BIRMINGHAM CITY University

CMP6200/DIG6200

INDIVIDUAL UNDERGRADUATE PROJECT

2024–2025

A3: Dissertation

INVESTIGATING THE ROLE OF COLOR THEORY IN WEBSITE DESIGN AND ITS IMPACT ON USER EXPERIENCE

Course: Digital Media Computing

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Abstract

This dissertation explores how the application of color theory in web design influences user experience and engagement, using a prototype website called “Bob’s Bistro” as a case study. The project involved the creation of a customizable web interface where users could select their own color schemes followed by data collection through a user questionnaire and Google Analytics tracking over a 28-day period. The study aimed to assess how different color choices affect perceptions of aesthetic appeal, emotional responses and readability. Results from the survey indicated that the original red color scheme used for the website was generally rated as appealing and appropriate for the website’s theme with most users describing the readability as “Good” or “Amazing.” When offered with the ability to personalize the site 55% of participants chose to keep the default color scheme while 45% preferred their alternatives such as blue, black or grey. Despite the variety of color combinations, over half of the participants (11 out of 20) preferred the original red design to their customized versions. However, 90% of participants said they appreciated the option to customize colors and 18 confirmed it increased their engagement of the website. Google Analytics portrayed a total of 247 events across 28 users with the most common action being page views and user engagement events such as button clicks, and time spent on the website that’s over 10 seconds. These results convey that while color customization might not always lead to preference changes, it positively contributes to user involvement.

Acknowledgements

Firstly, I would like to express my sincere gratitude to my supervisor, Cathy Easthope, for her continuous guidance and support throughout this dissertation. Her weekly assistance has been invaluable in shaping my research for this project. I would also like to acknowledge my second supervisor, Jay Patel, for his input during our meetings. I would also like to extend my thanks to my tutor, Sandeep Chahil, for his continuous encouragement and support during my time at Birmingham City university.

I am deeply grateful to my friends and family for their unwavering support and motivation, ensuring that I stayed determined throughout this journey. A special mention goes to my grandad, who passed away. His love for the color yellow has always inspired me, and although I didn’t incorporate yellow

into this project, his memory has been a constant motivation. I have worked hard throughout this project and my degree so I can make him proud. Additionally, I appreciate my classmates for their valuable feedback when reviewing different models of my website. Finally, I would like to thank everyone who participated in my questionnaire, as their input provided essential data that contributed significantly to this project.

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Glossary

User Interface (UI)	The visual design of a website or app that includes its colors, layout, buttons and typography. It focuses on aesthetics and interactivity.
User Experience (UX)	The functionality and usability of a website or app to ensure they have smooth navigation.
Hue	A pure color in its most basic form.
Saturation	How intense or pure a color is. High saturation makes the color more vibrant whereas low saturation makes it appear duller.
Tint	A color that's mixed with white makes it lighter.
Shade	A color mixed with black that makes it darker.
Tone	A color mixed with grey, both black and white, that reduces its intensity.
RGB	A color model used for digital screens, based on red, green and blue light.
HEX Code	A six-digit code is used to define colors in design such as website design. (e.g #1B365D)
Human Computer Interaction (HCI)	The study of interactions between users and computers. It focuses on improving things such as accessibility and user experience by designing systems that are effective and user friendly.
World Wide Web (Web)	System of interconnected documents and resources that are accessed through the internet.
Primary colors	Basic hues that can't be created by mixing other colors. Red, blue and yellow in traditional RYB model or red, green blue in RGB model.

Secondary colors	Colors formed by mixing two primary colors in equal proportions. This being purple, green and orange.

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1 Introduction

1.1 Background and Rationale

The project on investigating the Role of Color Theory in Website Design and Its Impact on User Experience examines how different color choices in web design can influence user perception and engagement. Studies show that users form an opinion about a website in just 50 milliseconds (Lindgaard, G 2006), with 90% of their snap judgments influenced by color alone (Concept drop, 2015). This makes color a critical factor in shaping user experience and engagement in web design.

However, many websites don't use effective color strategies, leading to poor readability, inconsistent branding, and unengaged users. For instance, 38% of users will stop engaging with a website if the layout or content is unattractive (Georgiev, D, 2020). This project seeks to address this issue by exploring how applying color theory principles can enhance the user satisfaction, improve engagement, and offer more practical insights for web designers and businesses aiming to create more visually appealing and user-friendly websites that will improve their overall brand.

The increasing importance of user-centered design in contemporary digital environments emphasizes the need for experiences that are not only functional but are emotionally relatable for users. As users become accustomed to personalized experiences across platforms such as social media and e-commerce, their expectations require a deeper understanding of psychological, cultural and accessibility consideration, with color playing a crucial role in shaping emotional and behavioral responses from people online.

This project responds to these developments by investigating how color theory can be used together with a personalized website design framework that will be able to enhance engagement without compromising usability. By implementing a flexible, user-driven color customization feature in Bob's Bistro website, the research seeks to bridge theoretical insights from color psychology with practical design strategies. The artefact development process, evaluation methods, and critical findings presented throughout this dissertation will have a user centered approach aimed at contributing meaningful insights to the field of digital design.

1.2 Key Topics

1. Color Theory in Web Design:

- Color Psychology: Research was conducted to explore how different colors evoke emotions, influence user perceptions, and affect decision-making in people. This will include examining studies on color associations (e.g., red for danger, gold for wealth) while also considering accessibility factors such as challenges faced by people with learning disorders, people with reading difficulties or color blindness.
- Color Harmony and Contrast: Investigated how color combinations can create a visual balance, contrast, accessibility, and how these affect user readability and navigation on websites. This aspect will address how color choices also support users with visual impairments or learning disorders by ensuring sufficient clarity and contrast in colors.
- Properties of Color: Illustrated how changing the properties of color such as changing the hue, saturation, intensity and brightness values can evoke different feelings in users.
- Cultural Influences on Color Perception: Research and documents were conducted on how cultural differences impact the interpretation of colors in website design, making this an important factor for global web designers.

2. User Experience and UI/UX Design:

- User Feedback: Surveys have been created to assess how users respond to different color schemes in terms of engagement and satisfaction. They will be used as targeted questions relating to website prototypes and more people will likely answer these due to them not taking up large amounts of time while still getting the necessary information required for the project.
- Usability and Accessibility: This project discusses how color choices impact usability, focusing on accessibility standards such as color contrast ratios for users with visual impairments.

3. Digital Marketing and User Retention:

- Color in Call-to-Actions (CTAs): Specific colors were researched in CTAs (e.g., buttons, banners on websites) can influence conversion rates and user interactions. This is so the website prototypes the best it can be in relation to colors users prefer.
- Emotional Triggers in Marketing: Explored how colors are used in web design to emotionally engage users and enhance customer retention, tying it into different marketing strategies used by companies.

4. Research Methodologies:

- Quantitative Data Analysis: Statistical techniques like regression analysis have been used to study the relationship between color schemes and user engagement in web design.
- Qualitative User Feedback: Incorporated user surveys and interviews to gather insights on how color affects users' emotional responses and experiences.

Overall, these topics and themes will have explored both the technical and psychological aspects of color in web design, and its impact on user experience and engagement.

1.3 Project Aim and Objectives

Project Aim

To explore how the application of color theory in website design influences user experience and engagement.

Project Objectives

1. Conduct a comprehensive literature review to understand existing research on color theory, user experience (UX/UI trends), and website design, identifying gaps and best practices by Week 5 of the project timeline.

2. Design and develop a website prototype by week 19 that allows users to select their own color palette. The prototype will incorporate diverse applications of color theory while ensuring it meets established accessibility and usability standards.

3. Implement testing on the website prototype created to measure user engagement metrics such as click-through rates and time on the website, collecting data from a sample group by Week 21.

4. Distribute user surveys to gather qualitative data on users' emotional responses and preferences regarding the different color schemes used in the prototypes in Week 23.

5. Analyze both quantitative and qualitative data using statistical techniques and analysis to identify correlations between color choices and user engagement by Week 25.

6. Generate practical recommendations for web designers based on the findings of the project through research, focusing on how specific colors can improve user experience and engagement, and present these recommendations in the final report by Week 31.

1.4 Background Information

Color is essential in web design as it influences user perception, accessibility and engagement. While color theory provides a framework for more effective design its practical application within UI/UX remains to be inconsistent. Research has conveyed that colors impact emotions and behavior, but cultural and contextual factors can alter these effects. For example, red holds a wide range of different meanings across cultures around the world. In Chinese and Hindu traditions, red is commonly used in weddings, symbolizing luck and prosperity. In contrast, Western cultures typically associate weddings with white, a trend popularized by Queen Victoria, representing purity and innocence. However, in Chinese culture, white is more commonly linked to mourning and is traditionally worn at funerals, highlighting how color symbolism varies across societies.

This study hypothesizes that strategic color use will improve accessibility and usability for users, then brand perception for companies. Through analyzing different color combinations, contrasts and saturation this will help to provide practical guidelines for enhancing both visual appeal and functionality in web design.

