Digital Transformation Practice Research of Library Management in Vocational Undergraduate Colleges

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Abstract: Under the dual background of high-quality development of vocational education and in-depth advancement of the education digitization strategy, the digital transformation of library management in vocational undergraduate colleges has become a key measure to optimize the education support system. Taking the talent training characteristics of vocational undergraduate colleges, namely "practice-oriented" and "school-enterprise collaboration", as the starting point, this article systematically discusses the logical foundation and realistic demands of the digital transformation of library management in vocational undergraduate colleges. It focuses on the practical paths, guarantee system, and effectiveness evaluation methods of the transformation. The research indicates that the core objectives of the transformation need to be achieved by constructing a characteristic digital resource system, innovating an active enabling service model, and building an integrated management platform. At the same time, it relies on the "organization-talent-funding-system" four-in-one guarantee system and a multi-dimensional evaluation system to improve the quality of the transformation. The research results of this article can provide theoretical reference and practical guidance for the digital construction of vocational undergraduate libraries, help improve the service effectiveness of library management, and adapt to the training needs of high-level technical and skilled talents.

1. Introduction

With the continuous improvement of China's vocational education system, vocational undergraduate education, as a core carrier for cultivating high-level technical and skilled personnel, has become an important force in promoting industry-education integration and serving industrial upgrading. Library management, as a key component of the vocational undergraduate education teaching and research support system, directly affects the quality of talent training through its service quality and resource suitability [1]. At present, the in-depth advancement of the educational digitalization strategy and the rapid development of digital technology provide important opportunities for the transformation of university library management, and also pose severe challenges to the traditional library management model. The talent training characteristics of vocational undergraduate education, which emphasize "practice-orientation" and "school-enterprise

collaboration", determine that its library management needs to break through the resource construction and service logic of traditional academic universities and build a digital system that adapts to the development of professional clusters and meets the needs of practical training and teaching [2]. However, most vocational undergraduate libraries currently suffer from serious homogenization of digital resources, passive and lagging service models, and inefficient management processes, making it difficult to meet the diversified resource needs of teachers and students and the realistic requirements of vocational undergraduate education reform and development. In this context, exploring the logical basis, practical paths, and guarantee mechanisms for the digital transformation of vocational undergraduate library management is not only an intrinsic requirement for improving library service effectiveness and optimizing the education support system, but also an important measure to promote the high-quality development of vocational undergraduate education. This article, based on the characteristics of vocational undergraduate education and focusing on the core issues of digital transformation of library management, systematically discusses transformation practice strategies and effectiveness evaluation methods, providing theoretical reference and practical lessons for the digital construction of vocational undergraduate libraries.

2. The Realistic Basis and Core Demands of Digital Transformation of Vocational Undergraduate Library Management

2.1 Definition of Core Concepts

Vocational undergraduate education, as an important part of the higher education system, is fundamentally aimed at cultivating high-level technical and skilled talents. It is based on industrial needs to construct a talent training model of "industry-education integration and school-enterprise cooperation", distinguishing itself from the academic talent cultivation of ordinary undergraduate programs and the basic skilled talent cultivation of vocational college programs. It emphasizes the practical application ability and industrial adaptability of talents [3,4]. The digital transformation of library management is not simply a technological overlay but is supported by digital technology to realize the transformation of library resources from physical to digital form, the reconstruction of management processes from traditional manual mode to intelligent collaborative mode, and the upgrade of service models from passive supply to active empowerment. Its core components include a digital resource system, an intelligent management platform, a precise service mechanism, and a professional talent team, encompassing four dimensions. The specificity of the digital transformation of vocational undergraduate library management is concentrated in "practice-oriented" and "industry-adapted," that is, it needs to focus on the construction needs of vocational undergraduate professional clusters to build a digital resource system that is both professional and practical. At the same time, it needs to connect with special scenarios such as practical training and school-enterprise cooperation to form a differentiated digital management and service model, which is essentially different from the transformation orientation of ordinary undergraduates focusing on the digitization of academic resources.

