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Research on the Innovation Path of Digital-enabled Refined Student Management in Higher Vocational Education under the Type-orientation of Vocational Education

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ABSTRACT

The newly-revised *Vocational Education Law of the People's Republic of China clarifies that vocational education is an education type equally important to general education, establishes its type-orientation, and promotes connotative high-quality development of talent cultivation in higher vocational colleges. As a critical part of vocational education system, the traditional extensive student management model can hardly adapt to diversified student sources, industry-education integration and frequent off-campus internships. Digital technologies such as big data and smart campus provide new tools for refined student management, helping transform experience-driven administration into data-supported precise education. Based on the type-orientation of vocational education, this paper clarifies the internal logic of digital-enabled refined student management. It analyzes practical dilemmas including data silos, over-emphasis on hardware construction, insufficient digital competence of counselors, poor coverage in training scenarios and data privacy risks. Targeting the goal of fostering morality and professional skills, this study puts forward feasible paths: building integrated digital platforms, constructing multi-dimensional student digital profiles, realizing full-process digital management for industry-education training, improving counselors' digital literacy, establishing human-machine collaborative risk early-warning mechanism and completing data security regulations. The conclusions can offer practical references for student management reform in higher vocational colleges.

KEYWORDS

Type-orientation of vocational education; Digitalization; Higher vocational colleges; Refined student management; Industry-education integration

The report to the 20th National Congress of CPC emphasizes advancing educational digitalization and building a lifelong-learning society. Opinions on Promoting the High-quality Development of Modern Vocational Education* points out that vocational education should stick to fostering morality and skills, integrate education with training, and cultivate high-quality technical-skilled talents. As an independent education type rather than a supplement to general education, vocational education undertakes multiple missions including ideological guidance, quality cultivation and vocational competence training, which raises higher requirements for student management.

Higher vocational colleges have complex student groups covering general high-school graduates, secondary-vocational graduates and social enrollment students. These students differ in learning foundation, family background and career expectation. Besides, large-scale on-campus training, enterprise internships and skill competitions make students stay off-campus for a long time. Traditional management relying on offline talks, class meetings and patrols faces obvious limitations: delayed risk discovery and homogenized educational support, which cannot satisfy the demand of diversified student development.

At present, most higher vocational colleges have built multiple digital systems covering student affairs, academic administration, psychological assessment, second-class classroom and internship management. However, many schools attach importance to system procurement while ignoring practical educational application. Data resources fail to translate into real educational effects. How to apply digital means to build a human-oriented refined student management system adapting to industry-education characteristics has become an urgent research topic for vocational educators.

On such basis, this paper discusses the correlation among vocational education type-orientation, digital technology and refined student management. Combined with front-line counselor work experience, it analyzes existing problems and proposes targeted implementation paths for similar vocational colleges for reference.

1 Introduction

1.1 Connotation of the Type-orientation of Vocational Education

The type-orientation confirms vocational education's independent educational status. It adheres to employment-

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orientation, work-study combination and industry-education integration. Apart from professional knowledge, it focuses on cultivating students' craftsmanship, professional ethics and comprehensive vocational quality. Student management in higher vocational colleges cannot copy the mode of ordinary universities. It should cover the whole cycle of enrollment, campus study, enterprise internship and employment, and realize effective connection between on-campus and off-campus education.

1.2 Refined Student Management in Higher Vocational Colleges

Refined student management abandons the "one-size-fits-all" extensive mode. It respects individual differences, implements hierarchical and classified guidance, realizes advance risk intervention and differentiated assistance for academically-challenged, psychologically-vulnerable, financially-disadvantaged students and interns. Its core is shifting from passive problem disposal to proactive educational service to accomplish the fundamental task of fostering virtue through education.

1.3 Internal Compatibility between Digital Empowerment and Refined Student Management

Digital empowerment takes big-data and smart platforms as carriers to convert scattered information into analyzable data resources for student management decision-making. The compatibility is mainly reflected in three dimensions.

Firstly, digitalization breaks spatial constraints. Digital internship platforms connect schools and cooperative enterprises so that administrators can keep track of off-campus interns which traditional offline management cannot achieve.

Secondly, multi-source data supports multi-dimensional student portraits. Information of academic performance, training performance, psychological evaluation and social practice can be aggregated to help counselors understand students comprehensively and provide targeted intervention.

Thirdly, digitalization reduces repetitive administrative work such as form-filling and notice distribution. It releases counselors from trivial affairs so that they can devote more energy to heart-to-heart communication and ideological education.

Nevertheless, digital tools are only auxiliary means. Data statistics and risk alert cannot replace face-to-face ideological guidance and humanistic care. Technology must serve educational purposes rather than simple monitoring.

2 Practical Dilemmas of Digital-enabled Refined Student Management

Although many higher vocational colleges have promoted digital construction of student management, a series of dilemmas restrict the realization of refined education under the background of type-orientation.

2.1 Prominent Data Silos among Different Systems

Systems of student affairs, academic affairs, psychological counseling, second-class classroom and internship management are usually constructed by different departments without unified data standards and open interfaces. Student information is scattered in various independent platforms. Counselors have to log into multiple systems to collect student information manually. Repeated information collection increases burden for both teachers and students. Fragmented data makes it impossible to generate complete student growth portraits and weakens the value of digital construction.

