The prototype used the same typography, BBC Reith, thus matching BBC's font choice. The default font size was used as the baseline and was carefully positioned and sized to match the real article as closely as possible. The large variant of the text was created by scaling all text by 1.1 (110%), with all visual elements manually adjusted to maintain layout consistency to match that iof the real BBC News app. The small text size mode was likewise designed as the large mode, but the difference was in the default text size being scaled by 0.9, or 90%.
Furthermore, the same colour palette for both Light Mode and Dark Mode was used to match the visual styling. First, the Light Mode version was created for each of the three modes, with the matching colours of the real app, and afterwards, the Dark Mode versions were created in the same layout style, element position, etc., and carefully adjusted to match the colour scheme of the real BBC app. Both of these can be seen in Figure 3 and Figure 4 below.

Figure 3: The colour palette for the BBC News application

.

Figure 4: The BBC Reith font used throughout the application and prototype

4.3.2 BBC branding elements

The prototype also included BBC branding elements, such as their logo on the top of the pages, as well as their icons in the header and footer. This can be seen below in Figure 5 and Figure 6, respectively.

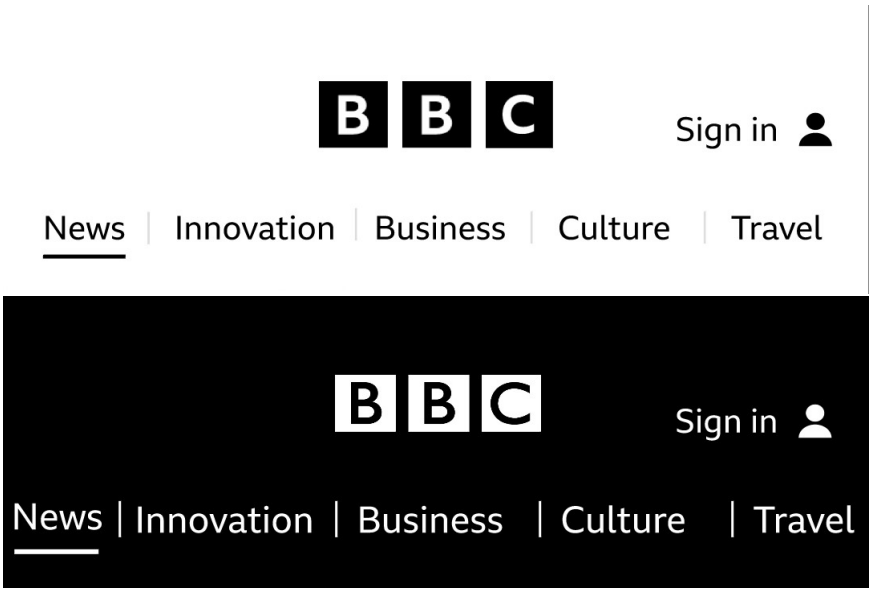

Figure 5: The header and BBC logo in Light Mode small, and Dark Mode default

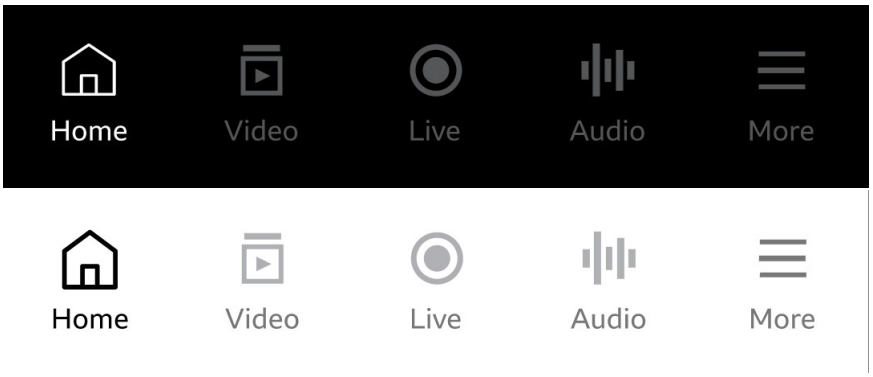

Figure 6: The footer and icons in Light Mode and Dark Mode

4.3.3 Article layout

The article layout, including headlines, subheadlines, featured image, as well as the real scrollable text from both BBC news articles was also as closely implemented to the real app as possible. This can be seen in Figure 7 below.

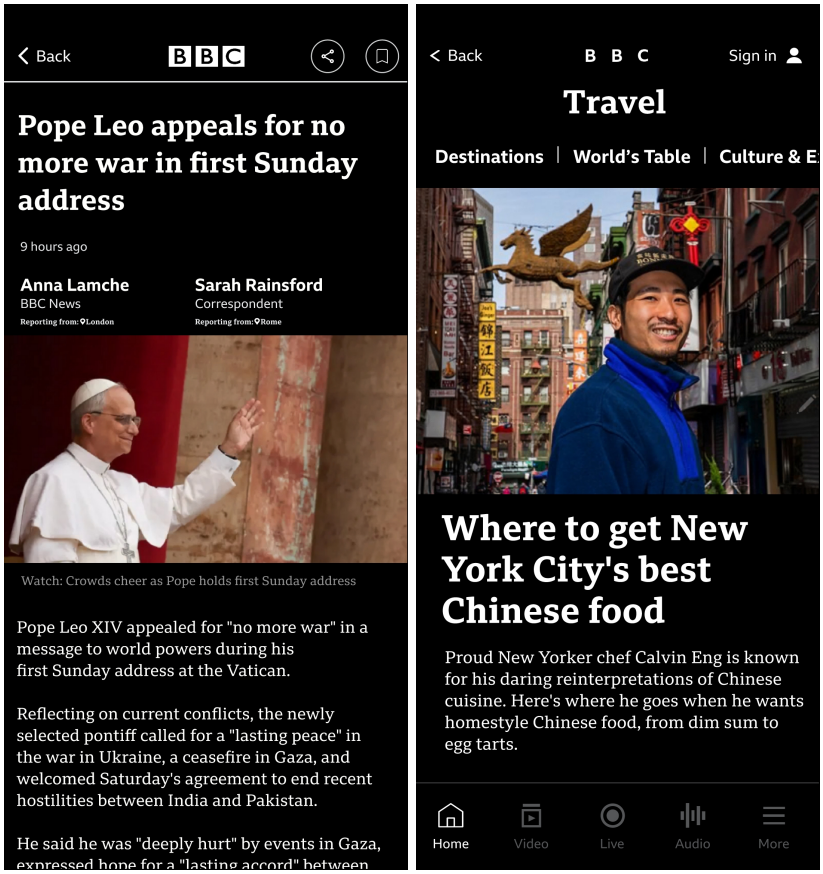

Figure 7: 1. The news article about the new pope in small font size. 2. The Travel page with the article about Chinese food in NYC

4.3.4 Settings menu, Theme selection, and Font size

The prototype also included interaction animations, such as when pressing the "Back" button in the top left corner, or switching between the "Home" and "More" sections in the footer. The settings menus were likewise designed to mimic the real menus, with only a slight change to the "Theme settings", as the option for an "Automatic" theme selection was removed for the sake of the test. This can be seen below in Figure 8.

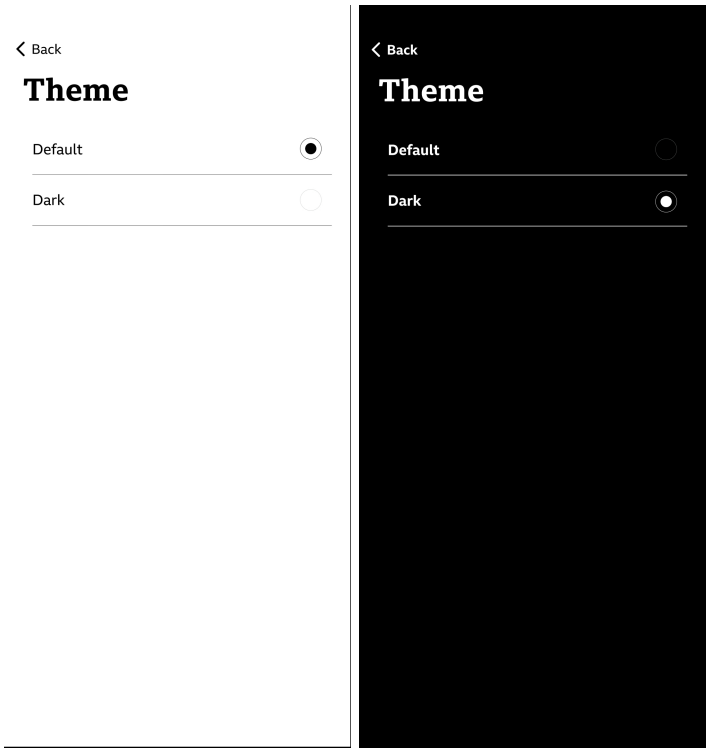

Figure 8: The theme selection setting

Below, as can be seen in Figure 9, the settings for adjusting the text sizes are also implemented, with three different sizes for each colour theme.

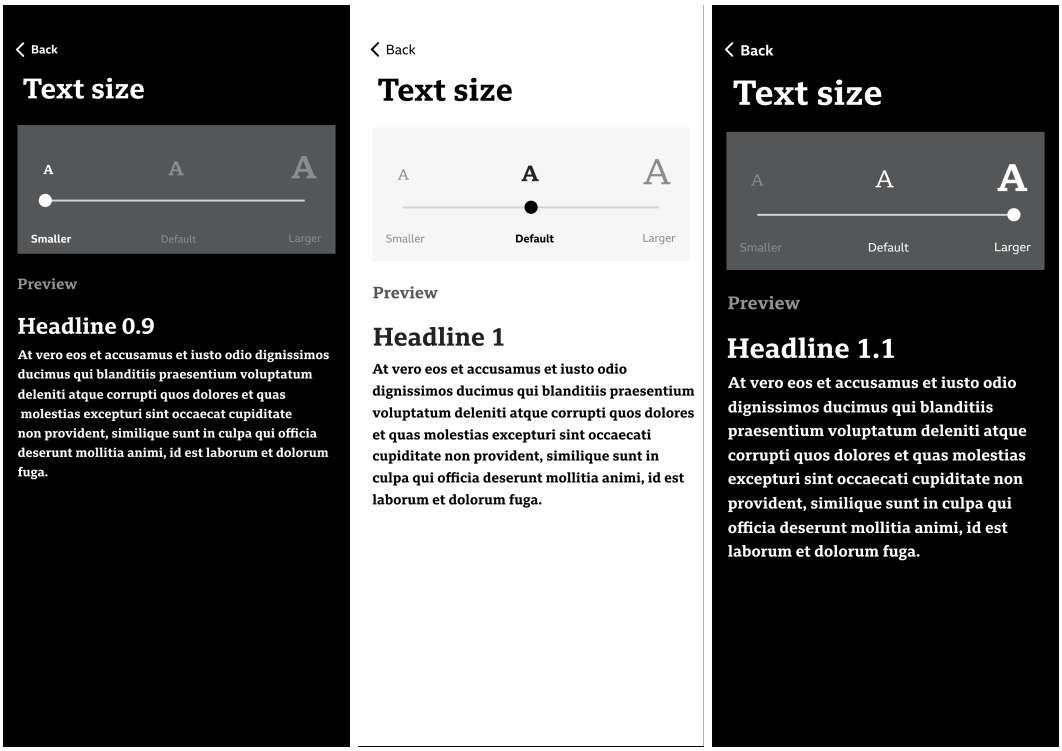

Figure 9: The text size option in the prototype in Light Mode and Dark Mode

4.3.5 More page

Lastly, another page that was used to locate the settings menu was the overall "More" page, where the users were also able to press text fields that would bring them directly to either the "Travel" section or the "News/Home" section. This can be seen below in Figure 10.