2.2 Theoretical Support for Digital Transformation of Vocational Undergraduate Library Management

Resource construction theory provides the core logical basis for digital transformation. This theory emphasizes the systematicness, integrity, and usability of resources, guiding vocational undergraduate libraries to break the separation between traditional paper resources and digital resources in digital transformation. Through resource classification, integration, standardized

processing, and other means, it constructs a digital resource system adapted to the needs of professional clusters. As an extension of resource construction theory, the digital resource integration logic requires libraries to take metadata specifications as the core to realize the interconnection of different types and sources of digital resources and improve resource retrieval and utilization efficiency [5]. User-oriented theory is the core support for digital service transformation. This theory advocates taking user needs as the starting point, through accurately understanding the resource needs and usage habits of teachers and students, and building a personalized, scenario-based service model, which is in line with the differentiated needs of vocational undergraduate teachers and students for practical digital resources and practical teaching support resources. The precision requirements of reader service under the user-oriented theory promote libraries to shift from "resource supply-centered" to "user demand-centered," and optimize service supply through user profile construction and demand data analysis. Collaborative governance theory provides a theoretical basis for resource linkage in transformation.

2.3 The Practical Demands of Digital Transformation for Vocational Undergraduate Libraries

The reform of vocational undergraduate talent cultivation models places new demands on the adaptability of library resources. Currently, vocational undergraduate education focuses on professional cluster construction, building curriculum systems around core technology areas of industries, and emphasizing the deep integration of practical teaching and industrial practice. This requires library resource construction to break through the limitations of the traditional "discipline-oriented" approach and shift towards a "professional cluster-oriented" and "practice-oriented" approach, providing more digital resources adapted to practical training and technological research and development. However, the traditional pattern of library resources, which mainly consists of academic monographs and theoretical journals, struggles to meet this demand, necessitating the optimization of resource structure through digital transformation.

The pain points of the traditional library management model constitute the internal driving force for digital transformation. At the resource management level, the separate management of print and digital resources under the traditional model creates "resource silos", requiring faculty and students to switch between different platforms for retrieval, resulting in low resource acquisition efficiency. At the service model level, traditional services, primarily based on "passive borrowing and returning" and "offline consultation", are difficult to adapt to the "fragmented learning" and "practical training scenario learning" needs of vocational undergraduate faculty and students, leading to delayed service response. At the management efficiency level, traditional processes such as manual cataloging and manual statistics are time-consuming and labor-intensive and prone to errors, making it difficult to achieve precise resource management and efficient allocation [6].

3. Construction of Practical Paths for Digital Transformation of Vocational Undergraduate Library Management

3.1 Construction of Digital Resource System

The digital resource system is the core carrier of the digital transformation of vocational undergraduate library management. Its construction needs to break through the homogenization limitations of traditional resource construction and, based on the logic of "integrating existing resources, accurately increasing resources, and collaborative sharing," form a characteristic resource pattern suitable for the development of professional clusters. The digital transformation and standardized processing of existing paper resources is the foundational project of the transformation. It is necessary to establish a scientific screening mechanism, prioritizing the digital conversion of

paper documents that have a high degree of matching with core professional clusters, high borrowing frequency, and practical guidance value, including professional textbooks, practical training manuals, and industry standard compilations. The precise construction of incremental digital resources needs to focus on the needs of vocational undergraduate professional clusters to build characteristic databases, which is the key to differentiated resource advantages. The construction of characteristic databases should adhere to the concept of "school-enterprise collaboration," jointly sort out the core competency requirements and technological development trends of posts with industry enterprises, and focus on collecting and integrating characteristic resources such as cutting-edge technology literature, enterprise training cases, skill competition resources, and vocational qualification certification tutoring materials to form a digital resource system covering the entire chain of "professional foundation-skill training-post improvement." The collaborative integration and sharing mechanism of digital resources across departments and colleges is an effective way to solve the dilemma of insufficient resources. It is necessary to rely on regional university library alliances, vocational education resource sharing platforms, and other carriers to establish resource co-construction and sharing agreements, clarify the ownership and usage norms of resources, and achieve complementary sharing of professional digital resources with other vocational undergraduate colleges and industry colleges.

