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Research on Mobile Learning Platform Interface Design Basedonvisual Attention Features of College Students

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Abstract: Eye-tracking technology was applied to investigate the visual experience characteristics and the factors influencing college students' visual attention in the mobile learning platform interface. It also aimed to summarize the visual experience patterns and design insights for platform interface development. Methods: Using head-mounted eye-tracking technology, 28 images from 6 categories of typical interface elements of the CGTN learning platform were selected as test samples. The subjects' eye movement data were recorded as they browsed the interface. Results: Significant differences were observed in attention time, frequency of attention, visual attention rate, and recall rate across different regions and subjects (P < 0.05). Conclusion: The analysis of factors influencing visual attention in platform interface design revealed that color, text, and typography significantly impact visual experience, while secondary areas and layout also contribute substantially to visual communication. The design of color and text elements, alongside innovative typography, can effectively boost the visual attention of college students and improve the platform's ability to communicate information.

Key words: The design of the interface, visual interaction, and mobile learning platforms.

1 INTROCDUTION

UI design plays a crucial role in recognition and guidance in the digital age. As the Internet continues to evolve, interface design has expanded beyond basic recognition and aesthetic concerns, now emphasizing user-friendliness and functionality. From a cognitive perspective, an interface consists of both physical and holistic features. Physical features pertain to the visible attributes of interface elements, such as icons, which include aspects like background, lines, size, shape, and color [1].

The overall features of an interface encompass its imageability, complexity, familiarity, and semantic distance. During the visual search process on device interfaces, the attributes of interface elements influence both user attraction and search efficiency, which in turn impact the overall user experience. Eye tracking technology, known for its precision and scientific reliability in measuring visual attention, has emerged as a vital tool for analyzing attention, tracking individual visual processing, and is increasingly relevant in interface research that attracts social interest. This technology allows for the analysis of eye movement indicators, such as fixation duration and the frequency of fixations in specific areas within a given timeframe[2]. Consequently, it plays a critical role in addressing the visual attention challenges faced by college students during interface interaction. As such, the design of an interface should account for both its physical attributes and its overall features. Visual attention is a complex cognitive process, with varying attention demands depending on the task, and the influencing factors can differ. Guided by visual attention theory, this study focuses on the visual cognition of college students in interface design, examining the impact of UI elements on visual attention. By conducting eye movement experiments, the paper investigates how different fixation-stage variables affect relevant metrics, and, in conjunction with visual search's cognitive mechanisms, reveals how UI design elements influence college students' visual attention. This research ultimately aims to enhance the intelligent user experience and ease of use, offering valuable insights for the design and development of mobile learning platform interfaces[3].

2 USER-CENTERED ANALYSIS OF UI DESIGN ELEMENTS

The interface design should prioritize the user, employing terminology and language that aligns with their understanding instead of the designer’s. It is essential to take into account the user's expectations for how information is presented and combined, particularly when designing for learning experiences that integrate specific software requirements.

When designing the interface for a specific application scenario, thorough research should be conducted to fully understand the fundamental characteristics of the platform. The interface design must take into account how it integrates with the application environment, ensuring it aligns with the context. It should incorporate design elements such as professional icons, relevant colors, and layout choices that represent the application's specific needs.

Timely information feedback is essential during user interaction with software. It's important to provide real-time updates, warnings, tips, and other necessary information. For instance, when the software is handling a large volume of data tasks, immediate results may not be available. During this waiting period, the system should display prompts like "Please wait while processing" or show a progress bar to inform the user. If no feedback is provided, the interface may seem unresponsive [4-5]. Additionally, when performing irreversible operations on data, the software must notify the user with a clear warning such as "irreversible operation" to encourage proper data backup.