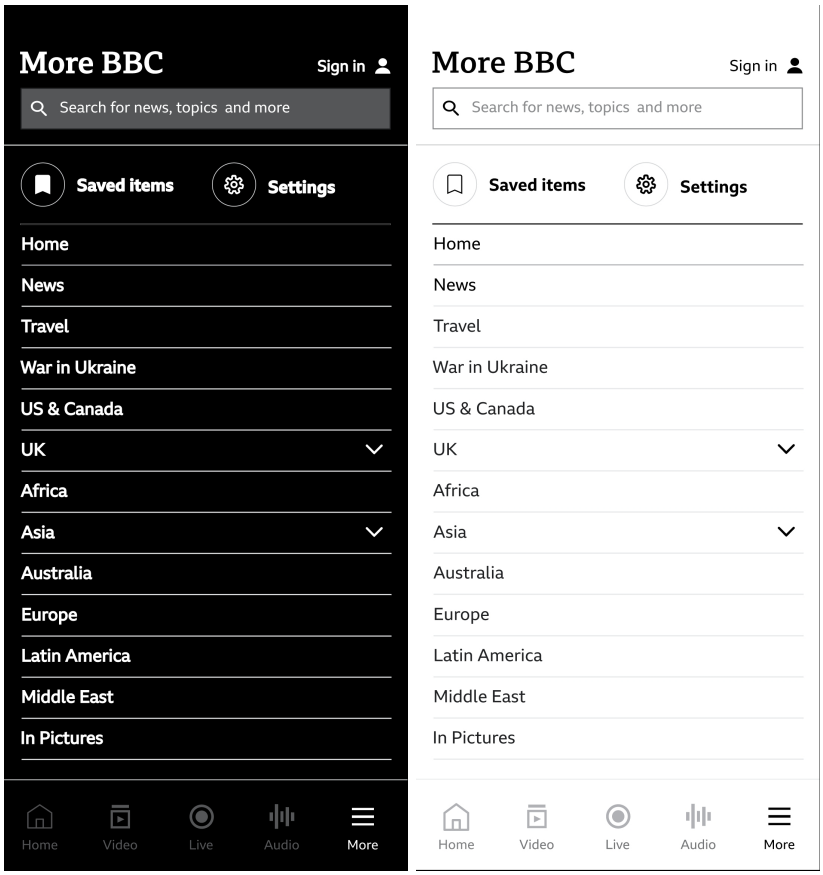

Figure 10: The "More" screen, which functioned as the page to access the settings for the prototype

5 Findings

5.1 SUS Scores

The prototype with its modified SUS test received a mean SUS score of 77.55 (SD = 7.73), indicating a generally high level of usability. Prior to hypothesis testing, assumptions of normality were assessed using the Shapiro-Wilk test, which evaluates whether the data significantly deviate from a normal distribution. The results were as follows:
W = 0.957 p = 0.302

Since p > 0.05, it is suggested that the data were approximately normally distributed. This justified the use of parametric testing in subsequent analysis. A one-sample t-test was conducted to determine whether the observed mean SUS score significantly differed from the benchmark value of 68. The one-sample t-test received the following results:
t(27) = 6.54 p = 0.0000000515

Given that p is significantly lower than 0.05, the result was statistically significant. These findings suggest that the prototype was perceived as significantly more usable than the minimum threshold typically considered acceptable.
To visualize the overall distribution of SUS scores, a boxplot was created, which can be seen below in Figure 11:

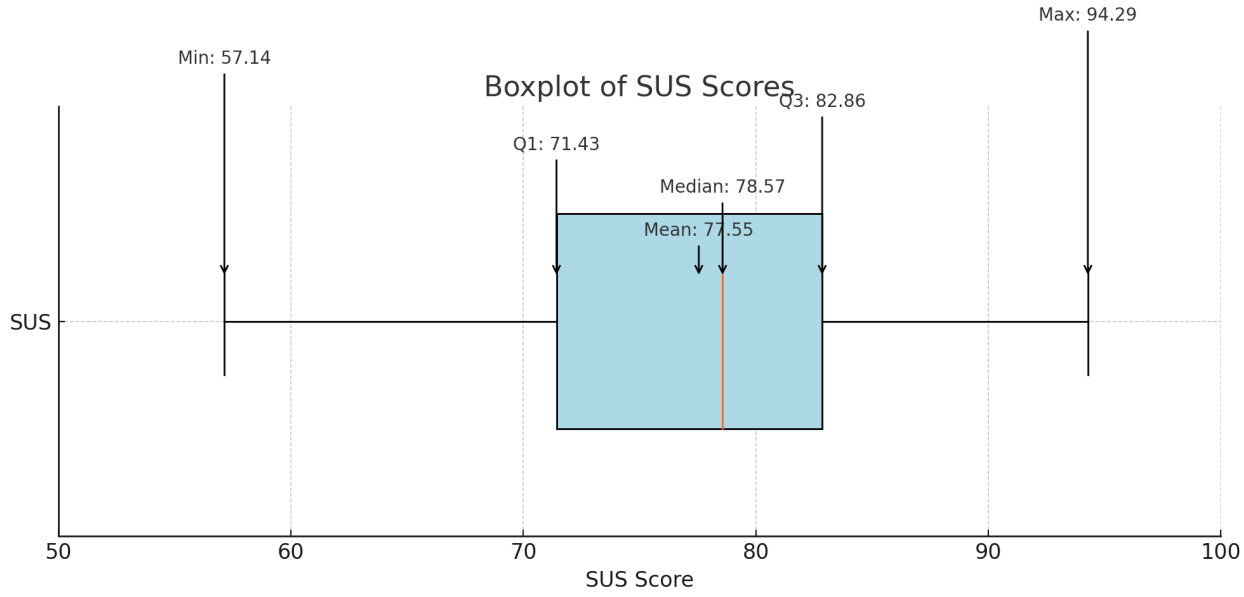

Figure 11: Box plot over the test participants' SUS Scores

This plot displays the median (78.57), interquartile range (Q1 = 71.43, mean = 77.55, median = 78.57, Q3 = 82.86), and the full range of scores (Min = 57.14, Max = 94.29).
A histogram with a fitted normal distribution curve can be seen below in Figure 12, and provides a visual confirmation of the data's approximate normality, further supporting the validity of the applied statistical tests.

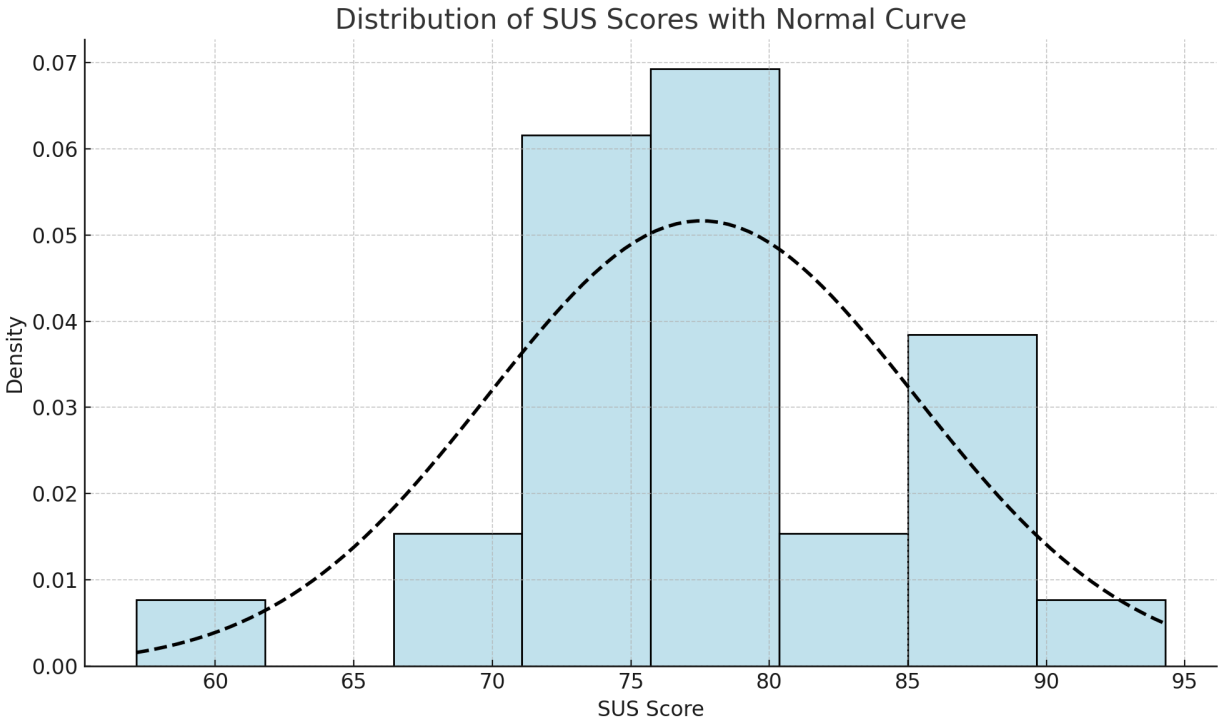

Figure 12: The SUS score distribution with normal curves to visualise the approximate normality of the data

As can be seen in Figure 12 above, the SUS scores from the test are very similar to a normal distribution of data, with the majority of the data being inside the 65-90 threshold.
Below in Table 2 is an aggregated table over the test participants' answers per SUS question, as well as the mean and the SUS score per question.

SUS Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	n	Mean	SUS Score
1. I would like to use this application frequently	0	1	10	16	1	28	**3,61**	**72,14**
2. The application was easy to use	0	1	0	24	3	28	**4,04**	**80,71**
3. I can use this application without any help	0	0	3	21	4	28	**3,96**	**79,29**
4. The functions in this application were well integrated	0	0	11	15	2	28	**3,68**	**73,57**
5. I am able to learn this application quickly	0	0	0	22	6	28	**4,21**	**84,29**
6. I felt very confident using the application	0	0	6	20	2	28	**3,86**	**77,14**
7. I can recommend this application to others	0	1	6	19	2	28	**3,79**	**75,71**

Table 2: Number of participant answers for each SUS question

As can be seen above in Table 2, the SUS scores were all aggregated, and the mean for each of the seven SUS questions was calculated, and approximated to 2 decimals. Question 5 scored the highest among the 7 SUS questions with 84.29, whereas question 1 had the lowest average SUS score of 72.14.

5.2 Usability Metrics

The test results indicated non-normality for all four usability metrics, and that the only metric that was not significantly different between the two modes was "Ease of navigation", as the p-value was 0.098, so > 0.05,

Below in Table 3 is a table of the aggregated usability scores, which compares the test participants' rating of the 4 metrics for each mode; Light Mode, and Dark Mode.

Question	Light mode or Dark Mode	Very Poor	Poor	Accepable	Good	Very Good	n	Mean
Ease of navigation	LM	0	2	8	14	4	28	**3.71**
	DM	0	1	0	15	7	28	**4.00**
Readability	LM	0	1	16	9	2	28	**3.43**
	DM	0	0	3	12	13	28	**4.36**
Efficiency	LM	0	2	7	19	0	28	**3.60**
	DM	0	1	4	16	7	28	**4.04**
Overall Satisfaction	LM	0	1	11	14	2	28	**3.61**
	DM	0	1	2	16	9	28	**4.18**

Table 3: Number of participants rating how they perceived the four usability metrics across modes

The descriptive results indicate that Dark Mode outperformed Light Mode on three out of

four criteria, as shown in the table above. While ease of navigation was rated similarly across themes (Light Mode: M = 3.71, Dark Mode: M = 4.00), Dark Mode received noticeably higher scores for readability (M = 4.36), efficiency (M = 4.04), and overall satisfaction (M = 4.18), compared to Light Mode's respective means of 3.43, 3.60, and 3.61.
The median scores were calculated to be 4.0 for all dimensions in both modes except for readability in Light Mode, which had a median of 3.0. This indicates a more mixed perception of readability in that theme.

Before selecting the appropriate statistical test, the distribution of the difference scores for each criterion was assessed using the Shapiro-Wilk test. This test evaluates whether the differences between paired observations follow a normal distribution. The results for all four usability dimensions were as follows:

- Ease of navigation, W = 0.692, p = 0.000000221
- Readability, W = 0.819, p = 0.000236786
- Efficiency, W = 0.845, p = 0.000236786
- Overall usability, W = 0.830, p = 0.000529680

To illustrate the non-normality of the four usability metrics, Figure 13 below showcases each metric with an embedded normal curve to show the spread of the data. The histograms shows how closely, or in this case, how far away each metric is from being normally distributed.

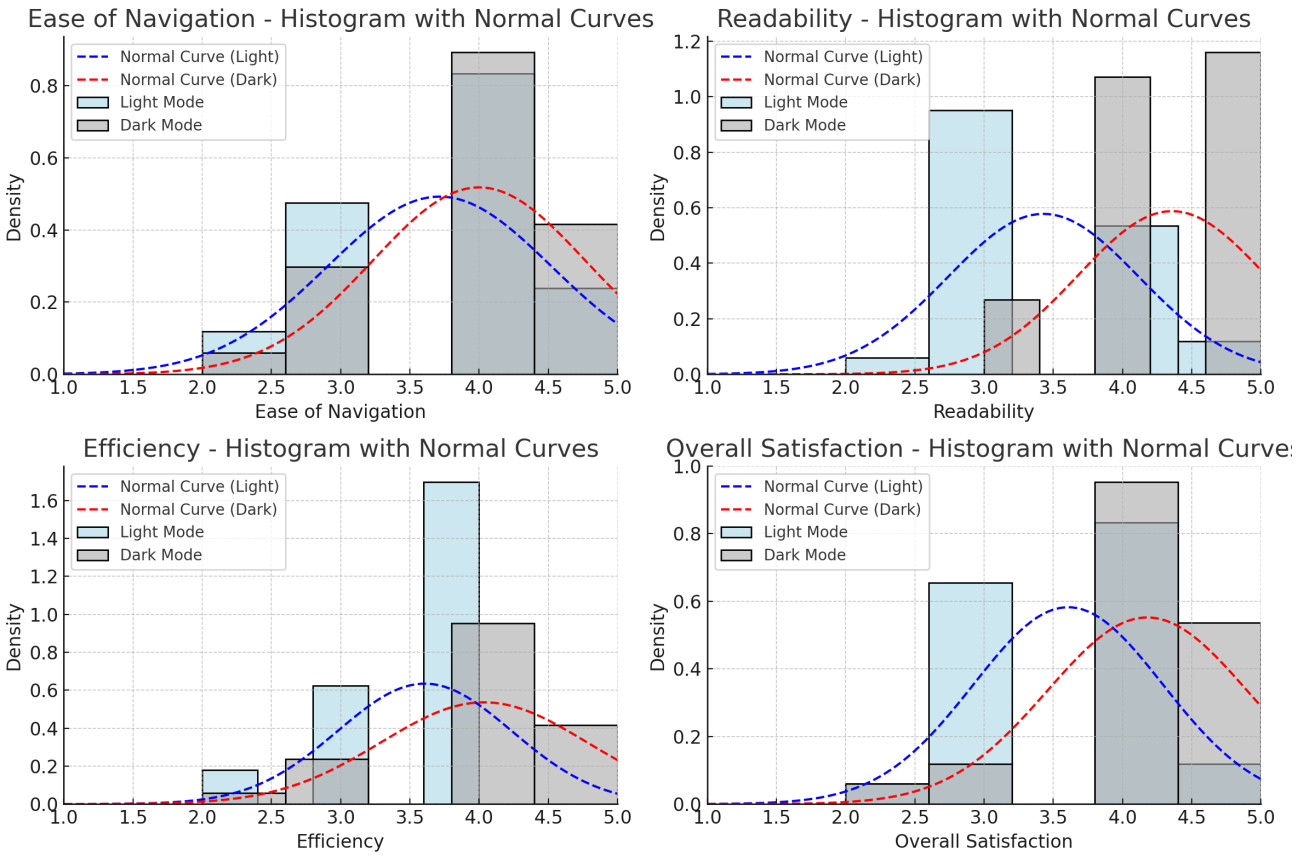

Figure 13: A histogram highlighting the four usability metrics, as well as their normal curves.

