Research on User Experience Based on Competition Websites

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Abstract. The design of the website interface has an impact on the user experience in all aspects. A set of relatively perfect interactive interface is often in line with the needs, cognition and behavior of the target user to form a good experience. In order for users to have a good experience, subjective evaluation and usability evaluation methods are usually used to test and tune after the interface is designed. This analysis method has its limitations. For example, it cannot reveal the thinking process and psychological activities of the user and the interface in the interaction process for the designer, and provide the tester with the time and space information of the user's search and processing process. This paper adopts more cutting-edge research methods. First, we analyze the usability of three websites of the same type and different structure, such as evaluating the effectiveness by task completion rate and error rate, and evaluating efficiency by operating time and operating path. Secondly, conduct eye movement experiments on users, further assist and re-verify the usability evaluation method, and analyze its dynamic interaction characteristics, and conduct a comprehensive user experience research on competition websites from qualitative and quantitative perspectives.

1. research background and meaning
The user-centered and people-oriented approach is getting more and more attention, and the user experience is therefore called the essence of the innovation 2.0 model. In the exploration of China's knowledge-oriented society's innovation 2.0-application innovation park model, user experience is even more regarded as the top of the "three experience" innovation mechanism.

1.1. The concept of user experience
User Experience (UE/UX) is a purely subjective feeling established by users in the process of using a product [1]. But for a well-defined user group, the commonality of its user experience is that it can be recognized through well-designed experiments [2]. The development of computer technology and the Internet is changing the form of technological innovation.

The ISO 9241-210 standard defines user experience as "people's cognitive impression and response to a product, system or service that is used or expected to be used". In layman's terms, it is "whether this thing is good or not, it is inconvenient to use" [3]. Therefore, the user experience is subjective, and it pays attention to the effect produced during actual application.

The supplementary explanation defined by ISO has the following explanation: user experience, that is, all the user experience before, during and after using a product or system, including emotions, beliefs, preferences, cognitive impressions, physical and psychological reactions, behaviors and achievements. And so on. The description also lists three factors that affect the user experience: system, user, and use environment.
1.2. Human-computer interaction design

Human-Computer Interaction (Human-Computer Interactin, HCI for short): Refers to the process of information exchange between humans and computers in a certain interactive manner using a certain dialogue language between humans and computers. Many well-known companies and academic institutions are studying human-computer interaction. In the history of computer development, people paid little attention to the ease of use of computers [4]. Nowadays, many computer users complain that computer manufacturers have not invested enough energy in how to make their products "user-friendly". And conversely, these computer system developers are also complaining, their reason is: designing and manufacturing computers is a very complicated task, just studying how to apply computers in new areas has already taken up most of their energy. There is really no extra energy to study how to improve the usability of computers.

An important problem of human-computer interaction (HCI) is that different computer users have different styles of use-their education, background, understanding, learning methods, and skills are different, for example, a left-handed person and an ordinary person. The habit of using is completely different. In addition, cultural and ethnic factors must be considered [5]. Secondly, the research and design of human-computer interaction need to consider that user interface technology changes rapidly, and the new interaction technology provided may not be suitable for previous research. Also, when users gradually master the new interface, they may put forward new requirements [6].

1.3. The significance of this question

User experience research on competition websites can improve the user experience of such websites. Under the premise of ensuring their integrity, the aesthetics, guidance, and efficiency of each module are strengthened, and users can comfortably reach their goals. The purpose of usage. This combines knowledge in many fields such as psychology and motor behavior, and is one of the popular research directions of many scholars in the Internet era.

This topic will combine user research, eye tracking and interface usability testing and many other design research methods to conduct interface design research on the official website of the National College Student Innovation Experience Competition. The research results will effectively analyze the effectiveness of the interface feedback, the efficiency of the guidance information, and the logic of the information architecture, and design and develop it, which greatly improves its usability and gives users of competition websites a good visual experience and operation experience.

2. Usability research of various competition websites

There are a lot of competition websites on the market now. This paper selects three representative websites with different structures but the same type as shown in the figure below to conduct a comparative analysis and research on the direction of structure layout [7].

2.1. Market analysis of websites with various layout structures

These 3 websites are all from China, and they are commonly used by Chinese college students. They are Competition Net, Cykrypton and College Student Competition Network. They correspond to three different interface structures, namely Grid pattern, List layout and Side expansion type. The number of daily active users comes from the data of the ASO 100 website, which shows that Competition Net has the largest number of users, and Cykrypton has a small number of users. (Figure 1)

| Interface structure       | Typical Case                  | Daily active number |
|--------------------------|-------------------------------|---------------------|
| Grid pattern             | Competition Net              | 20827               |
| List layout              | Cykrypton                     | 8921                |
| Side expansion type      | College Student Competition Network | 17042             |

Figure 1. 3 websites from China which commonly used by Chinese college students.
2.2. **Questionnaire analysis**
The three websites selected in this article have been verified by the market and have research standards. Therefore, this article adopts a questionnaire survey analysis method to conduct a qualitative analysis of these three websites to truly understand users' experience and demand expectations. The questionnaire is edited on the questionnaire star platform and distributed online, and is distributed to college students. The age distribution of the subjects ranged from 18 to 22, where n=10, and the ratio of male to female was 50%: 50%. The test subjects have used PC-side websites for 8-12 years, and the proportion of users who have used competition websites in the past year is 87%. A total of 171 questionnaires were collected for the paper, and the recovery rate was 100%. Among them, 127 were valid questionnaires, and the Cronbach’s Alpha of the questionnaire was measured to be 0.812, which has good reliability. In terms of validity, the KMO value of the questionnaire is 0.611, indicating that its validity is guaranteed. The questionnaire is mainly analyzed from several dimensions such as user expectations, core functions and user satisfaction. According to the statistics of the final questionnaire: (1) The highest proportion of users using competition websites is to register for competition and check the progress of the competition, and the usage rate is high. The second is to query contest information, such as previous awards and entry standards. (2) The user's pursuit of the simplicity of the website interface, reasonable layout and operational efficiency is the highest, followed by element design and legibility.

