The Role of Online Education in the Post-Epidemic Era

A Focus on Stomatology Practice

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Abstract. In the information age, online education has become an indispensable part. The combination of ' Internet + ' has obviously become the general trend. The emergence of the epidemic at any time has greatly stimulated the implementation of online education. Stomatology, as a practical research field, relies heavily on practical experience to train dentists. In the context of the post-pandemic era and the information age, combined with the existing oral medicine learning experience, the great potential provided by the Internet is used to explore new ways of information-based internship. Based on the investigation and research, this paper summarizes the views of oral medical interns on online and offline internship models. Then, it summarizes the advantages of oral information practice and learning, and provides a reference for exploring oral information education. Finally, it provides a summary and prospect for future oral medical information education. We hope that the mode, content and advantages of information technology reviewed in this article can help the majority of dental students and even other professional students to better invest in learning and practice, combined with the means of information-based learning, greatly improve the efficiency and quality of our education.

Keywords: Internet, epidemic, stomatology, online internship.

1 Introduction

The Ministry of Education has issued the "Opinions on Strengthening the Application and Management of Online Open Course Construction in Colleges and Universities,"

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aiming to promote the application of online courses and innovate teaching models. In response to the dynamic digital landscape, this marks a shift from traditional offline internships to online internships for medical students[1].

Aligned with the insights presented in the 2020 Horizon Report and articulated by the American Association for Higher Education, educators widely acknowledge the importance of students' independent learning before class. The 'Teaching and Learning Edition' categorizes 'Online Education' as a temporary measure during the epidemic, with a foreseen persistence of online education as an essential component of future higher education. This underscores its position as one of the three crucial trends in higher education developmentd, and the coronavirus epidemic has promoted online education[2]. However, the field of dental education has undergone a transformative shift towards online platforms, necessitating a reexamination of conventional approaches to practical dentistry training. This paper provides a comprehensive overview of implementation models and strategies for online dental practicum within the context of the "Internet Plus" era.

2 Objects and Methods

This study explores dental education, specifically focusing on cultivating talent to contribute to the reform and progress of medicine and health. It compares information-based teaching models with traditional practice-based ones. The findings and implications are summarized below. Totally 136 dental interns from 2021 to 2023 were selected, The survey items included: mastery of theoretical knowledge, improvement of clinical practice skills and so on.

Table 1. Comprehensive evaluation of online internship by dental interns

Subject Matter	Avail		NoHelp		General	
	n	%	n	%	n	%
Theoretical knowledge	130	95.59	0	0	6	4.41
Clinical practice skills	110	80.89	9	6.62	17	12.50
Learningmotivation	125	91.91	6	4.41	5	3.68
Ananlyzing date	119	87.50	2	1.47	15	11.03
Training clinical thinking	131	96.32	0	0	5	3.68
Antonomous learning	123	90.44	12	8.82	1	0.74
Absorbing learning	133	97.79	1	0.74	2	1.47
Team cooperation	113	83.09	12	8.80	11	8.09

The results show that pedagogical evaluation of online internships by dental students is shown in Table 1. Comparison of the effect of online and offline internships provides a certain theoretical basis and a solid foundation for exploring the practice of informative dentistry. Under the new situation of the Internet, offline internships for medical students are transitioning to online internship models [3].

3 The Advantages of Online Internship

3.1 The Realistic Convenience of Online Internship

In stomatology, traditional clinical practice teaching faces limitations, exacerbated by the expansion of student enrollment and an increased number of interns. This surge compromises the quality and effectiveness of clinical practice due to physical space constraints and visibility issues. Hospitals often struggle with limited seating capacity, particularly during oral treatments where viewing angles and visual acuity pose substantial barriers. Interns face challenges commuting between distant hospitals and schools, and the inconvenience of travel for resident physicians complicates their clinical practice.

Under these circumstances, the notable advantages of online internships become evident, addressing issues associated with crowded traditional offline internship hospitals and limited field of vision. When applied to clinical teaching, telemedicine technology not only addresses the shortage of clinical internship time for students but also mitigates the challenge of direct patient contact. This approach facilitates communication between patients and students, protects students from potential infections, and reduces the waste of medical protective equipment[4].

3.2 Seminar Enhances Communication

In recent years, there has been a notable emergence of teaching seminars, a concept that has gained prominence, particularly drawing inspiration from European educational practices. Within the medical field, the role of seminars has been significantly amplified. In the field of dental medicine practice, educators have the opportunity to foster discussions and learning through lectures or specialized presentations, focusing specificallyont pical clinic ases(Figure 1).

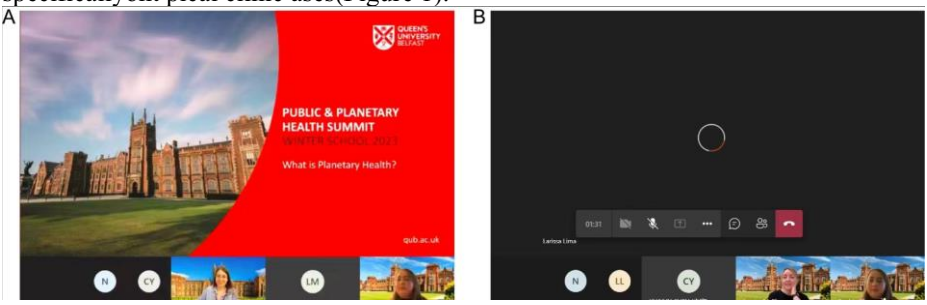

Fig. 1. 2023 Winter Holiday School Online Lectures. (A) School profile. (B) Seminar communication.

