



Applications of Flat Design in Enhancing Website User Experience

Zhihan Lin¹

¹ School of Art and Design, Fuzhou University of International Study and Trade, Fuzhou, 350200, China

Zhihan.Lin@fuist-edu.cn

Abstract. Today's era is the era of the Internet, interface design has long been closely related to our lives. In recent years, the popular materialized design style has gradually been replaced by a flat design style, now flat design has become the mainstream in website interface design, it follows the "less is more" design philosophy, focuses on the information of the site itself, highlights the key information, optimize the previous website interface, inflated, information not highlighted disadvantages, in the interface style gives a person with a concise and rigorous, bright color rich visual effect, giving the user experience pleasure. This paper uses the relative analysis method to briefly explain the development of flat design and discusses the application of flat design in web design in many aspects. The design is people-oriented, focusing on explaining the user experience of flat design in web design and the role of web designers in web production, as well as the advantages and disadvantages. Flat design has obvious advantages in improving user reading and device processing speed. Although flat design has gradually matured and has been widely adopted, there is still a lack of theoretical research on graphic design. This article provides a necessary reference for relevant researchers.

Keywords: Flat design, Dynamic web design; Visual communication design, User experience

1 Introduction

In the digital era, the design of websites and applications is essential to provide a good user experience. With the rapid development of network technology, people use websites more and more frequently, whether at work or in daily life. This trend is particularly prominent in the use of mobile devices because users want to quickly find the information they need on smaller screens, which is in line with their "less is more" design concept. Therefore, web design needs to adapt to screens of different sizes and resolutions, and the flat design style is becoming mainstream with its strong adaptability, simplicity, and clarity.

The flat design style removes unnecessary decoration and effects, and focuses on the display of core content, making the interface more concise and intuitive. This design style is not only suitable for various screen sizes but also helps to improve web browsing speed, reduce system memory consumption, extend device standby time,

© The Author(s) 2024

Y. Wang (ed.), *Proceedings of the 2024 International Conference on Artificial Intelligence and Communication (ICAIC 2024)*, Advances in Intelligent Systems Research 185,

https://doi.org/10.2991/978-94-6463-512-6_2

and improve system response speed. In the Internet era, flat design has become the development trend of web pages and system user interface (UI) design because it highlights key information and optimizes user experience. With the surge in the number of web pages, exploring the role and influence of flat design in web design is an important topic for designers. The advantages of flat design lie in its simple and regular interface style, bright and rich colors, and the ability to give users a pleasant experience, which are the reasons why it has become the mainstream of design. What are the advantages of flat design? With the sharp increase in the number of web pages, the effect and impact of the flat design trend, which is often applied to system UI design in recent years, on web design is a very direct question to explore. This paper employs the relative analysis approach to provide a succinct overview of the evolution of flat design and explore its various applications in web design. This study has significant value in inspiring innovative design by relevant researchers.

2 An Overview of the Key Design Routes and Developments of Flat Design

Since entering the era of information, and with the development of web technologies (HTML5/CSS3, JavaScript, etc.), people have accessed information through a variety of means (such as mobile phones and computers). In contrast, with the richness of people's mental world, people demand more efficiency and fun website interface visual effects to avoid user visual fatigue effects [1].

2.1 The Concept of Flat Design

The concept of flattened design was first introduced by Google in 2008. The core meaning of the flattened design concept is to remove redundant, thick, and complicated decorative effects. The concrete expression removes the excessive insight, texture, graduation, and elements that can make a 3D effect so that the "information" itself can be re-emphasized as the core. At the same time, in the design elements, the emphasis is on abstraction, simplification, and symbolization [2].

The same is true of the flattened web design style. It brings good visual effects and aesthetic experience to the user with a simple layout, comfortable colors, and reasonable text combinations. Compared to other design styles, it can effectively reduce user access time to information, improve user browsing experience, and better meet the requirements of efficient work [1].

