Research on the Construction and Management System of Oral Medical Technology Training Bases

Tian Chengcheng[1,#], Cao Yanhua[1], Chen Dequan[1], Chen Zhuo[1,#], Zheng Peng[1], Chen Huifang[1,2,3,4*]

[1]College of Medical Applied Technology, Guangdong Lingnan Institute of Technology, Guangzhou, 510663, China
[2]College of Pharmacy, Guangdong Lingnan Institute of Technology, Guangzhou, 510663, China
[3]College of Chemistry & Pharmacy, Guangxi Normal University, Guilin, 541004, China
[4]Medical & Health College, Guangzhou Pearl-River Vocational College of Technology, Guangzhou, 511300, China
[#]Tian Chengcheng and Chen Zhuo contributed equally.
*Correspondence author: chf@lnedugroup.com

Abstract: This article explores and studies the construction and management system of dental technology training bases. In response to the current situation and existing problems in the construction of training bases, this article focuses on analyzing the importance of industry education integration and emphasizes the necessity of introducing new technologies and equipment. To enhance students' comprehensive practical abilities, a training base construction strategy guided by the integration of industry and education, the combination of reality and virtuality, and the improvement of the curriculum system is proposed, with the construction of a four-dimensional integrated system management system as the starting point. By integrating real enterprise cases, adopting virtual simulation systems, increasing investment in digital equipment and software, strengthening the construction of "dual teacher" teacher teams, enhancing the application of intelligent teaching platforms, and integrating vocational skills competition standards into curriculum norms, students' practical abilities and teamwork abilities are effectively improved, and high skilled applied talents in the field of oral medicine technology that are more in line with future development needs are cultivated.

Keywords: Oral Medicine Technology; Training Base; Integration of Industry and Education; Combination of Virtual and Real; Management System

1. Introduction

On December 21, 2022, the General Office of the Communist Party of China Central Committee and the General Office of the State Council issued the "Opinions on Deepening the Reform of the Modern Vocational Education System", which pointed out that "based on enhancing the key capabilities of vocational schools and focusing on deepening the integration of industry and education, we should effectively improve the quality, adaptability, and attractiveness of vocational education, cultivate more high-quality technical and skilled talents, skilled craftsmen, and national craftsmen, and timely introduce new methods, new technologies, new processes, and new standards into educational and teaching practices. The advantage of vocational education is to cultivate high skilled talents. Oral medicine technology is a highly practical and applied discipline that requires students to have a solid theoretical foundation and proficient hands-on abilities[1-3].

The training base is an important place to cultivate students' innovative thinking and comprehensive professional qualities, as well as an area for students to conduct daily practical operations. At present, there are many problems in the practical training and teaching of oral medicine technology, such as incomplete equipment, single teaching mode, and imperfect management. In recent years, with the popularization of digital technologies such as CAD/CAM and 3D printing, and the continuous emergence of new technologies, the urgent problem in the field of oral medicine technology education is how to keep the construction of training bases up with the pace of industry development and enhance students' comprehensive competitiveness. The key to deepening teaching reform lies in practical training bases. As a bridge between theory and practice, innovating the construction and management

path of practical training bases is of great significance in promoting the modernization process of dental technology education[4-5].

2. Analysis of the Current Situation of Training Base Construction in Vocational Colleges

2.1 Vocational colleges have basic training and teaching bases, but they cannot meet the requirements of high-level teaching

Although many vocational colleges have established basic training and teaching bases, providing students with practical training places, the equipment and devices used in these training bases are relatively traditional and outdated, and the equipment updates have not kept up with the speed of technological progress in the industry. Some colleges even use training equipment that has been eliminated by enterprises, and the teaching equipment in the training bases does not meet the teaching needs. Some universities still remain at the stage where teachers operate demonstrations on the podium and students watch around the teachers. The teaching methods are relatively traditional, which can indeed allow students to learn relevant theoretical knowledge. However, students themselves rarely have the opportunity to practice independently, and the feeling of watching others operate is completely different from practicing in person. Universities should focus on narrowing the gap in the quality of vocational education, ensuring that teaching equipment can keep up with the times and keep pace with the development of the times[6-9].

