User Experience Design Strategies of University Library Websites

Zhinan Qin
Yangjiang Campus Library, Guangdong Ocean University, Yangjiang, Guangdong, China

Abstract: With the rapid upgrades of the information technology, it is a development trend for university libraries to provide online services through websites and other terminals. Although university libraries have already begun the transformation of online services, due to the widespread use of common design templates, the structure of library websites in different universities is similar, with complicated and inefficient information architecture, resulting in the bad user experience. University libraries are rich in collection resources and have a wide range of service objects. In the design, priority should be given to protecting and utilizing collection resources and meeting the diverse needs of users. This paper proposed to improve the service quality of university library websites from the perspective of user experience, applying the relevant theories and methods of service design and user experience design. Through analysis and design means including user personas, scenario analysis, information architecture, interaction design, visual communication design, user evaluation and design iteration, the user experience of university library websites will be improved from the two dimensions of usability and emotional value.

Keywords: University Library Websites; Online Services; Service Design; User Experience Design; Design Strategies

1. Introduction

University libraries are open to teachers, students, researchers and the public. It undertakes many functions such as paper materials borrowing, electronic resource inquiry and downloading, literature collection and citation inquiry, holding knowledge lectures, providing reading and discussion space, sci-tech novelty retrieval, intellectual property service, achievement display and so on. It is one of the most important internal activity spaces in colleges and universities, and also an important window for serving the society and image display. As the center of university information resources, university libraries have unparalleled resource advantages and service potential in supporting teaching and research, promoting the integration of industry and education, serving local economic and cultural construction, protecting intangible cultural heritage and so on [1-4].

2. University Library Online Services

Colleges and universities have invested a lot of money for libraries and operated massive information resources. The number of service objects in university libraries is large and the service needs are diverse. If the library staff alone provides services on site, it will inevitably lead to problems such as low resource utilization and heavy workload. Therefore, the onlineization of library services is an inevitable choice. It provides personalized services through websites, apps, service accounts, mini programs and other terminals, breaking through the physical limitations of time and space, so that users can initiate, modify or withdraw service applications at any time and place according to their own needs. Most of these services can get instant response online, such as electronic resource inquiry and downloading, literature collection and citation inquiry, appointment of seminar room, notification and announcement access and so on. When users need high-tech and time-consuming services such as sci-tech novelty retrieval and intellectual property service, they can submit service requirements through online platforms and library staff provide services in order. The system displays the process in real time in a visual form, so that users can have a clear understanding of the service process and have a reasonable expectation of time consumption, which helps to improve user satisfaction. With the in-depth development of the digital era, libraries can use big data and artificial

intelligence technology to establish and continuously optimize a service model centered on users' personalized needs [5].

The online services of libraries have been widely used in colleges and universities. The library websites are the basic platforms to realize online services, supplemented by apps, service accounts, mini-programs and other terminals to improve the service process. The existing university library websites are usually based on the general templates provided by suppliers, combined with library functions and collection resources to finish detailed design. However, systematic design from the user perspective is insufficient. As a result, the library websites of different universities have similar structure and redundant information architecture, with too many functions or information tiled on the home page. There is no clear and convenient visual guidance for common services. The lack of library science expertise may lead to difficulties to quickly locate functions or information entrances, as if lost in the virtual space of the library, resulting in poor user experience.

From the perspective of improving the user experience, the following will discuss the strategies of optimizing the design of library websites to improve its usability and emotional value. When it comes to improving the user experience of university library websites, we can consider from two aspects. One is to sort out the pain points of university library service design, and the other is to master the basic theories and common methods of user experience design.