Since all p-values were below 0.05, the null hypothesis of normality was rejected for all 4 usability metrics, indicating that the data is non-parametric. As a result, the Wilcoxon Signed-Rank test, was used to compare the metrics. The test presented the following results:

- Ease of navigation, $p = 0.098$
- Readability, $p = < 0.001$
- Efficiency, $p = 0.024$
- Ease of navigation, $p = 0.005$

Ease of navigation was the only usability metric that was not statistically significant, as the p-value was $p = 0.098$, so > 0.05. Readability, Efficiency, and Ease of Navigation all had p-values that were < 0.05, meaning that all three of them were all statistically significant. These findings show that participants rated Dark Mode significantly higher in terms of readability, efficiency, and overall satisfaction than Light Mode. While ease of navigation did not

differ significantly, the trend still favored Dark Mode in terms of mean score.

Figure 14 below shows boxplots for each metric, highlighting the spread and central tendency of scores and further illustrating Dark Mode's advantage.

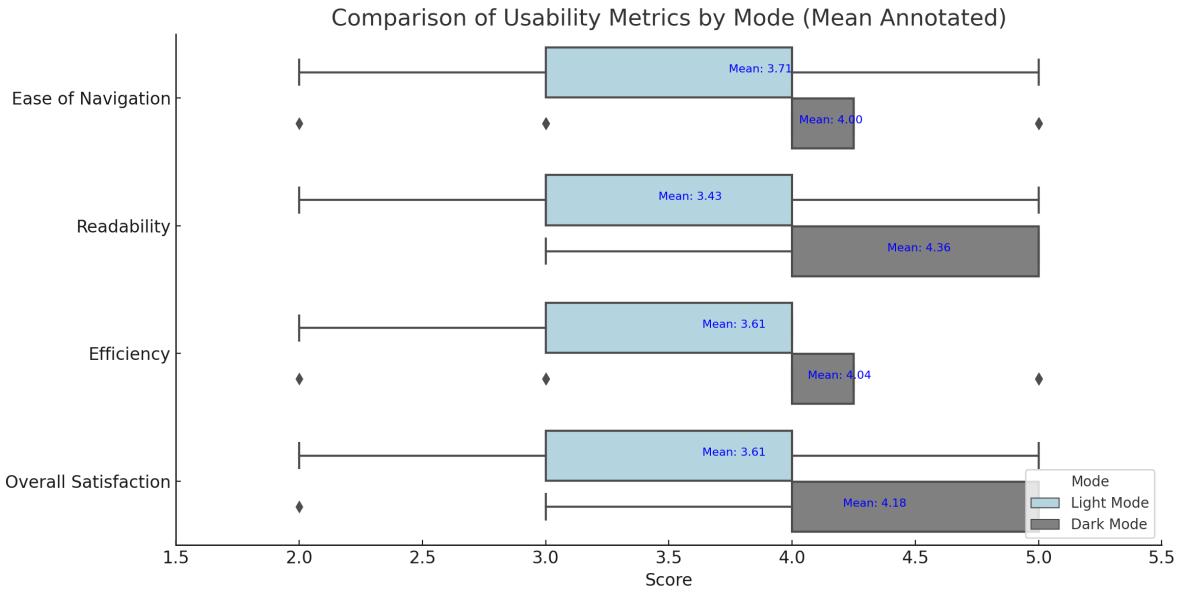

Figure 14: Boxplots for each of the four usability metrics with their mean value.

Due to the 1–5 scale and clustering of scores in the upper range, the boxplots show limited variation, resulting in visually similar distributions across the usability metrics. This visual similarity reflects the generally high ratings across both modes
Analysing the box plots above, the range for the box plots is very similar, as for all metrics, except for readability, the minimum value that was selected was 2 (poor). For all metrics the value 5 (Very Good) was the maximum score that was given, except LM efficiency for which the highest score was 4 (Good). The boxplot quartiles and medians for each usability metric are described below.

Ease of navigation LM, Q1 = 3, mean = 3.71, Q3 = 4.
Ease of navigation DM, Q1 = 4, mean = 4.00, Q3 = 4.5

Readability LM, Q1 = 3, mean = 3.43, Q3 = 4.
Readability DM, Q1 = 4, mean = 4.36, Q3 = 5.

Efficiency LM, Q1 = 3, mean = 3.61, Q3 = 4.

Efficiency DM, Q1 = 4, mean = 4.04, Q3 = 4.5.

Overall satisfaction LM, Q1 = 3, mean = 3.61, Q3 = 4.
Overall satisfaction DM, Q1 = 4, mean = 4.18, Q3 = 5.

When observing Dark Mode and ease of navigation, there are some outliers, where at least one participant rated it lower than most of the other participants, causing outliers to be at 2, and 3, however, there is also a test particpant who has rated it higher than the others, resulting in an outlier on 5 as well.
Dark mode efficiency also have the same outliers as the aforementioned on 2, 3, and 5. In overall satisfaction, there is a single outlier of a participant having rated it 2, whereas the majority have rated it higher.
The difference between the means for each of the metrics is the following.
Ease of navigation = 0.29, Readability = 0.93, Efficiency = 0.43, Overall satisfaction = 0.57.
For all 4 usability metrics, Dark Mode had a higher calculated mean.

Looking into each of the 28 test particpants, the lowest average usability score across both modes was test participant 13, with an average of 2.625. The test participant who had the highest usability score was test participant 1, with a score of 4.625.
Figure 15 below shows a boxplot of the average usability score per test participant, pr. mode.

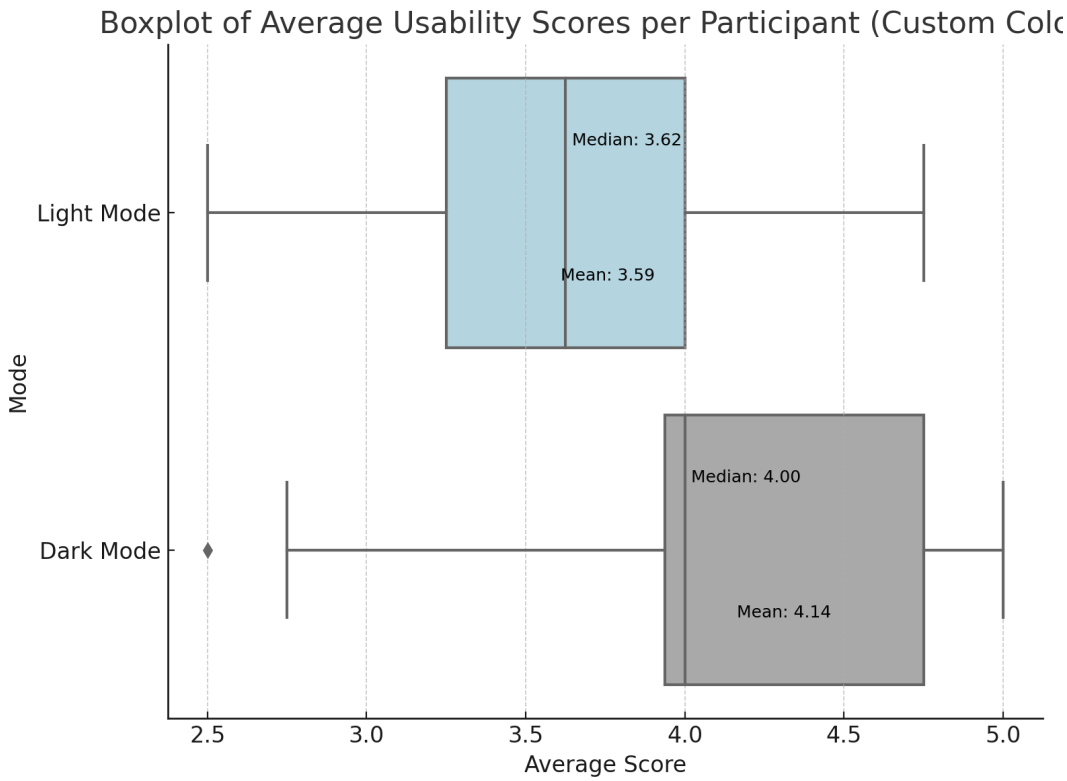

Figure 15: A boxplot for each mode

Combined, Light Mode was rated with the minimum score of 2.5, the maximum score of 4.5, Q1 = 3.25, mean = 3.59, median = 3.62, and Q3 = 4.75.
Combined, Dark Mode had an outlier on 2.5, the minimum score of 2.75, the maximum score of 5.0, Q1 = 3.9, mean = 4.14, median = 4.00, Q3 = 75.
As can be seen in the average boxplot of Figure 15 above, Dark Mode received a higher score on average on all the aforementioned parameters. The difference between the mean of LM and DM = 0.55.

5.3 Time on task

The results from the calculated time on task completion showed that there was no significant difference between what colour mode the test participants started with, and the time spent on completing each task in order. In general, the group starting with Dark Mode first completed the tasks on average only slightly faster than those starting in Light Mode.
The calculated mean time that the test participant spent on completing the seven tasks can be seen in Table 4 below.

Task	Fastest time per task	Slowest time per task	n	Mean time per task
1. Go to Travel on the home page. Find and skim the news article on Chinese food in New York	111 sec	198 sec	28	152.29 sec
2. Press the Back button in the top left corner. Adjust the text size in the app settings found in the footer under "More"	11 sec	32 sec	28	19.29 sec
3. On the home page, find and skim the news article on the new pope	57 sec	94 sec	28	72.36 sec
4. Switch between Light Mode and Dark Mode themes in the app settings found in the footer under "More"	6 sec	17 sec	28	10.25 sec
5. Go to Travel on the home page. Find and skim the news article on Chinese food in New York	52 sec	94 sec	28	73.5 sec
6. Press the Back button in the top left corner. Adjust the text size in the app settings found in the footer under "More"	6 sec	18 sec	28	10.18 sec
7. On the home page, find and skim the news article on the new pope	50 sec	80 sec	28	62.0 sec
Total time average	**334 sec**	**480 sec**	28	**399.86 sec**

Table 4: Table showing how much time the test participants spent on average completing each of the 7 tasks

As can be seen in the table above, the fastest task on average for the test participants to complete was task 4 with 10.25 seconds, where they had to go to the settings menu, and change the colour theme of the prototype. The fastest time for task 4 was 6 seconds, and the slowest time to complete the task was 17 seconds.

The task that the test participants spent the most time on completing was Task 1, where the test participants needed to find a news article on Chinese food in New York, by first clicking

a sub-menu in the header, "Travel", which would then lead them to another page, where the news article was clickable. The test participants then had to click the article, and afterwards read and skim it, where some of the test participants spent more time skimming the article than others. The fastest completion time for task 1 was 111 seconds, whereas the one who completed it the slowest spent 198 seconds. On average, task 1 was completed in 152.29 seconds. The average for completing all 7 tasks was 399.86 seconds. The fastest completion time for all tasks was 334 seconds, whereas the slowest time was 480 seconds.

To see the difference in the task completion time between Light Mode and Dark Mode, the times were aggregated per task and divided by the starting mode of the participant. Participants with uneven participant numbers (e.g., Test Participant 1, 3, ...) began in Light Mode, while those with even participant numbers (e.g., Test Participant 2, 4, ...) began in Dark Mode. The mean task completion time per Task, divided into each starting mode, is visualised in Figure 16 below.