2.3. **Usability analysis based on task method**
According to the results of the questionnaire survey and the selected test objects, the article sequentially analyzes the usability of the website with 3 different interface structures from the dimensions of completion, fault tolerance, efficiency and user satisfaction of the 5 tasks that meet the relevant expectations of users. The task settings are as follows: (1) Open the website to find the registration entrance, and activate the personal account after entering. (2) Find Competition A, click and browse the entry requirements, registration method and competition process. (3) Find the outstanding works or award-winning works in the past and browse them. (4) Look for competition-related courses or trainings and browse them. (5) Find competition A, register and check the information to confirm that the registration is successful. The test uses a Likert five-level scale, where 1 point represents "strongly disagree", 2 points represent "disagree", 3 points represent "general", 4 points represent "agree", and 5 points represent "very agree". [8] The result is shown in the figure below. (Figure 2)

| Website                        | Average completion time (seconds) | Average number of errors | Effectiveness average (subjective) | Efficiency average (subjective) | Interface aesthetics |
|-------------------------------|----------------------------------|--------------------------|-------------------------------------|---------------------------------|----------------------|
| Competition Net               | 41.92                            | 2.41                     | 4.10                                | 3.27                            | 3.22                 |
| Cykrypton                     | 71.88                            | 6.91                     | 3.27                                | 5.74                            | 3.76                 |
| College Student Competition Network | 52.29                            | 3.62                     | 3.97                                | 3.92                            | 4.10                 |

*Figure 2. usability of the website with 3 different interface structures*

2.4. **Usability analysis based on eye tracking technology**
Visual search mainly uses a series of gazes, saccades and following movement characteristics of the eyes, and acquires and processes external information through the induction of external stimuli. Secondly, a series of characteristics of eye movement are affected by external information stimuli,
such as the color, size, shape and height of the transaction [9]. In the research of interface design, eye movement analysis can be mainly used to study the visual characteristics of page size, layout and information presentation. These characteristics not only affect the saccade of the eyes, but also affect the degree of the saccade of the eyes. In this paper, by excluding objects with a naked eye vision of 1.0 or higher and no eye diseases from a group of users who meet the above requirements, a group of subjects are strictly screened for experimentation. As shown in the figure below, the web interface layout types involved in the experiment are: grid layout, list layout, and side expansion layout. (Figure 3)

The article selected several main variables for experimentation, mainly fixation duration, fixation points and saccades. Among them (1) The longer the gaze duration, the more difficult it is for users to extract or understand information. (2) The more gaze points, the lower the search efficiency, and the lower the rationality of the layout. (3) The greater the number of saccades and the greater the amplitude of saccades, the greater the amount of user searches, that is, the greater the cognitive load caused. The tasks of the experiment are extracted from the first 3 tasks above, and the results are shown in the figure below. (Figure 4)

| Website                        | Eye Movement Index | Mean   |
|--------------------------------|--------------------|--------|
| Competition Net                | Fixation duration  | 475662.320 |
|                                | Fixation points    | 612.518  |
|                                | Saccades           | 9.92    |
| Cykrypton                      | Fixation duration  | 823814.720 |
|                                | Fixation points    | 1112.518 |
|                                | Saccades           | 17.94   |
| College Student Competition Network | Fixation duration | 879262.480 |
|                                | Fixation points    | 982.137  |
|                                | Saccades           | 14.26    |

(Figure 4, experimental variables and results)

From the experimental results, it can be seen that there is a significant difference in eye tracking index data between the competition websites with side-expanding layout and the other two types of websites. The gaze duration and the number of saccades are significantly lower than the other two, which shows that the average correct rate is also the highest, which well shows that the user search efficiency is relatively high. Combined with the above analysis of usability based on the task method, the grid-type interface layout website is higher than the side expansion type and the list layout type in terms of usage efficiency and interactive effects.

3. Research summary
This research reflects the value of usability testing at the cognitive and behavioral level of user experience. Various indicators based on usability can more accurately reflect the cognitive behavior and satisfaction of users[10]. Through a series of qualitative analysis of competition websites, the main conclusions drawn from the quantitative analysis are as follows: (1) When users conduct visual search, websites with grid-shaped interface layout are higher in use efficiency and interactive effects than side-expanded and list-based websites. (2) The user satisfaction of websites with a list layout interface layout is slightly lower than that of the grid type and side expansion type. At the same time, the researcher believes that a competition website with a good user experience needs to have the following points: (1) Clear interface levels. For complex information, a clearer interface level should be used to control the display of information, reduce or lighten the cognitive load of users, and improve the interaction effect. (2) The interface layout conforms to user habits. For the complicated side-expanding layout interface, users often have clear goals when using competition websites, and they hope to find target information and verify ideas faster.

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