2.2 A Brief History of the Development of Flat Design

The earliest software with the flattened style was Microsoft, which launched an audio video player called Zune in September 2006 in the United States, then Microsoft applied this style of design in the interface design of Windows Phone 7 released in October 2010, this design style was named "Metro UI", then was widely applied to the Windows 8, Xbox 360, Microsoft website interface design, and gradually entered

the eyes of ordinary users, while the popularity of the flat design style is after Apple released the operating system iOS 7 in September 2013. Much of the research and commentary on the flattened design style began with Windows 8, culminating with the release of iOS 7, with little authoritative literature due to the late start [3].

3 Integration and Innovation of Flat Design and Web Design

3.1 A Typical Case Study of the Flat Design of Web Pages

CNN's web design is a very good example of flattened web design in addition to what people know about Apple's website.

The appearance of the website prototypes was created to represent real news sites. The headlines, sub-headlines, other text, and images are arranged to be like the arrangement of contents on CNN's news website. Furthermore, the use and placement of clickable links and pointers (for example, view all>) were done in line with Complete Sport's news website. Webpage contents have been organized into three columns in a newspaper format just like it appears in the CNN homepage shown in Figure 1. Headlines come in the largest font, while sub-headlines are smaller-sized text, and other general news articles are in the smallest sizes, usually below images. These prototypes must not be far off from the kinds of news websites available to people, as anything contrary would make the experiment less realistic to test users and make this study not valid with regards to interface designs of news websites [4].

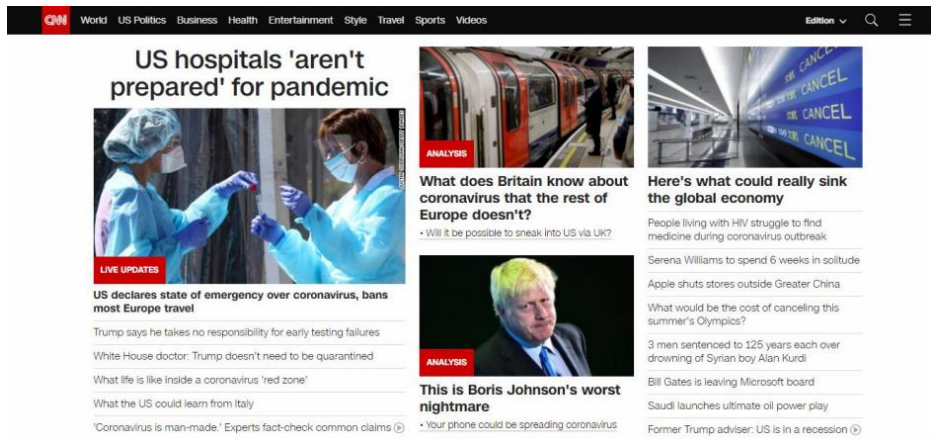


Fig. 1. A screengrab of the homepage of CNN's news website [4].

Before flat design prevailed, people usually used materialized design, so simulated design was often compared with flat design. When designing a simulated website prototype, try to use more real-world descriptions to highlight the characteristics of simulated websites. The design used also includes the shadow of the real product, changing the contrast of the picture when the picture gets the focus, using arrows on the text links of some news articles, and filling the color linearly on the shape. Real-

world descriptions are used in weather images, sports, the latest world news, reader event reports, art, entertainment links, newspaper headlines and submit buttons. The use of visibility is designed to attract more attention from users to notice that these items are clickable, while the description of the real world increases the intuitiveness of the information.

3.2 Flat Design on the Impact of User Experience

In the early stages of people's exposure to the digital product interface, designers need to design interfaces that simulate people familiar with things to reduce user learning costs, so that the designed interface can be adapted to different user groups, reduce the common user's unfamiliarity with digital products, draw the distance between digital products and users; as digital products gradually penetrated people's lives, people have accumulated a considerable experience of use, and generated more advanced demand, and for the elements in the interface design from transition to abstract lay the foundation [3].