Art aesthetics: The harmony of colors plays a significant role in software interfaces, often having a greater influence than graphics or text. For a better user experience, the primary color of the interface should align with the context it serves. For instance, using green tones in designs for environmental protection can convey the concept of sustainability. Similarly, for police-related software, blue and white might be the dominant color choices. If the selected color scheme is mismatched with the application's context, it may appear out of place and be harder for users to recognize [6-8]. Moreover, selecting an appropriate number of colors and ensuring their coordination is essential in interface design. Typically, the use of no more than three color families is recommended, as excessive colors can overwhelm the interface. When multiple elements such as text, tables, and icons are displayed together, careful attention must be paid to color harmony to prevent a cluttered appearance.

Aesthetic design. The software interface must follow the principle of visual appeal, as its appearance significantly influences the user's mood and shapes their first impression of the software. For instance, the landing page, being the first screen users encounter upon logging in, plays a crucial role. It should be thoughtfully designed to captivate the user's attention from the very start.

Logical layout. The arrangement of elements within the software interface should be done thoughtfully. For example, when considering the typical operation window, the size and positioning of elements such as the search bar, toolbar, status bar, and layer list need to be carefully planned [9]. Since the software is designed to serve the user, the window size must be balanced–not too small to hinder reading and usability, nor too large to interfere with navigation and interaction within the interface. A well-organized layout not only enhances the visual appeal but also reflects the principles of aesthetic design.

Consistency principle. Unified style. Consistency in design is evident not only in the uniformity of each window's appearance but also in the coherence of the design elements. For instance, in software, the toolbar typically includes common tools like search, layering, marking, clearing, and printing. When designing the tool buttons, a consistent style should be applied–whether it's a uniform icon style, a consistent flat design, a unified 3D style, or a harmonious personified style. Mixing different styles within the same software is discouraged [10]. Adhering to a single, cohesive style enhances the interface's overall beauty and sophistication, significantly raising its artistic quality.

Consistent interface structure. Software typically offers a variety of functions that, although similar in operation, are implemented using different spatial analysis algorithms. While each function may be implemented differently, efforts should be made to identify common elements and ensure that all functions share a similar interface layout. This consistency is reflected not only in the operational steps but also in the design of the interface for the operation window. A consistent interface structure allows users to predict how the software will behave, facilitating quicker mastery. Once a user becomes familiar with one function, they can apply the same interface structure [11] to efficiently learn and operate other functions.

Efficiency principle. Streamlined interface design. Simplicity is reflected in users' preference for straightforward, rule-based graphics. Additionally, simple designs make the user's interaction more intuitive and systematic. As a result, the principle of simplicity should guide the entire software interface design process. The interface shown to users should be direct and clear, minimizing unnecessary distractions and preventing errors during user interaction.

User-friendly interaction. The design of the software interface should focus on simplifying user operations, as a well-organized interface enhances the overall efficiency of the software [12]. When a menu can handle multiple tasks, it should not be split into several steps. For example, related operations within the same window should not require separate menu actions, and related menu items should be placed in close proximity to each other, avoiding unnecessary distance between them.

Accurate information delivery. The content shown on the interface, whether text or graphics, must align precisely with the corresponding function to ensure clarity and prevent confusion. Users are not expected to comprehend the underlying logic of the code, so designers must focus on presenting the interface from the user's interaction standpoint. This means that designers should consistently prioritize the user's actions when conceptualizing how the interface should be displayed.

3 METHOD

3.1 VISUAL ATTENTION SPAN

Attention is a key aspect of cognitive psychology, referring to the focused mental effort often accompanied by prolonged eye movements. Attention tasks generally involve both bottom-up and top-down processing. Top-down processing involves the selection, integration, and construction of information and representations, guided by prior experiences, expectations, and motivations during the perceptual process, such as when performing a visual search task [13]. On the other hand, bottom-up processing, also known as stimulus-driven attention, is characterized by immediate attention shifts triggered by external stimuli. In visual attention, focused mental activity can sometimes be driven by the need for stimulation (top-down processing). For example, when searching for a target icon within a group of interfaces, people tend to focus on features such as color, shape, or size associated with the target. At other times, particular features of a stimulus stand out because captivating stimuli attract attention (bottom-up processing). For instance, among a set of interfaces, those with a distinct shape are more likely to grab attention. In visual search tasks, targets that are visually appealing often receive more attention. Studies have shown that people's gaze is drawn to specific elements in images, and different types of images can result in varying gaze durations, cognitive engagement, and visual learning outcomes.