2 Literature Review

2.1 Themes

This report takes a thematic approach that guides the development of the artefact which has comprised an example website informed by research on color theory in website design. Each of these themes speaks to another aspect of this topic, with an accompanying set of relevant keywords used during the research process supporting each.

List of Themes

1) What is color theory and how does it affect digital design?
2) How does color impact user experience and perception?
3) How does color enhance user engagement?
4) Cultural interpretations of color and how it is present in website design
5) Color trends and how this relates to web design
6) Different evaluation approaches in color design studies

The first theme will touch on the very basic foundation of color theory in digital design, covering key concepts such as color harmony, contrast, and the psychological effect of colors. These principles allow for the effective use of colors on the website. Key words include color theory, basics of color theory, color harmony, psychological effects of color.

The second theme is color and UX, regarding how it affects users by influencing their feelings and ways of interaction and behaviors. This section will outline the effect of color on emotional response and visual perception in UI/UX design. Important key terms in this theme are the effect of colors on UX, color as an emotional response, and design for visual perception.

The third theme describes how color can contribute to the goal of engaging users: How it supports capturing attention, thereby triggering click-throughs and even purchases. This section categorizes

discussions related to the utility of visual design towards the generation of end-user behaviors. The keywords include user engagement, customer-attracting colors, and conversion rates.

The fourth theme is on the cultural interpretations of color in website design, focusing on how different cultures influence perception and usage. This theme ensures that the website is inclusive and resonates with diverse audiences. Keywords used in this theme include cultural color symbolism, global color design, and inclusive design.

The fifth theme is color trends in website design, where a study is conducted on how current design and aesthetic preferences are influenced by color choices. These include the minimalist color schemes, dark mode, and gradients that help make sure the artefact is in the same pace as regards modern user expectations. Keywords here include web design trends, color trends, innovative palettes.

The last theme talks about the evaluation approaches in color design studies, reviewing such methods as user testing, A/B testing, and usability assessments. It is indispensable to count the effectiveness of created websites in the framework of this theme. Keywords include user testing, color usability evaluation, and design principles.

2.2 Review of Literature

2.2.1 What is color theory and how does it affect digital design?

The historical evolution of color theory when it became an evolutionary theory provides a solid foundation for understanding the science of color perception. Color theory is the study of how humans interpret and perceive color through combining physiological processes and experiences that have been developed over time (Ladd-Franklin, C. 1892). Color perception in humans begins with the interaction of light with the retina in the eyes (Helmholtz, H. von. 1852). These have two types of photoreceptor cells that are called rods and cones. The rods are responsible for people's vision in lower lighting conditions. On the other hand, cones detect colors in brighter, more well-lit environments which are known as the Purkinje effect (Purkinje, J.E. 1825). Literature articles explain how specific wavelengths of light play a role in stimulating these cells and how it helps them transmit signals to the brain. (Hering, E., Hillebrand, F. 1889) The trichromatic theory illustrated that the retina in the eye contains three distinct types of receptors that are sensitive to red, green, and blue light. (König, A. and Helmholtz, H. von. 1891) These are the primary colors that are combined to produce the full spectrum of hues that are seen by humans. (Young, T., Helmholtz, H. von. 1852) However, this was criticized for not being able to explain the unique perception of yellow as this was seen as a distinct color. As a result, Hering developed the opposing process theory where color perception came from opposing pairs of colors: red and green, blue, and yellow, and black and white. (Hering, E. 1878) Color perception is different for everyone as it is a subjective experience that has been shaped by how the brain receives different signals from the eyes. As Newton stated (Newton, I. 1704), "Colors are not inherent properties of light but are constructed by the human mind based on physical stimuli". This makes color perception fundamental when creating digital applications such as for websites where colors can be manipulated to create whatever emotional or behavioral response the creator would like to make the audience feel.

2.2.2 How does color impact user experience and perception?

The role of color brings out emotional reactions in people, which is particularly important in shaping the user's experience. Color can also have psychological properties (Elliot, A.J., Maier, M.A. 2007) where it influences people's behaviors. (Tractinsky, N. 2004) An example would be that blue is associated with feelings of trust, security, and calmness, this makes it a main choice for websites that

want to have high credibility such as corporate and banking websites. (Kim, J., Moon, J.Y. 1998) On the other hand, yellow often brings negative emotions as it is described as overly bright, distracting and too friendly. (Valdez, P., Mehrabian, A. 1994) Insights such as this convey how color impacts how users can feel about websites which will influence their satisfaction and if they are likely to stay for longer. (Cyr, D., Head, M., Larios, H. 2010) Long wavelength colors such as yellow and red are more emotionally intense for people than shorter wavelength colors like green and blue. Findings like these are important to understanding how colors can create different emotions such as pleasure or anxiety which makes it relevant when designing digital applications such as websites that intend to make users feel specific emotions. (Valdez, P. and Mehrabian, A. 1994) Appropriate color schemes being used can make user perception better and make the websites more reliable. Websites that used a blue color scheme were rated higher in satisfaction and trust (Tractinsky, N. 2004) which potentially could lead to increased loyalty. (Cyr, D. 2008) This connection between trust and color perceptions conveys the need for designers to be careful with the color choices made while designing to make sure positive user experiences are created. The cognitive affective model of communication theory (Te'eni, D. 2001) explains how the communication medium such as websites and the message formed from this, such as the color schemes affect the users' emotions and perceptions. The websites as a medium can change how the users view the website in terms of satisfaction and trustworthiness. This theory shows a more structured way on how color can create psychological reactions for people and can determine if a user is satisfied with a websites design or not.

2.2.3 How does color enhance user engagement?

Previous research has pinpointed that, for user engagement, especially in Instagram, visual content plays an important role. (Yu, C. 2020) discusses the user-generated content issue and how it shapes perceptions of destinations, related to the web design project in underlining the users' experience through visual aesthetic points of view. That is particularly essential in considering how color choices in web design can affect the way users react emotionally and interact with a website-a theme this project extends by focusing on color theory in web environments. Color greatly influences the way humans experience emotions and behave in digital spaces. (Labrecque & Milne, 2012) talk about the different colors that enforce different emotional responses: red, which excites romance, excitement and anger; blue, on the other hand, evokes trust and calmness. These psychological effects are important in web design as they have a possibility of influencing users' perceptions of a brand and their likeliness to engage with a site. The focus of color theory in this study therefore underpins how specific colors can enable user experience in web design that would be aligned to the emotional goals of the website.

2.2.4 Cultural interpretations of color and how it is present in website design

The concept of culture is that it is an abstract and complex term (Barber, W., Badre, A. 1998) that has been defined by different researchers in different ways. Hofstede defines culture as a "software of the mind" (Hofstede, G. 1991) whereas Segall says "Any experience a person has is influenced by that person's previous experiences" (Segall, M.H. 1999). Cultural elements are taught across five distinct cultures, each of which differentiates itself from others. (Segall, M.H. 1999) Theory testing and building is key to helping cross-cultural human computer interaction (HCI) in exploring different studies and conducting investigations that are vital in relation to interface designing such as designing websites. (Tractinsky, N. 2000) Cultural differences influence the perception of color massively, which significantly impacts users' experience in global markets around the world. For instance, grey was perceived as more professional and neutral by people in Canada due to its duller tone. On the other hand, blue was universally more liked across diverse cultural groups such as:

Canada, Germany, and Japan. These findings can emphasize the importance of tailoring color schemes to cultural expectations around the globe, so it is able to improve the user experience and avoid cutting off international audiences. (Noiwan, J., Norcio, A.F. 2006) In general, cultures differ on large amounts of things around the globe such as languages and formats of dates and times but also emotions and perception, “Culture functions as the basis of peoples behaviors, thoughts and feelings” (Komin, S. 1991). As a result, there are general guidelines of cross-cultural interface design and cultural differences that exist that need to be adapted for designing digital interfaces such as websites. (Fernandes, T. 1995) This will improve the user's performance and satisfaction if cultures are considered and integrated in web design. In experimental website that have been tested amongst American and Thai groups, there was some similarities as both cultural groups rated blue as their favorite color and violet as their least. However, their second favorite colors differ as American's is red whereas Thai people preferred yellow. The study suggests that blue is seen as the favorite color amongst both cultures as it is easily seen in the peripheral area of the human eye. (Marcus, A. 1992)

2.2.5 Color trends and how this relates to web design

Color trends that emerge convey how the role of saturated colors keeps changing in design and offers different insights that are useful in web design. The increased use of vibrant colors in urban areas is described to be a response to all the demands for attention identity and visual communication. (Bell, S. 2019) An example given was Superkilen Park in Copenhagen and the Pigalle Basketball Court in Paris as these demonstrate how bold hues can redefine spaces by making them more engaging and memorable to people. Bright colors have been said to be a response to technological advancements and internet culture and the need for more “photogenic spaces”. (Bell, S. 2019) These underscore the psychological impact of color in generating positive user experience which can relate in web design as saturated color attract users’ attention more when it’s applied strategically.

Professional attitudes towards color in design, especially in the architecture sector, have changed from traditional reliance on neutral and safer palettes to more bold and dynamic hues. (McLachlan, F. 2013) Supergraphics that are large scale graphic designs applied to architectural surfaces can “visually change the shape of the object” (Mikhailov, S. 2020) allowing it to become part of a larger narrative structure that includes new imagery and creating fresh visual content.