2.2 Emphasis on Hardware Construction rather than Educational Scenario Application

Some colleges equate digital transformation with purchasing smart management platforms. They invest a great deal in hardware while ignoring vocational-education-oriented functional design. Most platforms focus on attendance, approval and statistical functions, lacking modules for training process evaluation, craftsmanship cultivation and interns' ideological dynamic tracking. Digital construction is separated from real educational demands, resulting in the phenomenon of "having platforms but no effective application". Simple online supervision may even ignore students' subjective status and emotional needs.

2.3 Insufficient Digital Competence of Counselor Teams

Counselors are the key implementers of refined student management. In addition to ideological education and psychological counseling capabilities, digital transformation requires them to master data reading, system operation and

information analysis skills. Quite a few counselors are accustomed to traditional experience-based work modes. They can only operate basic functions of digital platforms and cannot dig risk hints from massive data. Existing training mostly focuses on simple system operation, lacking case-oriented practical training targeting industry-education scenarios, which leads to low utilization rate of digital systems.

2.4 Management Blind Spots in Off-campus Internship and Training Scenarios

Work-study combination is the typical feature of vocational education. However, off-campus internship has become a weak link in digital student management. The data-sharing mechanism between schools and enterprises is incomplete. Existing internship platforms mainly realize check-in and weekly-journal submission, lacking evaluation modules for professional ethics. Interns' psychological pressure and interpersonal conflicts are difficult to be fed back to schools in time. Moreover, small-and-medium-sized cooperative enterprises have limited informatization conditions, which further hinders the extension of refined management to off-campus sites.

2.5 Potential Risks of Data Privacy and Ethics

Digital student management collects large quantities of sensitive information including identity, academic records, psychological assessment results and activity records. Problems such as excessive data collection, unclear access authority and simplistic algorithm labeling emerge in practice. If quantitative data is directly used to define student characteristics without artificial verification, misjudgment may occur and damage students' legitimate rights. Balancing data application and personal privacy protection is a vital challenge for digital student management.

3 Innovative Implementation Paths

Aiming at above-mentioned dilemmas, higher vocational colleges should adhere to the principle of "education-oriented, technology-assisted, safety-guaranteed", and promote digital-enabled refined student management from six perspectives.

3.1 Build Integrated Data Center to Break Data Silos

Colleges should promote interface interconnection among student-affairs, academic, training, mental-health, internship and subsidy systems, establish unified campus data standards and realize one-time collection and multi-department sharing of basic student data. A counselor-oriented management cockpit should be developed for integrated information checking. Meanwhile, non-essential information collection shall be prohibited to reduce the burden of teachers and students.

3.2 Construct Vocational-education-oriented Multi-dimensional Student Digital Portraits

Student digital portraits should cover not only academic achievements, but also training performance, skill certificates, competition experience and professional quality evaluation, highlighting vocational education characteristics. According to portrait information, colleges can carry out classified assistance for different student groups. It should be clearly stipulated that digital portraits are only reference clues. All data alarms must be verified through offline heart-to-heart talks instead of being taken as the sole basis for student reward or punishment.

3.3 Establish School-enterprise Collaborative Digital Management Mechanism for Internships

Optimize the function of internship management platforms, add evaluation items for professional ethics and post adaptability, and allow enterprise tutors to feed back students' real-time performance. Set-up convenient online complaint channels for interns to report psychological pressure and work-related troubles, so that counselors can respond timely. Simplify operating procedures for enterprises with low informatization level. Push online learning resources about craftsmanship and labor education to realize continuous ideological education when students are off-campus.

3.4 Improve Counselors' Digital Literacy through Hierarchical Training

Carry out multi-level training for counselors. Basic training covers system operation and early-warning-information reading. Advanced training combines real student-work cases to improve counselors' ability of identifying potential risks

from data. Set up special courses for digital management of interns. Organize regular experience-sharing salons. Meanwhile, reduce meaningless digital form-filling tasks to avoid increasing counselors ' administrative burden.

3.5 Construct Human-machine Collaborative Risk Early-warning Mechanism

Build an early-warning model covering academic risk, psychological crisis and internship safety based on integrated multi-source data. Early-warning lists are only available for corresponding administrators instead of being disclosed to students. Form a closed-loop workflow: system risk prompting → counselor offline investigation and interview → establishing assistance files → follow-up tracking. Big-data screening serves as signal source, while human-oriented educational intervention remains the core.

3.6 Perfect Institutional System for Data Security and Ethical Governance

Implement the minimum-necessary principle for data collection. Establish hierarchical data access authority, especially strict approval procedures for highly-sensitive psychological data, and keep complete access logs. Formulate data-usage ethical norms and forbid unauthorized data leakage. Strengthen information-security education for administrative staff and deploy technical encryption measures to prevent data-security incidents.

4 Conclusion

Under the type-orientation of vocational education, student management in higher vocational colleges must follow the goal of fostering morality and professional skills. Digitalization provides effective tools to solve traditional management difficulties such as insufficient off-campus supervision and homogenized educational support. Nevertheless, digital transformation is not merely system procurement, but systematic reform covering idea, business, team and institution.To give full play to digital empowerment effect, colleges need to break data silos, build vocational-characteristic student portraits, improve school-enterprise collaborative internship management, enhance counselors ' digital competence, establish human-machine collaborative early-warning system and strictly enforce data-security norms. It should always be emphasized that technology is auxiliary rather than decisive. Data clues cannot replace face-to-face communication and humanistic care. With the continuous iteration of digital technology, higher vocational colleges need to keep exploring the reasonable boundary of digital application, avoid excessive technical monitoring, and realize the unification of technical rationality and educational value rationality. In this way, digital construction can better serve the cultivation of high-quality technical-skilled talents and boost the high-quality development of modern vocational education.

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