A flattened design can also enhance the user experience. Design always serves people, so the user experience is crucial. What kind of experience can be called a good experience? It is that the user finds the product beautiful, convenient, easy to use, but also interesting, creating pleasure in the process of use. Currently, many designs are over-focused on decoration, thus weakening the main information. Designers attract the eye of the user through complex design, although beautiful things are easy to capture the user's eye, good-looking and unusable products are not able to keep the user's eye for a long time, and seriously affect the user's mood. Flat design is a design style that has just emerged in recent years, which is why this style design is sought after by everyone, not only because of the design style novelty, the main reason is that the flat design is in the user's perspective to design consideration. First, from a functional point of view, the flattened design removes the unnecessary decorative effect, and emphasizes the focus information on the site, so that the user has a clear look at what the site wants to express, the user can decide according to their needs to continue to stay on the website, neither interfere with the user nor disturb the user. At the same time, flattening design optimizes the information architecture on the website, reduces the information layer, and flattened design is mostly used for vector graphic design, file size control is proper, and the speed of the website is also improved. Second, from the point of view of visual design, the flattening design emphasizes minimalism, both on the graphical elements and on the layout of the web page, flattening design has been greatly simplified. But in terms of color matching, the flat design compared to the previous website design, more color, brighter and brighter, are in pure color blocks in the eyes of the user, easy to catch the user's eye. This is why it reflects the simple and not simple places of flattened design. Added to the elaborate layout design, the user experience is comfortable to use and feels aesthetic and fashionable, naturally letting the user in the process of experience create a sense of pleasure [1].

3.3 Advantages and Limitations of Applying Flat Design in Web Design

Advantages. (1) Adaptive and low-cost design. A flat design style interface is mostly composed of vector graphics, simple color blocks, and other elements. The interfaces of flat design style can better adapt to a variety of screen sizes and maintain good visual recognition. Because the flat design abandoned unnecessary high light, shadow, texture, and other decorative elements, this reduces the size of the page file, accelerates the speed of page response, and can maintain better visual readability on different sizes of screen [3]. (2) Use different image processing techniques to increase web page traffic. Images play an important role in the communication of information on web pages, but in flattened web design, many images are not suitable to be embedded directly in the web, so sometimes it is necessary to use image processing techniques to make the image more compatible with the visual effects of web pages. Web design requires using all kinds of images, commonly used image types including dynamic graphics, screenshots, and shooting graphics. Adding different types of images in web design, can enhance the viewing of the web page, increase the richness of web content, also enhance the visual effect of web pages [4]. The user can view short videos from the website, the website brings to the user a very strong sense of writing. When browsing the web page, the user can form a strong influence. The image interpretation function of the web page animation can facilitate users to understand the operation of the webpage and increase the user's satisfaction with the webpage [5]. (3) The flattening style is more suitable for the screen size of mobile phones. Simplified interface design can more intuitively highlight important information and close the distance between the user and the content of the web, allowing users to quickly retrieve their desired operating information, and effectively enhance the user's operating experience [6].

Limitations. Flat design is valuable in many scenarios, but there are some problems in some design scenarios.

A study on website flattening designs and traditional designs found that: flat design is inferior to traditional design in several aspects. Text search, where fonts popular in flat design were used, leads to a higher cognitive load than search in texts with traditional fonts, although there was no significant difference in the objective measure – search time. A flat icon search is performed almost twice as slowly as a realistic icon search and is characterized by a higher cognitive load. Analysis and processing of user interface objects on webpages with flat design takes more time than on traditional websites (calculated per screen area) and is accompanied by a significantly higher error rate; the difference in oculomotor activity reflects the specificity of traditional and flat webpage design [7]. Thus, flattened web design is a major design trend, but it should be a more complex and simple design, rather than mixing more modern and diversified designs, making the web interface difficult to read and understand. In future studies, page style harmonization and simplification improvements could be considered to improve the adaptability of flat design.

Flat Design and Responsive Web Design. The flattened style is most evident in web design is the interface design, compared with complex interfaces, simple interface elements can not only reduce the user's reading obstacles but also make it easier for the user to approach the essence of things, thereby enhancing the experience [6].