3.2 VISUAL COMPLEXITY

Visual complexity is typically understood as the amount of detail or intricacy present in an image. In interface research, this concept is often described in terms of the number of basic shapes and components, such as lines and figures, that constitute an interface. Feature integration theory posits that simpler icons are more comprehensible than their more complex counterparts. For instance, Dundon et al. demonstrated through an experiment that airplane icons are simpler and more efficient than human figures, as they better capture user attention and enhance cognitive efficiency. However, in visual search tasks, the perceived simplicity of familiar icons does not necessarily result in higher search efficiency for simple icons [14-18]. Furthermore, eye movement experiments explore how college students' visual attention and comfort are influenced by design elements, employing eye-tracking devices to examine the full process of "skip (sweep) − gaze − fixate" to uncover users' visual attention and emotional comfort preferences, as well as design evaluation criteria. This research also involves the assessment of UI web page designs. It further investigates implicit metrics related to UI design elements to capture subconscious user behavior. Given the study's diverse goals and subjects, implicit measurement evaluations encompass methods like eye-tracking, EEG testing, and functional MRI. In this study, eye-tracking was chosen due to its simplicity, ease of use, and its capacity to present intuitive data, allowing for the capture of users' unconscious actions when interacting with interface elements and providing insights into visual experience patterns and comfort levels. The study first selected a representative and authoritative English-language official website as the test sample, conducting eye-tracking experiments using specialized equipment. Following this, various visual experience factors such as webpage color, layout, fonts, and text colors were assessed in groups. The final component included a supplementary interview, focusing on a mobile learning platform interface to explore college students' visual attention, subjective feelings, and comfort. This approach facilitated the integration of visual attention and comfort associated with different webpage design elements.

4 EXPERIMENT

The Tobii TX300 eye tracker was utilized to monitor and record human eye movement patterns, providing valuable data on the focus of attention as an objective measure. The device is connected to the computer display, with its settings–including program, color temperature, brightness, and contrast–carefully calibrated to ensure consistency. The subject is positioned in front of the screen, with the viewing distance controlled between 60 and 80 cm. Various metrics, such as the viewpoint path, line chart, interest zone sequence, gaze chart, and hot zone map, were processed and analyzed using specialized software. These indicators allow us to identify the location and timing of the subject' s initial gaze when examining web design elements. Additionally, through eye movement metrics like fixation duration and frequency within specific areas, we can gain insights into the user' s interest in the interface and the reasons behind this behavior.

Through investigation and observation, the websites of CGTN, a leading and authoritative platform in the industry, are chosen as sample sites. These websites are categorized into various modules based on distinct design elements, such as titles, layout, fonts, font sizes, font colors, interface colors, links, and more.

Initially, the sitting posture and eye condition of the subjects were assessed. Subsequently, the sample images were analyzed in conjunction with an eye movement test. Participants were instructed to observe images of specific web design elements, guided by text prompts on the interface, following their usual viewing habits. They were then asked to press the space bar to proceed with browsing until the task was completed.

By integrating eye movement experimental data with interview responses, various visual analytics such as the eye movement hotspot map, path map, gaze map, and other relevant data were derived. These were used to gain insights into the subjects' visual interests, assess the characteristics of their visual experience, and evaluate the comfort level of the interface design elements. Additionally, practical discussions on the application of these designs were proposed. Throughout the experiment, testers continuously monitored the participants' eye movement data and made adjustments for any detected anomalies. Key metrics, including the number of gaze points, average gaze duration, gaze rate, initial gaze time, and gaze return rate for each experimental sample, were recorded. The data were then compared, analyzed, and interpreted to assess how the quality of interface design influences the visual experience of college students.

