

Educational Mechanisms for College Libraries to Promote Data Literacy among College Students in the Era of Big Data

Guodong Zhu^{1*}

¹ Yunnan Minzu University, library, Kunming, Yunnan, China

Email Address

394404148@qq.com (Guodong Zhu)

*Correspondence: 394404148@qq.com

Received: 2 February 2024; Accepted: 15 March 2024; Published: 21 April 2024

Abstract:

In the context of the big data era, data literacy has become an important aspect of cultivating students in higher education. As a concentration of information resources, college libraries play a crucial role in the cultivation of students' data literacy. This paper first discusses the importance of college libraries in data literacy education. Secondly, it analyses the current problems of college libraries in data literacy education, such as the imperfect education system, the lack of librarian's ability, the lagging construction of data resources and the limited cross-departmental cooperation. Then, a series of strategies are proposed to promote college students' data literacy education, including building data resource system, improving librarians' competence, innovating education modes and methods, and strengthening cross-departmental cooperation, etc., in order to help college libraries promote college students' data literacy education.

Keywords:

Big Data Era, College Libraries, Data Literacy Education, Data Resource System

1. Introduction

With the rapid development of information technology, big data has penetrated into all fields of social life, and the requirements for data processing and analysis ability are becoming higher and higher. Therefore, data literacy education for college students is particularly important. With rich information resources and professional knowledge service functions, college libraries are an ideal place to carry out data literacy education. However, in practice, many college libraries still have some problems in data literacy education. This paper aims to explore how to effectively use the resources and advantages of college libraries to improve the data literacy of college students.

2. The Importance of College Libraries in Data Literacy Education

The university library plays a central role in data literacy education. It is a central inventory of information resources and a hub for knowledge exchange, providing

students and faculty with a wealth of scholarly resources and data tools. By integrating and providing access to a wide range of databases, journals, books, and professional instruction, the library supports members of the higher education community in developing their ability to retrieve, evaluate, manage, and apply information. At the same time, libraries provide essential educational and training services such as workshops, tutorials, and online instruction to help users enhance their data literacy, which is essential for developing students' critical thinking, research skills, and lifelong learning. Libraries are therefore an indispensable pillar in promoting data literacy education.

3. Problems in Data Literacy Education of College Libraries in Data Literacy Education of College Students

3.1. Data literacy education has not yet formed a complete system

Higher education libraries are currently facing some challenges in playing the function of enhancing data literacy education for college students. In particular, data literacy education has not yet formed a complete system, and this problem has become a major obstacle to improving students' data literacy. This is manifested in the following aspects: first, data literacy education activities in college libraries often lack unified planning and coordination. Such educational activities are mostly in the form of temporary lectures, short-term workshops or case sharing sessions, which lack systematicity and continuity. Although these activities provide knowledge related to data literacy to a certain extent, it is difficult for students to gain a comprehensive and in-depth learning experience because they are not conducted under a continuous and organic system. Second, college libraries lack long-term planning for data literacy education. What is in short supply is a long-term layout for the various levels and stages of data literacy, from basic data awareness cultivation to the enhancement of advanced data processing and analytical skills, and there is no blueprint for education that covers a comprehensive and gradual depth. This short-term and fragmented teaching arrangement makes the effect of data literacy education greatly reduced, and it is difficult to match with students' overall learning planning and future career development needs [1].

3.2. Inadequate data literacy competence of librarians

In the context of the digital age, data literacy has become one of the key indicators for evaluating the professional competence of librarians. However, many current librarians show significant deficiencies in their knowledge and skills in data literacy, which limits their ability to provide effective data literacy education. Some librarians lack adequate knowledge of data management and analysis. In the rapidly evolving information age, data management skills are increasingly required and involve many aspects of data collection, organisation, protection, analysis and visualisation, which not all librarians are proficient in. This lack of skills makes librarians ineffective in instructing students in data-related tasks. Some librarians are also relatively weak in their knowledge of data ethics and regulations. Data use and processing must comply with relevant laws, regulations and ethical standards to protect individual privacy and intellectual property rights. Librarians who lack this knowledge find it difficult to provide students with accurate guidance on data use, which may lead to legal risks in their future research endeavours. Librarians' deficiencies in advanced data skills are even more pronounced as the data handling requirements of research work increase.

For example, for cutting-edge data technologies such as big data analysis and machine learning, librarians are required to have not only theoretical knowledge, but also practical skills, which, however, are often beyond the knowledge of ordinary librarians [2].