Many architects viewed color as a secondary element and focused more on structure of buildings. However, it’s been portrayed that contemporary practices have increasingly recognized the potential of vibrant colors to serve as primary design elements that are more capable of redefining spaces and evoking emotional responses. This reflects the shift of trends as people are now embracing color as a vital tool for engagement. These insights are useful in web design as they show the functional and emotional power of color as web design in the past has also viewed color as secondary and focused more on basic branding. (Scott, P. 2017)

2.2.6 Different evaluation approaches in color design studies

Studies used different methodologies to assess its impact on user perception and behaviors. A multi method approach was used by combining eye tracking, surveys and interviews to explore how website color schemes affected trust, loyalty and satisfaction amongst cultures. (Cyr, D 2010) Comparative analysis to urban projects was showcased on how saturated colors redefined public spaces and identity. (Bell, S. 2019) These findings conveyed how the functional and emotional impact was determined by use of vibrant hues, and this was applicable to digital interfaces such as websites too. Frameworks such as cognitive affective models of communication and psychological reversal theories (Cyr, D 2010) further explained how color influences trust while shaping user satisfaction and e-loyalty in website design. (Walters, J. 1982) The professional attitude of those times towards

vivid colors was documented, which emphasized their ability to enhance engagement and redefine design practices in web design. (McLachlan, F. 2015) Such methods from various biometric tools used to theoretical models all demonstrate the different multifaceted roles that color plays in improving user experience and engagement while offering valuable insights into effective website design.

2.3 Summary

The literature review portrays the importance of color theory in digital design, especially website design. Basic theories, like trichromatic and opposing process theories, set a base to understand how humans perceive and interpret colors, which will further help stimulate an emotional and psychological response. Color affects user experience because it can create different kinds of feelings and behaviors. For instance, blue creates trust, while yellow may promote negativity. Knowing information like this is essential in understanding colors. Cultural differences further push color perception and drive inclusive designs that resonate globally. These mean that modern demands for a more exciting design translate into emerging trends that favor brighter palettes. Several methods of evaluation that find their use in the identification of optimal color schemes include eye tracking and surveys. This research, therefore, constitutes the foundation upon which appropriate color informed theory, psychology, culture, and emerging trends are integral to website design and have formed the approach used in this project in developing and evaluating the website.

Furthermore, in reviewing the literature it has become clear that color has the potential to enhance emotional engagement and visual aesthetics. Also, it presents challenges regarding accessibility and cultural variability. Some researchers emphasize the emotional power of warm colors like red (Labrecque & Milne, 2012), whereas others highlight the risks of alienating users through poor contrast or inappropriate cultural associations (Noiwan & Norcio, 2006). These findings directly shaped the development of the Bob's Bistro website, particularly in selecting the default colors and then building the personalization feature. Recognizing the trade-offs identified in previous studies done, this project has aimed to balance the aesthetic appeal with functional clarity to ensure that color choices enhance rather than hinder the usability and inclusivity for users.

3 Method and Implementation

3.1 Methodology

This project employs an instinctive design approach, blending theoretical principles of color theory with practical website design. The process began with a fixed color scheme, which evolved over time into multiple schemes and ultimately into a customizable user interface with automatic color-changing text. This method allows for an organized exploration of how different color applications can affect user perception and interaction, ensuring that research can be repeated by future researchers.

This approach closely aligns with user centered and iterative design practices where feedback and evolving insights guide the progression of development. Although described as instinctive, the design process was driven by careful observation and practical testing rather than intuition alone. The ability to adapt based on visual appeal and technical constraints made this approach flexible and appropriate for the project that heavily depends on a subjective perception.

Ethical considerations were also considered during the research process. All participants who engaged with the website were informed about how their data would be used through a cookies banner added at the bottom of the screen. Google Analytics was used strictly to analyze user

interaction data without collecting any personal information to ensure compliance with data privacy standards and ethical research practices. In addition, the methodology incorporated predefined evaluation criteria such as readability and user satisfaction. These were measured through both quantitative data from Google Analytics and qualitative feedback from users, allowing for a successful assessment of how color theory impacts user experience.

The decision to use a mixed range of methods for the evaluation strategy was made by needing both quantitative behavioral data and qualitative user perceptions that align with recommendations by Creswell (2014) on triangulating data sources for greater insights. The survey allowed for structured data collection regarding subjective opinions on visual appeal, readability and engagement, while Google Analytics provided objective metrics of user interaction behaviors on the website.

Other methods, like observational studies, were considered but ultimately found to be prohibitive with the limited budget and the remote location of the participant recruitment. In future work, it might be worthwhile to include this to give more richer contextual insights into user behavior. Ethical considerations were also considered throughout the project. The questionnaire was entirely anonymous in which no personally identifiable information was gathered, it was also GDPR compliant in web research. Google Analytics report results were scrutinized at the level of anonymity to avoid breaching participant confidentiality. All the above steps confirmed that there existed ethical integrity practiced at all steps during research on the project.

3.2 Design

First prototype

Initially, the project featured a single, static color scheme that was applied to a basic website layout. The initial blue color scheme was chosen due to its associations with cleanliness and trust, which are both qualities that are important for a restaurant website. Also, it reinforced a professional, modern brand image that helped to present users' impression of quality and hygiene. This first stage established the foundation for both the visual and functional aspects of the design.

The appearance of the first prototype has been created with an emphasis on simplicity and a clear visual identity for Bob's Bistro. It has a clean layout with proper navigation structure that was prioritized to enable easy usability on desktop and mobile devices for the website. Visual hierarchy has been preserved with consistent heading sizes and spacing. The original blue color scheme was applied in the background and navigation menu whereas the text and buttons used black and white tones to create contrast and avoid visual fatigue. Such an organizational setup allows for future upgrades to be made on an accessible design foundation.

Progressive Refinement

Multiple versions of the website were created, each featuring distinct primary and secondary color schemes. This phase aims to compare the effects of different color combinations on the website's aesthetics and user interface.

Within the progressive refinement phase of the project, color schemes were chosen by the primary and secondary colors and how emotionally striking it would be with users. The color schemes were used deliberately not just on primary elements such as the headers and the background but even on secondary accents like hover effects and the navigation menu to give a sensory visual look. Layout changes, such as padding, center-aligned margins and interactive hover effects were added increase the visual impact and responsiveness in the user interface. Through testing for the varying color contrast and background color, improvements allowed combinations testing that did not

compromise on accessibility while general atmosphere and brand continuity of the website was augmented.

Customizable Interface

Building on the earlier prototypes, the final design incorporated a customizable color scheme feature. Users could select their preferred colors, and the text color would automatically adjust to maintain readability. This adaptive design highlights the practical application of color theory to enhance both personalization and usability for users.

The default color scheme was shifted from blue to red after discovering that blue can suppress appetite (Foroni *et al.*, 2016). In contrast, red is commonly used in restaurant branding as it stimulates hunger and creates a sense of urgency, while evoking excitement in people. Research indicates that red increases energy levels and heart rate, making it the best choice for encouraging engagement and increasing appetite, which is why it is often incorporated into restaurant color schemes. (Mileva, G. 2024)

In designing the customizable interface, careful attention was given to ensure the color-selection controls remained intuitive and unobtrusive within the overall layout. Color picker controls were thoughtfully placed to be seen at the top of the page, with default locations clearly visible to ensure consistency. JavaScript functions were written in modular style to track changes in real time so users would receive instant feedback when colors were chosen which improved user control perception. Fail-safes were implemented so that users could not choose color combinations that would compromise readability. Personalization elements were added that improved the user experience without compromising functionality of the website.

3.3 Implementation

Development Tools and Technologies

For the development of tools and technologies, these were built on the use of standard web technologies, the project also focused heavily on maintainability and performance optimization. Best practices such as semantic HTML structures, separation of concerns through external CSS stylesheets, and unobtrusive JavaScript were applied. A mobile version was developed, with responsive breakpoints integrated at the end of the CSS to guarantee that content scaled naturally from the large desktop version to the smaller mobile version.

Color Scheme Integration

Initially, the color scheme was hard-coded, but this evolved into multiple versions with different color schemes. The final version uses JavaScript to allow users to select their preferred colors, which triggers automatic adjustments to the text color to maintain contrast. Allowing users to change colors gives them control over the accessibility of the website, whereas pre-colored websites often assume what works for everyone.

The combination of various color schemes was created through adaptive CSS variables to facilitate quick switching between pre-defined sets. The configuration had all the versions of the prototypes maintain branding consistency and express a varying emotional tone using color psychology. Transition effect was managed through CSS animations to create a smooth visual transition during color scheme switching to avoid harsh transitions that aren't visually appealing.

Dynamic Color Adjustments

Algorithms written in JavaScript were included to be able to automatically adjust the text color based on the background color selected by the user, ensuring reliable readability. This dynamic adjustment follows pre-defined contrast rules and color theory principles, delivering a seamless user experience.