4.1 EXPERIMENTAL RESULTS AND ANALYSIS

As shown in Figure 1, the size of the circles in the path diagram indicates the frequency and duration of the subject's gaze on specific points. The warmer the color, the longer the gaze duration in that area, reflecting the subject's increased interest and highlighting key areas of the interface [10]. By analyzing fixation points, average fixation durations, and eye response rates, we observed several trends. The font style was predominantly Times New Roman, as seen in sample 1; the most frequently observed color on the mobile learning platform's interface was blue, present in sample No. 5; the title was mostly found in the large font of sample No. 1; the layout closely followed the arrangement of the flag plate in sample No. 1; the links were primarily concentrated on example link 1, which lacked underscores; and the background color was mainly green, as seen in sample No. 4.

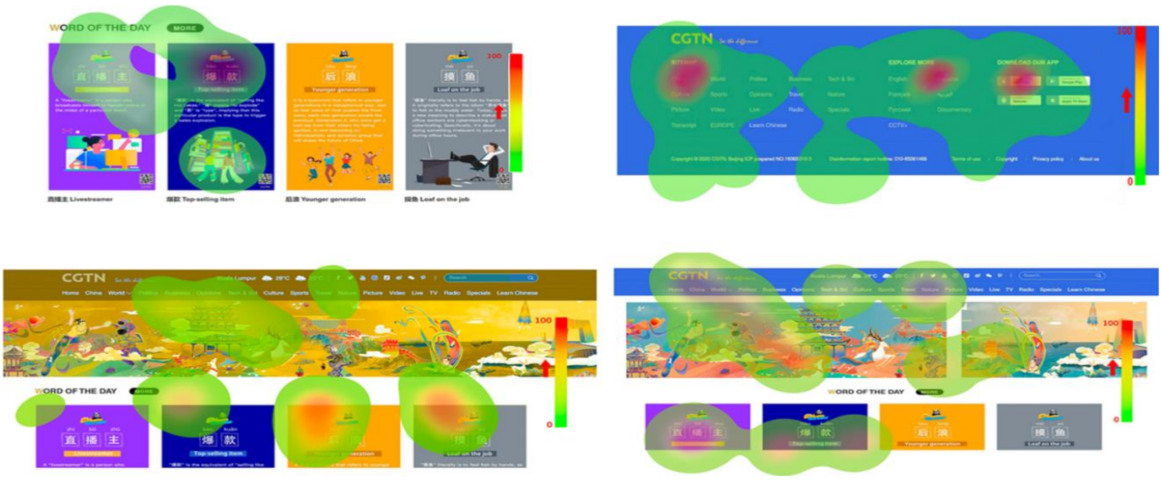

Fig 1. Thermal zone map of eye movement experiment.

Table 1 provides a detailed description of each reference index used in the eye movement experiment, along with explanations and evaluations of the experimental data. Table 2 presents the analysis of the experimental data, comparing the experimental materials with the eye movement indices.

Table 1. Reference indicators and evaluation criteria.

Reference Indicators	Evaluation Criteria
Number of focus points	The higher the number of attention points, the more information the sample can provide to the subjects
Average gaze duration	The higher the gaze duration, the richer the intention shaped by the sample in the subject's mind
Sighting rate	The ratio of the number of people observing this sample to the total number of people in the subgroup experiment
Knightliness Rewind Rate	The higher the look-back rate, the greater the subject's interest in that sample

Table 2 Eye movement experiment data.

Group	Sample No.	Number of attention points (total)	Average gaze duration/ms	Sight gaze rate/%	Sighting back rate %
Fonts	1	22.56	5004.78	100	0.78
	2	12.44	2283.22	100	1.21
	3	13	3168.89	100	0.65
	4	20	4319	100	0.79
	5	16.22	3818.78	100	0.99
	6	9.44	2243.889	100	0.62
Font color	1	11.67	2308.67	100	1.20
	2	8.22	2146.44	100	0.74
	3	8.22	2033.67	100	0.96
	4	11.33	2778.67	100	0.57
	5	13	3292.11	100	0.71
Title word	1	2.44	488.3704	100	0.73
	2	1.93	346.7037	100	0.59
	3	1.3	231.6296	100	0.51
Layout	1	17.78	4183.875	100	0.46
	2	8.44	2065.778	100	0.79
	3	8.89	2161.667	100	0.59
	4	7.22	1863.889	100	0.50
	5	9.78	2310.667	100	0.56
Link	1	17.78	4183.875	100	0.79
	2	8.44	2065.778	100	0.79
	3	8.89	2161.667	100	0.56
	4	7.22	1863.889	100	0.50
	5	9.78	2310.667	100	0.53
Page color	1	9.56	2121.556	100	1.25
	2	8.78	1975.889	100	0.53
	3	9.67	2094	100	0.63
	4	14.3	3189.889	100	0.76