3.3. Lagging behind in the construction of data resources in some university libraries

In today's information explosion, the construction of data resources in college libraries is crucial to meet the learning and research needs of students and teachers. Unfortunately, however, some university libraries are lagging behind in the construction of data resources, which is mainly manifested in the two aspects of insufficiently rich data resources and untimely updating. On the one hand, some university libraries have a limited inventory of data resources, especially in certain cutting-edge disciplines and specialised fields, and the libraries are unable to provide sufficient and diversified data resources. For example, in areas such as big data and artificial intelligence, a large number of datasets are needed to support teaching and research, but libraries may not be able to meet these needs due to the high cost of acquiring resources or limited purchasing budgets. In addition, the rise of interdisciplinary research requires libraries to be able to provide cross-disciplinary data resources, but this puts higher demands on their data acquisition and integration capabilities. On the other hand, the insufficient update rate of data resources is also a problem. Scientific research and technological development are changing rapidly, but the data resources in libraries fail to keep up with them, resulting in students and teachers not being able to access the latest research data, which in turn affects the quality of their academic research and teaching. The timeliness of data resources is crucial to maintain academic competitiveness and research frontiers [3].

3.4. Insufficient co-operation among departments involved in data literacy education

In today's information technology era, data literacy education is crucial to students' learning and future career development. However, in many colleges and universities, there is insufficient cooperation between libraries and teaching departments, IT departments and other departments involved in data literacy education, which limits the potential of data literacy education. Insufficient co-operation between libraries and teaching departments. Libraries are a treasure trove of knowledge and should be an important venue for data literacy education. However, in practice, teaching departments often carry out curriculum and teaching activities independently of libraries, lacking effective communication and synergy, which makes data literacy education lack unified planning and implementation. The resources and professional power of libraries have not been fully utilised in the development of syllabus, updating of course content and innovation of teaching methods. Secondly, the cooperation with the IT department also seems to be inadequate. the IT department holds the technical resources and expertise of universities, which is crucial for providing technical support and platform construction for data literacy education. However, due to the lack of effective communication mechanisms and cooperation platforms, IT departments often only play the role of technical support without being deeply involved in the development of data literacy education content and teaching process. This lack of inter-departmental cooperation affects the effectiveness of data literacy education.

4. Strategies for College Libraries to Promote Data Literacy Education for College Students in the Era of Big Data

4.1. Build a perfect data resource system

In the digital era, data resources have become an important support for education and research in colleges and universities. Therefore, college libraries must build a perfect data resource system to meet the learning and research needs of teachers and students. College libraries should develop a clear set of systematic plans to identify and determine the core data resources needed based on educational goals and research directions. This includes a comprehensive review of existing data resources, assessing their applicability and timeliness, and ensuring that the data resources provided are closely related to the teaching and research of the university. Active access to high quality data resources through purchasing and subscription services. This means establishing long-term and stable relationships with data providers, negotiating reasonable prices and terms of use, and updating and expanding the data resource library in a timely manner. At the same time, libraries should screen and introduce multidisciplinary data resources so as to meet the needs of teachers and students in different subject areas. In addition to purchasing and subscription, university libraries should also work to develop and integrate open access resources. This includes promoting and supporting open science practices, such as encouraging faculty and students to share their research data and facilitating open access publishing. At the same time, libraries should make use of existing open access data resources, such as government data, research project datasets, etc., and provide a comprehensive and convenient access platform by integrating these resources. To maximise the use of resources, libraries also need to provide relevant technical support and training services. This includes teaching teachers and students how to effectively retrieve and use data resources, as well as how to manage and analyse data to enhance their data literacy. Finally, university libraries should establish a data resource monitoring and evaluation mechanism to regularly assess the use of data resources and collect user feedback in order to continuously improve the resource system [4].

4.2. Enhance librarians' data literacy ability

In the context of the digital era, the data literacy ability of university librarians is of great significance in improving the quality of library services and meeting users' needs. Therefore, continuous training and education are essential to improve librarians' data management, analysis skills and data service capabilities. Higher education libraries should develop and implement a comprehensive training programme that addresses the different needs and skill levels of librarians in data literacy. This training programme should include best practices in data management, such as aspects of organising, storing and sharing data. Through such training, librarians can become more familiar with how to handle and maintain datasets to ensure data quality and availability. The training programme should also cover data analysis skills, including statistical analysis, data visualisation and interpretation of data results. By acquiring these skills, librarians can better support users' research activities and provide data mining and analysis consulting services to users. In addition to training in professional skills, librarians should be encouraged to engage in interdisciplinary learning to understand the data needs and characteristics of different disciplines. This interdisciplinary understanding can help librarians better communicate with academic faculty and researchers to provide customised data

services. Training methods should also be diversified and can include workshops, online courses, seminars, and peer learning. Libraries can invite data management and analytics experts to give presentations or collaborate with other institutions to share training resources. Evaluating the effectiveness of training is also a key part of improving librarians' data literacy skills. Libraries should regularly evaluate the training results and adjust the training content and methods through librarians' feedback and performance. Through such training and education, librarians will be able to more effectively support data-intensive academic research, provide professional data services, and ultimately enhance the overall service level of libraries and meet the diverse needs of users.