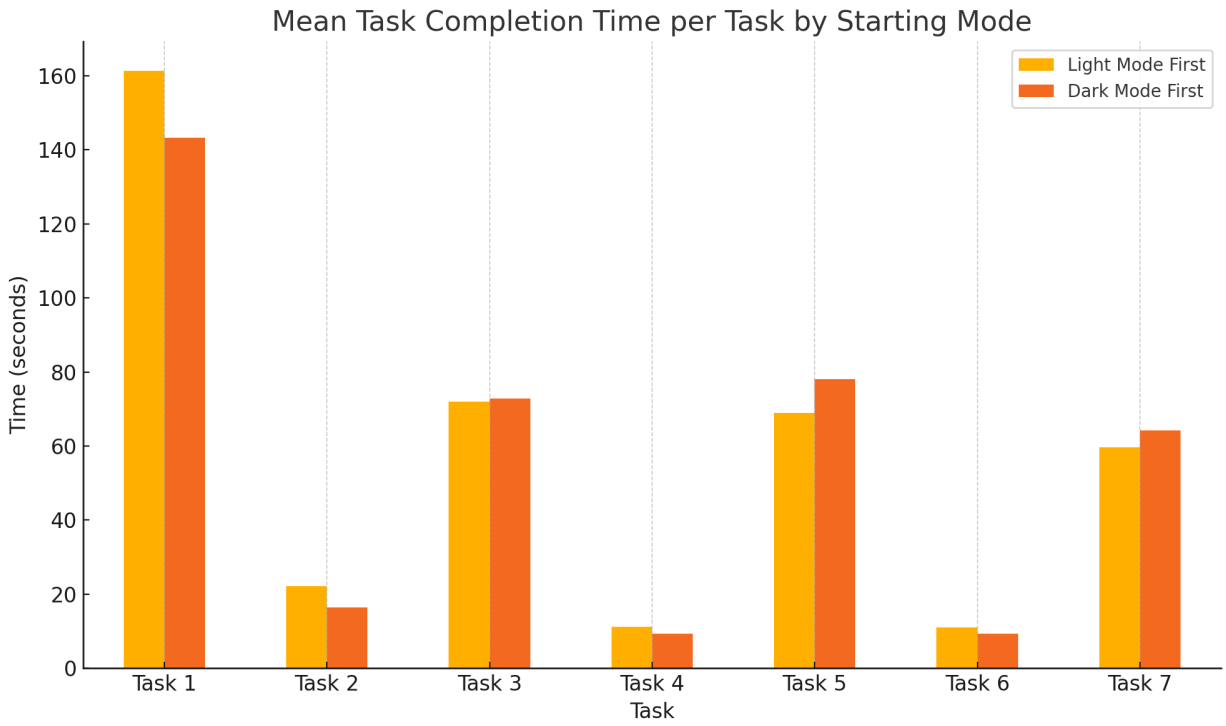

Figure 16: Average time the two groups of participants spent per task completion

As can be seen above, task 1, in which the test participants were asked to find, and skim the news article about Chinese food in New York, the group starting with Dark Mode (DM) was slightly faster, than the ones who started with Light Mode (LM). Observing Task 2, where

they were asked to change the font size in the settings menu, the DM group again completed the task on average slightly faster than the LM group. Task 3, where they had to find, and skim another article, this time about the newly elected pope, the average time for each group is almost identical, with the LM group being only slightly faster. Task 4, where they had to change the colour of the two modes, was the fastest completed task on average, and the two groups almost had an identical average completion time.

Task 5 is a repeat of task 1, but the difference was that the theme colour had changed, meaning that the LM group tested the Dark Mode version secondly, and the DM group tested the Light Mode version secondly. In task 5, the LM group had a slightly faster average time. In task 6, which is a repeat of task 2, the DM group only had a slightly faster average time. Task 7, the LM group had a slighly faster average time.
We can combine the time results for all 7 tasks for each mode, and add them to another graph that highlights the overall mean time and median per mode that the participants started with. This can be seen visualised in Figure 17 below.

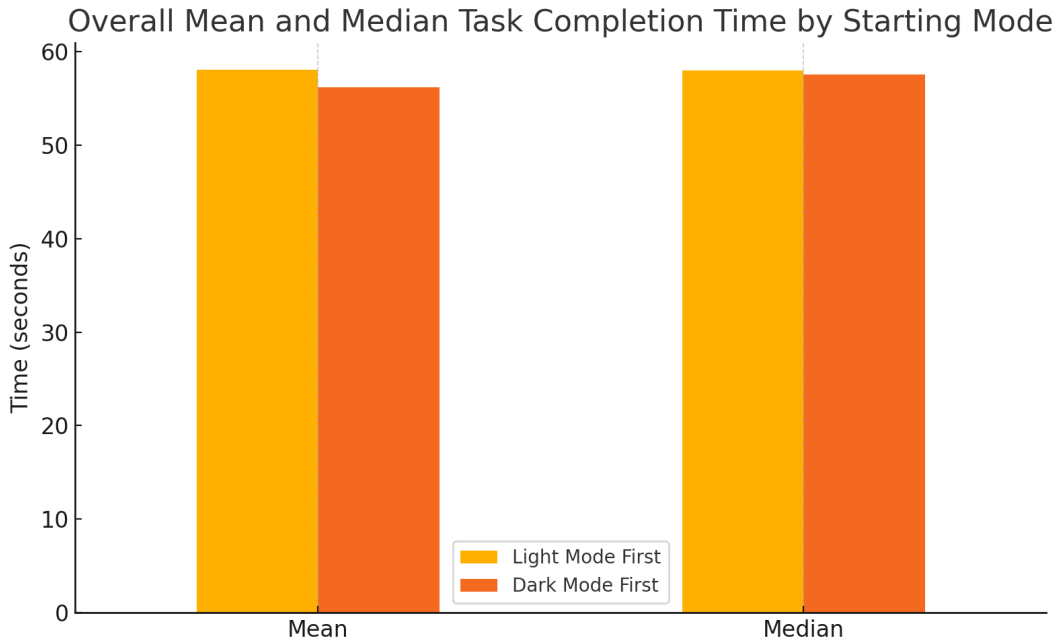

Figure 17: Average time for each of the two groups spent on completing each task

The Light Mode first group had a mean completion time per task of 58.05 seconds and a median of 58 seconds. The Dark mode first group had a mean completion time per task of 56.19 seconds, and a median of 57.57 seconds.
While the participants starting in Dark Mode performed slightly faster on average, the differ-

ence was small. To assess whether the data was normally distributed, a Shapiro-Wilk test was applied to the average task completion times per participant within each group:
Light Mode First: $W = 0.965$, $p = 0.799$ Dark Mode First: $W = 0.919$, $p = 0.210$

As both p-values exceeded the threshold of 0.05, normality could be assumed. This justified the use of parametric statistical testing with an independent samples t-test to evaluate whether the observed difference between the groups was statistically significant.
$t = 0.89$, $p = 0.382$
The result was not statistically significant, indicating that the mode in which participants began the test with had no significant effect on the task time completion. While minor variations were observed across individual tasks and group averages, these did not reach statistical significance. The results show that the starting mode does not have a direct effect on the results of the user experience between the two modes.

5.4 Qualitative Findings

In general, there was a preference among the participants to prefer Dark Mode over Light Mode. It is primarily based on Light Mode causing increased eye-strain among some of the participants, and Dark Mode feeling more modern to use. Furthermore, some test participants also based this preference on their daily use patterns.
Below in table 5 is a table that divides the test participants' qualitative answers into 7 themes. Each theme reflects repeated patterns in user feedback and includes both positive and negative perspectives. The table highlights accommodated quotes examples for each theme (the entire interview transcript is in Appendix D D), as well as the number of test participants who answered positively and negatively, respectively.

Theme	P or N	Quote examples
1. Preferred mode	P: 19	"Dark Mode felt more like my style, as it just made my eyes feel more comfortable." - P19
	N: 5	"The brightness hurt my eyes a bit and made me feel somewhat annoyed." - P2
2. Reading Comfort and Focus	P: 18	"I felt better using Dark Mode... the contrast made the experience more enjoyable." - P28
	N: 4	"In Light Mode, the app felt nice, but the brightness of the screen and the mode made it feel like it required more focus to read articiles." - P28
3. Ease of Navigation	P: 13	"I wasn't confused at any point... I just had to look around a bit to find the back button inside the article view." - P21
	N: 9	"At one point when I was getting out of the settings menu... I felt kinda lost." - P19
4. Interaction Frustrations (buttons & Settings)	P: 6	"The prototype showed a blue box that helped guide me, which I appreciated from a navigation standpoint." - P23
	N: 15	"Some buttons required multiple clicks before they responded." - P28
5. Customisation & Text Control	P: 12	"I liked that I could customize the articles, not just in terms of colour mode, but also with the text size." - P12
	N: 5	"The option was a bit hidden within multiple menus, and I had expected it to be accessible directly at the top of the article." - P26
6. Content Layout	P: 7	...in Dark Mode, I switched to smaller text...it created better spacing between paragraphs and sections... it ended up improving readability - P13
	N: 6	"I would prefer a layout more like a traditional newspaper, where you flip pages instead of scrolling infinitely." - P4
7. General App Experience	P:16	"Overall, it was a good experience for me." - P9
	N: 3	"I became a little annoyed that I had to scroll all the way up and down to find the right buttons." - 28

Table 5: Coded interviews in seven themes. Number of positive (P) and negative (N) statements for each theme

Overall, the qualitative feedback supports many of the usability trends identified in the quantitative sections. While user preference leaned significantly toward Dark Mode, particularly in terms of visual comfort and readability, multiple participants highlighted navigational frustrations and issues with interaction precision. An example of this is test participant 28, who stated "*I became a little annoyed that I had to scroll all the way up and down to find the right buttons,*". This points to a need for improved shortcut access and persistent UI elements for better navigation.

The strong preference for Dark Mode observed in qualitative feedback, echoes the significantly higher SUS scores, as well as the usability ratings recorded for Dark Mode in the quantitative analysis. Test participant 19 stated that "*Dark Mode felt more like my style, as it just made my eyes feel more comfortable,*". This reinforces Dark Modes effectiveness in reducing

visual strain during extended reading sessions.
Despite there being a strong trend towards Dark Mode being the preferred mode, some test participants, e.g. test participant 4, still favoured Light Mode, mainly due to their habits, or their readability preference to personal visual needs.
They stated the following "*I had increased focus while using Light Mode. I use it daily, so I'm used to it.*" The test participants were also asked to state that, if they could change something about the application, what would that be. One of the themes that was mentioned was Ease of Navigation, as it caused some confusion or slight frustration among the test participants. One of the reasons why, which was mentioned by multiple test participants, such as test participant 28, had to do with the placement of the "back" button, as it was placed at the top of each page in the prototype, thus requiring scrolling all the way up.
Test participant 28 stated " *I had to scroll all the way up in the articles to hit the back button, and also all the way down on the home page to access the bottom menu and find the "More" button to reach the settings. That became a bit annoying,*".

Another aspect mentioned by the participants was a need for a simplified means of accessing the settings menu. Although there was a strong interest in the adjustable features themselves, some of the suggestions included adding the feature of changing the font size, as well as the theme, directly to the article itself, as test participant 26, who stated
"*The option was a bit hidden within multiple menus... I had expected it to be accessible directly at the top of the article,*". This emphasised the importance of embedding key settings into the main reading interface, instead of being hidden behind multiple clicks and pages.
While some test participants described the application as feeling familiar and easy to use, familiarity did not fully prevent interaction challenges, especially regarding navigation and settings accessibility. The familiarity might have contributed to the overall ease of use, as test participant 5 stated "*The app felt very similar to other news apps I've used, or even some social media apps like Twitter. I Liked the experience overall,*".
These qualitative findings suggest that while the foundation of the prototype is fairly solid and visually effective, future iterations would benefit from enhancing navigation flow, increasing the visibility and accessibility of customisation tools, as well as reducing repetitive scrolling. Addressing these areas could potentially improve both usability and user satisfaction in mobile news applications.

6 Discussion

6.1 User preference and visual comfort

The majority of the participants expressed a clear preference for Dark Mode during mobile news reading. Dark Mode was frequently described as more comfortable and visually appealing: “The colour contrast in Dark Mode, I feel, was better. Visually, I would also say that it was more pleasing and, overall, a more interesting experience.” (Test Participant 1)
Kohler & Zhang [14] similarly highlight that many users associate Dark Mode with increased visual comfort, especially during prolonged reading sessions.
However, Light Mode was also valued by some for its resemblance to print media.
“I feel that Light Mode more closely resembles that of a physical newspaper.” (Test Participant 1). The findings align with prior research suggesting that Dark Mode enhances visual comfort, particularly for extended reading, but that user preferences remain context-dependent.

6.1.1 Readability and text size

Participants consistently highlighted the impact of font size and mode on readability. Larger text sizes in Dark Mode were associated with enhanced focus and comfort.
“I could concentrate more easily when reading the article in Dark Mode, especially with the large font. It just felt smoother.” (Test Participant 17)
The finding aligns with recommendations from Norman [17], which emphasise the importance of adaptive text scaling for improving readability in mobile applications, particularly under varying lighting conditions. Conversely, small text in Light Mode was often perceived as difficult to read:
“The white background with small text made it harder to focus. It was a bit blinding at times.” (Test Participant 6)
These results reinforce the value of font size customisation and support prior research on the role of text scaling in mobile readability.

6.1.2 Navigation and Efficiency

Participants rated ease of navigation similarly across Light Mode and Dark Mode, citing intuitive and consistent navigation paths.

“It was easy to go back or switch sections, no matter the mode.” (Test Participant 13)
This observation is consistent with findings by Nielsen & Budiu [16], who stress that clear information architecture and predictable navigation patterns are critical to mobile usability, independent of visual theming. While efficiency scores were slightly higher in Dark Mode, the difference was not large. The redundancy of navigation elements contributed to a strong sense of control and clarity:
“Dark Mode helped me read faster and with fewer distractions.” (Test Participant 22).

