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Exploration of the Application of Information-Based Teaching in Surgical Nursing Education at Higher Vocational Colleges

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Abstract: Surgical nursing is the core course of higher vocational nursing, which has the characteristics of strong practice, high operational requirements, fast knowledge updates, and so on. The traditional teacher-based teaching model has limitations in the presentation of clinical situations and repeated skill training. Based on the practice of higher vocational surgical nursing teaching, this paper reviews the teaching status quo, analyzes the application value of information-based teaching in stimulating learning drive, improving practical training operation and supporting personalized learning, constructs the practice path from the aspects of resource platform construction and teaching evaluation implementation, and puts forward optimization strategies for existing problems, in order to provide reference for the reform of higher vocational surgical nursing teaching.

Keywords: Information-based teaching; Higher vocational education; Surgical nursing; Blended teaching; Virtual simulation

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1. Introduction

Since the implementation of the Healthy China strategy, the ability requirements of nursing practitioners have been continuously improved. Surgical nursing connects basic medicine and clinical practice, and its teaching quality directly affects whether nursing students can be qualified for their posts in the future. Higher vocational nursing education has always been oriented by job demand, emphasizing both theory and practice. In recent years, information technology has gradually entered the classroom, and resources such as intelligent vocational education platforms, virtual simulation systems, and micro-lectures have been applied, which provide new ideas for solving problems such as limited clinical probation opportunities, high cost of operational training, and large differences in students' foundations in external nursing education. Previous studies have shown that the intelligent teaching model supported by knowledge graph can promote the

adjustment of teaching structure and process in higher vocational external nursing, and the virtual and reality integration curriculum reform can indeed improve students' learning engagement. However, the application of information methods in external nursing teaching is still not deep enough, and scattered resources are common. The course of external nursing requires both theory, operation and clinical thinking, and the necessity of teaching reform is relatively prominent. The following three aspects are presented from the application value, practice path, and optimization strategy, for the reference of first-line teaching.

2. Current development status and contemporary opportunities for surgical nursing education in higher vocational education

2.1. Inherent limitations of traditional surgical nursing teaching models

Surgical nursing involves perioperative nursing, operating room cooperation, common disease nursing and many other contents. The knowledge points are trivial and closely related to the clinical situation. Traditional classroom teaching is mainly based on teachers' teaching and demonstration, and students passively accept it, so it is difficult to form a clinical thinking chain independently. Due to the limitations of model resources, operating space, and patient privacy, the opportunity for students to practice repeatedly is limited, the operation is standardized, and scene response is not fully exercised. In addition, real cases could not be reproduced, the dynamic process of surgical cooperation could not be restored only by classroom teaching, and students lacked perceptual knowledge of aseptic technology, intraoperative cooperation and other key links. In addition, if the wrong movement formed by students in repeated practice is not corrected in time, it is easy to solidify into bad habits over time, which may pose a safety hazard in the future [1].

2.2. Development opportunities arising from the digital transformation of vocational education

Since the advancement of education digitalization, the teaching methods of vocational education are undergoing profound changes. Most higher vocational colleges have built smart campuses and online course platforms, and the popularity rate of students' intelligent terminals is high. The basic conditions for the implementation of information teaching have been met. The digitization of teaching resources, the datalization of the teaching process, and the precision of learning evaluation have gradually become the direction of reform. Some studies have pointed out that by relying on artificial intelligence teaching resources and knowledge maps, students can be supported before, during, and after class, and their clinical decision-making ability can be gradually developed. This prompts teachers to rethink the curriculum content organization and teaching implementation methods, and the classroom is changing from knowledge teaching to ability training. The national vocational education digital strategic action continues to advance, and the policy and platform conditions for the co-construction and sharing of curriculum resources and inter-school cooperation are also gradually improving [2].