2.2 The training base lacks digital tools that combine traditional craft techniques with teaching practice, which cannot keep up with the requirements of the times

Due to insufficient investment, many vocational colleges' training bases lack digital tools that combine traditional craft techniques with teaching practice, which cannot keep up with the requirements of the times. As a result, the mastery of digital craft techniques only stays at the theoretical level. This situation not only restricts students from learning the latest technologies in a timely manner, but also reduces their ability to keep up with future trends in the medical industry. When students enter an advanced technology enterprise for internship or work, without experience in operating high-end equipment, it will be difficult for them to adapt to the position. It may even undermine students' confidence in their work.

2.3 Lack of high-level teaching team

At present, the quality of the teaching staff in the field of oral medicine technology is uneven, and there is an urgent need to improve the existing teaching staff. Due to the characteristics of the development of oral medicine technology, it is difficult to recruit teachers for this major. Among many vocational colleges, the teachers who undertake practical teaching are still from the background of oral medicine. These teachers have sufficient theoretical knowledge, but lack practical experience in denture enterprises, resulting in insufficient practical teaching ability; To solve the problem of teacher shortage, vocational colleges have lowered the threshold for recruiting full-time teachers. Some undergraduate students majoring in oral medicine technology directly enter the college after graduation, lacking a certain number of years of work experience and practical experience in enterprises. This makes it difficult for teachers to provide professional skills and practical teaching concepts when guiding students. The quality of the teacher team directly affects the teaching effectiveness of the training base and the improvement of students' practical operation skills. Improving the professional skills and practical operation level of teachers and building a high-level team of oral medicine technology teachers has become an urgent problem to be solved.

2.4 Deep integration of school enterprise cooperation has not been achieved

The degree of integration between school enterprise cooperation is insufficient, and the mechanism of cooperation between school training bases and enterprises is not sound. Although school enterprise cooperation is regarded as an important way to improve teaching quality and strengthen students' employment ability, in practical operation, this cooperation model often appears superficial and lacks practical cooperation content. Insufficient investment by enterprises in the development and design of school training courses in school enterprise cooperation results in a certain deviation between the course content and the actual needs of the enterprise, making it difficult for graduates to quickly adapt

to their job positions and achieve seamless integration between graduates and job skills.

3. Construction Strategy of Training Base

In order to adapt to the professional characteristics and development trends of oral medicine technology, it is urgent to strengthen the construction of training bases and management systems. The following thoughts and suggestions are proposed:

3.1 Strengthen the Integration of Industry and Education

Practical training is integrated with real cases of enterprises, and project-based teaching is carried out with enterprises and medical institutions, allowing students to solve practical problems in clinical practice through projects. For example, teaching cases such as oral restoration design, 3D printing, and implant guide plate implantation are the core content of practical teaching projects. They are learned in a simulated work environment, integrating theory and practice in teaching. By incorporating real cases, students are exposed to advanced technology and new process flows, deeply understanding and mastering professional skills, and cultivating their comprehensive practical abilities. Add bricks and tiles to their future career paths.

Firstly, the authors advise the institute to Build an integrated base of "education industry research" and implement the dual scenario transformation between "campus training base and enterprise practice center" and to organize regularly professional teachers to attend professional skill enhancement training in enterprises. Full time teachers should study full-time in enterprises for at least one month each year, learning the most advanced production technology and new industry standards of enterprises, and applying them to teaching to cultivate practical talents that meet industry needs. Secondly, the authors suggest institute should encourage teachers to actively collaborate with enterprises on practical projects and patent research and development, so as to enhance their practical skills and scientific research abilities. Thirdly, the authors advise the institute to invite enterprise mentors to participate in professional teaching curriculum design and textbook writing, so as to integrate teaching, production, and research, and make teaching content more in line with industry development trends.