A dynamic color compensation feature was created based on conditional logic testing the user-input background color luminance values. Depending on these values, suitable foreground text colors were automatically changed to black or white to offer maximum legibility. This was further refined with a series of tests involving various hues and saturation levels for ensuring consistency even for extreme situations like pastel-colored backgrounds or high-contrast neon colors. Instead of depending on human selecting, this dynamic adaptation automated one of the most important details of accessibility to guarantee that no user would inadvertently make the text impossible to read.

4 Evaluation

4.1 Evaluation Methodology

4.1.1 Evaluation Metrics

For the evaluation in this project, a survey methodology has been used to gather user feedback on two distinct website designs, the default color scheme and the interactive color scheme where users are able to choose their preferred colors. The survey was created and distributed to people using Google Forms, this is a widely accessible platform for collecting qualitative and quantitative questionnaire data. This provided valuable insight into user preferences, visual appeal and overall ease of use across the two-color schemes on the website designed.

In addition to this user feedback, Google Analytics was implemented to track user behavior on the website. Specific metrics such as click rates were monitored to see if color choices had a measurable impact on user engagement. This included user interactions with elements such as navigation links and hover-over images.

By combining the insights from the survey with the objective behavioral data from Google Analytics, the evaluation provides a balanced and comprehensive understanding to how color theory influences the effectiveness of web design.

4.2 Results

The user experience and performance of the Bob's Bistro website was evaluated using both Google Analytics data and a user questionnaire that gathered 20 responses. These results helped assess the effectiveness of the color scheme and personalization features in terms of user satisfaction.

4.2.1 Google Analytics Data

Over the span of 28 days, the website was recorded to have 247 user events from 28 unique users who were all new visitors. The traffic portrays a noticeable spike around mid-April, suggesting a peak in user engagement during this time (see Figure 1).

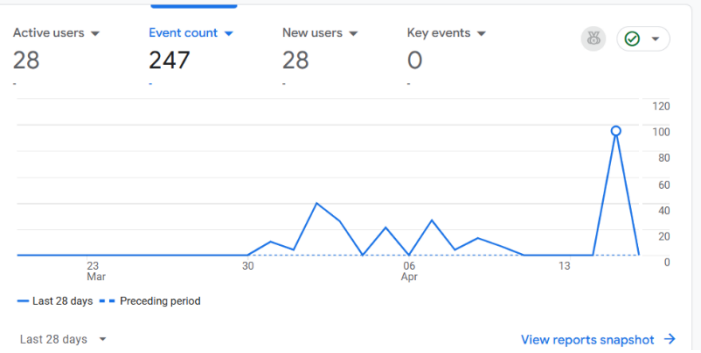
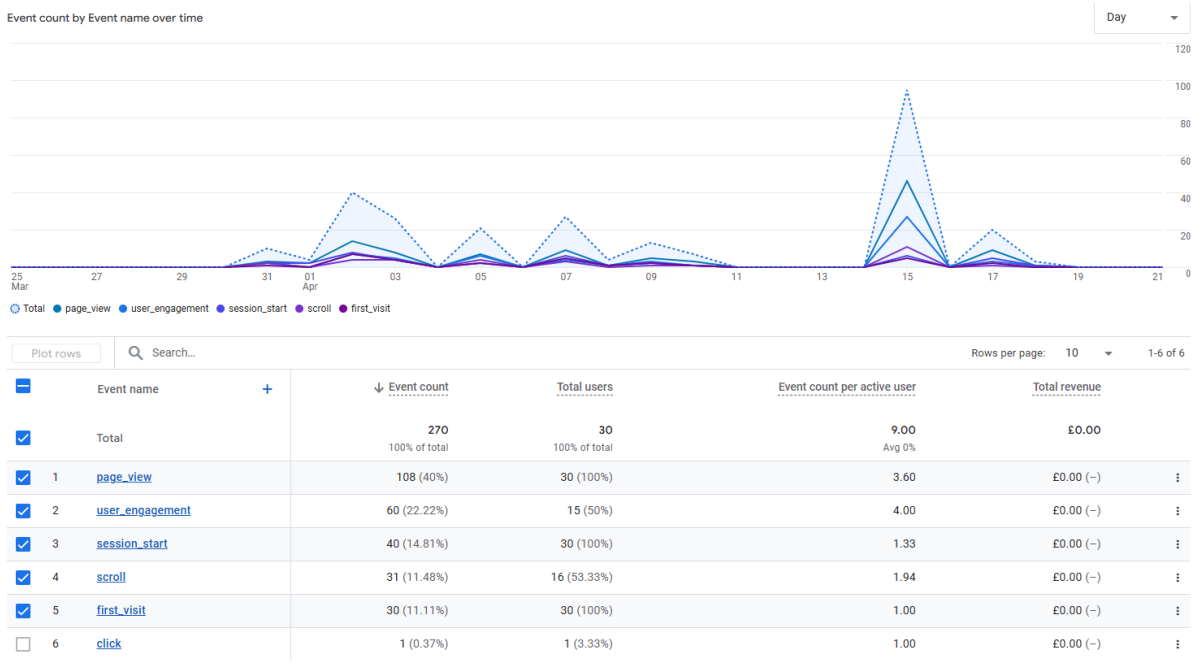


Figure 1: Total event count recorded over a 28-day period on the Bob's Bistro website.

To evaluate how users interacted with the website, event data was collected between 21st of March and 16th of April 2025. This data shows insights into user engagement patterns such as session starts and page views. As shown in Figure 2, the most frequently triggered event was page views with a total of 98 recorded instances across all users. Other events that are noticeable include the user engagement, session start and scroll results which indicate that users commonly visited the website; around half engaged further by scrolling or spending active time on the site.



		Event name	Event count	Total users	Event count per active user	Total revenue
☑		Total	270 100% of total	30 100% of total	9.00 Avg 0%	£0.00
☑	1	page_view	108 (40%)	30 (100%)	3.60	£0.00 (–)
☑	2	user_engagement	60 (22.22%)	15 (50%)	4.00	£0.00 (–)
☑	3	session_start	40 (14.81%)	30 (100%)	1.33	£0.00 (–)
☑	4	scroll	31 (11.48%)	16 (53.33%)	1.94	£0.00 (–)
☑	5	first_visit	30 (11.11%)	30 (100%)	1.00	£0.00 (–)
☐	6	click	1 (0.37%)	1 (3.33%)	1.00	£0.00 (–)

Figure 2: Breakdown of event count by event name over time for the Bob's Bistro website.

The table shown in Figure 2 presents the breakdown of events by name, total counts, number of users involved and the event frequency per user. The first visit was observed 28 times, indicating persistent traffic on the website. However, the recording of only one click event suggests limited engagement with interactive elements indicating user interactivity may be enhanced by incorporating additional interactive features on the website. These findings validate that consumers would browse and interact with the content to some extent, but that further interactivity creation would drive increased interaction and site stay.

4.2.2 Survey Results

A total of 20 participants completed the questionnaire evaluating the original and customized color schemes of Bob's Bistro website. Throughout the whole survey 1 is ranked as the best rating whereas 5 is the worst. The original red color scheme received mixed ratings with an average of 2.35 where 1 was extremely appealing and 5 was not appealing at all, most users choosing 2 to say the color scheme was appealing but not extremely.

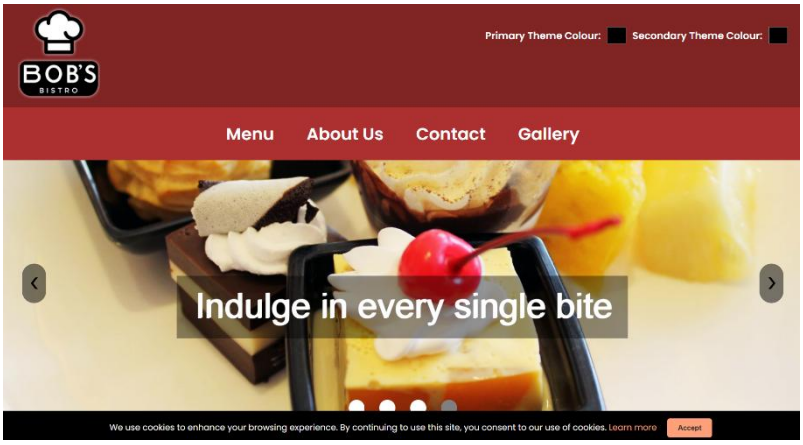


Figure 3: Screenshot of the Bob's Bistro website.

In terms of readability most people rated it as “Good” or “Amazing” which suggests strong visual contrast so the text on the website was easy to read. How appropriate the colors were for the context of the Bistro website, which averaged at 1.85 indicating moderate support.

Approximately half of respondents stated they wouldn’t have picked a different color scheme for the website’s default color scheme. A respondent suggested using different colors, such as black, blue or grey, which highlighted a few concerns about personal preferences. Also, several mentioned aligning the site’s colors more closely with the logo or opting for lighter schemes to modernize the feel of the website.