3. University Library Service Design

In 1984, G. Lynn Shostack proposed the concept of Service Design from the perspective of management and marketing, and advocated the use of service blueprints as one the most important tools to realize system process management and improve service efficiency [6]. In addition to the mature application in the commercial field, service design also has a wide range of application scenarios in the library field, which can be applied to the service improvement and transformation of university libraries. Gao Honghe et al. reviewed and measured the CSSCI journal literature related to service design from 1999 to 2022, and in the analysis of keywords and research hotspots, service design and library appeared simultaneously as keywords for the first time in 2008, and service design appeared together with user experience in 2017 [7]. The design of university library service should base on the university educational goals and discipline settings, consider the social, economic and cultural development needs of the region, and provide support for teaching, research, social service and cultural heritage. The main tools of service design include service blueprints, standardized process of service design, user personas and so on. The service blueprint refers to a detailed description of the service process, contact points, users, related service providers and the interaction between physical and invisible system elements in the form of flow charts [8]. The service objects of university libraries include undergraduates, postgraduates, teachers, researchers, library managers, off-campus personnel and so on. When conducting service design, we should fully investigate the use needs of different service objects, formulate practical service specifications and use codes, so as to improve the service efficiency. Within a reasonable range of management workload, libraries should meet the individual needs of different service objects as much as possible, and maximize the utilization efficiency and service scope of the collection resources.

As the information center of universities and even regions, university libraries coexist with digital resources and paper resources. The university library websites are not only the internet mapping but also the enhancement of the physical libraries. The relationship of library websites and physical libraries are complementary to each other. Digital resources and paper resources have different characteristics. Digital resources can be obtained remotely and are not exclusive in use. The platform needs to ensure the equality and sharing of digital resources in access. The number of paper resources is limited, and it is generally not available to others after being occupied. Therefore, the inventory of paper resources needs to be updated in real time. After repeated use, paper resources need to be maintained or replaced due to damage or lost. Above characteristics are the important

differences between digital resources and paper resources. The service design of university libraries should fully consider the commonalities and differences between digital and paper resources, not only make good use of library resources to improve their utilization and accessibility, but also protect these valuable resources through reasonable rules.

4. User Experience Design

ISO defines the user experience as the user's perceptions and responses that result from the use and/or anticipated use of a system, product or service, including the users' emotions, beliefs, preferences, perceptions, comfort, behaviors, and accomplishments that occur before, during and after use. This article will use usability and emotional value as the elements of university library user experience design [9]. Usability and emotional value can be further subdivided into specific indicators. Usability can be subdivided into functionality, ease of use, reliability and other indicators, relatively paying more attention to efficiency attributes. On the basis of usability, emotional value focuses on the subjective feelings of the users. It requires not only to help users to complete tasks efficiently and accurately, but also to provide users with positive emotional value. It is important to make users feel respected, cared for, comfortable and relaxed, achieve goals by enjoying services, and generate a sense of accomplishment and self-identity. Only in this way, users will be willing to reuse the current websites in the future, and have the intention to try more related services.

Many times, the designers of websites are not the actual users, and need to use certain means to clarify the specific needs of the users. User persona and scenario analysis are common methods to determine user needs in the process of user experience design. User experience design and service design have many common points at the method level. For example, user persona is also a common tool for service design, and scenario analysis is similar to the core role of service blueprints.

User persona refers to a group of basic descriptions of typical target users, including age, gender, occupation, education background, economic status, psychological status and so on, in a qualitative or quantitative manner, to support subsequent user scenario analysis and design decisions [10]. A design task generally deals with multiple user personas and their website use behaviors are different. Therefore, it is necessary to classify and create the user personas for each group of typical target users, to lay solid foundation for the scenario analysis. Common means used to collect user information include interviews, questionnaires, on-site observations, investigation reports, backstage data and so on.

Scenario analysis takes user personas as the basis and simulates the physical environment, goals, psychological expectations, emotions, behaviors, investment, immediate feelings, post-reflection and continuous use intention of users when using the websites. Scenarios can be further subdivided into environmental scenarios, task scenarios and equipment scenarios. Environmental scenarios refer to the physical environment, cultural norms, conduct codes, and ongoing activities around when users visit the websites. Task scenarios refer to the purpose of the users' visit to the websites, the action taken, the level of attention, the emotional stability and so on. Equipment scenarios refer to the electronic devices used to visit the websites, including their performance, physical size and network status.

User personas and scenario analysis are mainly used to analyze and mine user needs. The specific work of user experience design can be carried out from three aspects: information architecture, interaction design and visual communication design [11].