3.2 Digital Service Model Innovation

In the context of digital transformation, vocational undergraduate library services need to transition from a "passive response" model to a "proactive empowerment" model, building a personalized, scenario-based, and intelligent service system centered around teaching, practical training, and scientific research. Precise resource delivery services rely on the establishment of a personalized recommendation system based on user profiles. This is achieved by collecting and analyzing data such as faculty and students' borrowing records, professional information, learning behaviors, and practical training projects to construct multi-dimensional user profiles, clarifying the resource needs differences among different majors, grades, and learning stages. Based on user profiles, big data analysis and recommendation algorithms are utilized to accurately push matching digital resources to faculty and students through various channels such as the library's official website, WeChat official account, and learning platforms. For example, pushing practical training cases and operation guides for corresponding projects to students in the practical training stage, and pushing cutting-edge industry literature and teaching reference resources to teachers, achieving "precision drip irrigation" of resource services. The core of scenario-based service extension is to build an embedded subject service model that integrates into the teaching process, breaking the spatial limitations of library services. The library needs to select subject librarians with professional backgrounds and digital service capabilities to connect with various secondary schools and professional clusters, deeply participate in curriculum design, practical training teaching, scientific research projects, and other aspects, providing customized services, such as assisting teachers in screening and integrating curriculum digital resources, conducting special resource utilization training for practical training classes, and providing literature retrieval and analysis support for faculty and students' scientific research projects. Intelligent service upgrade is an important support to improve service efficiency and experience. It is necessary to accelerate the application of intelligent equipment and technologies, optimize intelligent consulting services, rely on the intelligent customer service system to achieve 24-hour automatic response to common problems, and combine artificial consultation to build a "intelligent + artificial" collaborative consulting model to improve the professionalism and timeliness of consulting services.

3.3 Construction of a Digital Management Platform

A digital management platform provides the technical support for realizing the full-process digitization of library management. Its construction requires breaking through the superficial application of "technology stacking" and achieving an in-depth transformation of "technology empowering process restructuring," thereby enhancing the refinement and efficiency of management. The selection and iteration of core management systems should adhere to the principles of "integration, adaptability, and scalability". Combining the scale and needs of vocational undergraduate libraries, an integrated library management system (such as ILAS, Huiwen Libsys, etc.) with multiple functions such as resource management, service management, and data analysis should be selected. System functions should be specifically adapted to the characteristics of vocational undergraduates, including specialized resource management modules, practical training resource docking modules, and school-enterprise resource collaboration modules. At the same time, a normalized system iteration mechanism should be established to update system functions and optimize user experience in a timely manner based on technological development trends and feedback from teachers and students. The construction of a data middle platform is the core of achieving precise management. It is necessary to integrate data from the entire library management process, including resource procurement data, cataloging data, circulation data, user behavior data, and service feedback data. A unified data collection and storage mechanism should be established to achieve centralized management and interconnection of data. Through the data analysis function of the data middle platform, key information such as resource utilization patterns, user needs characteristics, and service weak links can be mined to provide data support for resource procurement optimization, service model adjustment, and management decision-making, thereby realizing "data-driven management". The construction of a platform security system is the bottom-line guarantee for digital transformation. A "multi-level, all-round" security protection system needs to be constructed, including three dimensions: technical protection, system security, and personnel management. At the technical level, data encryption technology (such as AES encryption) should be used to encrypt and store sensitive data during transmission, and security equipment such as firewalls, intrusion detection systems, and virus protection systems should be deployed to prevent network attacks and data leakage. A data backup and recovery mechanism should be established, using a combination of local backup and cloud backup to ensure data security and availability. At the system level, data security management systems, user rights management systems, and network security management systems should be improved to clarify security responsibilities and operating standards. At the personnel level, safety awareness training for library managers should be strengthened to improve their data security protection capabilities and emergency response capabilities. Digital restructuring of management processes is the key to realizing the value of the platform. Relying on the digital management platform, it is necessary to break down the process barriers of traditional manual management and restructure and optimize core links such as resource procurement, cataloging, circulation, collection, and discarding.