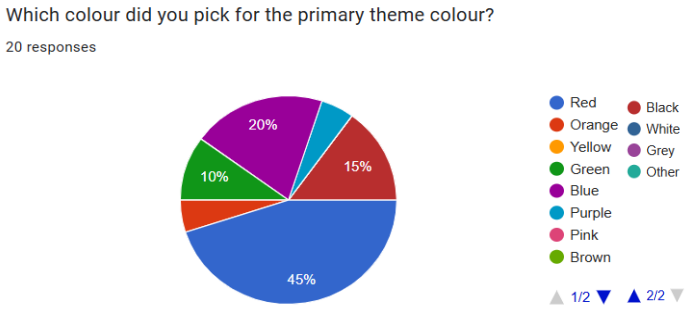


Figure 4: Results of primary theme color chosen by users on the survey.

Following this, the next section of the survey focuses its questions on where users interacted with two interactive color pickers which allowed them to personalize the design of the website. The most common colors selected for the primary color picker included red, blue and black, being 15%. Secondary colors had a wider range from white and grey to pink and yellow but 30% still chose red making it the most chosen color still.

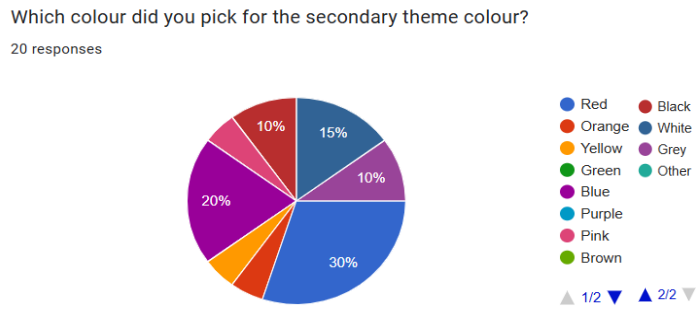


Figure 5: Results of secondary theme color chosen by users on the survey.

Despite the variety of combinations selected, when asked if they preferred their customized color scheme over the original red design the majority indicated that they didn’t (11 out of 20). Only 7 participants preferred their own color selections while 2 were unsure. This conveys that although users enjoyed experimenting with different color schemes, the original was still considered the most effective by most respondents. However, 18 participants said they were glad to have the option to customize the colors and many reported that this feature increased their engagement with the website.

The ratings of the websites appeal after applying chosen colors were mixed with a range of between 1 and 3. When asked how their chosen colors made them feel while browsing most of the responses were relatively neutral. Most common responses were 1 or 2 suggesting users were happy or somewhat happy and appreciated the personalization but didn’t always find it significantly more impactful than the default color scheme.

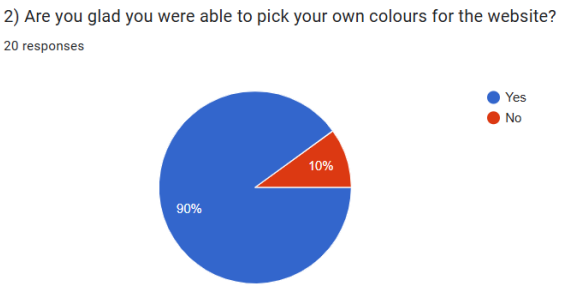


Figure 6: Results on survey for users being glad if they could pick their own colors for the website.

Survey Question	Most Common Rating/Response	Average Score	Summary
Original color scheme appeal	2	2.35	Most people found the original color scheme moderately appealing.
Original color scheme relevance to website theme	1	1.85	Users generally felt the color scheme was appropriate for the website's theme.
Appeal after color choices	2	2.1	After customizing colors, users found the website more visually appealing than before.
Chosen colors made users feel	1	1.65	Most users reported feeling happy with their chosen colors.
Recommend website to friends	2	3.5	Users were moderately willing to recommend the website. This ranking was out of 10.
Readability rating	Good	60%	Majority rated the text readability as "Good" indicating generally clear text.
Satisfied with contrast between light and dark elements	Yes	75%	Most users were satisfied with the visual content.
Most popular primary color chosen	Red	45%	Red was the most popular color choice for the primary color, aligning with the original theme.
Most popular secondary color chosen	Red	30%	Also, red was the most popular secondary color choice, though there was more variation among users.
Prefer color choices to original color scheme	No	55%	Slightly more users preferred the original color scheme over their custom version.
Glad they could choose their own colors	Yes	90%	Nearly all participants appreciated the ability to personalize the websites color scheme.
Tried out more than one color	Yes	90%	Most users experimented with multiple options showing active engagement with customization.

Does choosing color increase engagement	Yes	65%	The majority felt more engaged when they could select colors, conveying customization added value.

*Figure 7: Table showing questionnaire results and summary. Ratings were based on a 5-point scale where **1 = most positive** and **5 = most negative**. The survey question recommended to friend's ranking was out of 10.*

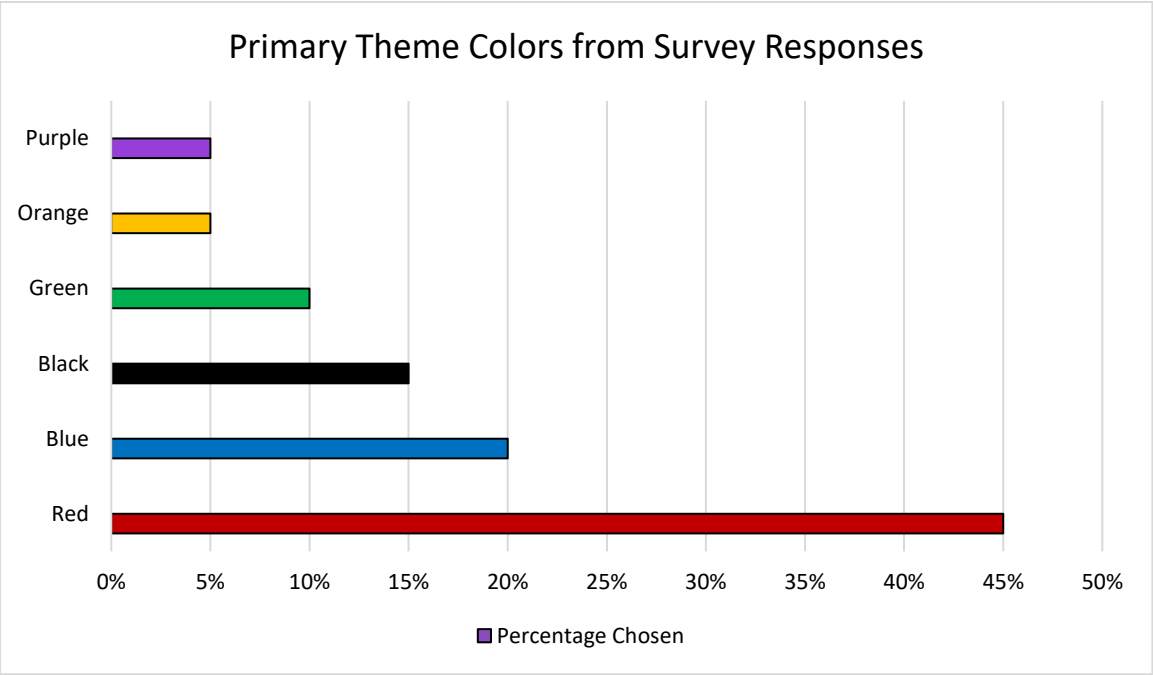


Figure 8: Bar graph of the distribution of primary color choices by users.

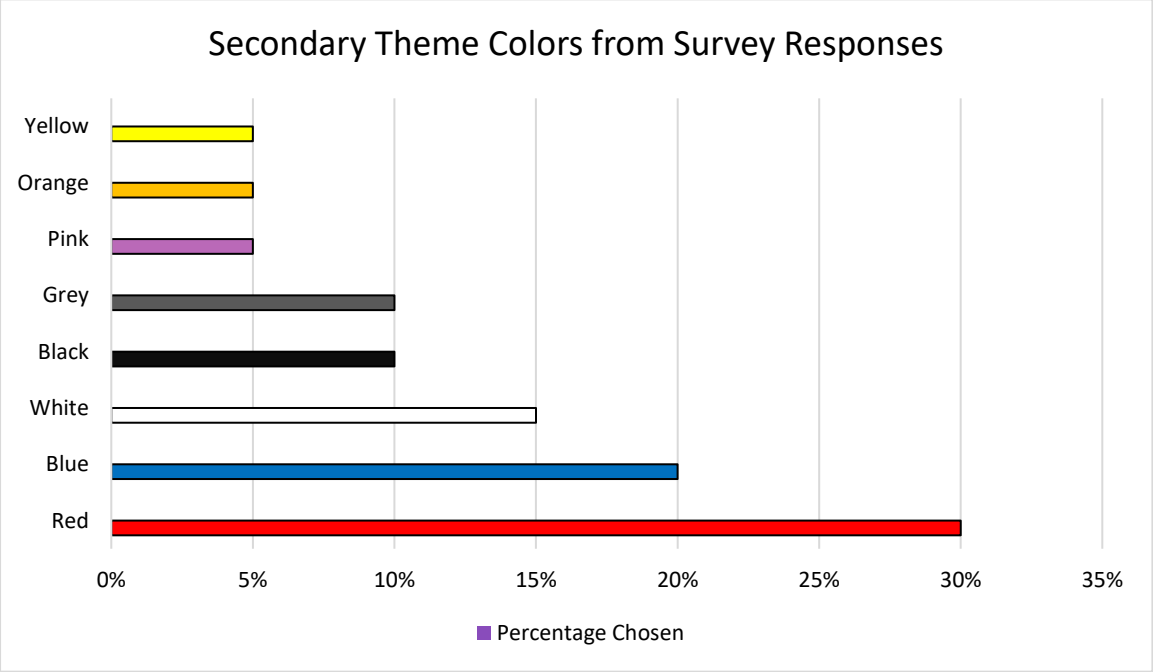


Figure 9: Bar graph of the distribution of secondary color choices by users.