The use of images and page layouts is also an important part of web flattening design, and designers often use Photoshop to design flattened web pages in addition to simply using CSS to embellish web pages. Photoshop can plan a web page layout with tools such as grid lines, reference lines, and edges. In practical operations, grid lines can be used to plan the main structure of the web page, placing various elements at the grid line intersection, making the layout of web page elements smoother and more orderly. At the same time, reference lines can be used to adjust the location and size of various elements of the site, ensuring the beauty and comfort of the web page [8]. Designers can consider using technologies such as CSS Sprites to further optimize page loading speed. Combine several small icons, small images, etc. into a larger image, and then use the background image positioning method in CSS style to quote the images in them, which can significantly reduce the number of HTTP requests, thereby increasing the page loading speed. In summary, to avoid image files generated by Photoshop resulting in long loading times of web pages, it is necessary to properly compress the size of the image file during the design process and use technologies such as CSS Sprites to further optimize the page loading speed to improve the user experience [8].

3.4 Future Trends of Flat Design in Web Design

Use Pictures to Flatten the Web. The application of ultra-large images is one of the trends in web design. Use photos as the background of the website, so that the website page can form a strong visual effect, the application of large images is also an embodiment of concise design, and clear image content can make the website appeal clearer. [9] Images not only enable people from different countries to understand what is expressed in the same image but also reduce the difficulties that people with reading disabilities encounter when browsing the web. In other words, users are not literate, they are also able to interpret the meaning of the image in their way [9].

Trends in the Application of Computer Image Technology in Web Design. In the process of web design, web pages, and user interaction, always insert a variety of image compression and image enhancement algorithms [9]. Artificial intelligence-assisted design is the trend of web design future development. Many image processing technologies play an important role. However, the role of designers in web design cannot be ignored due to the development of technology [10].

4 Conclusion

Starting from a brief description of the history of flat design, the paper elaborates on the application and development of flat design for web design in many aspects and

intuitively explores its advantages and disadvantages. It also provides some feasible directions for the future flat design of web pages. The web design style in the new era continues to develop and change with various social and humanistic factors. The flat design style is in line with the current people's life and business needs and is well satisfied with contemporary society. The quality of web design directly affects the user's experience. The style should be adjusted according to the user's experience to meet the user's experience needs. In the fast-paced state of work and life, people prefer to extract more useful information in a limited time, so the overly complex page style makes users feel tired and reduces the user experience. At present, flat web design not only improves efficiency and convenience when users browse the web but this eye-catching but concise design style is deeply loved by everyone. Designers also need to constantly update their concepts, integrate, and innovate new designs, and pursue more expressions. In terms of research, graphic design, particularly web design and graphic design, is mostly based on practice. In the future, the theoretical achievements should be combined with practical applications to produce more innovative designs.

References

1. Chen, Y.: Flat-scale design for a pleasant website user experience. MSc. Thesis, Shanghai, China, Shanghai Normal University (2017).
2. Gan, X., Huang, M., and Zhang, W.: Flattening artistic creative style to innovate in web design. *Literary and Art Weekly*. 2023(15), 83-86 (2023).
3. Chen G.: Flattening artistic creative style to innovate in web design. MSc. Thesis, Xi'an, China, Xi'an Polytechnic University (2016).
4. Okoye, J. N.: Universal design & usability investigation into the flat design and skeuomorphic interfaces: A case study of a news website. MSc. Thesis, Oslo, Norway, OsloMet (2020).
5. Xu, Q.: Analysis of application of computer image processing techniques in web design. *Computer Knowledge and Technology*. 18(21), 82-83 (2022).
6. Sun, N.: Discussion of the application of flat style to web interface design. *Wireless Internet Technology*. 18(16), 72-73 (2021).
7. Burmistrov, I., Zlokazova, T., Izmalkova, A., Leonova, A.: A. Flat design vs traditional design: Comparative experimental study. In *Human-Computer Interaction–INTERACT 2015: 15th IFIP TC 13 International Conference*, pp. 106-114, Springer International Publishing, Bamberg, Germany (2015).
8. Qin, Y.: Analysis of Photoshop's Application Skills in Web Design. *Electronic Technique*. 52(05), 288-289 (2023).
9. Lin, H., Tan, H., Zhao, J.: Application of Picture Superiority Effect in Web Page Design. *Packaging Engineering*. 35(18), 13-16+24 (2014).
10. Xiong, H.: Application of Computer Image Processing Technology in Web Design. *China Computer & Communication*. 35 (01), 41-43 (2023).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

