

The SWOT analysis of online medical teaching in the context of "Internet Plus" during epidemic prevention and control

Nengliang Duan

Second Affiliated Hospital of Soochow University

Zhixiang Gao

Second Affiliated Hospital of Soochow University

Xiaolong Liu (✉ liurol@163.com)

Second Affiliated Hospital of Soochow University

Zhiyuan Qian

Second Affiliated Hospital of Soochow University

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Abstract

Introduction

At the end of 2019, a new coronavirus suddenly swept the world. In order to prevent the epidemic from spreading to the campus, China's Ministry of Education asked all universities to postpone the opening of school. With the rapid development of Internet technology, the Internet has inevitably become an important teaching way during the epidemic. Online face-to-face communication technology and a wide range of medical network open courses provide convenient teaching conditions for medical students and teachers, but also put forward a great challenge to the traditional medical teaching.

Methods

By summarizing the teaching situation of our hospital during the epidemic, SWOT analysis was used to analyze the advantages, disadvantages, opportunities and threats of network medical education, and put forward corresponding countermeasures and suggestions.

Results

Compared with traditional medical teaching, internet teaching has its advanced and desirable aspects, which is manifested in obvious teaching convenience and rich resources. However, there are also some defects that are difficult to make up in a short time due to the imperfect network development and the distance between teachers and students.

Conclusion

"Internet + education" is the inevitable direction of modern medical teaching reform and development, especially in the special period of epidemic prevention and control. In order to ensure the teaching progress and quality, online teaching is bound to become one of the most effective measures at this stage. This requires medical colleges to actively do a good job in epidemic prevention and control, make full use of Internet resources, strengthen the teacher team-building, improve the assessment and evaluation system and the comprehensive quality of medical students.

Introduction

Every time the emergence of infectious diseases often has a huge impact on millions of people^{1,2}, and now with the increasing cross-linking of the world, it is easier to produce global harm³. An unexplained acute respiratory syndrome coronavirus broke out in Wuhan, in Hubei Province of China in December, 2019, and quickly spread to other areas⁴. On February 12, 2020, World Health Organization (WHO) officially named the disease caused by novel coronavirus as coronavirus disease 2019 (COVID-19)^{5,6}. As of 10 December, over 267 million confirmed cases and over 5 million deaths have been reported. The epidemic has done great harm, and the prevention and control work is urgent. As early as January 27,

2020, in order to stop the spread of the epidemic to the campus, China's Ministry of Education asked all colleges and universities to postpone the opening of school and actively carry out online teaching, so as to ensure the teaching progress and quality during the epidemic prevention and control period, and achieve "stop classes but keep teaching and learning". Today, when the epidemic has not subsided, new cases of COVID-19 continue to be reported everywhere, which is a great pressure on the normal operation of medical teaching⁷. In order to ensure the normal teaching activities of teachers and students, while doing a good job in epidemic prevention and control, our hospital actively carries out online teaching to ensure the teaching progress and quality of medical students. However, in the process of implementation, we found many difficulties. Now we use SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis to analyze the advantages, disadvantages, opportunities and threats of medical online teaching during epidemic prevention and control, and put forward corresponding countermeasures and suggestions, in order to provide reference for the development of internet medical teaching.

Swot Analysis Of Online Teaching In Medical Major Learning During The Epidemic Period

SWOT analysis, or situation analysis, is to arrange various major internal strengths, weaknesses, external opportunities and threats closely related to the research object in a matrix form. Then using the idea of system analysis, the factors are matched and analyzed, and a decision conclusion is drawn^{8, 9}. In this paper, SWOT analysis is used to comprehensively, systematically and accurately study the problems encountered in medical online teaching during the epidemic period, so as to provide new strategies for medical teaching reform. Table 1 summarizes the analysis.