3.2 Virtual Reality Integration Orientation

It is very important for the institute to integrate virtual simulation systems into the teaching process, by using advanced VR (virtual reality) and AR (augmented reality) technologies to simulate various complex clinical scenarios, and to build highly realistic practical teaching environments in order to create new immersive and interactive teaching experiences, and then to construct a progressive practical teaching mode of "virtual reality combination+job scenario" Vocational colleges should make the vocational teaching platform of virtual simulation technology demonstrate significant advantages in the field of medical education, break the regional limitations of traditional teaching, and effectively expand the radiation range of teaching resources with its spatial crossing characteristics, so that students from different places can enjoy educational resources. Vocational colleges should integrate practical teaching courses based on the real job scenarios of enterprises, such as full denture arrangement, implant guide plate implantation, orthodontic scheme design and other professional skill operations. Students can log in to the platform to experience the charm of digital tooth arrangement, implant guide plate design, and orthodontic design, broaden their horizons, and stimulate their interest in course learning.

Increase investment in digital equipment and software. The dental restoration industry is developing towards digitization, networking, and intelligence. The application of digital technology has put forward new requirements for the abilities of dental technicians and provided guidance for the training direction of students majoring in dental technology. In recent years, the oral restoration technology vocational skills competition has set up a digital restoration project for the oral cavity, further clarifying the development path of "on-the-job course competition certificate" integrated education and improving the quality of talent cultivation. The digital device cluster plays a crucial role in teaching applications, including CAD/CAM, intraoral scanning systems, 3D printing, etc. The intraoral scanner can quickly and accurately capture the soft and hard tissue conditions in the patient's mouth, CAD/CAM can help technicians complete the design, layout, and cutting of oral restorations, and the designed denture models can be printed out through 3D printers. The comprehensive application of digital technology not only improves the accuracy of denture production, but also shortens the production cycle of oral

denture restoration components. In the process of teaching practice, by teaching digital modules and visualizing the process, students can have a clearer understanding of the overall process of making oral restorations. The application of digital technology can also reduce the workload of teachers. Teachers can directly record students' operating conditions through system operations and correct students' errors in a timely manner. The investment in digital equipment and technological innovation have broken students' inherent understanding that oral medicine technology is just assembly line work, dirty, messy, and poor employment environment, increasing students' sense of professional identity and enhancing their enthusiasm for learning [1-2].

3.3 Improve the Construction of the Curriculum System

Based on market demand, develop courses related to "Oral Digital Restoration Technology", focusing on teaching how to use advanced digital technology to implement efficient oral restoration plans. With the increasing awareness of aesthetics, the aesthetics of anterior teeth have been highly valued, and the teaching design of aesthetic foundations and oral medicine aesthetics courses should meet the needs of the industry. Due to the significant impact of anterior teeth on facial aesthetics, it is recommended to increase the practical hours of dental aesthetics and incorporate practical cases of anterior tooth restoration design to enhance students' practical skills. In addition, developing modular and personalized courses to meet the constantly changing job market demands of vocational college graduates is very important. Students choose corresponding modules of courses based on their interests for learning. The development of these courses not only enriches the teaching content, but also provides students with more diverse learning methods, enhances their learning enthusiasm, and enables them to better adapt to the development of future oral medicine technology related fields. The course content is regularly updated to meet the requirements of positions such as dental restoration makers and dental technicians in new industries, formats, and models. By studying the new demands of the dental technology industry and continuously introducing cutting-edge technology and theoretical knowledge into the curriculum system, students can timely grasp the latest industry trends and enhance their professional competitiveness. Increase practical teaching hours. In 2025, the Ministry of Education issued the "Teaching Standards for Oral Medicine Technology Majors (Higher Vocational Education Majors)". The standard states that in principle, practical teaching hours for vocational majors should not be less than 50% of the total hours. The new standard has increased the cultivation of practical operation opportunities for students, enabling them to have good professional qualities and comprehensive abilities, and meet the core skills required for the position.