6.2 SUS and overall Usability

SUS scores and usability scores indicated that both Light Mode and Dark Mode versions of the prototype were perceived as highly usable and effective. The average SUS score across both modes was above the usability benchmark of 68, suggesting that the simplified mobile news reading experience provided by the prototype was both efficient and satisfying to users.
Dark Mode outperformed Light Mode in readability, efficiency, and overall satisfaction, aligning with qualitative feedback, for example:
“I preferred reading in Dark Mode because the interface felt calmer and better suited for longer reading.” (Test Participant 9)
The result echoes prior findings by S. *et al.* [20], who reported that well-implemented Dark Mode can improve perceived user satisfaction and reduce visual strain in mobile applications.

Ease of navigation remained comparable between modes, suggesting that the observed usability differences were primarily driven by visual comfort and reading experience rather than by navigational structure.
It is important to reflect on the specific version of the SUS used in the study. A customised SUS version with 7 positively phrased questions was employed instead of the standard 10-item SUS. This was done to streamline the questionnaire for participants and to avoid potential confusion caused by alternating positive/negative wording. While this version preserved the core usability dimensions, the scores obtained may not be directly comparable to published SUS benchmarks derived from the full 10-item format.

Moreover, the relatively high SUS scores observed should be considered in light of the prototype’s simplified structure. The prototype included only a limited set of features, such as

basic navigation, article reading, and appearance customisation, all of which were implemented and visually polished to look and feel as closely as possible to the real BBC News app. The focused and uncluttered interaction model likely contributed to high perceived usability, as users encountered few opportunities for frustration or error, other than some buttons requiring a larger hit-box. It is common for relatively simple prototypes to produce higher SUS scores than would be expected in a fully-featured application with more complex interactions. It is less likely to encounter errors or interaction frustrations when testing a fairly polished and simplified prototype.

Consequently, while the usability results strongly suggest that both Light Mode and Dark Mode implementations were usable and well received within the scope of the prototype, they should not be interpreted as guaranteeing equivalent usability in the context of a news application with richer content and more interaction layers.
Nevertheless, the fact that Dark Mode achieved a clear usability advantage, even in a controlled prototype context, highlights the impact that visual mode alone can have on user experience and perceived usability in mobile news reading environments.

6.3 Related Work

The study's findings both align with and contribute to prior research on Dark Mode usability, mobile UI patterns, and font customisation, providing further empirical evidence in the specific context of mobile news-reading applications.
The measured Dark Mode preferences support findings from S. *et al.* [20], who reported enhanced visual comfort and reduced glare.
The importance of text size flexibility aligns with modern design guidelines, with Apple [2] and Google [11] both advocating for user-controlled font scaling to improve readability
Navigation clarity across modes reinforces findings by Norman [17], who emphasises that structural consistency and clear navigation patterns are more critical to usability than visual theming. The use of a realistic prototype contributes to the state of the art by demonstrating that high-fidelity testing of news apps yields meaningful usability insights.
These findings reinforce the value of conducting controlled, high-fidelity usability testing to better understand how Dark Mode design choices impact key aspects of the mobile news-reading experience.

6.4 Methodological Reflections

One of the choices made was the use of a high-fidelity prototype, designed to visually replicate the BBC News mobile application.
By incorporating authentic branding, fonts, and layout from the BBC News app, the prototype encouraged natural user behavior and allowed the participants to evaluate the experience within a familiar interface. The design choices aimed at increasing the validity of the study without the need for a fully functional application.

The decision to restrict the functionality of the prototype to a set of predefined tasks was made to maintain a controlled testing environment. Participants encountered a consistent task flow, minimising confounding variables and making it easier to attribute usability feedback to visual mode differences, rather than to interface complexity.
The design trade-off enabled clearer comparisons between Light Mode and Dark Mode, but also meant that some natural browsing behaviours, such as content scanning or multitasking, were outside the scope of observation. If these features had been implemented, the time on task completion, SUS score, and usability metrics score would likely have resulted in similar or slightly different results.

Another methodological strength lies in the use of using both quantitative, and qualitative data. The quantitative data, such as SUS scores and usability scores, provided measurable insight into usability, while qualitative responses enriched the findings with user sentiment and personal preference. This combination strengthened the validity of the results and allowed patterns to be understood from both statistical and experiential perspectives.
However, the content limitation, such as only being able to read two articles, was beneficial for consistency but narrowed the range of reading interactions. Users were not exposed to longer or multimedia-rich articles that might influence their preferences differently, particularly in how Light and Dark Modes affect the reading/viewing experience or layout perception.

The demographic of the participant group of adults 20-30 years of age, was useful for establishing baseline usability trends, but it also limited the ability to generalise the results. While this age group represents a core segment of mobile news consumers, future studies could

benefit from broader sampling to capture a wider range of needs, particularly among older adults, children, or users with accessibility needs.
Additionally, although the prototype was designed to appear platform-neutral, all testing was conducted on Android hardware. This decision did not directly undermine the results, but should be considered when interpreting user performance and preferences.
Another point of reflection is the reliance on self-reported data regarding visual comfort. While many participants described their experience with eye strain or visual fatigue, the study did not incorporate objective physiological measurements such as eye-tracking or pupil dilation. This limits the ability to quantify the ergonomic impact of the different colour modes.

Finally, the study's short-term design captured user impressions during a single session, which may differ from long-term behaviour. While valuable for observing immediate reactions, the effects of habitual use, mode-switching across contexts, or adaptive learning over time remain unexplored.

6.5 Limitations

All usability tests were conducted in person, in a controlled, well-lit room at Aalborg University. While this ensured consistency in device setup and ambient lighting, it may not fully reflect the diverse real-world conditions under which mobile news reading typically occurs, such as in low-light environments or outdoors. The consistent test environment may have favoured Dark Mode performance slightly, as participants were not exposed to extreme lighting contrasts that could strongly affect visual mode perception.

The use of the prototype BBC News app which was created for testing. Although this improved ecological validity, participants may have brought pre-existing familiarity or positive brand associations to the experience, particularly if they were regular users of the BBC News app. Including a question about whether participants were active users or familiar with the BBC News app could have provided valuable insight into the potential bias. Such associations could have subtly influenced satisfaction ratings or subjective comfort, especially since the prototype was designed to mirror the real app as closely as possible.

The sample consisted entirely of young adults. This demographic may be more comfortable

with Dark Mode and mobile customisation features than the general population, potentially skewing preference data. Older users or those with lower digital literacy might exhibit different mode preferences or usability patterns. The sample was limited to 28 test participants aged 20–30, which restricts the generalisability of the results across age groups and populations with differing accessibility needs.
The testing was conducted solely on Android devices, rather than testing on iOS devices as well, potentially affecting users who are accustomed to using Apple/iOS devices.
Participants were aware that they were taking part in a usability study, which may have led participants to focus more consciously on interface details than they would during natural use. In particular, knowing that visual mode was a focus of the study may have made participants more attentive to appearance-related aspects than they would be in routine reading.
Many participants were students at Aalborg University, particularly from the Medialogy program. As this group may have greater awareness of design and usability principles, their responses could reflect higher sensitivity to interface details and appearance, potentially influencing preference patterns.

The prototype included only one article per section, limiting the variety and complexity of reading interactions. Furthermore, the majority of themes available were also strictly limited, including only one news story and one travel/culinary story.
The testing was limited to single-session testing, thus missing long-term interaction patterns and context-driven preferences. The difference between day and night reading was not assessed. No physiological data were measured, such as eye tracking, blink rate and pupil dilation, which could have complemented and strengthened subjective feedback on visual comfort.

Finally, the use of a modified SUS version with 7 positively phrased items introduces a potential measurement bias. While this version was chosen to improve clarity, it may have produced slightly inflated scores compared to the original SUS, which uses a mix of positive and negative items to balance response tendencies.

7 Conclusion

7.1 Key findings

The thesis investigated whether there are usability differences between Light Mode and Dark Mode in the context of mobile news reading. The research aimed to evaluate user-friendliness across four core usability metrics in both colour modes: Readability, efficiency, ease of navigation, and overall satisfaction, while also exploring user preferences and customisation behaviour. The findings demonstrated a clear overall preference for Dark Mode, particularly in terms of readability, visual comfort, and overall satisfaction.

The thesis was guided by the hypothesis that there would be a measurable difference in user-friendliness between Light Mode and Dark Mode in mobile news reading.
This hypothesis was partially confirmed, allowing us to *reject* the null hypothesis

Dark Mode was rated higher in readability, efficiency, and overall satisfaction, both quantitatively and qualitatively. Participants frequently cited reduced visual strain and a more comfortable reading experience when using Dark Mode, particularly with larger text sizes.
However, no significant difference was found for ease of navigation, indicating that navigational clarity was more strongly influenced by interface structure rather than by colour mode.
Overall, the results largely support the hypothesis while also underscoring the importance of offering customisable visual modes to accommodate diverse user needs and contexts.
Efficiency was rated slightly higher in Dark Mode, suggesting that it may support smoother task flow and visual scanning during mobile reading.
Font size customisation emerged as an important feature, with users expressing strong appreciation for the ability to adapt text size to their preferences. No single font size was rated as universally optimal, reinforcing the importance of offering flexible personalisation options in mobile news applications.

By focusing specifically on mobile news reading, the combination of a realistic prototype, task-driven testing, and dataanalysis provides insights into how visual modes impact user experience in content-heavy mobile applications.
In addition to contributing empirical evidence, the thesis offers practical design recommen-

dations for improving readability, efficiency, and user control in news apps. The methodology also serves as a model for future studies seeking to balance ecological validity with experimental control.

7.2 Future work

Future studies should adopt longitudinal approaches, allowing participants to use Light and Dark Modes over an extended period of time. This would help reveal patterns of habituation, contextual switching, for example, in daytime and nighttime conditions, and on long-term visual comfort that cannot be captured in single-session studies.
For a more detailed study of the impact of colour modes on mobile news reading, future research should expand on the demographics, including multiple age groups, as well as, for example, those who suffer from visual impairment.

Older adults might have different font size and contrast preferences, which also accounts for children as well, who likely require a different design to accommodate their needs, attention span, and interaction patterns Users with visual impairments or light sensitivity might also have other preferences in terms of whether they prefer choosing Light Mode or Dark Mode.
Individuals with cognitive or accessibility-related needs might also have different preferences in terms of the text sizing, but also might require additional accessibility features, such as an audible text reader, or extreme contrast.
Such inclusion could potentially enhance the understanding of universal usability in mobile reading applications. Usability testing should be extended to a broader range of devices, across different mobile operating systems (such as iOS), tablets, computers, and e-readers, to assess how platform differences influence mode preferences and interaction patterns.

Future studies could integrate tools such as eye tracking to monitor visual scanning patterns and fatigue. It could also utilise pupil dilation or blink rate as indicators of visual strain. Furthermore, heart rate- or EDA-sensors could likewise be used to measure stress or the impact of the content they are reading.
Combining subjective feedback with physiological data would result in a more comprehensive understanding of ergonomic impacts and strengthen the individual comments on, for

example, eye strain and fatigue.

Future prototypes should incorporate a wider range of news content and interaction types, such as short-form and multimedia articles. Interactive infographics and embedded videos are also typically a widely used feature for digital news outlets. Enabling the user to personalise their news feed could also potentially increase the time they spend on reading or engaging with news. These features could result in a deeper analysis of real-world news consumption behaviours across Light Mode and Dark Mode.

7.3 Conclusion

The thesis contributes to a growing body of evidence supporting the value of Dark Mode and customisation features in mobile news applications.
While Dark Mode appears to offer usability advantages for many users, preferences remain context-dependent and highly individualised. Designers and developers should therefore prioritise flexibility, accessibility, and user control when crafting mobile reading experiences. By exploring user interaction with a high-fidelity news reading prototype, the thesis demonstrates how thoughtful design choices can enhance the usability, satisfaction, and inclusivity of mobile news platforms, thus empowering users to tailor their reading experience to their personal needs and preferences.

References

1. Aalborg, U. *Samsung Media Innovation Lab for Education (SMILE)* https://me-ga.create.aau.dk/labs/. Accessed: 2025-06-09.
2. Apple. *Human Interface Guidelines: Themes and Dark Mode* 2023. https://developer.apple.com/design/human-interface-guidelines/.
3. Bangor, A., Kortum, P. T. & Miller, J. T. An Empirical Evaluation of the System Usability Scale. *International Journal of Human–Computer Interaction* **24,** 574–594 (2008).
4. Brooke, J. SUS: a "quick and dirty" usability scale. *Usability Evaluation in Industry,* 189–194 (1996).
5. Center, P. R. *News Platform Fact Sheet* 2024. https://www.pewresearch.org/journalism/fact-sheet/news-platform-fact-sheet/.
6. Center, P. R. *Social Media and News Fact Sheet* 2024. https://www.pewresearch.org/journalism/fact-sheet/social-media-and-news-fact-sheet/.
7. Eisfeld, H. & Kristallovich, F. *The Rise of Dark Mode: A Qualitative Study of an Emerging User Interface Design Trend* Master's Thesis, Jönköping University, School of Engineering. 2020. https://www.diva-portal.org/smash/get/diva2:1446677/FULLTEXT01.pdf.
8. Etikan, I., Musa, S. A. & Alkassim, R. S. *Comparison of Convenience Sampling and Purposive Sampling* **1,** 1–4. https://doi.org/10.11648/j.ajtas.20160501.11 (2016).
9. Field, A. *Discovering Statistics Using IBM SPSS Statistics* 4th. ISBN: 9781446249185 (SAGE, 2013).
10. For Standardization, I. O. *Ergonomics of human-system interaction – Part 11: Usability: Definitions and concepts (ISO 9241-11:2018)* tech. rep. (2018). https://www.iso.org/standard/63500.html.
11. Google. *Material Design Guidelines: Dark Theme* 2023. https://m3.material.io/styles/color/dark-theme.
12. Institute, R. *Digital News Report 2022* 2022. https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2022.
13. Kim, K. & Wilcox, L. *Effects of Dark Mode on Visual Fatigue and Acuity in Optical See-Through Head-Mounted Displays* in *Proceedings of the IEEE International Symposium on Mixed and Augmented Reality (ISMAR)* (2019). https://www.researchgate.net/publication/336569145_Effects_of_Dark_Mode_on_Visual_Fatigue_and_Acuity_in_Optical_See-Through_Head-Mounted_Displays.