Table 1
SWOT matrix of medical online teaching during epidemic period

Internal and external factors	Strengths	Weaknesses	
	<ol style="list-style-type: none"> 1. Convenient, fast, Instant and efficient 2. Rich resources and solid foundation 3. Personality teaching, pioneering thinking 4. Cultivate autonomous learning ability 5. The most effective measures in special period 	<ol style="list-style-type: none"> 1. Teachers are inexperienced and unable to integrate resources effectively. 2. Talk on paper and lack of practice. 3. The evaluation and assessment system are not perfect. 4. It is difficult to form an effective learning environment. 	
Opportunities	<p>1. Strong support from national policies</p> <p>2. The rapid development of the Internet</p>	<p>S-O strategies</p> <ol style="list-style-type: none"> 1. Make full use of high-quality resources and improve teaching mode 2. Use the epidemic period to consolidate the foundation and expand thinking 3. Improve the comprehensive quality of medical students in combination with national policies 	<p>W-O strategies</p> <ol style="list-style-type: none"> 1. Optimize course design and simulate practical training. 2. Strengthen the construction of teachers, select excellent teachers to teach, and share online teaching experience.
Threats	<p>1. Instability.</p> <p>2. The original teaching plan has been broken.</p> <p>3. Network security</p>	<p>S-T strategies</p> <ol style="list-style-type: none"> 1. Reasonably plan the time and reformulate the teaching plan 2. Strengthen medical humanities and ethics education and maintain Internet security 	<p>W-T strategies</p> <ol style="list-style-type: none"> 1. Formulate phased learning objectives 2. Improve and perfect the examination and evaluation system and improve the teaching quality

Strengths

Online teaching has been proved as an efficient modality of learning in different educational and governmental studies^{10, 11, 12}, relying on the Internet platform, online teaching transfers the traditional physical classroom to a virtual live studio. By making full use of the characteristics of real-time communication and two-way interaction of live broadcasting, medical students are no longer limited by time and space, and can use fragmented time to conduct teaching interaction and learning anytime and anywhere, which is time-saving and efficient¹³. A number of high-quality platforms, such as MOOCs,

Jreenity, And Rain Classroom, offer "micro-courses" of 5 to 10 minutes, the elaborate teaching video enables students to concentrate, fully mobilize their enthusiasm and improve their learning efficiency. For the key and difficult problems, students can watch the replay repeatedly and consolidate the knowledge points in time. Medical colleges and universities at home and abroad have realized the sharing of high-quality teaching resources, students can experience high-quality teaching resources according to their own interests, consolidate basic knowledge and broaden the scope of knowledge at the same time^{14, 15}. Online teaching supports a variety of teaching modes. According to the characteristics of the course, teachers can design personalized teaching plans, break the traditional "cramming" teaching mode, adopt the teaching mode of "student-led, teacher-guided", and use CBL, PBL and other teaching methods for case discussion, which requires students to systematically analyze, examine, diagnose and treat a disease with complete clinical thinking, so as to cultivate students' interest in learning and train the clinical thinking of medical students¹⁶. Online teaching pays more attention to cultivating medical students' ability of independent thinking and independent learning, and guides students to change their role from "want me to learn" to "I want to learn"¹³. Through the learning tasks published by teachers online, combined with teaching videos, students can find out and fill gaps through autonomous learning and literature review, so as to master relevant knowledge points more effectively. During the epidemic prevention and control period, online teaching has become the most effective measure in this special period to reduce population flow and block the spread of the epidemic while ensuring the teaching progress.

Weaknesses

Time is tight, the task is heavy, and most teachers lack online teaching experience and can not effectively integrate various learning resources, resulting in online teaching becoming a teaching mode of "voice or video + PPT". Due to the lack of clinical practice, oral teaching of basic knowledge and clinical experience is difficult to achieve the ideal teaching effect^{7, 17, 18}. For interns and regular trainees, the training of professional qualities such as clinical skills is more important, and online teaching is difficult to achieve^{19, 20}. During the post epidemic period, medical colleges and universities responded to the call of the Ministry of education to carry out online teaching. However, due to the surge in the number of users, the servers of various teaching platforms are unstable, and it is difficult to form an effective learning environment stably. At present, a complete online teaching evaluation and assessment system has not been formed. Teachers cannot effectively control students' learning status. Some students cannot interact effectively with teachers and learn effectively due to their low self-discipline. Therefore, there will be a "Matthew effect" in which the superior is better and the weak is weaker. In addition, for some students in remote and poor areas, due to the limitations of economic conditions, the flow cost of online teaching will undoubtedly increase their living burden.

Opportunities

In 2010, the state required: "strengthen the construction of network teaching resource system and introduce international high-quality digital teaching resources; Develop e-learning courses and establish digital libraries and virtual laboratories; Establish an open and flexible public service platform for

educational resources to promote the popularization and sharing of high-quality educational resources ". In 2015, the "Internet plus" became a national strategy of China. The new concept of "Internet plus education" was gradually advancing in the field of education. In February 2020, in order to ensure the learning and living needs of students with financial difficulties during the epidemic, medical colleges and universities actively gave subsidies to students with financial difficulties to solve their urgent needs. Since the 21st century, the powerful connectivity realized by modern digital tools has brought extraordinary convenience around the world. Social media has created a huge global network and has great power to quickly spread information²¹. Therefore, the rapid development of the Internet and the popularity of mobile communication equipment have also brought great convenience to medical network teaching.