4.3. Innovative Data Literacy Education Models and Methods

In today's rapid development of information technology, data literacy has become one of the necessary abilities for college library users. Therefore, libraries need to innovate the mode and methods of data literacy education, combine online and offline resources, and carry out diversified educational activities.

Libraries can organise a series of seminars, inviting experts and scholars in the fields of data science and information management to share the latest data management knowledge, analysis tools and research results. These workshops can be held offline to increase interactivity and participation; at the same time, they can be shared simultaneously online through live streaming or recorded videos, so that users who cannot be present can also participate in the learning.

Workshops are an effective way to enhance practical skills. Libraries can hold regular offline workshops to provide opportunities for hands-on practice, so that participants can learn operations such as data collection, cleaning, analysis and visualisation under guidance. In addition, to improve the coverage and flexibility of workshops, libraries can develop online teaching modules that allow users to learn independently online, submit assignments or projects, and receive feedback via an online platform. Online courses, on the other hand, are a flexible and efficient way of learning. Libraries can collaborate with educational institutions to develop a series of online data literacy courses, covering different levels from basic knowledge to advanced applications, so that users can choose the right course to learn according to their individual needs. At the same time, libraries can create an online learning community to encourage communication and discussion among users and enhance the learning experience. In addition, libraries can make use of modern technologies, such as virtual reality (VR), augmented reality (AR) and gamified learning, to provide users with an immersive and interactive learning experience, stimulate learning interest and improve learning results.

4.4. Strengthen cooperation and linkage with other departments

In order to effectively promote data literacy education, college libraries need to establish close partnerships with teaching departments, academic research departments, IT departments, etc., to form a strong alliance for cross-departmental cooperation. Co-operation with teaching departments is the key to enhancing the effectiveness of data literacy teaching. Libraries can coordinate with the Academic Affairs Office and relevant faculties to incorporate data literacy courses or workshops into students' compulsory or elective courses so that they become part of students' academic training. In addition, libraries can invite faculty members to participate in the design of the courses to ensure that the training content is integrated with the

teaching of subject specialisations and is closer to the practical needs of students and academic research. Collaboration with academic research departments can promote the deep integration of research data management and data literacy. Libraries can work with research institutions to provide data management services, such as archiving, sharing and open access to research data, as well as organising lectures and seminars related to research data management to help researchers improve their data processing and analysis skills. Collaboration with IT departments is a technical guarantee to ensure the smooth implementation of data literacy education. IT departments can provide necessary technical support, such as building online learning platforms, maintaining databases, and providing big data analysis tools. At the same time, IT experts can also participate in the teaching of the curriculum, directly explaining to students practical knowledge such as data security and software use. In addition, libraries should also cooperate with other departments, such as campus media, and make use of their channels and resources to expand the influence of data literacy education and raise awareness of the importance of data literacy across the campus. Through such cross-departmental collaboration, not only can we integrate on-campus resources to improve the quality and efficiency of data literacy education, but we can also create a supportive learning environment that promotes the overall improvement of data literacy among students, faculty, and even the entire academic community.

5. Conclusions

With the advent of the big data era, the role of college libraries in promoting data literacy education for college students cannot be underestimated. In the face of the existing problems and challenges, college libraries need to take effective measures to continuously improve their service capacity, innovate their education mode, and keep pace with the times to meet the data literacy education needs of college students. Through these efforts, a solid data literacy foundation can be laid for students' lifelong learning and future career development.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

Funding

This work was supported by the Scientific Research Fund Project of Yunnan Provincial Education Department "Investigating the Mechanism of University Libraries Promoting Data Literacy Education for College Students in the Era of Big Data".

References

- [1] Xu, L.L. Innovation of Data Literacy Education Mode in College Libraries in the Era of Big Data. *Media Forum*, 2023, 6(16), 105-108.
- [2] Hou, L.L.; Zhu, H.N.; Xiang, D.D. Countermeasures for data literacy education in public libraries in the context of big data era. *Inside and Outside Lantai*, 2022, 19, 3.

- [3] Yu, K.; Hu, H.Y.; Wang, H.; Chen, Z.; Zhang, H.B. Research on the mechanism and path realisation of data literacy cultivation for university students in library expansion under the background of big data. *Economist*, 2022, 10, 226-228.
- [4] Huanxue, X. Connotation and cultivation mechanism of data literacy of college librarians under the background of big data. *China Management*.



© 2024 by the author(s); licensee International Technology and Science Publications (ITS), this work for open access publication is under the Creative Commons Attribution International License (CC BY 4.0). (<http://creativecommons.org/licenses/by/4.0/>)