4. Safeguard System and Effectiveness Evaluation of Digital Transformation of Vocational Undergraduate Library Management

4.1 Construction of Safeguard System for Digital Transformation

The digital transformation of vocational undergraduate library management is a systematic project that requires the construction of a "organization-talent-funding-system" integrated safeguard system to provide comprehensive support for the orderly advancement and continuous deepening of the transformation work. The core of organizational safeguard lies in establishing a

cross-departmental collaborative digital transformation working mechanism to break the traditional closed operation pattern of libraries. A digital transformation leading group should be established, headed by the school leader in charge, with the joint participation of representatives from the library, academic affairs office, training center, information center, secondary colleges, and cooperative enterprises. The responsibilities of each entity should be clarified: the library is responsible for the overall planning and specific implementation of the transformation work; the academic affairs office and secondary colleges provide teaching needs docking and professional resource support; the information center safeguards the construction of the technical architecture and network security; and cooperative enterprises participate in the construction of characteristic resources and the design of practical services. At the same time, a normalized collaborative deliberation mechanism should be established, regular work promotion meetings should be held to coordinate and solve cross-departmental and cross-entity collaborative problems in the transformation process, and a transformation promotion pattern of "top-down linkage and left-right collaboration" should be formed. Talent safeguard is the core driving force of digital transformation, and the key lies in the two-way effort of improving the digital literacy of library management personnel and building professional teams. On the one hand, a hierarchical and classified digital literacy training system needs to be established. In response to the needs of management personnel in different positions, special training should be carried out in digital resource construction, intelligent platform operation and maintenance, big data analysis, subject services, etc., and industry experts and technical service providers should be invited to provide practical guidance to improve the technical application capabilities and professional service levels of management personnel. On the other hand, the team structure should be optimized by introducing talents with professional backgrounds in digital libraries and information technology to supplement the team's technical strength. At the same time, management personnel should be encouraged to conduct in-depth research and study in secondary colleges and cooperative enterprises to cultivate compound talents with library professional literacy, vocational education cognition, and industrial practice vision.

4.2 Effectiveness Evaluation System for Digital Transformation

Constructing a scientific and rational effectiveness evaluation system is a crucial means to examine the quality of digital transformation in vocational undergraduate library management and to promote the optimization and upgrading of the transformation. This system needs to adhere to the principles of "comprehensiveness, relevance, and operability" and establish an evaluation framework covering multiple dimensions of "resources-services-management-users." The construction of evaluation indicators should focus on the core goals of the transformation, unfolding from four core dimensions: resource construction, service quality, management efficiency, and user satisfaction.

The evaluation indicators for the resource construction dimension need to highlight vocational undergraduate characteristics, including the quantity and quality of specialized digital resources, digital resource coverage, resource update frequency, the degree of cross-departmental/ school-enterprise resource sharing, metadata standardization rate, and so on. The focus is on measuring the suitability and differentiated advantages of the digital resource system. The indicators for the service quality dimension should focus on the effectiveness of service model innovation, including the success rate of accurate resource recommendation, the number of majors covered by embedded services, the timeliness and resolution rate of intelligent consultation, remote service access volume, user training participation, and so on, to comprehensively evaluate the accuracy, timeliness, and coverage of digital services. The indicators for the management efficiency dimension need to reflect the effectiveness of process optimization, including the processing time