The survey was distributed through multiple channels to ensure diversity in participant backgrounds, resulting in varied sets of responses. This included sharing it with university classmates, friends and family, as well as posting it on online platforms such as Reddit and digital media forums. The aim was

to reach a mix of participants with different backgrounds and levels of familiarity with web design. While the survey didn't collect specific demographic information, participants generally ranged in age from early 20s to mid-30s. This wider distribution helped ensure that the feedback was not limited to a single group of people and better reflected real world user preferences and experiences.

4.3 Discussion

The overall evaluation of Bob's Bistro website highlights how color schemes and personalization can impact user engagement and satisfaction. Insights from Google Analytics and survey responses reveal both design choices and areas that need improvement.

In the context of user-centered design, the project's findings reinforce the critical role that color selection and personalization play in shaping both initial impressions and sustained engagement. As color can influence emotional response within milliseconds (Labrecque & Milne, 2012), the strategic use of red within the default design capitalized on established psychological associations between warm tones and appetite stimulation. By providing users with both a curated experience and the option for customization, the artefact successfully balanced aesthetic consistency with a sense of user empowerment, reflecting best practices in adaptive web design.

However, the results also highlight that offering personalization alone is not sufficient to guarantee enhanced user satisfaction or interaction. The limited active engagement with interactive elements suggests that functionality must be paired with persuasive design techniques to guide user behavior effectively. Features such as prompts, and clear visual cues can significantly influence user interaction rates (Fogg, 2003). Therefore, while Bob's Bistro website achieved strong passive engagement and positive aesthetic feedback, the design could have been more dynamic and have more behavior-driven engagement strategies if done again.

Throughout the course of this project, the practical application of color theory within a real-world context provided valuable insights beyond initial expectations. An unexpected outcome was that while personalization was widely appreciated by users, it did not consistently improve their satisfaction with the visual appearance of the website. This highlighted the complexity of user preferences and the importance of providing guided customization rather than unlimited freedom. Furthermore, balancing emotional impact with readability and accessibility emerged as a much greater challenge than anticipated as it reinforced the notion that technical compliance alone does not guarantee a positive user experience. The project also revealed the importance of responsive color design, as users' experiences could have varied depending on the device type and screen brightness. These lessons suggest that color focused design work in the future must be approached carefully and consider the emotional, cultural, technical and contextual factors extensively.

4.3.1 Website engagement

Analytics data showed that the site had 28 unique users and over 240 recorded events with a spike in engagement being around the middle of April 2025. Most of these interactions were passive such as page views or scrolls with only one click event recorded. This conveys how the site's visual design was appealing enough to attract attention however lacked enough interactive elements to be able to encourage deeper engagement. Studies illustrate that while good visual design draws users in, functional design is the key to sustaining their attention (Sutcliffe, A., Namoun, A. 2012). Future versions could incorporate features such as interactive menus on the desktop version as well as on the mobile version since my mobile version has an interactive hamburger menu. Promotional pop ups could also help to stimulate deeper user engagement.

Furthermore, when user engagement is high it can be compared to outside conditions like where and when the survey was being handed out. For instance, the April middle peak in engagement could be correlated with periods of high online sharing activity. Users' temporal patterns of behavior would be able to drive future designs such as deployment of website features or placement of ads at peak usage times to encourage more. User-behavior driven by event-triggers such as suggestion of color schemes would also make the system deliver interaction more passionately with later releases.

4.3.2 Preferences

Survey participants gave the original red color scheme an average appeal rating of 2.35, indicating a moderate approval rating. Many found it visually appropriate for a bistro website as red is commonly associated with appetite and food. Although some users suggested different color alternatives such as blue or grey, blue is known to repress appetite. Most people, however, still preferred the original design over their own customized versions. This implies that familiarity and contextual appropriateness outweighs personal preference within web design. This behavior reflects how users tend to stick with familiar design trends even when alternatives are provided (Norman, 2004).

In addition, the preference for the original red design highlights the importance of aligning aesthetic choices with user expectations in specific industry contexts. Research by Labrecque and Milne (2012) further supports the idea that color congruency with brand type can enhance user trust and satisfaction. In the case of Bob's Bistro website, the red color scheme may have unconsciously reinforced traditional associations with warmth, appetite stimulation and dining experiences. This finding conveys that while offering customization is beneficial for users, maintaining a strong, coherent brand identity through color is crucial in industries where people's emotions play a significant role.

4.3.3 Personalization

Despite most users not preferring their own color choices, 18 out of 20 appreciated the customization feature of the website. This supports the idea that personalization increases engagement as it offers the users a sense of control even if it doesn't always lead to better aesthetic outcomes. These findings reinforce that successful color applications in website design are multidimensional as aesthetic appeal was reflected in users' positive reactions to both the default and customized color schemes. Many described how the website was visually pleasing and more emotional responses were captured through the survey feedback. Participants reported to be feeling "happy" or "a bit happy" when interacting with their chosen colors which aligns with establish color psychology principles. Participants' emotional responses align with established color psychology theories which highlight how color can influence user feelings and behavior (Elliot & Maier, 2007). Additionally, readability remained a consistent strength with 60% rating the text as "Good" and 75% reported satisfaction with the light/dark contrasts. Therefore, together these elements convey that balancing visual harmony, and functional clarity is the key to engaging user experience.

Another interesting observation is although the opportunity for personalization was valued, it may have introduced a degree of choice overload for some users. Choice overload occurs when offering too many options can lead to decision fatigue rather than empowerment (Iyengar & Lepper, 2000). While most participants experimented with colors, the fact that a majority still preferred the default color scheme highlights the importance of carefully balancing user freedom with an organized design direction. Future designs could consider offering a limited number of preset themes rather than full customization, combining flexibility with simplicity to optimize user experience.

4.3.4 Limitations

The small sample size and limited interaction options restricts how broadly these results can be applied. More advanced personalization tools and longer testing periods could have helped to make deeper insights into the project. Additionally, the low number of interactive events on the website suggests that clickable elements and visual cues need to be improved to encourage more user interaction. The absence of demographic data collection restricts the ability to analyze how factors such as age, gender or design experience may influence color preferences.

Furthermore, it is important to consider potential biases in the same population, which mainly include individuals familiar with digital media through university, forums or personal networks. Participants with a background in design or higher digital literacy may interpret websites aesthetics and usability differently or more harshly than the public audience. Without controlling such background factors, there could be a risk that the results overestimate the intuitive appeal of certain design features. Future studies could seek a more stratified sampling approach to better capture the preferences of both experts in design and non-experts.

4.3.5 Implications

Overall, correct usage of color should consider brand consistency and readability when choosing colors to use. Personalization tools are valued by users even if they do not necessarily employ them to modify preferences. Adding more interactive features and more explicit structuring of content on the website would be an improvement in the future because this would most likely increase user interaction and improve overall experience of the website. Further research could explore how color personalization impacts user engagement and conversion rates within commercial environments such as e-commerce websites.

Additionally, these findings reinforce the growing importance of user-centered design practices, particularly with the growing competition in digital markets. As user expectation for personalization continues to rise, offering adaptive color schemes could become a standard for inclusive design. Implementing features such as an automatic dark mode detection, or options optimized for color-blind users, would not only enhance engagement, but improve accessibility compliance. Considering the emotional and psychological impact of color choices during web development could give businesses a strategic advantage in fostering customer loyalty and brand trust.

5 Conclusion

In conclusion, the dissertation aimed to find out how color theory affects web design with the most important areas of focus being user interaction and visual presentation. From both the user survey and Google Analytics data, it has portrayed how color selection greatly contributes to positive users' opinions and perceptions of websites.

The results stated that while the original red color scheme was generally well received in terms of suitability for the website’s purpose, opinions from people on its overall appeal were more mixed than expected. Although users were given the opportunity to personalize the design using custom color pickers, most people still preferred the default red color scheme. This illustrates that while customization of the website was appreciated, it doesn’t always lead to better user experience in terms of aesthetic satisfaction.

Nonetheless, the ability to choose colors positively influenced the engagement of the website as it was reflected in both the survey results and user interaction data received. Google Analytics indicated consistent user activity and interest across the site, while most survey participants noted

that the personalization feature improved their overall experience of the website and made them feel an emotional connection to the website. These findings reinforce the importance of considering color theory in website design not only for the visual harmony but also for usability and emotional engagement of users.