3. Core application value of digitalized teaching in empowering surgical nursing education in higher vocational colleges

3.1. Tailoring instruction to individual differences to foster students' intrinsic motivation to learn

Information technology can transform the abstract anatomical structure and surgical process into graphics,

animations, and videos, and the learning threshold is reduced through intuitive presentation. Students can watch the demonstration repeatedly at their own pace, and turn from passive listening to active exploration. The experience of developing and applying micro-lectures in operating room nursing teaching shows that short video resources are convenient for students to use fragmented time to preview and review, and their learning participation is significantly improved. Through task push, online tests, and discussion interaction, the feedback between teachers and students is more timely, and students' learning interest and professional self-efficacy are also enhanced. Students are no longer simply knowledge recipients, and the breadth and depth of classroom participation have been expanded. The entry basis of higher vocational students is quite different, and it is difficult to take into account the needs of different levels in the classroom with uniform progress. The information platform can record the learning time, test scores and error distribution, and teachers can identify the weak links and push the corresponding resources. The intelligent teaching model supported by a knowledge graph can provide a personalized learning path and intelligent question-and-answer, so that the teaching of external nursing can transition from step-by-step teaching to individualized teaching [3]. The practice of transitional nursing teaching in secondary and higher vocational schools also shows that the intelligent teaching platform combined with video feedback can provide accurate guidance for students' specific problems in operation. Students with slow learning progress can go back to the difficult points, and students with spare ability can access the expanded content, and the overall pace is more flexible.

3.2. Leveraging virtual simulation to enhance the practical applicability of hands-on training instruction

External nursing training emphasizes hands-on operation ability. Virtual simulation technology can construct high-fidelity surgical scenes and nursing processes, so that students can repeatedly practice aseptic operation, posture placement, intraoperative emergency cooperation and other key content in a risk-free and repeatable environment, and operational errors will not cause practical consequences. Some studies found that the operation performance and teaching satisfaction of junior college nursing students trained by a virtual reality system were significantly better than those of the control group who only watched the demonstration video. The combination of virtual and reality training modes, on the one hand, alleviates the practical difficulties of students in clinical probation, on the other hand, it also reduces the safety risks and consumables costs brought by the real operation, so that the operation skills can be repeatedly polished under the condition of low cost [4]. In addition, the virtual system can also set up high-risk sudden situations such as massive hemorrhage and cardiac arrest, which are difficult to reproduce in real training.

4. Construction of a practical pathway framework for information-based teaching in surgical nursing in higher vocational education

4.1. Build an information-based teaching resource platform centered on core skills

Focusing on the core skills of external nursing and typical cases, the teaching team organized the operation cooperation process, common nursing techniques, common complication observation, and other content, which were broken down into several teaching units of five to ten minutes and recorded into micro-courses. The resource construction should be close to the needs of the position, integrate real clinical cases and operation points into it, and set up thinking questions and online question banks to facilitate students' preview before class and consolidation after class. Resources should be continuously updated after being

online to form a retrievable and reusable resource library to avoid scattered storage and inconvenient calling of materials. Technical standards and metadata specifications should be unified to facilitate subsequent migration and sharing between different platforms [5]. At the same time, based on the virtual simulation experiment teaching project, a virtual training module for external nursing should be built, and key links such as preoperative preparation, intraoperative cooperation, and postoperative monitoring should be covered. After the students completed the operation in the virtual environment, the system automatically recorded the steps and gave scoring and error-correction prompts, and the teacher focused on the common problems. The practice of virtual and reality integration curriculum reform in higher vocational nursing shows that under this model, students' scores can maintain a high level, and their first aid literacy and learning engagement are significantly improved compared with those before the reform. The virtual training was connected with the physical operation. The process was familiarized in the simulation environment first, and then returned to the training room to consolidate the operation feeling, and the training efficiency was improved significantly.

4.2. Implement a diversified teaching evaluation mechanism throughout the entire learning process

Before class, micro-lectures and preview tests were pushed on the platform, and students entered the class with questions. The class focused on case discussion, operation exercises and difficult questions, and carried out interactive and inquiry-based learning. After class, the development task and online assessment were completed through the platform. The experience of external nursing teaching reform with three-chain collaboration shows that the three scenes before class, during class, and after class are connected, which helps students build their knowledge system, and their clinical decision-making ability can be gradually improved. On this basis, the past single evaluation method based on the final theory examination was broken, and the online learning behavior, virtual simulation operation score, classroom performance, practical training assessment and clinical probation evaluation were all included in the comprehensive scores. With the help of platform data, learning portraits are automatically generated, and the learning process can be dynamically monitored. The application effect of the intelligent teaching platform combined with video feedback also confirmed that the process evaluation and immediate feedback were helpful in detecting and correcting operational errors early, and teaching satisfaction was improved. The evaluation results are fed back to the students in time, their own shortcomings can be clearly seen, and the learning will form a positive cycle.