Table 3 presents the results of a correlation analysis conducted to explore the relationship between the experimental materials and the subjects' average gaze duration, recall rate of the line of sight, and average gaze area. The Pearson correlation coefficient was employed to assess the strength of these associations. The correlation coefficient between the experimental materials and the average gaze duration was found to be 0.942, with a significance level of 0.01, suggesting a strong and statistically significant relationship between the two variables.

Table 3. Pearson correlation analysis.

	Average gaze time/ms	Sighting back rate %	Average gaze area
Pearson Correlation	.942	.876	.640
Significance (two-tailed)	.000	.000	.000

** Significant correlation at the 0.01 level (two-tailed).

A statistical analysis of the total number of gazes revealed significant differences in the main effect across the different regions of interest, as indicated by the repeated measurement ANOVA, $F(4,116) = 4.423$ (Table 4), $p<0.01$. Post-hoc tests further showed that the number of gazes in the font size region was notably greater than that in the linked region (p<0.05). No significant differences were observed among the other regions of interest (all p>0.05).

Table 4. Analysis of variance table for total number of gaze.

Source of effect	Methods	Square and	Degree of freedom	Mean Square	F	Significance
AOI	Assuming sphericity	6727.492	4	1681.873	4.423	0.002
	Greenhouse Geisler	6727.492	2.792	2409.902	4.423	0.007
	Sin-Fedt	6727.492	3.119	2156.83	4.423	0.005
	Lower limit	6727.492	1	6727.492	4.423	0.044
Error (AOI)	Hypothetical sphericity	44106.36	116	380.227		
	Greenhouse-Geisler	44106.36	80.957	544.816		
	Sin-Fedt	44106.36	90.456	487.603		
	Lower limit	44106.36	29	1520.909		

Regarding the average fixation time, the repeated measurement ANOVA revealed no significant difference in the main effect across the regions of interest, F(4,116) = 0.964 (Table 5), p>0.05. As a result, no post-hoc comparisons were conducted for the regions of interest.

Table 5. Mean gaze duration ANOVA table.

Source of effect	Methods	Square and	Degree of freedom	Mean Square	F	Significance
AOI	Assuming sphericity	2.79E-05	4	6.96E-06	0.964	0.43
	Greenhouse Geisler	2.79E-05	3.158	8.82E-06	0.964	0.417
	Sin-Fedt	2.79E-05	3.589	7.76E-06	0.964	0.424
	Lower limit	2.79E-05	1	2.79E-05	0.964	0.334
Error (AOI)	Hypothetical sphericity	0.001	116	7.23E-06		
	Greenhouse-Geisler	0.001	91.58	9.15E-06		
	Sin-Fedt	0.001	104.071	8.06E-06		
	Lower limit	0.001	29	2.89E-05		

Regarding the mean pupil diameter, the results from the repeated measurement ANOVA indicated a significant main effect of differences among the regions of interest, F(4,116) = 10.779 (Table 6), p<0.001. Post-hoc analyses revealed that the average pupil diameter in the title region was significantly larger compared to the font region (p<0.05). Additionally, the pupil diameter in the typesetting region was notably larger than in both the font (p<0.001) and link regions (p<0.001). Furthermore, the average pupil diameter in the link region was significantly greater than that in the font region (p<0.01). No significant differences were observed between the remaining regions of interest (all p>0.05).

Table 6. Mean pupil diameter ANOVA table.