14.Kohler, T. & Zhang, A. *Dark Mode: How Users Think About It and Issues to Avoid* 2023. https://www.nngroup.com/articles/dark-mode-users-issues/.

15.Kunjir V. Bhandekar P., e. a. *Automatic Dark Mode Enabler for Smartphones to Improve User Experience* in *2024 International Conference on Intelligent Systems and Applications (ICISA)* (2024).

16.Nielsen, J. & Budiu, R. *Mobile Usability* (New Riders Press, Berkeley, CA, 2012).

17.Norman, G. N. *The State of Mobile User Experience* 2021. https://www.nngroup.com/articles/state-mobile-ux/.

18.Ofcom. *Adults' Media Use and Attitudes Report 2023* Accessed: 2025-06-09. 2023. https://www.ofcom.org.uk/__data/assets/pdf_file/0020/261341/adults-media-use-and-attitudes-report-2023.pdf.

19.Rubin, H. J. & Rubin, I. S. *Qualitative Interviewing: The Art of Hearing Data* 2nd. ISBN: 978-0803950964 (Sage, Thousand Oaks, CA / London / New Delhi, 1995).

20.S., A., C., B. & W., T. G. Light and Dark Mode: A Comparison Between Android and iOS App UI Modes And Interviews with App Designers and Developers. *Journal of Mobile Human-Computer Interaction* **12,** 22–39 (2024).

21.Sauro, J. & Lewis, J. R. *Quantifying the User Experience: Practical Statistics for User Research* 2nd. ISBN: 978-0128023082 (Morgan Kaufmann, 2016).

22.Shapiro, S. & Wilk, M. An Analysis of Variance Test for Normality (Complete Samples). *Biometrika* **52,** 591–611 (1965).

23.Wilcoxon, F. Individual Comparisons by Ranking Methods. *Biometrics Bulletin* **1,** 80–83 (1945).

24.Yadav, R., Gaikwad, S., Padalkar, S., Pawar, A. & Wani, M. *Curate: A News App for the Millennial News Consumers* in *2022 IEEE 6th International Conference on Computing Methodologies and Communication (ICCMC)* (2022), 1273–1278.

A SUS

Table 6: Full SUS Table

Particpant ID	1. I would like to use this application frequently	2. The application was easy to use	3. I can use this application without any help	4. The functions in this application were well integrated	5. I am able to learn this application quickly	6. I felt very confident using the application	7. I can recommend this application to others
1	Neutral	Agree	Agree	Agree	Agree	Agree	Agree
2	Strongly Agree	Agree	Agree	Agree	Agree	Agree	Strongly Agree
3	Agree	Agree	Strongly Agree	Strongly Agree	Agree	Agree	Agree
4	Neutral	Agree	Agree	Agree	Agree	Agree	Agree
5	Agree	Strongly Agree	Strongly Agree	Agree	Strongly Agree	Agree	Agree
6	Agree	Agree	Strongly Agree	Agree	Strongly Agree	Agree	Agree
7	Agree	Agree	Agree	Agree	Agree	Agree	Agree
8	Agree	Agree	Agree	Agree	Agree	Agree	Agree
9	Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree	Agree
10	Agree	Agree	Agree	Agree	Agree	Agree	Agree
11	Neutral	Agree	Agree	Neutral	Agree	Agree	Neutral
12	Agree	Agree	Agree	Neutral	Agree	Agree	Agree
13	Disagree	Disagree	Agree	Neutral	Agree	Neutral	Disagree
14	Agree	Agree	Neutral	Agree	Strongly Agree	Agree	Agree
15	Agree	Agree	Neutral	Agree	Strongly Agree	Strongly Agree	Agree
16	Neutral	Agree	Neutral	Neutral	Agree	Agree	Agree
17	Neutral	Agree	Agree	Neutral	Agree	Agree	Neutral
18	Neutral	Agree	Agree	Neutral	Agree	Neutral	Neutral
19	Neutral	Agree	Agree	Neutral	Agree	Neutral	Neutral
20	Agree	Agree	Agree	Neutral	Agree	Neutral	Neutral
21	Agree	Agree	Agree	Agree	Agree	Agree	Agree
22	Neutral	Agree	Agree	Neutral	Agree	Neutral	Agree
23	Agree	Agree	Agree	Agree	Agree	Agree	Strongly Agree
24	Agree	Agree	Agree	Neutral	Agree	Agree	Agree
25	Neutral	Agree	Agree	Neutral	Agree	Agree	Agree
26	Agree	Strongly Agree	Agree	Agree	Strongly Agree	Agree	Agree
27	Agree	Agree	Agree	Agree	Agree	Agree	Agree
28	Neutral	Agree	Agree	Agree	Agree	Neutral	Neutral

Table 7: SUS Table with number values 1-5

Participant ID	1. I would like to use this application frequently	2. The application was easy to use	3. I can use this application without any help	4. The functions in this application were well integrated	5. I am able to learn this application quickly	6. I felt very confident using the application	7. I can recommend this application to others	**Mean**
1	3	4	2	4	4	4	4	**3,57**
2	5	4	4	4	4	4	5	**4,29**
3	4	4	5	5	4	4	4	**4,29**
4	3	4	4	4	4	4	4	**3,86**
5	4	5	5	4	5	4	4	**4,43**
6	4	4	5	4	5	4	4	**4,29**
7	4	4	4	4	4	4	4	**4,00**
8	4	4	4	4	4	4	4	**4,00**
9	4	5	5	5	5	5	4	**4,71**
10	4	4	4	4	4	4	4	**4,00**
11	3	4	4	3	4	4	3	**3,57**
12	4	4	4	3	4	4	4	**3,86**
13	2	2	4	3	4	3	2	**2,86**
14	4	4	3	4	5	4	4	**4,00**
15	4	4	3	4	5	5	4	**4,14**
16	3	4	3	3	4	4	4	**3,57**
17	3	4	4	3	4	4	3	**3,57**
18	3	4	4	3	4	3	3	**3,43**
19	3	4	4	3	4	3	3	**3,43**
20	4	4	4	3	4	3	3	**3,57**
21	4	4	4	4	4	4	4	**4,00**
22	3	4	4	3	4	3	4	**3,57**
23	4	4	4	4	4	4	5	**4,14**
24	4	4	4	3	4	4	4	**3,86**
25	3	4	4	3	4	4	4	**3,71**
26	4	5	4	4	5	4	4	**4,29**
27	4	4	4	4	4	4	4	**4,00**
28	3	4	4	4	4	3	3	**3,57**
Total mean	**3,61**	**4,04**	**3,96**	**3,68**	**4,21**	**3,86**	**3,79**	**3,88**

Table 8: SUS Table with scores 1-100

Participant ID	1. I would like to use this application frequently	2. The application was easy to use	3. I can use this application without any help	4. The functions in this application were well integrated	5. I am able to learn this application quickly	6. I felt very confident using the application	7. I can recommend this application to others	SUS
1	60	80	40	80	80	80	80	71,43
2	100	80	80	80	80	80	100	85,71
3	80	80	100	100	80	80	80	85,71
4	60	80	80	80	80	80	80	77,14
5	80	100	100	80	100	80	80	88,57
6	80	80	100	80	100	80	80	85,71
7	80	80	80	80	80	80	80	80,00
8	80	80	80	80	80	80	80	80,00
9	80	100	100	100	100	100	80	94,29
10	80	80	80	80	80	80	80	80,00
11	60	80	80	60	80	80	60	71,43
12	80	80	80	60	80	80	80	77,14
13	40	40	80	60	80	60	40	57,14
14	80	80	60	80	100	80	80	80,00
15	80	80	60	80	100	100	80	82,86
16	60	80	60	60	80	80	80	71,43
17	60	80	80	60	80	80	60	71,43
18	60	80	80	60	80	60	60	68,57
19	60	80	80	60	80	60	60	68,57
20	80	80	80	60	80	60	60	71,43
21	80	80	80	80	80	80	80	80,00
22	60	80	80	60	80	60	80	71,43
23	80	80	80	80	80	80	100	82,86
24	80	80	80	60	80	80	80	77,14
25	60	80	80	60	80	80	80	74,29
26	80	100	80	80	100	80	80	85,71
27	80	80	80	80	80	80	80	80,00
28	60	80	80	80	80	60	60	71,43
AVERAGE SUS	72,14	80,71	79,29	73,57	84,29	77,14	75,71	77,55

B Usability Metrics

Table 9: Full Usability Metrics table

Participant ID	Light Mode: Ease of navigation	Dark Mode: Ease of navigation	Light Mode: Readability	Dark Mode: Readability	Light Mode: Efficiency	Dark Mode: Efficiency	Light Mode: Overall satisfaction	Dark Mode: Overall satisfaction
1	Very Good	Very Good	Good	Very Good	Good	Very Good	Good	Very Good
2	Very Good	Very Good	Good	Very Good	Good	Very Good	Very Good	Very Good
3	Acceptable	Good	Acceptable	Very Good	Poor	Very Good	Poor	Very Good
4	Very Good	Acceptable	Good	Acceptable	Good	Poor	Good	Poor
5	Good	Good	Acceptable	Very Good	Good	Good	Good	Very Good
6	Good	Good	Acceptable	Very Good	Good	Good	Good	Good
7	Good	Good	Very Good	Very Good	Good	Good	Good	Good
8	Good	Good	Acceptable	Good	Good	Good	Good	Good
9	Very Good	Very Good	Very Good	Very Good	Good	Very Good	Very Good	Very Good
10	Good	Good	Acceptable	Good	Good	Good	Good	Good
11	Good	Good	Acceptable	Good	Acceptable	Good	Acceptable	Good
12	Good	Good	Good	Very Good	Good	Very Good	Good	Very Good
13	Poor	Poor	Acceptable	Acceptable	Poor	Acceptable	Acceptable	Acceptable
14	Good	Very Good	Good	Very Good	Acceptable	Very Good	Acceptable	Very Good
15	Poor	Very Good	Good	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
16	Acceptable	Good	Acceptable	Good	Good	Good	Acceptable	Good
17	Good	Good	Acceptable	Good	Acceptable	Good	Good	Good
18	Acceptable	Acceptable	Acceptable	Good	Acceptable	Good	Acceptable	Good
19	Good	Good	Acceptable	Good	Good	Acceptable	Acceptable	Good
20	Acceptable	Acceptable	Poor	Good	Acceptable	Acceptable	Acceptable	Good
21	Good	Good	Acceptable	Very Good	Good	Good	Good	Good
22	Acceptable	Good	Acceptable	Good	Good	Good	Acceptable	Good
23	Good	Very Good	Good	Very Good	Good	Very Good	Good	Very Good
24	Acceptable	Acceptable	Good	Very Good	Good	Good	Good	Good
25	Good	Good	Acceptable	Good	Good	Good	Acceptable	Good
26	Acceptable	Very Good	Acceptable	Very Good	Acceptable	Good	Acceptable	Very Good
27	Good	Good	Good	Good	Good	Good	Good	Good
28	Acceptable	Acceptable	Acceptable	Good	Good	Good	Good	Good

Table 10: Usability Metrics table with numbers 1-5

Particpant ID	Light Mode: Ease of navigation	Dark Mode: Ease of navigation	Light Mode: Readability	Dark Mode: Readability	Light Mode: Efficiency	Dark Mode: Efficiency	Light Mode: Overall satisfaction	Dark Mode: Overall satisfaction	**Mean**
1	5	5	4	5	4	5	4	5	**4,63**
2	5	5	4	5	4	5	5	5	**4,75**
3	3	4	3	5	2	5	2	5	**3,63**
4	5	3	4	3	4	2	4	2	**3,38**
5	4	4	3	5	4	4	4	5	**4,13**
6	4	4	3	5	4	4	4	4	**4,00**
7	4	4	5	5	4	4	4	4	**4,25**
8	4	4	3	4	4	4	4	4	**3,88**
9	5	5	5	5	4	5	5	5	**4,88**
10	4	4	3	4	4	4	4	4	**3,88**
11	4	4	3	4	3	4	3	4	**3,63**
12	4	4	4	5	4	5	4	5	**4,38**
13	2	2	3	3	2	3	3	3	**2,63**
14	4	5	4	5	3	5	3	5	**4,25**
15	2	5	4	3	3	3	3	3	**3,25**
16	3	4	3	4	4	4	3	4	**3,63**
17	4	4	3	4	3	4	4	4	**3,75**
18	3	3	3	4	3	4	3	4	**3,38**
19	4	4	3	4	4	3	3	4	**3,63**
20	3	3	2	4	3	3	3	4	**3,13**
21	4	4	3	5	4	4	4	4	**4,00**
22	3	4	3	4	4	4	3	4	**3,63**
23	4	5	4	5	4	5	4	5	**4,50**
24	3	3	4	5	4	4	4	4	**3,88**
25	4	4	3	4	4	4	3	4	**3,75**
26	3	5	3	5	3	4	3	5	**3,88**
27	4	4	4	4	4	4	4	4	**4,00**
28	3	3	3	4	4	4	4	4	**3,63**
Mean	**3,71**	**4,00**	**3,43**	**4,36**	**3,61**	**4,04**	**3,61**	**4,18**	**3,87**