Strengthening the "dual teacher" teaching team, the core competency of "dual teacher" teachers is mainly professional practical ability [9]. For example, Guangdong Lingnan Vocational and Technical College, together with Shenzhen Kangtai Fitness Medical Technology (Shenzhen) Co., Ltd. and Shenzhen Kangtai Health Medical Technology Co., Ltd., jointly formulated full-time teacher skill improvement training, hired senior technical personnel from enterprises to serve as part-time teachers in schools, integrated high-quality talent resources both inside and outside the school, and created a "dual teacher" teaching team, which can promote the overall quality improvement of teachers, combine practical experience with theoretical knowledge, and students can receive practical skill guidance closely related to actual work needs while receiving theoretical teaching, cultivating practical talents with practical operation ability for enterprises.

With the help of intelligent teaching platforms and AI interactive tools, students are provided with diverse interactive tools that cover multiple knowledge fields, from professional basic knowledge to advanced skill knowledge. The interactive tools include scenario simulation, real-time Q&A, etc. AI empowers teaching, builds a bridge for teacher-student interaction, and improves students' participation and learning enthusiasm in the classroom. The time and space freedom of the intelligent teaching platform is high, and students can independently set their learning trajectory and choose appropriate learning resources according to their personal cognitive characteristics and knowledge needs, thereby optimizing the function of knowledge acquisition and achieving highly personalized learning styles.

Vocational colleges should meet the requirements of vocational skills competitions, integrate core vocational ability competition content into curriculum teaching, conduct irregular training on various modules of oral medicine technology projects for students, cultivate students' professional practical level, adopt disruptive teaching reforms, take content as the core and task as the driving force, simulate competition scenarios of practical operations, and students can use practical simulations to clearly understand their own knowledge blind spots, and then improve and enhance their comprehensive abilities in a targeted manner, realizing the improvement of students' self-learning ability. Inviting experts in the field to conduct special reports and share experiences allows students to keep up with the

latest developments in the industry, accept the latest research results and clinical experience. Such activities not only play a significant role in building a complete professional knowledge system, but also open up a broader academic perspective for students [3-4].

Teaching teams should adopt project-based teaching methods more often, advocating students to use teamwork to complete the production of real cases of oral restorations, in order to enhance their practical abilities and teamwork skills, accelerate the pace of interdisciplinary integration, integrate knowledge from multiple fields such as dentistry, oral materials science, biomechanics, digital technology, etc., and help students improve their comprehensive application abilities. The integration of project-based learning and interdisciplinary courses can comprehensively upgrade the curriculum system of practical training bases, providing students with more abundant, effective, and challenging learning resources. By building student entrepreneurship projects and practical bases, students' research and practical innovation abilities can be improved. Taking the "5+3" innovation and entrepreneurship project as an example, a team of 5 students experiences 5 different corporate job roles, 3 types of innovative projects, and 3 mentors provide theoretical and technical support and guidance, truly integrating 5+3 into professional learning. When the project is put into practical operation, it can rely on the internal "College Student Innovation and Entrepreneurship Incubation Park" and the Industry Education Integration Base of the school. The school has set up an advanced and open research environment, encouraging students to engage in innovative activities across fields, participate in practical projects and internship activities, and make reasonable use of the school's resources. Under the careful guidance of mentors, students can deepen their theoretical knowledge and master research related methods during the practical period, thereby enhancing their ability to deal with practical problems and innovate and start businesses.

3.4 Construction of the "Four Dimensional Integration" Institutionalized Management System

3.4.1 Institutional Dimension

The management department of the training room should formulate relevant regulations and rules, such as the "Training Room Management and Safety Regulations" and "Equipment and Instrument Operation Procedures". Management personnel must be clear about their job responsibilities and authorities, ensure that the training site meets the requirements of standardized regulations during daily operation, and based on this foundation, adopt modern information management mode to implement full process control of the practical teaching base, ensure the orderly operation of the professional practical training base, and require students to implement relevant regulations during the training process. When operating equipment, they must strictly follow the operating procedures to ensure students' personal safety and implement standardized training operations.

3.4.2 Technical Dimension

Vocational colleges should introduce advanced IT systems to implement comprehensive real-time monitoring and dynamic management of consumables inventory and equipment status. The working status information of the equipment can be collected in real time through intelligent sensors and wireless communication technology, and the inventory data of consumables can be updated in real time. At the same time, establish a comprehensive functional platform for managing practice materials in practical work. After students complete the teaching tasks assigned by the teacher in the system, the operation trajectory and data information of each task can be accurately recorded by the system. The backend can automatically generate detailed skill scoring standards, and the system can automatically complete the grading of student assignments. Teachers can also customize the evaluation mode of the system, achieving a combination of online system grading and teacher grading [9-11].