5. Realistic challenges and optimization strategies for information-based teaching in surgical nursing at higher vocational education

5.1. Analysis of current practical challenges in the advancement of information-based teaching

The information resources of some colleges and universities are still mainly based on ready-made video delivery. Combined with the characteristics of students in our school, the originality of the docking job needs, the lack of systematic resources, and the lack of correlation between resources, it is difficult to support coherent clinical thinking training [6]. The construction cost of virtual simulation projects is high, updates and maintenance are not timely, and there is a certain disconnect with the latest clinical guidelines and operating standards; some resources only exist as electronic translations of classroom videos, interactive and exploratory design is insufficient, and students' thinking is difficult to mobilize. In addition, information

teaching puts forward higher requirements for teachers' ability in resource development, data application, and classroom design. Some experienced teachers are slow to accept the new technology, and the teaching is still stuck in the traditional mode of PPT and lecture. Although young teachers are familiar with the operation of the platform, they tend to attach importance to the form and neglect the connotation, and the technology is out of touch with the teaching content. If the school fails to follow up on financial investment, technical maintenance, and incentive mechanisms, the enthusiasm of teachers will also be affected. Moreover, if the information-based teaching is not tightly connected with clinical practice and post standards, it is easy to become a technical demonstration in the classroom. Some virtual case scenarios are outdated, and there is a gap with the real hospital workflow. The experience accumulated in the simulation environment is difficult to transfer to the clinic directly, and the training of students' job adaptability is still insufficient.

5.2. Exploring information technology-based teaching optimization strategies aligned with job requirements

School-hospital cooperation and school-enterprise cooperation are encouraged. School teachers and clinical front-line nursing backbone jointly develop resources, transform real cases, standard operating procedures, and the latest guidelines into digital teaching materials, and then integrate the curriculum resource database based on a knowledge graph to realize the correlation and push of knowledge points and avoid scattered accumulation of resources [7]. At the same time, a regular update and review mechanism for resources should be established to ensure the scientific validity and timeliness of the content. It can also learn from the experience of the existing intelligent teaching model to promote the synchronous update of curriculum resources and clinical post cases. Its teaching ability should be included in teacher training and assessment, and teachers' resource development ability and data literacy should be improved through teaching workshops, teaching competitions, and enterprise practice. Interdisciplinary teaching teams should be established, clinical teachers and educational technicians should work together to prepare lessons, guide technology to serve teaching objectives, and avoid informatization for the sake of informatization. The teaching content was reverse-designed according to the requirements of nursing post ability, and the virtual simulation training was closely linked with clinical probation and practice, so as to promote the progress of classroom-virtual-clinical step by step. Referring to the experience of virtual and reality integration curriculum reform, the vocational qualification standards and skills competition requirements are integrated into the whole process of informationized teaching, and students gradually complete the internalization of vocational ability in the transformation of simulation and real scenes.

6. Conclusion

Information-based teaching has injected new vitality into the classroom of external nursing in higher vocational colleges. Its value lies not only in the update of technical means, but also in promoting the transfer of teaching focus from teachers' teaching to students' learning. This transformation has deep significance for the improvement of curriculum quality. From micro-lecture resources and virtual simulation to blended teaching and process evaluation, information means run through all aspects of pre-class, in-class and after-class, and some long-term problems in external nursing teaching are expected to be alleviated. At the same time, resource construction, teacher quality and work-study connection still need to be improved. Higher vocational colleges should closely follow the needs of positions, rationally choose technical tools, so that

information means can effectively serve the improvement of the quality of nursing personnel training.

Disclosure statement

The author declares no conflict of interest.

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