C Time on Task

Table 11: Full table over time on task completion for each participant in seconds

Participant ID	1. Go to Travel on the home page. Find and skim the news article on Chinese food in New York	2. Press the Back button in the top left corner. Adjust the text size in the app settings found in the footer under "More"	3. On the home page, find and skim the news article on the new pope	4. Switch between Light Mode and Dark Mode themes in the app settings found in the footer under "More"	5. Go to Travel on the home page. Find and skim the news article on Chinese food in New York	button in the top left corner. Adjust the text size in the app settings found in the footer under "More"	7. On the home page, find and skim the news article on the new pope	Total Time in seconds	Mean
1	131	29	78	11	54	9	58	370,00	52,86
2	121	21	86	8	52	6	50	344,00	49,14
3	150	27	65	10	61	8	54	375,00	53,57
4	134	18	80	5	75	10	62	384,00	54,86
5	144	25	76	8	84	10	66	413,00	59,00
6	154	12	75	9	85	8	65	408,00	58,29
7	198	32	94	14	73	7	60	478,00	68,29
8	124	17	86	10	94	11	56	398,00	56,86
9	124	23	63	7	62	13	56	348,00	49,71
10	163	22	74	9	77	8	80	433,00	61,86
11	111	19	57	5	80	6	59	337,00	48,14
12	121	13	70	13	77	7	76	377,00	53,86
13	181	25	70	15	72	18	59	440,00	62,86
14	116	19	57	10	85	13	67	367,00	52,43
15	175	15	74	13	58	7	62	404,00	57,71
16	187	17	94	8	58	11	56	431,00	61,57
17	166	17	58	8	67	9	56	381,00	54,43
18	145	22	69	6	85	9	73	409,00	58,43
19	156	24	64	17	79	14	64	418,00	59,71
20	159	17	59	15	94	6	74	424,00	60,57
21	182	14	66	9	57	12	61	401,00	57,29
22	134	11	57	12	73	11	55	353,00	50,43
23	176	15	78	13	63	9	54	408,00	58,29
24	119	13	63	8	57	13	61	334,00	47,71
25	171	18	76	10	90	18	53	436,00	62,29
26	158	12	80	11	86	9	59	415,00	59,29
27	193	27	88	17	66	15	74	480,00	68,57
28	171	16	69	6	94	8	66	430,00	61,43
Mean pr task	152,29	19,29	72,36	10,25	73,50	10,18	62,00	399,86	57,12

D Qualitative Interviews Transcript

Test participant #1

Q1: I feel that Light Mode more closely resembles that of a physical newspaper.

Q2: The colour contrast in Dark Mode, I feel, was better. Visually, I would also say that it was more pleasing and, overall, a more interesting experience. The images in the articles were clearer and stood out more.

Q3: I had no issues while using the app.

Q4: I would have liked to see more of the article immediately when opening it, instead of needing to scroll all the time. It would be great to have a function for adjusting text size directly in the article, either through a setting or by pinching the text in and out.

Q5: The two themes worked well, and I felt that the personalisation was a good addition.

Test participant #2

Q1: The brightness hurt my eyes a bit and made me feel somewhat annoyed. I think Light Mode is just too bright. However, it was equally easy to use both Light and Dark Mode.

Q2: Dark Mode felt better and easier on my eyes. It increased my comfort while reading, skimming through articles, and using the app overall.

Q3: It was very easy to learn how to use the app from the beginning.

Q4: I have nothing I would improve.

Q5: The app was very easy to use.

Test participant #3

Q1: I felt eye strain with the default text size, but this decreased when I changed it to a larger size.

Q2: I was more comfortable using Dark Mode. I think the default text size in this theme is

more comfortable than in Light Mode. The images looked better and had a "pop-out" effect. I'm used to Dark Mode on my own phone, which is why I prefer it.

Q3: I felt a bit frustrated when looking for specific articles in the menus and sub-menus. It left me feeling somewhat confused.

Q4: There's nothing I would change about the app.

Q5: I would revise some of the questions to clarify how to locate different articles faster, as it would save time.

Test participant #4

Q1: I had increased focus while using Light Mode. I use it daily, so I'm used to it.

Q2: Dark Mode made me feel more relaxed. However, I also felt more likely to lose focus in that mode, since the darkness had a calming effect.

Q3: I didn't feel lost when using the app, but when I changed the theme, I needed a moment to adjust to how my eyes reacted to it.

Q4: I didn't really like all the images in the articles; they felt a bit distracting during reading. I would prefer a layout more like a traditional newspaper, where you flip pages instead of scrolling infinitely. A bullet-point summary at the top of each article section would also be nice.

Q5: I liked the app and the experience a lot. It was interesting to see how much the theme colours and adjustable text sizes affected my focus while reading. I hadn't thought about that before.

Test participant #5

Q1: What stood out to me in Light Mode was that the text looked very nice and sharp. However, after skimming through the first article, my eyes started to feel a bit tired. That might have been due to the lighting in the room, but I'm not entirely sure.

Q2: Switching to Dark Mode felt more comfortable for me. The contrast worked better, and

it was actually easier to read the text. The images also stood out more from the background, which made them easier to see.

Q3: At first, I looked for the settings icon in the top right corner, but after rereading the task instructions, I realised I needed to use the bottom navigation bar instead. That helped clarify things.

Q4: I would probably add a settings icon in the top navigation bar, all the way to the right. That way, no matter where you are in the app, you could access the options more easily.

Q5: The app felt very similar to other news apps I've used, or even some social media apps like Twitter. I liked the experience overall.

Test participant #6

Q1: I found Light Mode a bit too bright for my eyes. The layout and navigation felt the same across both modes, but I personally prefer Dark Mode.

Q2: The app felt more modern in Dark Mode, and it was more comfortable to read in. The contrast was better in my opinion, and what stood out most was that it was simply easier to focus on the articles in this mode.

Q3: I felt a bit confused when trying to return to the main page after reading the article about the Pope. I didn't realise I had to scroll all the way to the top to go back.

Q4: I would probably change the app so that the back arrow appears automatically when you start scrolling upwards, like a top navigation bar that slides in.

Q5: Overall, I enjoyed testing the app. I was surprised by how much the theme affected how my eyes reacted, especially since I'm so used to using Dark Mode on my own phone.

Test participant #7

Q1: The only thing that really stood out in Light Mode was that the bright white background felt a bit irritating to my eyes.

Q2: I preferred the contrast in Dark Mode—it made it easier for me to read the text compared

to Light Mode.

Q3: I didn't have any major problems, but some of the buttons felt slightly counterintuitive to use. At times, they were a bit hard to press and didn't always respond the way I expected.

Q4: I would probably make the buttons a bit larger to improve usability. They worked fine overall, but there were a few moments where I struggled to press them properly.

Q5: Not much else to add, except that it was a nice experience overall. Trying out the colour themes and adjusting the font size was actually fun, I normally just stick with the default settings.

Test participant #8

Q1: Nothing in particular stood out to me in Light Mode, but the overall design reminded me of other news apps I've used before, which I liked. It felt familiar and easy to understand.

Q2: Dark Mode felt pretty similar to Light Mode overall, though I did find it slightly easier to read the articles in this mode. There wasn't a big difference for me otherwise.

Q3: I didn't feel stuck at any point and was able to complete all the tasks without issues.

Q4: I don't have anything I would change about the app.

Q5: I liked trying out both modes, and I think the prototype worked as intended.

Test participant #9

Q1: My eyes started to feel a bit tired while reading in Light Mode.

Q2: Dark Mode felt better overall. The contrast between the background and the text was better, which made it easier to read.

Q3: There were no moments where I felt stuck or unsure during navigation.

Q4: I don't have anything I would want to change about the app.

Q5: Overall, it was a good experience for me.

Test participant #10

Q1: I liked reading in Light Mode, but nothing in particular really stood out to me.

Q2: I think I actually prefer Dark Mode over Light Mode. It feels more natural to me, especially since I use my phone a lot, and it's usually set to Dark Mode. My phone also switches modes automatically based on the lighting in the room, so I'm more used to that experience.

Q3: I didn't feel stuck at any point, but I was a bit annoyed that you had to go through, I don't know, maybe three or four pages just to change the theme or adjust the text size. If I could change something, it would be to make those settings easier to access.

Q4: As I mentioned, I would probably simplify the app's navigation a bit to make interactions faster and more intuitive.

Q5: I'd honestly like to use news apps more after this. I think it worked well for the most part.

Test participant #11

Q1: I noticed that the layout felt very familiar. it reminded me of other news reading apps I've used. After a few minutes, though, the brightness started to bother me. I was told that the screen brightness was set to a fixed level and that I shouldn't change it, so it ended up feeling a bit too bright for me.

Q2: Dark Mode felt easier on my eyes and made me feel more relaxed while skimming through the articles. I especially liked how the images and even the text popped out more from the background. It was just easier for me to maintain focus in this mode.

Q3: There weren't really any moments where I felt stuck. I was able to complete all the tasks without any issues.

Q4: I don't have anything I would change. The app worked perfectly fine for me as it is.

Q5: Overall, I think the prototype worked really well. It suits my reading style, as I prefer white text on a dark or grey background since I tend to read a lot.

Test participant #12

Q1: The brightness in Light Mode didn't bother me much at first. However, as I kept scrolling through the first article about Chinese food, I started to feel a slight soreness in my eyes.

Q2: Dark Mode felt better to use. The contrast made my eyes feel less strained, and the text was more comfortable to read, even when I adjusted the text size. Somehow, the paragraphs felt better integrated in this mode. Even though they're technically the same, they just felt more pleasing to read and scroll through.

Q3: There was a moment when I tried to press the button to return to the home page, but I had to try a few times before it worked. The precision required to hit the button felt too narrow, so the tappable area could be larger.

Q4: As I just mentioned, increasing the tappable areas for some of the navigation buttons would make the app feel smoother and easier to use.

Q5: I liked that I could customise the articles, not just in terms of colour mode, but also with the text size. It really changed the experience for me.

Test Participant #13

Q1: Well, I felt like a lot of the information seemed overwhelming, even though I realised, once I had turned on Dark Mode, that the articles are, of course, identical. In Light Mode, the text felt more scattered or roaming. In Dark Mode, I found it easier to focus on individual words and elements. Even though, visually, I usually prefer brighter interfaces, like greys, I felt Light Mode was kind of visually overwhelming. Something that stood out to me in Dark Mode was how certain buttons blinked or hovered when I tried to access them. At first, this was a bit distracting, but it also helped me understand which elements were actually pressable, since not all of them were. So even though I rated navigation kinda low, that aspect helped the learning experience. Another issue I noticed in Light Mode was the formatting of the articles. It seemed less considered. Bold and italic text, or lines separating content, just blended in poorly. It all felt kind of random. Honestly, I think if you're thinking about older users or the risk of scams, Light Mode doesn't help, as everything looks messier. Even though the content is the same, Light Mode makes it perceptually more overwhelming. It might even

be harder to spot fake articles in Light Mode for that reason.

Q2: In Light Mode, I initially increased the text size to large, hoping it would make things easier to read and less overwhelming. And in a way, it worked, as fewer words appeared on the screen, which helped reduce that "information overload" feeling. But then, in Dark Mode, I switched to smaller text, and it actually created better spacing between paragraphs and sections, which gave a better overview of the content. So even though using small text was originally just something I did for variation, it ended up improving readability because the spacing helped break up the content more clearly.

Q3: At one point, I accidentally went back too far while trying to access the settings or menu options. That was frustrating. Also, I was annoyed that to get to certain buttons, like going back or accessing more options, I had to scroll all the way to the top.

Q3: At one point, I accidentally went back too far while trying to access the settings or menu options. That was frustrating. Also, I was annoyed that to get to certain buttons, like going back or accessing more options, I had to scroll all the way to the top. In most modern apps, as soon as you start scrolling, the top or bottom bar appears, giving you easy access to navigation shortcuts. But here, I had to reach the physical top or bottom of the screen, which slowed things down.

Q4: Going backwards from what I just said, I would've liked it if the top and bottom bars with buttons appeared as soon as I started scrolling, so I didn't have to reach the very top or bottom to access them. Also, the buttons themselves required very precise tapping. I'd prefer larger touch areas, so I wouldn't have to hit the icon exactly to activate it. Just being in proximity should be enough.I also felt there was too much movement when reading the articles, not just vertical scrolling, but some horizontal shifting too. Maybe I'm imagining that, but I'd definitely prefer the width to be fixed, with strictly one-directional, vertical scrolling. Side-scrolling content in news apps just doesn't work well for me.

Q5: No, not really, though I did find the article about Chinese food a bit all over the place. There were a lot of references to things I didn't know about, and it seemed like multiple dishes were listed by the same chef. So, making a top 10 or top 7 list felt kind of pointless when the items were so similar. The article about the Pope, on the other hand, felt more informative. It was relevant, about a new Pope and his viewpoints on international topics, which made it more engaging. So overall, one article felt like meaningful news, and the other

just felt like a bit all over the place..