3.4.3 Evaluation Dimensions

The management of practical training teaching should be evaluated from three dimensions: process evaluation, comprehensive assessment, and enterprise feedback. Process evaluation mainly focuses on the status and performance of students in their daily learning process, while comprehensive assessment mainly focuses on students' comprehensive learning achievements. Enterprise feedback presents students' practical situation and work ability in the actual work environment. This multidimensional evaluation system can comprehensively and accurately evaluate students' comprehensive quality and skill level. At the same time, professional skill level certification standards can be introduced and integrated into 1+X certificate courses, such as the assessment standards for dental restoration system teachers, as the core content reference of the management system of the training base. Through three years of theoretical and practical training, students' vocational skill level can meet the requirements of

advanced restoration system teachers [11].

3.4.4 Collaborative Dimension

Vocational colleges should promote deep cooperation between schools and enterprises to cultivate vocational talents. Both parties should jointly apply for educational and teaching research projects, and jointly build technological innovation research and development platforms to promote the deep integration of theoretical teaching and practical application. They should build and optimize a "school school enterprise" three in one resource coordination system. For example, the Oral Health Industry Education Integration Community, led by Hunan Huaxiang Dental Medical Technology Development Co., Ltd., brings together vocational colleges, dental hospitals, and enterprises from all over the country to hold academic seminars from time to time to jointly explore the construction and training of dental technology majors, enhance the effectiveness of resource allocation, and achieve the deep integration of the oral health industry education chain, industry chain, and talent chain, To cultivate dental technology professionals with both theoretical literacy and practical abilities for social development.

4. Actual Cases and Effects

Guangdong Lingnan Vocational and Technical College has established a dental technology practice training base of over 600 square meters, with 6 practical teaching and training rooms, including traditional craft restoration room, digital craft restoration room, clinical simulation room, technician preparation room, etc. The dental restoration process equipment is fully equipped, and the investment in software and hardware of the teaching base has exceeded 6 million yuan. The training base can enable 200 students to start classes simultaneously. Gradually expanding the scale of teaching staff, currently there are 15 full-time teachers and 20 part-time teachers in the field of oral medicine technology, including 5 dentists and 7 dental technicians, and 10 dual teacher teachers. The school has established joint talent training bases and "Factory Colonel" practice centers with over 50 medical institutions, including Jinan University Suihua Dental Hospital, Qingyuan Zhongda Dental Hospital, Hunan Huaxiang Dental Medical Technology Development Co., Ltd., Kangtai Bodybuilding Medical Technology (Shenzhen) Co., Ltd., Shenzhen Kangtai Health Medical Technology Co., Ltd. and other medical institutions and enterprises. Through the completion of the training base, Guangdong Lingnan Vocational and Technical College has increased the number of professional practical teaching hours, and teachers have tracked and guided operations, resulting in an increase in the frequency of students winning awards in professional skills competitions. Winning students have been locked in to employment positions by employers in advance, improving their competitiveness in employment.

5. Conclusion

The members of our research group have conducted research on the construction and management system of dental technology training bases, collaborated deeply with enterprises, continuously introduced emerging technologies and advanced devices in the industry, and built an efficient practical teaching base that adapts to teaching development and is close to market demand, achieving the ecological construction and coordinated progress of the education chain, talent chain, and industry chain. The members of our research group fully utilize advanced technologies such as digital technology and artificial intelligence in the application examples of the oral denture industry during the teaching process. While improving the teaching quality and management level of the practical teaching base, they can also promote the transformation of the practical teaching base towards "intelligence, automation, and ecology". The teaching team, with the integration of industry and education, the combination of reality and virtuality, promotes the optimization of the curriculum system and innovation of the management system, effectively enhances students' practical level, and cultivates high skilled applied talents that better meet the needs of the industry.

Acknowledgements

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