

# Research review of China's barrier-free education website for visual impaired people

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## Abstract

network education has become a vital education model with the coming of information age, however, visual impaired people will encounter many obstacles when visit the education websites. To realize the educational equality, many researchers design and do R&D on websites on account of the characteristics of vision barrier people. By sorting out and analyzing the existing literature in China, this paper points out the deficiencies of the existing research in terms of researchers, research content, depth and quantity, and puts forward some Suggestions for future research.

## Keywords

Visual impaired, barrier-free education, education website.

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## 1. Introduction

Visual impairment group has always occupied a large proportion in China's disabled people. By the end of 2010, China's disabled population was about 85.02 million, among which 12.63 million were visually impaired<sup>[1]</sup>. Visually impaired people have a strong desire for knowledge. However, due to their own particularity, they receive information mainly through auditory and tactile channels, which limits their access to knowledge, and learning resources for them are relatively few. Safeguarding the rights of disabled people to enjoy education resources equally with the general population is conducive to realizing the fairness of education. So how to provide barrier-free education services and learning resources suitable for visually impaired people to the greatest extent? Nowadays, this is also a problem concerned by researchers in relevant fields.

People with disabilities should have equal rights to share knowledge with ordinary people. In today's information age, in addition to paper resources, most people also obtain information through the Internet, which is not only convenient, but also enables them to grasp the latest information as soon as possible. Network education has also become a new teaching method, and has become a new trend of education development for various countries. Similarly, the network can also be a good auxiliary tool for visual impaired education. So to speak, the emergence of the Internet provides a new way of education for the visually impaired. However, design of ordinary education website cannot meet the needs of visually impaired people. In order to ensure that visually impaired people can equally participate in network education, researchers carried out relevant research on barrier-free network education. This study tease the research on barrier-free education website for visually impaired people in China in recent years, and hope to point out the direction for further research in the future by sorting out and analyzing the existing research.

## 2. Functions and effects of barrier-free education website

The educational website for visually impaired people is a special barrier-free education website. On the one hand, it follows the design standards and specifications of barrier-free website; on the other hand, it considers the particularity of visually impaired people. The page is relatively more concise

and has functions such as Text-to-Speech technology. Scholars discussed the role and significance of barrier-free education website for visually impaired people from multiple perspectives <sup>[2][3]</sup>:

Firstly, it can help overcome the time and space barriers for visually impaired students to participate in teaching. As long as the network conditions are met, visually impaired people can study on the barrier-free education website regardless of time and place, which overcomes the mobility difficulties caused by vision.

Secondly, it can make up the deficiency of teachers. There is a shortage of visually impaired education teachers in scenes at all stages. The appearance of barrier-free education website can alleviate this condition to some extent. Students learn and train through the education website, which can not only make up for the shortage of teachers, but also save education resources.

Thirdly, it can make up for the deficiency of learning resources for visually impaired people. The production cost of braille books is high, the number of publications is small, and the types are not rich. Visually impaired students often cannot access to the same books and materials as ordinary students. Barrier-free education website can collect books into a resource system and classify them to different education websites for the convenience of different students. This not only saves the cost of braille books, but also meets the learning needs of visually impaired students to a greater extent.

Fourth, it can enhance the communication between the visually impaired and others. Visually impaired people tend to be immersed in negative emotions and generally do not interact with others. The appearance of barrier-free education website provides an opportunity for them to discuss and communicate with others. Over time, it is also beneficial to their physical and mental health.

Fifth, it can help to cultivate the ability of the visually impaired to learn independently. Through the the website, the visually impaired can arrange their own learning plans and courses according to their own needs and learning styles. Taking themselves as the main part, they reduce their dependence on teachers and enhance their ability in individual study.

### **3. Problems exist in barrier-free education network.**

Visually impaired people are the most directly benefited group from the establishment of barrier-free education website. In the environment of network education, they can get the most preferential treatment. However, during the design process, people often ignore the feelings of the visually impaired and fail to think and design from the perspective of the visually impaired, thus failing to provide them with effective help to the greatest extent. The barrier-free network education facing China still has the following problems <sup>[4]</sup>:

First, pictures lack the explanatory text. In view of visual appeal and concision, the design of education web often intersperses some pictures. The visually impaired people usually get web content through the screen reader, but the picture information is hard to get. Many images lack alternative text, making it impossible for readers to access. Thus the visually impaired cannot accurately and effectively browse or grasp all the information in the web page. At this time, all the pictures make no sense for them.

Second, low keyboard usage. Through investigation, the researchers found that most of the websites need mouse operation, and the usage of keyboard is low, which is certainly unrealistic for the visually impaired. They cannot accurately click with mouse to browse the web page, and in most cases, they need to skip the page through keyboard operation.

Third, alternative content for other non-text elements. The OBJECT element is often used to embed multimedia content in Web pages, and an issue that most designers ignore providing long text descriptions. For the visually impaired, this is similar to the effect of ignoring the alternative text for they couldn't understand the corresponding multimedia content without the text description.

Form controls are not properly organized. Most designers tend to overlook the proper organization of form controls when organize the pages. When browsing a website, the visually impaired have to face a composite form composed of multiple controls. It is likely that the unclear organizational

relationship will make the screen reader unable to read the text properly and judge the exact meaning of the control in focus, which may lead to many errors.