5. Design of University Library Websites

From the perspective of university library service design, supporting websites need to solve two key problems, one is to protect and make good use of library resources, and the other is to meet the diversified needs of users. From the perspective of user experience design, protecting and making good use of library resources is one of the core demands of library managers. In this way, we can further simplify the design strategies: first find out all kinds of typical target users of the university library websites, obtain specific usage requirements through user personas and scenario analysis, then use information architecture, interaction design and visual communication design to meet these needs from both usability and emotional value, and finally establish a scientific and feasible evaluation system to

support the continuous optimization of the websites, as shown in Figure 1.

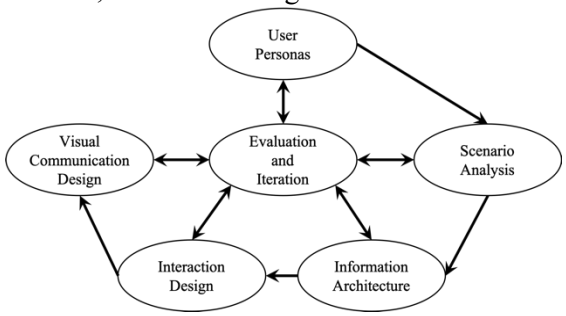

Figure 1. The Design Strategies

5.1 User Persona

The user persona is to figure out who the users are and what we need to know from them.

The target users of university library websites can be roughly divided into two categories: on-campus users and off-campus users. On-campus users mainly include undergraduates, postgraduates, teachers, researchers, library managers. The feature extraction of on-campus users is very convenient, because their age, specialty, education background, occupation and living habits are relatively stable. The situation of off-campus users is relatively more complicated, depending on the opening up and cooperation degree of university libraries. For example, some universities establish library alliances and share some collection resources. Some universities have opened the services of sci-tech novelty retrieval, intellectual property service, paper collection and citation inquiry to the public. In these cases, the characteristics of target users are more diversified.

Constructing user personas requires not only a list of various feature attributes, but also the classification of attributes to serve the specific design work. For example, the information of age, profession, frequency and period of electronic equipment usage from the user personas can reveal users' acceptance to the complexity of information architecture to a certain extent. Understanding the electronic devices commonly used by target users is of great help to interaction design, because dealing with familiar interaction modes will lead to high information search efficiency and easy operational experience. Tool websites and softwares commonly used by target users, like searching engines, learning platforms and office softwares, have reference significance for both interaction design and visual communication design.

5.2 Scenario Analysis

Scenario analysis is to figure out why users use the websites and how to use them.

The more accurate the user personas are, the higher the fitting degree of the scenario analysis to the reality. Scenario analysis can use forward derivation and reverse analysis. The forward derivation refers to starting from the user personas, combining with the work and study arrangement of each semester, screening the user activities that intersect with the library, analyzing the time period and frequency of users seeking library services, distinguishing which activities are continuous and which are triggered by specific conditions, figuring out the surrounding environment, purpose, expectation, behaviors, strategies, emotion, energy, urgency and other factors behind the activities, and prioritizing various activities from the user's point of view. These analyses have a fundamental impact on the information architecture of library websites.

The analysis path of forward derivation is purpose-behavior-result, while reverse analysis is result-behavior-purpose. At present, colleges and universities have a wide range of channels to accept various complaints and suggestions, and libraries also receive many suggestions for improving services. Designers need to analyze the problems, appeals and emotions contained in the complaints and suggestions, and explore the real reasons. Sometimes the complaints and suggestions point to Service A, but in fact the problems may be caused by Service B, or caused by multiple factors. Therefore, it is of great reference value for improving the user experience of university library websites to deeply explore the service conflict points hidden behind the complaints and suggestions.

5.3 Information Architecture

The information architecture is to figure out what information users want to see and how to present them clearly and understandably.

The university library website is like a virtual library. The information architecture is the classification and presentation logic of various resources and functions, which is equivalent to the space design and identification system of the physical library. A concise and clear information architecture helps users efficiently understand and operate the website, which is a prerequisite for a good user experience.

Different users may have different priority requirements for resources and functions, but it is not recommended to design multiple information architectures. Based on the unified information architecture, personalized service of different user groups can be realized through authority management. Information architecture design needs to find a variety of balance points, such as the balance of interests of different user groups, the balance of flat structure and multi-level structure, the balance of displaying common functions and hiding low-frequency functions.