Source of effect	Methods	Square and	Degree of freedom	Mean Square	F	Significance
AOI	Assuming sphericity	0.216	4	0.054	10.779	0.000
	Greenhouse Geisler	0.216	3.086	0.07	10.779	0.000
	Sin-Fedt	0.216	3.495	0.062	10.779	0.000
	Lower limit	0.216	1	0.216	10.779	0.003
Error (AOI)	Hypothetical sphericity	0.582	116	0.005		
	Greenhouse-Geisler	0.582	89.486	0.006		
	Sin-Fedt	0.582	101.356	0.006		
	Lower limit	0.582	29	0.02		

4.2 ANALYSIS OF EXPERIMENTAL RESULTS OF TOPIC WORD SAMPLES

In the title sample experiment, the title font was set to a standard black, with black as the font color, and the title size was varied to investigate which size most effectively captured the visual attention of the subjects. From the path diagram, it is evident that the highest value of attention is observed in sample group 1. The heatmap indicates that participants' focus tends to radiate outward from the visual center along the central axis, expanding both to the sides and surrounding areas, with the majority of attention concentrated on the large text title region. In sample 2, the visual center initially focuses on the central large text, drawing the subjects' attention to the enlarged title before they expand their gaze to observe the surrounding words and patterns. The large header was designed with a font size of 70 points, spacing set to 15, and bold formatting. This prominent title plays a crucial role in emphasizing and enhancing the overall platform interface, making the information clear, easy to read, and well-structured, which facilitates quicker access to key information for users [19]. An ill-suited title size may confuse the interface and negatively impact the reading experience. Overall, large titles in the interface of online learning platforms are effective in capturing the visual attention of users.

4.3 ANALYSIS OF INTERFACE LAYOUT SAMPLE EXPERIMENT RESULTS

The interface layout experiment primarily focuses on two types: the home page layout and the link layout. The layout designs include Banner, POP, column, and corner arrangements. In the experiment, sample 1 attracted the most attention (19.4), while sample 2 showed the highest return rate. The visual heatmap indicates that sample 1's banner layout drew the most visual focus. When participants observed sample 1, their gaze was concentrated on the upper section of the title area and the lower part of the subbar, both positioned centrally on the page. This layout's strength lies in its ability to create a more organized and prioritized interface structure, resulting in a clean, stable, and visually appealing design. The overall page becomes more striking while emphasizing the core elements, with a layout that is adaptable to different platform sizes and interface constraints.

For the link layout, various elements like color, font, and text alignment were analyzed, categorized into four styles: dotted underline, no underline, line underline with an arrow, and line underline, to determine user preference [20]. In this part of the experiment, participants showed the highest attention toward sample 1, which did not use underlining, and both sample 1 and sample 2 had higher return rates. Sample 1, which is simpler and more refined in terms of color, layout, and typography, offers a more comfortable visual experience. The use of non-underlined links provides a cleaner look, minimizing distractions from unnecessary elements, thus making it easier for users to search and read, ultimately improving the efficiency and speed of accessing information. Overall, banner layouts and ununderlined link designs proved to be the most visually engaging for users.

5 DISCUSSION

In the eye movement experiment, the subjects' reactions to sample 5 revealed that in the font color group, brighter colors and more noticeable page hues, along with elements featuring higher color saturation or contrast, played a key role in capturing users' visual focus. This suggests that the use of color in interface design can positively influence the rate of visual attention. Color, layout, and typography are widely regarded as the three most fundamental design elements in interface creation.

Among various design elements, color plays a crucial role in transmitting visual information and serves as a fundamental aspect of design language. Based on the findings from eye movement experiments, designers can effectively integrate color, user memory, associations, and interface design. This process allows for the transformation of the abstract emotional qualities of color━such as brightness, purity, and chroma━into a psychological language that conveys human emotions, thereby creating a distinct visual experience and platform identity. Additionally, the priority of visual attention observed in the experiment suggests that samples that attract more attention typically have a higher visual priority. Designers can focus on a deeper exploration of the brand image and background of the platform, utilizing these insights to guide color selection and application. This approach aligns with users' attention patterns and interests, effectively communicating the platform's identity and its attributes. Generally, the primary color scheme for the interface should reflect colors commonly encountered in daily life, adjusting their saturation and contrast as needed. The platform should emphasize and enhance its unique features and visual identity, promoting a style that is comfortable, eco-friendly, healthy, and natural.