This approach is particularly beneficial for oral medicine interns, enabling them to cultivate multidisciplinary collaboration skills and comprehensive disease diagnosis through online case analysis[5]. Transitioning from passive reception to active engagement enhances students' participation, stimulates enthusiasm, and cultivates clin-

ical thinking abilities, resulting in a significant improvement in the competency of dental students.

3.3 Online CAD/CAM System

In recent years, the field of stomatology has undergone a digital leap, driven by the rise and rapid development of computer-aided design and computer-aided manufacturing (CAD/CAM) technology.

The introduction of Prosthodontics CAD/CAM technology dates back to the 1970s and 1980s. one can envision a scenario in which the clinical instructor collects data, sends it to the intern, who then receives the data online, models it on the computer, proposes a treatment plan, and even engages in remote production and transmission. These concepts represent potential applications in online internships. However, compared to previous clinical technologies, dental CAD/CAM technology exhibits a higher dependence on equipment and materials, Moreover, interns need to possess advanced skills in operating online equipment. Nevertheless, it can also serve as a catalyst for honing interns' skills, presenting a crucial advantage of online internships.

3.4 Online Internship of Medical Imaging

Virtual simulation experiment teaching is an inevitable outcome of the ongoing reforms in higher medical education during the information age. The image-based, realistic, convenient, and repeatable virtual experiment environment has established a new learning platform, evolving into a novel mode of medical experiment teaching[6].Students can pass through the computer into the maxillofacial image, through the Winter classification of mandibular impacted third molars, to further understand the familiar oral imaging, exercise the ability to identify oral image(Figure 2).

Fig. 2. Online internship of medical imaging.

This teaching approach transcends the constraints of time and space, overcoming limitations related to venues and instruments. Students can undergo repetitive training without an increase in experimental costs, significantly expanding the content and

scope of their learning experience and providing a genuine "open teaching environment"[7]. This approach not only mitigates the risk of viral transmission and reduces potential conflicts between doctors and patients but also immerses students in a realistic environment, contributing to the enhancement of their comprehensive abilities.

3.5 Application of Virtual Simulation Technology

One notable advantage of online internships lies in their ability to harness the potential of information technology, achieving outcomes beyond the reach of traditional offline internships. A case in point is the virtual training system for microscopic periodontal flaps developed collaboratively by the School of Stomatology at Lanzhou University and UNIDRAW (Figure 3).

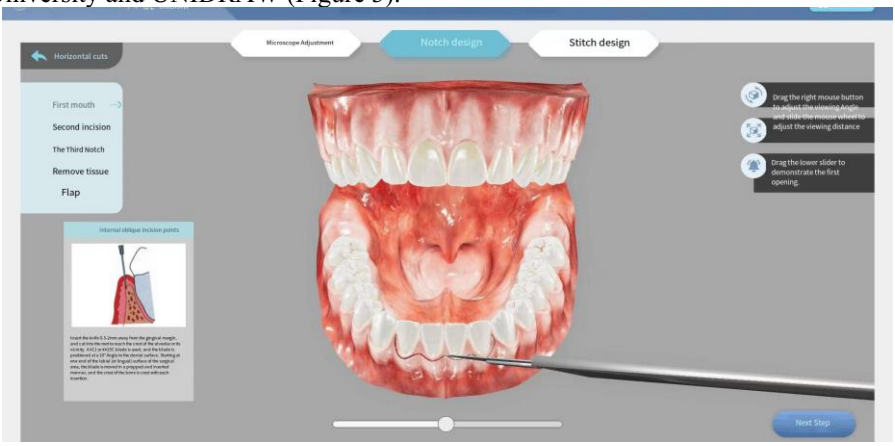

Fig. 3. Virtual training system for micro periodontal flap surgery. (A)Basic knowledge of flap surgery. (B)Notch design. (C)stitching operation. (D)Simulated treatment process.

The basic operation learning module enables students to simulate incision and suture design, featuring a user-friendly interface, repeatable learning opportunities, and clear instructions. The comprehensive case module replicates real clinical scenarios, allowing students to exercise their comprehensive abilities. A key strength of virtual training systems is their capacity to facilitate repetitive learning based on individual needs, free from constraints related to equipment, venues, or other resources. This approach enables students to deepen their grasp of basic theoretical knowledge, establishing a robust foundation for subsequent real-world operations in offline practice.

4 Conclusions

Clinical practice stands as a pivotal component of stomatology education, serving as a crucial juncture for integrating theoretical knowledge with practical skills and transitioning medical students into proficient professional[8]. Exploring effective practice modes for stomatology students is, therefore, of paramount significance.

The virtual learning platform emerges as a sustainable and high-quality educational infrastructure, offering features like virtual anatomy, live demonstrations, and case discussions—an ideal communication and learning platform for clinicians and medical students[9].

With the current outbreak gradually easing, offline practice is resuming. Dentistry as a practical discipline, the combination of online and offline practice mode, has been the general trend. It should be complemented by the breadth of knowledge of information technology and the practical operation of the hospital, so as to complement each other's strengths.

The learning effect of the new model can be judged by the online knowledge level examination, the regular inspection and testing of practical operation in the offline hospital, and the evaluation of the effect of basic dental knowledge and hands-on practical operation.

Through the combination of online and offline internship mode to deepen the clinical internship process, in the training of advanced professional knowledge at the same time, but also to enrich the practical experience, hands-on ability, as well as strong communication skills of dental professionals, to contribute to the community and health care institutions, online and offline combination of dental internship mode, still need to continue to explore the perfect, in order to cultivate high-quality and comprehensive dental personnel to provide a new strategy! It is believed that it will become a general trend of dental internship teaching in the future.

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