User persona and scenario analysis are to prepare for the design work, which belongs to the demand research stage. Entering the design stage, the information architecture is the first and most important step. After determining the information architecture, the interaction design, the frontend and backend development begin to cooperate. Once the information architecture is changed in the later stage, the workload of the frontend and backend development will be very large. During the information architecture construction, designers needs to deeply match the design of website services with the user cognition, which needs a large amount of user research and testing to ensure the integrity, functionality, ease of use, fault tolerance, and reliability of the information architecture.

5.4 Interaction Design

Interaction design is to figure out how users complete the expected task on the websites.

The main work is to design a series of page operations to help users complete the expected tasks. Interaction design often encounters two situations: the first is the website service has a corresponding offline scene, for example, book inquiry and seminar room reservation; the second is the website service is the only way for the library to provide. For the first case, because there is already the preconceived experience of the offline service, and for the continuity of online and offline experience, the design of online service should be logically and linguistically close to the offline scenes. In the second case, taking the electronic literature service as an example, its interaction design can refer to some similar services of offline scenes, so that users can create associations with existing experience when using current service, and quickly understand the relevant expressions and operations to ensure good user experience.

Different operating systems such as Windows, MacOS, HarmonyOS and ChromeOS follow different specifications in interaction design, which means that users may have developed a relatively fixed habit of interacting with screens. Studying and appropriately applying these interaction specifications to university library website design will help users quickly establish operational confidence and avoid the embarrassing situation of not knowing how to start the operation. Furthermore, as public service platforms, university library websites have the responsibility to provide barrier-free services for the visually impaired groups and elderly groups in the form of auditory-assist, color, font, typesetting and others.

5.5 Visual Communication Design

Visual communication design is to figure out how to make users feel relaxed and delightful using visual elements.

The university library website is an important external display window for the universities. Visual communication design can use elements such as the university emblem, university characteristics, landmark buildings, campus location and other symbols to create a university cultural brand, increasing the sense of identity and belonging of on-campus users, and expanding the social influence.

The impact of visual communication design on operational efficiency is not as critical as information architecture and interaction design, but it is also worthy of further discussion. Visual communication design needs to take both aesthetics and efficiency into account. The logo, layout, color and graphic design of the website are subjective to a certain extent and have a high degree of freedom in emotional expression. However, the university library website is essentially an instrumental platform for the comprehensive utilization of information. The primary goal of visual communication design should be to help users quickly understand the website architecture, locate the target functions, and reduce the cognitive burden, rather than purely express aesthetic viewpoints. The elements and styles of the visual communication design of the university library website should be consistent with the physical library, so that users feel familiar and comfortable in the process of use.

5.6 Evaluation and Iteration

Evaluation and iteration are to figure out how users view the websites and what kind of improvement they want.

So far, after doing some user research, we have done a series of design work based on the analysis results. In fact, we cannot fully know the user's ideas, so we need to conduct user testing and collect user evaluations in a timely manner, as a reference to evaluate and correct our analysis and design work.

In the evaluation of user experience, this paper used the dimension of usability and emotional value. Usability is a comprehensive concept, which can be subdivided according to different research objects. For example, for university library websites, usability can be evaluated from dimensions such as task success, time-consuming, understandability, predictability, fault tolerance and others. Positive emotional value should be based on the premise of task success, but it does not mean that the task success must produce related positive emotions. Sometimes users achieve the expected goals, but the process is not pleasant and encounter various difficulties, which may have a negative impact on the user willingness to continue to use. Emotional value can be evaluated from dimensions such as respect, care, relaxation, freedom, inspiration, self-identity and others.

The evaluation and iteration can not only be applied in the website design stage, but also be recommended after the website is officially launched, so as to optimize the website service and improve the user experience continuously.

6. Summary

This paper proposed to improve the website service quality of university libraries from the perspective of user experience, using relevant theories and methods of service design and user experience design, through analysis and design means including user personas, scenario analysis, information architecture, interaction design, visual communication design, user evaluation and design iteration, in order to enhance the usability and emotional value.

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