Overall, the project achieved its objectives by combining practical development with user centered testing and analysis. The research highlights the value of thoughtful color applications and the potential benefits of offering personalization options in enhancing user satisfaction and engagement online. Furthermore, this project demonstrates how color theory, when applied thoughtfully, enhances website design across three vital user experience metrics: aesthetic appeal, emotional engagement and readability. While personalization didn't always shift preferences, it empowered users and maintained high visual standards for the website. These findings portray that color decisions should be made with consideration for how they look, feel and function for diverse audiences.

Ultimately, this project on investigating the role of color theory in website design and its impact on user experience demonstrates how the thoughtful integration of color theory and user-centered design principles can significantly enhance both the aesthetic quality and functional accessibility of digital experiences.

6 Recommendations for future work

Due to the time constraints and the large scope of the project, there are several areas that could be further explored in future work. One alternative approach would be to focus on analyzing existing websites and their color schemes rather than building a custom interactive design. By comparing real world examples across different industries, future research could reveal how color choices impact brand perception and user engagement in real environments.

Additionally, expanding the project beyond a single restaurant website could provide more diverse insights into color theory in web design. With more time, multiple interactive websites could have been created for different sectors such as banking, e-commerce, education or fitness. These all have different types of goals and user expectations. For example, banks usually use calm colors like blue or grey to show trust and professionalism, while fitness websites might use brighter colors like orange or green to give a more energetic feel. Looking at how users interact with color choices across different industries could help spot patterns and give more general design advice.

Another idea for future work could be to test out different color theory styles such as comparing monochromatic schemes to more complementary ones and see how these affect people's emotions and preferences. More advanced testing methods like A/B testing or using larger sample groups could also make the results more reliable and offer clearer data on how color impacts user experience.

Another would be the differences in screen types and the display brightness as this may have affected how users perceived color on the website. For example, some mobile users may have experienced slightly different visual contrasts compared to those on desktop monitors. While the site was designed to be responsive, user interactions may vary between device types, and this could influence engagement with customization. Conducting targeted testing across different device types would help to ensure color choices are accessible and effective in diverse viewing contexts.

Future research could also benefit from integrating biometric user experience testing methods such as heat mapping, facial emotion tracking, or eye movement analysis to complement survey feedback. Such techniques would offer deeper insights into unconscious emotional responses to color schemes, reducing potential bias from self-reported surveys. Furthermore, implementing controlled A/B tests comparing warm versus cool color palettes could help isolate the impact of color temperature on user engagement and satisfaction in different contexts. Expanding the participant pool to include users from different cultural and linguistic backgrounds would also provide richer comparative data, particularly given the strong influence of culture on color perception. Finally, investigating the application of dynamic color adjustment based on real-time environmental factors, such as ambient light or user settings, could represent an innovative future direction in creating fully adaptive and personalized web experiences.

These suggestions could help develop the research further and make it more useful for real life website design. Also, it would give better understanding of how color affects people in different contexts and how designers can use that to create more effective and engaging websites.

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9 Appendices

9.1 Appendix A: Gantt chart

Project Plan **Ellie Pitt** **10-Oct-24**

Task ID	Task Name	Start Date	End Date	Duration (In Weeks)	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32
1	Deciding on a project idea	15/09/2024	29/09/2024	2																																
2	Project Proposal	30/09/2024	14/10/2024	2																																
3	Literature Review	15/10/2024	25/11/2024	6																																
4	Website Development	26/11/2024	29/01/2024	9																																
5	Website Testing	30/01/2025	13/02/2025	2																																
6	Conducting Surveys	14/02/2025	28/02/2025	2																																
7	Data Analysis	01/03/2025	15/03/2025	2																																
8	Writing Dissertation (Draft)	16/03/2025	06/04/2025	3																																
9	Writing Dissertation (Final)	07/04/2025	28/04/2025	3																																
10	Design Poster	29/04/2025	06/05/2025	1																																

9.2 Appendix B: Questionnaire results

20 responses

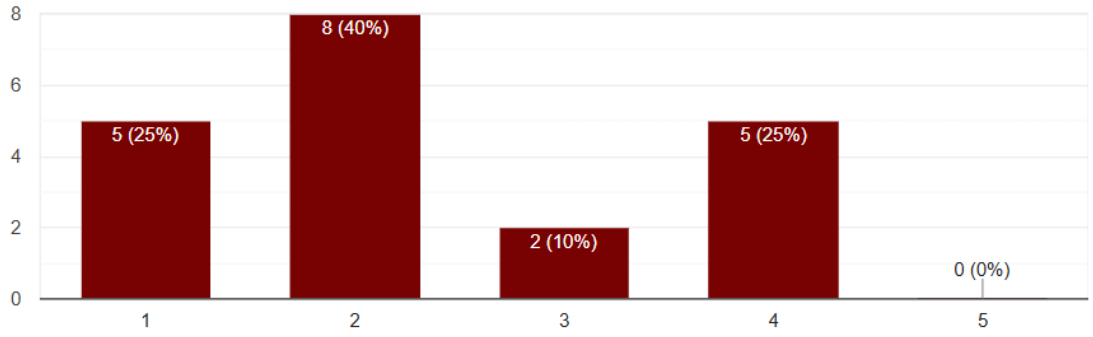
View in Sheets

Summary | Question | Individual

1) How appealing do you find the original red colour scheme?

Copy chart

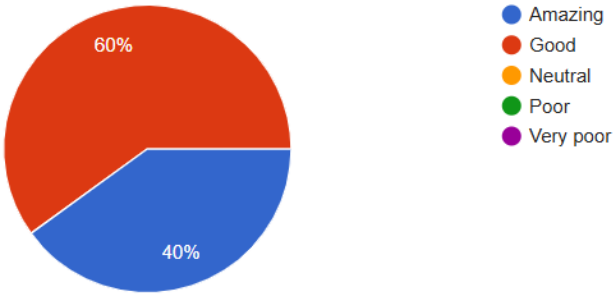
20 responses



2) How would you rate the readability of the text in the original colour scheme?

Copy chart

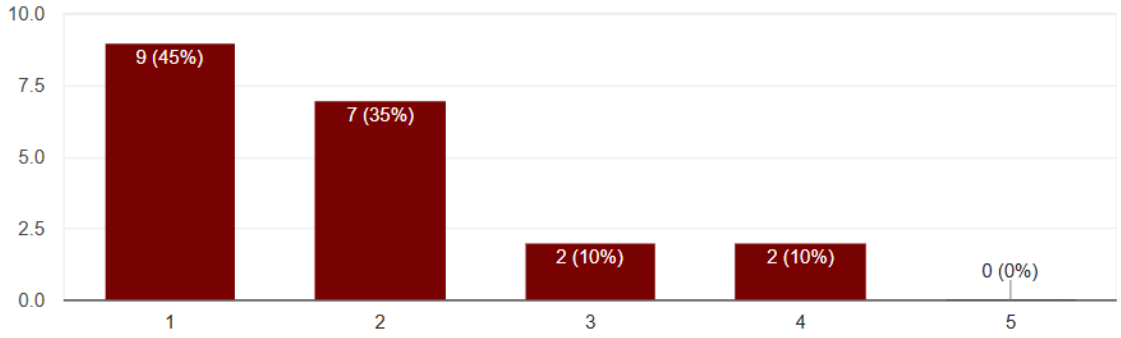
20 responses



3) How appropriate is the original colour scheme for the websites purpose/theme?

Copy chart

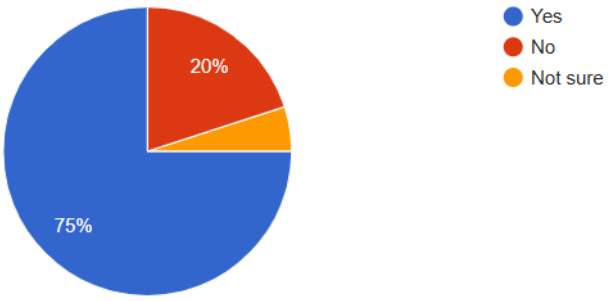
20 responses



4) Are you satisfied with the contrast between the light and dark red elements?

Copy chart

20 responses



Would you have picked a different colour scheme for the websites original colour scheme and if yes why?

20 responses

No

no

No I enjoy it!

Yes, I would have probably picked a lighter background with black text

yes. because it doesn't go well with the other text and images on the page

Would you have picked a different colour scheme for the websites original colour scheme and if yes why?

20 responses

yes. because it doesn't go well with the other text and images on the page

More contrast

No

I would have picked black and grey due to my personal preferences although the varying shades of red work well I would have definitely chosen black for simplicity sake since it's a safe option

I think I wouldve chosen a colour scheme that matches the logo. However, since the logo doesnt have much variation of colour anyway, it works.

I believe the original colour scheme is suitable and appealing for the purpose of the website but a more neutral colour scheme of black or grey could contrast well with the elements on the website. Also the text colour would be more suitable for the red colour scheme if it was black for easier readability, this is the same for blue for example in the colour picker options.