Designers can select a base color that aligns with the platform's image, complemented by gentle and approachable secondary colors and accents. When combined with the layout and typography of the interface, these elements help emphasize the platform's distinct design philosophy. For instance, an interface aiming to convey a luxurious image may incorporate Moronic’s color palette, while a platform targeting younger audiences might adopt trendy seasonal colors for decoration. The careful selection of colors plays a key role in enhancing the visual appeal and capturing users' attention.

From the experiment’s fixation diagram, it is evident that in the four groups of font and title samples, 9 samples predominantly focus on the text area. This suggests that the participants direct considerable attention to the text, indicating that this area is crucial for the experiment. The design of textual content in interface design plays a significant role in extending users' engagement time [21-24]. Based on the experimental findings from the text area, it can be inferred that to capture user attention more effectively, clear and well-chosen typography should be utilized in the text area. This improves visual coherence and relevance, aiding users in quickly comprehending the interface. Well-executed text design and typography also help in swiftly conveying a brand’s identity and message.

Currently, most interfaces incorporate graphic combinations, which can generally be classified into two types: complementary graphics, where the text emphasizes the platform's theme and draws users' attention, and integrated graphics, where the text and graphics together create the main structure of the interface. These two elements work together to enhance the overall visual experience [25]. Regardless of the graphic-text combination, text is a fundamental element that often demands careful consideration from designers. By innovating with text, designers can restructure the platform’s information, filtering it in a way that provides users with more direct and efficient access to key content.

Using artistic fonts and creative background designs also introduces varied visual experiences for users, forming a unique and effective visual language in their minds that conveys the platform’s characteristics and identity. For example, incorporating bright and saturated colors into the text can generate a high contrast interface for a mobile learning platform, capturing users' attention while emphasizing the platform’s textual content. In mobile learning platform interface design, designers should focus on color harmony, limit excessive ornamental elements, and delve deeper into research that enhances the platform's identity and the content’s significance. Text content should be used to strengthen users' understanding and memory of the platform.

6 CONCLUSION

User interface design serves as the crucial connection through which platforms convey their value and display their functions, while also acting as the key interface between users and the platform. Based on an eye movement analysis, this paper outlines the principles and characteristics for enhancing visual experience design and visual attention optimization in mobile learning platforms. The discussion focuses on five elements: color, text, typography, layout, and secondary areas. This empirical study offers an objective foundation for selecting and refining interface design solutions, contributing to the development of a mobile learning platform that prioritizes visual attention. It also aims to improve the platform's interface design evaluation system, providing more precise guidance for advancing evaluation theory in interface design.

However, due to certain limitations, this study has several shortcomings. These include the absence of dynamic prototype testing and the inability to fully assess interaction rationality and usability based solely on the data from the design prototype experiment. Additionally, the data analysis algorithm used in the study is relatively basic. Moving forward, more advanced algorithms will be explored, such as the Gazelle optimization algorithm—a nature-inspired meta-heuristic optimizer; the Dwarf Mongoose optimization algorithm, which is used for feature selection in text document clustering; and the Groundhog optimization algorithm, which applies hybrid particle swarm techniques based on genetic operators for unsupervised text feature selection and text clustering.

Moreover, given the varying browsing habits of the participants, some subjects spent more time browsing, but this had minimal impact on the subsequent experiments. Further research will be necessary to address these issues.

As time progresses, mobile learning platforms have become a crucial means for individuals to access information via the Internet. By enhancing users' visual focus, interface design can evoke a stronger emotional connection, fulfill psychological demands, serve as a symbol for social interaction, and establish a distinctive platform layout, all while generating significant cultural and economic value.

COMPETING INTERESTS

The authors of this paper affirm that they have no conflicts of interest.

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