Fifth, the page of frames in using is unreasonable. During the website construction, wide using of framework structure and the unreasonable operation in designing and using is easy to make read obstacles for the visually impaired group. For example, if designers don't provide straightforward title of text framework in the frame structure, the visually impaired groups have to show the characteristics of the "linear" once again when deal with the frame page because they need browse the page by the screen reader to identify and read the content. However, it is impossible for the visually impaired to see the text content of multiple frames on the page in parallel at the same time and quickly determine which frame should be read or operated at first.

#### **4. The design and development of the education website accessibility.**

The research on barrier-free Internet started late in China. At first, the research only focused on the values, countermeasures and evaluation of web accessibility. With the deepening of the research, more and more researchers began to pay attention to the practical design and development methods of web accessibility, especially in education.

Sun Zhen-xiang proposed the design model and flow of the barrier-free web education and part of the barrier-free design method of development elements.<sup>[5]</sup> Zhang Jian-nian discussed the design concept, principle and model of education website from the perspective of accessibility, and gave specific design methods from two aspects of media access and information comprehension on education and teaching.<sup>[6]</sup> on the basis of in-depth research, Zhang Jial-ian et al. Introduced and analyzed the IMS Access for All specification developed by IMS, and put forward to guide the construction of barrier-free network learning environment based on IMS AccessForAll specification.<sup>[7]</sup> Chen Zi-jian analyzed the specific problems in the development process of education website, illustrated how to conduct barrier-free development through examples, and finally introduced the barrier-free detection method of education website.<sup>[8]</sup> Qi Xiang-hua et al. Discussed the research status of network accessibility of information service institutions for visually impaired people from two aspects of web pages and digital resources, and proposed development countermeasures.<sup>[9]</sup>

In addition to the research on the accessibility of education website, other researchers have carried out relevant researches from the perspective of the accessibility of online courses. For example, Huang Lu starts from the network course, and after elaborating the design model, design principle and design strategy of the barrier-free network course, she puts forward the framework of the barrier-free network course, and develops, tests and evaluates the Directing and Producing the Television Teaching Material according to the proposed design.<sup>[10]</sup> Zhu Xiao-jun introduced the basic architecture, module design, page arrangement, navigation, setup and construction of learning resources of the barrier-free network curriculum system for visually impaired group. He hopes by using of the system, will further expand the users of network courses, then truly realized to obtain the learning content at the same degree and the same level.<sup>[11]</sup> Wen Jian-pin first proposed a set of barrier-free evaluation index system and method for online courses in China.<sup>[12]</sup>

Some researchers have explored the barrier-free design of web pages according to the characteristics and needs of visually impaired people. For example, Yang Jin-zhuan carried out A-prompt automatic detection data analysis on the homepage and secondary pages of 45 online courses in China and 15 overseas courses. Aiming at the main problems found in the test, he discussed in detail the barrier-free design principle and the operation that should be adopted, and introduced the process of using a-prompt software to repair specific problems.<sup>[13]</sup> Wang Ya-xi put forward the principle of barrier-free design of network interface for visually impaired users by understanding their habitual access mode and their physiological, cognitive, psychological and behavioral characteristics. He attempts to design the web page from two aspects: the structure division of the web page and the improvement of the browser interface for visually impaired users.<sup>[14]</sup>

## 5. Reflection.

Looking at the research on the education website for visually impaired groups in China, we have made some achievements in related researches, both in the theory of Internet education accessibility or in the practice of website construction. However, on the whole, the research on online education accessibility of visually impaired in China, from quantity or content, is insufficient as follows:

Firstly, from the point of the researchers, most of them are teachers and students from college, majoring in computer, education technology, and so on, and a lot of researches are from team led by Professor Sun Zhen-xiang of Zhejiang Normal University. In addition, few researchers engaged in web accessibility research and the personnel structure is single, which led directly to the narrow range of the study. The construction of education website for visually impaired people involves management, computer science, law and even pedagogy, etc., which requires scholars in various fields to conduct theoretical and practical research from multiple perspectives.

Secondly, from the perspective of research content, although the relative research in China involves theoretical construction and practical development, while the content of practical development mainly focuses on the requirements and technology of website production without detailed introduction to the use of development tools. This is also part of the reason that the barrier-free website construction in China has not been vigorously promoted, so that web developers do not know how to develop such websites.

Thirdly, the research depth is insufficient. Although the research on web accessibility in China involves many aspects, but we still lack in-depth research and analysis. Researchers study from foreign methods to test the accessibility construction of the website by detection tools, and the large amount of data obtained by test is only used to explain phenomenon without the specific analysis of the data. Exploring the reasons only through the data makes the research only stay in revealing the status quo, which cannot really solve the problem.

Fourth, from the perspective of the number of studies, currently there are very few domestic researches specifically focusing on the education website for visually impaired people, and most of these researches were concentrated around 2009. In recent years, researches on this topic show a decreasing trend. However, the current situation of the development and use of education website is not ideal. Therefore, the research on this topic should be followed up or deepened.

The construction of barrier-free education website not only reflects the true meaning of a harmonious society, but also provides lifelong learning opportunities for the visually impaired, enabling them to learn at any time and any place, which has a positive significance. Based on the existing research, the barrier-free education website in China has made certain development and progress. In the future, the research can focus on the development and promotion and application of the website, aiming at solving the actual needs, and truly promoting the equal participation of visually impaired people in the education network.

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