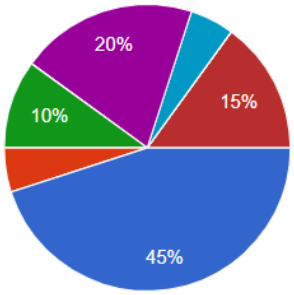
Yes, I would have chosen a brighter shade of red (such as #fc0303) because people feel hungrier when they see bright red or orange.

Primary Theme Colour Picker

Which colour did you pick for the primary theme colour?

Copy chart

20 responses



Red
Orange
Yellow
Green
Blue
Purple
Pink
Brown

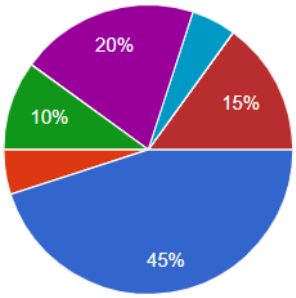
1/2

Primary Theme Colour Picker

Which colour did you pick for the primary theme colour?

Copy chart

20 responses



Black
White
Grey
Other

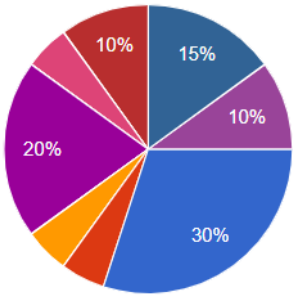
2/2

Secondary Theme Colour Picker

Which colour did you pick for the secondary theme colour?

Copy chart

20 responses



Red
Orange
Yellow
Green
Blue
Purple
Pink
Brown

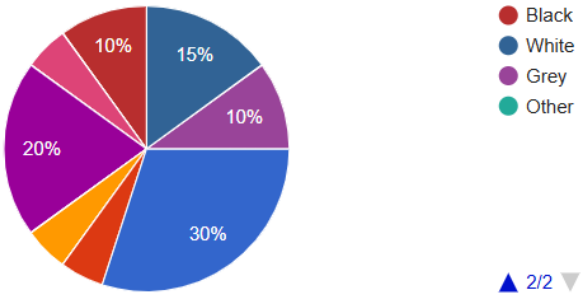
1/2

Secondary Theme Colour Picker

Which colour did you pick for the secondary theme colour?

Copy chart

20 responses

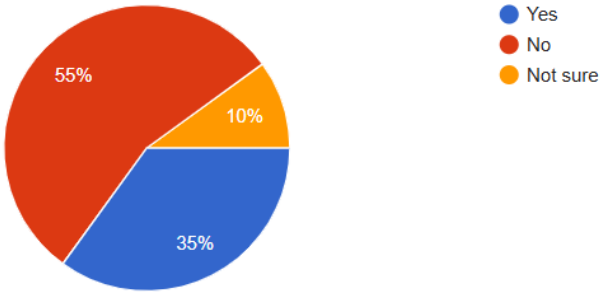


User picks the Colour Scheme

1) Do you prefer your colour choices to the original colour scheme?

Copy chart

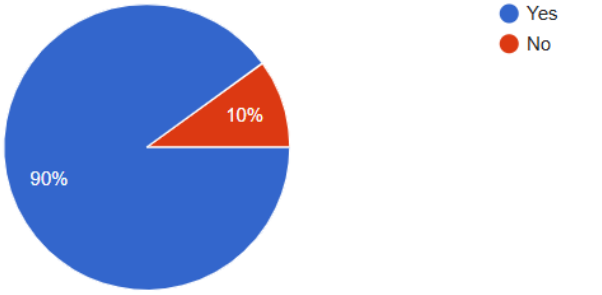
20 responses



2) Are you glad you were able to pick your own colours for the website?

Copy chart

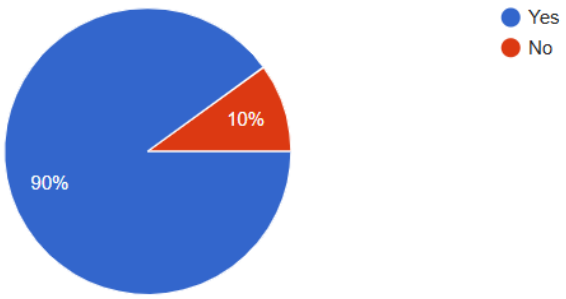
20 responses



3) Did you try more than one colour before making the final selection?

Copy chart

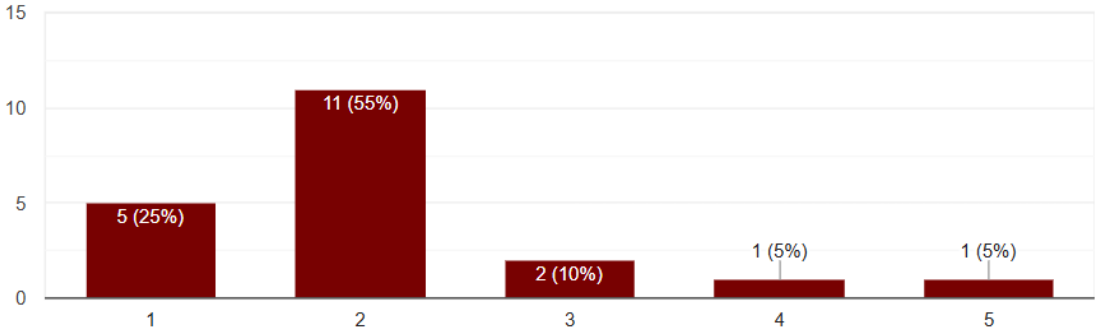
20 responses



4) How appealing is the website after applying your colour choices?

Copy chart

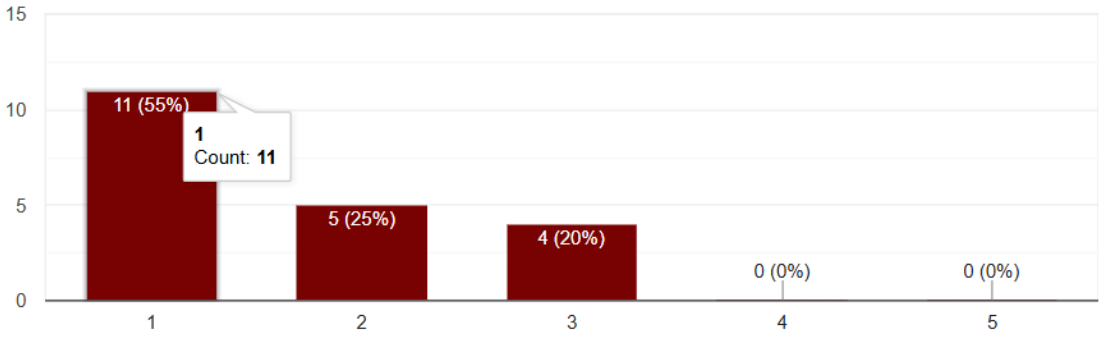
20 responses



5) How does your chosen colour make you feel while browsing?

Copy chart

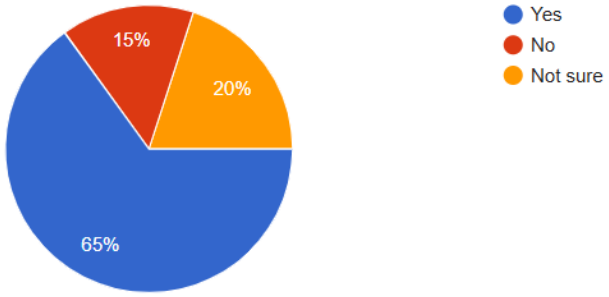
20 responses



6) Does being able to chose your own colours increase your engagement for the website?

Copy chart

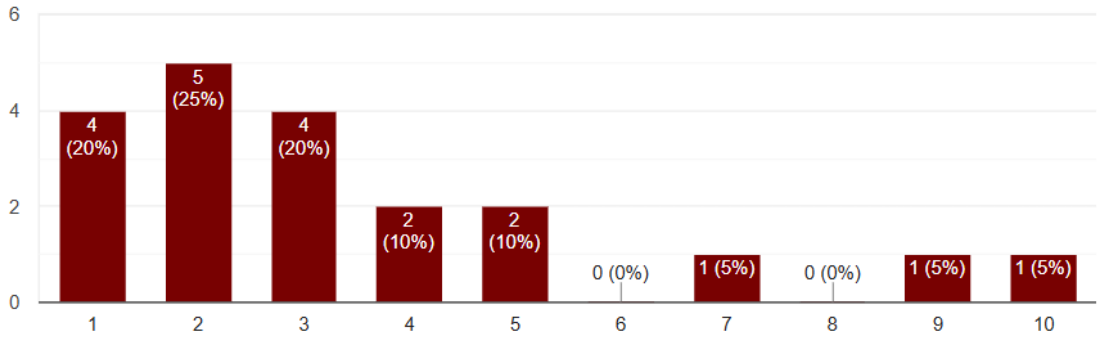
20 responses



7) How likely are you to recommend this website to a friend based on your customization experience?

Copy chart

20 responses



9.3 Appendix C: Links

Website link: Index

Questionnaire link: https://forms.gle/EFmzUrbZ2o7njXVv8