for resource procurement, cataloging, circulation, and other processes, the failure rate of digital platform operation and maintenance, data processing efficiency, and the ratio of financial input to output, to measure the improvement effect of digital transformation on management efficiency. The indicators for the user satisfaction dimension should focus on the actual experience of teachers and students, including the convenience evaluation of resource acquisition, service attitude satisfaction, the satisfaction of digital service needs, the rectification rate of feedback opinions, and so on. The transformation effectiveness and shortcomings are reflected through the evaluation of teachers and students. The selection of evaluation methods needs to adopt a comprehensive evaluation method combining quantitative and qualitative approaches to ensure the objectivity and comprehensiveness of the evaluation results. Quantitative evaluation mainly collects relevant data on resource construction, service implementation, and management processes through the digital management platform and uses statistical analysis methods to quantify and score various quantitative indicators, directly reflecting the specific effects of the transformation. Qualitative evaluation collects subjective evaluations of digital resources, service models, and management processes from teachers and students through teacher-student forums, in-depth interviews, questionnaire surveys, etc. At the same time, experts from the same industry and representatives from industry and enterprises are invited to evaluate the professionalism and suitability of the transformation work, making up for the limitations of quantitative evaluation.

4.3 Risk Aversion and Future Prospects of Digital Transformation

The digital transformation of vocational undergraduate library management faces multiple risks and challenges in its advancement. It is necessary to accurately identify the types of risks, formulate scientific and effective risk aversion strategies, and, based on technological development and vocational education reform trends, clarify the future development direction. The core risks in the transformation process mainly include technology iteration risk, data security risk, and service adaptation risk. Technology iteration risk stems from the rapid updates of digital technology. If the library fails to keep up with technological development trends in a timely manner, it may lead to outdated intelligent platforms and disconnection of technology applications, affecting the effectiveness of the transformation. Data security risks are mainly manifested as user information leakage, digital resource loss, network attacks, etc., which seriously threaten library management order and user rights. Service adaptation risk refers to the failure of the digital service model to accurately match the practical learning and teaching needs of vocational undergraduate teachers and students, resulting in a "technology-demand disconnect," leading to low service utilization.

To address the above risks, targeted risk aversion strategies need to be formulated. In terms of technology iteration risk aversion, a technology dynamic monitoring and argumentation mechanism should be established to regularly track technology development trends in the digital library field, and a technology argumentation team should be formed to scientifically evaluate technology selection and platform upgrades to avoid blindly following trends. A long-term cooperative relationship should be established with technology service providers to ensure that the platform can be upgraded and iterated in a timely manner and obtain continuous technical support. In terms of data security risk aversion, the construction of a security protection system should be strengthened, regular network security inspections and vulnerability investigations should be carried out, encryption technology and security protection equipment should be upgraded, and data backup and emergency recovery plans should be improved. Personnel safety management should be strengthened, data security training should be carried out to enhance the safety awareness and emergency response capabilities of management personnel, and the user permission hierarchical management and operation log supervision system should be strictly implemented. In terms of

service adaptation risk aversion, a normalized user demand research mechanism should be established. Through questionnaires, interviews, symposiums, and other methods, the resource needs and service expectations of teachers and students should be grasped in real time, and service content and models should be adjusted in a timely manner. Subject librarians should be encouraged to deeply participate in teaching and practical training to accurately connect with the needs of teachers and students, ensuring that digital services are highly adapted to the needs of vocational undergraduate talent cultivation.

5. Conclusion

The digital transformation of vocational bachelor's degree libraries is an inevitable choice to adapt to vocational education reform and the educational digitization strategy. Its core essence lies in basing itself on the "practice-oriented" characteristic to realize an all-round digital upgrade of resources, services, and management. This study confirms that the transformation needs to be supported by resource construction theory, user-oriented theory, and other theories to accurately respond to the realistic demands of talent training model reform and the upgrading of teachers' and students' needs. In practice, the pain points of the traditional management model can be effectively solved through three core paths: the construction of a characteristic digital resource system, proactive and enabling service innovation, and the construction of an integrated management platform, supplemented by a four-in-one guarantee system of "organization-talent-funding-system". At the same time, building an effectiveness evaluation system covering multiple dimensions of resources, services, management, and users can provide a scientific basis for transformation optimization. In the future, vocational bachelor's degree libraries need to continuously avoid technical, security, and service adaptation risks and deepen development in the direction of intelligence and collaboration. The transformation framework and practical strategies constructed in this paper provide a feasible solution for improving the efficiency of vocational bachelor's degree library management and supporting the training of high-level technical and skilled personnel.

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