Test participant #14

Q1: What stood out to me in Light Mode was how different it felt compared to Dark Mode. I was genuinely surprised by how much of an impact the colour mode had on the reading experience. I didn't expect it to make such a big difference.

Q2: I was very pleasantly surprised by Dark Mode. It stood out more than Light Mode, mainly because I felt the contrast was better. It was also less straining on my eyes, which made the reading experience more comfortable.

Q3: The only part that left me a little confused was when I was asked to go back from the first article. The back button was located all the way at the top of the page, so I had to scroll up to access it. Other than that, I didn't encounter any issues while using the app. I actually liked it.

Q4: As I mentioned earlier, I would probably improve the back navigation. It could be made more intuitive, especially for users who spend a longer time in the app and need to navigate between articles more efficiently.

Q5: I don't have much else to add, other than that I was surprised by how much Dark Mode actually made it easier and more comfortable for me to read. Even when adjusting the text size, it felt like a smoother experience. It was fun to try out.

Test participant #15

Q1: I don't really know, but I find it easier to read in Light Mode. I don't know if it's because I wear glasses, maybe, or if I just find it a bit easier in general, but it's definitely easier to read in Light Mode. However, it was a bit more difficult to navigate when you're presented with a lot of options at the same time.

Q2: Funny enough, I think it's the opposite here. I find it easier to navigate in Dark Mode, and that's mainly in relation to the menus, choosing what to click on, and also in the settings.

Strangely, even though the content is the same, I found it easier.

Q3: Overall, I think the application was quite easy to use. It made sense to me and reminded me a lot of other news apps I've used, especially English ones. I had a bit of trouble with the back button at one point when I had scrolled all the way to the bottom. Then I was told to go back. But it wasn't there. So I thought, okay, I'll try scrolling back up, and eventually I found it. But that was a bad experience. So that was the difficult part when I used the app, at least.

Q4: I think I would maybe make a back button that follows the user, or at least make it easier to go back when you're further down in articles, so that it's easier and more intuitive. Maybe you could also consider integrating the Light/Dark Mode switch somewhere on the page as well, to make it more accessible, because you had to go pretty deep into the settings to change it.

Q5: It was a good phone to use, I think. Overall, I'm satisfied with the experience.

Test Participant #16

Q1: Overall, I think it was a good experience. I was surprised by how much the two modes changed throughout. It became easier to read the text when switching modes, as the conditions changed. It was a bit harder to read in Light Mode.

Q2: I think it was a good experience. You just had to get used to it. I found the text easier to see when it was in Dark Mode. The settings, you just have to figure them out. But you learn that quickly, as you can tell. It's easier to read the text when switching modes in the app, whether it should be Light or Dark. When it turned black, it was actually a bit clearer to read, because the text became white. So it stood out well.

Q3: I just had to figure out the settings, but I sometimes feel that way on my own phone, too. But you learn it. And you use it, the news site app.

Q4: That's a bit hard to answer. This is the first time I'm using it. It was a good idea to separate everything, so you could see the difference between the two modes.

Q5: I think it was a good experience to try reading in the different kinds of modes.

Test Participant #17

Q1: Regarding what stood out to me when I used Light Mode, I'd say that I felt I had to strain my eyes a bit more than in Dark Mode. It felt just slightly more tiring for the eyes.

Q2: In terms of what stood out when I used Dark Mode, I'd say it felt less tiring, and it seemed to require less effort from my eyes to read the content. Also, I clearly prefer Dark Mode over Light Mode myself, so I might be a bit biased, but overall, I just found the readability better, because, from what I could see, there was more contrast between the text and the background.

Q3: There weren't any moments where I really felt lost or unsure, the closest was probably when I had to exit an article and had to click the "X" on the text before I could return to the main menu. I thought it was quite a few steps just to go back. Only afterward did I notice that there was also a button in the submenu to go directly to the main menu with just one click.

Q4: I don't really have any ideas for what I'd improve in the app besides what I already mentioned.

Q5: I don't really have anything more to add, other than it was fun to try.

Test Participant #18

Q1: I thought Light Mode looked more clean in way, and I liked how the interface is designed. I noticed, though that when I reached the second article, my eye kinda felt a bit dry when reading, but I am not sure if it was the brightness, or maybe the lighting in the room.

Q2: Dark Mode was easier on my eyes, and I found myself reading the text a bit faster in that mode. The colour contrast made the headlines stand out more, and in general I was just more satisfied when using this mode, and especially when skimming through the food article, as it was quite long, and had a lot of text.

Q3: I had no moments where i felt lost, or didnt know how to progress, as I completed every task.

Q4: What I would change, is that I would likely want to be able to change the settings a bit

easier, for example in the article itself, as depending on the length of the article, it can be more useful to either have smaller or larger text size, as the paragraphs becomes a bit more divided.

Q5: I was pleasantly surprised when using the dark mode, as it made me feel more comfortable when reading.

Test Participant #19

Q1: The thing that stood out to me was just how bright light mode actually was,when I compare the two modes. I tried to switch back to light mode after using dark mode, and I could feel like a small twitch in my eye. Like not a lot, just slightly. So I felt less comfortable when using light mode, as it required perhaps more effort when reading on something so bright. .

Q2: Dark Mode felt more like my style, as it just made my eyes feel more comfortable, I would say. The navigation was pretty much the same, but the major difference in my opinion, would be the text contrast.

Q3: At one point when I was getting out of the settings menu, going back, etc.I felt kinda lost, as it took me a few seconds to realise how to get back to the articles, when I had to find the second one about the new pope.I got it, though, and I found the article right after pressing the right place. it was helpful with the blue boxes showing you where to click.

Q4: I am not sure what I would change, as the reason why it took me a bit longer to find the other article likely has to do with me just not being able to locate the button straight away. Perhaps increasing the visibility of the pressable buttons, or maybe the size, I am not sure.

Q5: Switching between the two colours felt surprisingly nice, and it felt great to turn on the dark mode, as it almost immediately felt an increased comfort, when I was told to redo the tasks as sthe econd time. After completing both modes, it became clearer to me why the tasks were identical, as I didn't actually know how my eyes reacted.

Test Participant #20

Q1: There wasn't really anything that stood out to me in light mode. It's a news reading app, and it looks and feels like other apps too, which was nice, like the familiarity and navigating the pages in the app

Q2: Dark mode felt kinda like the same as light mode. There wasn't really too much of a difference, other than perhaps a slight increase in reading the text. Perhaps it did feel a bit nicer overal, as I feel like dark mode added more space between the paragraphs, even though I still believe that its mainly in my head, as the articles were identical in the two modes.

Q3: There was a task where I had to adjust the font size, and I had to look at the settings menu for just a moment longer than what I typically would, as I tried to skim for the word font, but in the app it was called text size, so I kinda missed it, but I found it pretty quickly just after.

Q4: Not so much in terms of the application, no, but maybe more so to do with the wording of the questions, or tasks, so that the same words are used, when describing where to press.

Q5: I liked the experience overall. I don't have too much to complain about, as it felt just like any other news reading app that I have tried. So yea, maybe it has more to do with me in terms of the whole task wording thing, but the app itself worlds as it was supposed to, and I enjoyed it for the most part.

Test Participant #21

Q1: Light Mode felt very standard to me, just what you'd expect from a typical reading experience. It was fine to use, and I didn't really notice anything unusual.

Q2: Dark Mode felt a bit different, but in a good way. It wasn't what I'm used to when reading, so it kind of switched things up a bit. Visually, it looked more modern, even though it's basically just reversing the colours, it still had a noticeable impact.

Q3: I wasn't confused at any point. I just had to look around a bit to find the back button inside the article view.

Q4: Nothing specific comes to mind, but I did find myself missing the ability to swipe from

the edge of the screen to go back, instead of having to tap a button.

Q5: The app worked well overall, and I enjoyed trying out Dark Mode.

Test Participant #22

Q1: I didn't really like Light Mode, it felt a bit outdated to me. I usually prefer Dark Mode, as it fits better with how I use apps in general. I can see Light Mode being more useful in bright conditions or outdoors, but most of the time I read, I use Dark Mode.

Q2: I prefer Dark Mode because it's more visually pleasing and easier to read. Even though the layout is the same, the articles just looked better in this mode. I also felt less distracted while reading.

Q3: The only time I felt a bit stuck was when trying to access the settings menu. I had to first find the "More" button and then go through several menus just to find what I was looking for.

Q4: I would make it easier to access the settings menu, as it currently takes too many steps in my opinion.

Q5: I liked using Dark Mode a lot, as it looks similar to my own phone's interface, so I'm used to reading that way.

Test Participant #23

Q1: For shorter articles, I think Light Mode might work better for me. But when reading or skimming longer articles, as in this case, Dark Mode felt more enjoyable and comfortable. Light Mode just felt a bit too bright overall.

Q2: What surprised me was how much Dark Mode reduced my eye strain. It felt like the letters popped out from the screen visually, almost like a subtle effect. Skimming articles was noticeably easier for me in Dark Mode.

Q3: I didn't feel lost or stuck at any point, but I did notice a small difference in how the buttons responded in the two modes. Sometimes they required more precise tapping. When a button didn't respond, the prototype showed a blue box that helped guide me, which I

appreciated from a navigation standpoint.

Q4: I would make the interactive buttons a bit easier to press. Some of them felt like they required more precision than expected.

Q5: The app mostly responded well to my clicks, which I'd like to point out. Overall, I preferred Dark Mode, as it felt easier on my eyes, especially when reading through the longer paragraphs in the first article, which I believe was the one about food.

Test Participant #24

Q1: I felt a bit more exhausted when reading in Light Mode. Not because it was uncomfortable to read exactly, it just felt a bit more demanding. My eyes had to adjust more in Light Mode compared to Dark Mode.

Q2: Using Dark Mode felt more comfortable overall. In the environment I was in, it felt like the natural choice. There was still some sunlight outside, but the room wasn't super bright. When I'm outdoors and the sun is sharp, I usually have to use Light Mode because of screen reflection. But when I'm inside, I typically prefer Dark Mode.

Q3: I wasn't confused at any point.

Q4: Not really, everything felt well integrated, and the functions worked as expected.

Q5: I liked being able to switch between the modes, and it made it clear to me that Light Mode is not my preference. It was also nice to switch font sizes, and I could read the text without any issues across all three sizes.

Test Participant #25

Q1: I don't think anything in particular stood out to me in Light Mode. It felt a bit boring, in my opinion.

Q2: What stood out to me in Dark Mode was the contrast. Visually, it looked more interesting and engaging.

Q3: There weren't any moments where I felt stuck. The app was easy to use, both in terms

of navigation and reading.

Q4: Not really, nothing comes to mind.

Q5: I liked trying out the two modes. Dark Mode was easier for me to read in compared to Light Mode.

Test Participant #26

Q1: For shorter reading tasks, I think Light Mode works well, like when skimming headlines or reading article summaries. It felt fine for that kind of interaction.

Q2: When diving into full articles, Dark Mode stood out more to me. I was able to retain focus better, and the reading experience felt more intuitive. It also helped when I increased the text size. I felt like the text was easier to read that way, although I was able to read in all modes without issues.

Q3: I felt a bit confused when trying to adjust the text size at first. The option was a bit hidden within multiple menus, and I had expected it to be accessible directly at the top of the article.

Q4: Something I would like to change is the article presentation. It would be helpful to have a summary or some bullet points at the top of the articles. Scrolling through so much text, especially in the New York food article, became a bit boring after a while.

Q5: Everything in the app worked as expected. The buttons responded to my clicks, the articles were easy to scroll through, and both the colour mode switch and text resizing functioned well.

Test Participant #27

Q1: Nothing in particular stood out to me in Light Mode. It was easy to use, easy to navigate, and fairly easy to read in as well.

Q2: Dark Mode felt very similar to Light Mode, but I think the text was just a bit easier to digest. It felt slightly more comfortable for my eyes.

Q3: I didn't experience any frustration while using the app, except that sometimes I had to click multiple times to switch between "Home" and "More" in the bottom menu. That probably caused me to spend a bit more time when switching between tasks.

Q4: I would probably increase the button size in the bottom menu slightly to make them easier to tap. Otherwise, I don't know what I would change.

Q5: Not really, just that it was an interesting experience.

Test Participant #28

Q1: In Light Mode, the app felt nice overall, but the brightness of the screen and the mode itself made it feel like it required more focus to read the articles.

Q2: I felt better using Dark Mode. Compared to Light Mode, the articles actually felt shorter than they were. I felt like I could read faster in that mode, though that might just be my impression. I'm not the fastest reader, so I still took my time, but the contrast made the experience more enjoyable.

Q3: I had a few navigation issues where I felt a bit stuck. I had to scroll all the way up in the articles to hit the back button, and also all the way down on the home page to access the bottom menu and find the "More" button to reach the settings. That became a bit annoying. Also, some buttons required multiple clicks before they responded.

Q4: I would make the settings menu more accessible, as it currently feels a bit hidden. I'd prefer not having to scroll so much to find basic options.

Q5: I enjoyed the testing experience overall, and I liked trying the two modes. It made me realise that Dark Mode might suit me better than Light Mode. It helped me understand how the contrast and colour scheme can affect reading longer articles.