Threats

The epidemic situation is unstable. At this stage, China is facing a complex situation of multi-source and multi-point epidemic in a short time. The normal teaching plans of colleges and universities everywhere are frequently disrupted. Teachers need to learn and master online teaching technology in a short time, be familiar with relevant teaching platforms, and rearrange teaching content and progress. This is a challenge for teachers and students. In addition, the schedule of online teaching needs to be adjusted at any time according to the changes of the epidemic situation, but the changes of the epidemic situation are uncertain, resulting in uncertainty in the actual operation of online teaching during this period. Medicine is a science based on practice, and its particularity exists in teaching. If some medical materials, such as anatomical pictures, clinical operations or surgical videos, are leaked to the public platform, it will seriously affect the network environment, not only cause public discomfort, but also cause the disclosure of patients' privacy, which is a severe test for Internet security²².

Countermeasures And Suggestions

Advantage - opportunity strategies

During the epidemic prevention and control period, teachers and students actively responded to the call of the government, cooperated with each other, formulated personalized teaching plans while avoiding the spread of the epidemic, made use of online high-quality resources and tools, fully mobilized the learning enthusiasm of medical students and consolidated the medical foundation through flipping classroom, case discussion and other forms, and flexibly used 3D, AR²³ and AI Q&A technologies, Develop clinical thinking and improve the comprehensive quality of medical students.

Advantage-threat strategies

Reasonably plan the time and reformulate a flexible teaching plan to ensure that the teaching can be quickly switched between online and offline. Actively carry out medical humanities and ethics education, and guide students to correctly and standardized use of medical teaching resources. Protect patient privacy and jointly maintain Internet security²¹. Pay attention to students' physical and mental health and

establish correct outlook on life and values, so that medical students can bear the sacred responsibility of guarding life with a benevolence and love.

Disadvantage-opportunity strategies

According to the characteristics of medical courses, optimize the online course design, fully integrate theory and reality through online theoretical teaching, online simulated consultation and remote interaction with clinicians, actively carry out online discussion and train their team cooperation consciousness and adaptability while paying attention to cultivating medical students' autonomous learning ability. Strengthen the construction of teachers, make rational and efficient use of Internet resources, select excellent teachers to teach and share online teaching experience.

Weaknesses-threat strategies

According to the changes of the epidemic situation, formulate phased learning objectives, improve the evaluation system of network teaching, and complete the medical teaching tasks in the epidemic period with quality and quantity. Medical students should always remember the Hippocratic oath, study hard, be strict with themselves, and devote themselves to medical undertakings.

Discussion

During the epidemic prevention and control period, people made concerted efforts to fight a war of epidemic prevention. Colleges and universities across the country actively responded to the call of the Ministry of education to carry out online teaching with all resources while doing a good job in epidemic prevention and control, so as to ensure normal teaching progress and quality. In the process of online teaching, we make use of the high-quality resources of the Internet, formulate new teaching plans according to the syllabus, and establish an online teaching supervision group to timely adjust and improve the problems strongly reflected by students in the implementation process. According to the characteristics of each teaching subject, teachers put forward a variety of relatively convenient and pragmatic teaching methods, and encourage medical students to make full use of nearby resources to make up for the lack of clinical practice, such as practicing suture with orange peel, CPR training with pillows, simulated exercises with family members as Standardized Patients, etc. Truly "stop classes but keep teaching and learning".

With the progress of network technology, some offline functions can be gradually replaced by the network, which accelerates the transformation of medical education from "teaching centered" to "learning centered", and promotes some qualitative leaps in medical education from teaching form to content. Many online teaching platforms (such as MOOCs, Jreenity, Rain Classroom, classin, etc.) can provide online discussion, after-school test and other services, and can effectively guide students to learn. During the implementation of online assessment, we found that although teachers often use open questions in topic design and encourage medical students to solve problems through literature review, some students have poor self-management and self-discipline ability. They directly copy and paste the answers of other students to complete the task. The assessment quality is difficult to guarantee and the polarization is

serious. Therefore, how to develop and implement formative assessment of medical students under the background of "Internet plus" is the most urgent problem for all teaching hospitals in the epidemic period.

Conclusion

"Internet plus" education is the inevitable direction of the reform and development of modern medical teaching. Especially in the special period of epidemic prevention and control, online teaching is bound to be one of the most effective measures in this stage to ensure the teaching progress and quality. This requires medical colleges to actively respond to the national call, do a good job in epidemic prevention and control, make full use of Internet resources, strengthen the construction of teaching staff, improve the assessment and evaluation system, and perfect the comprehensive quality of medical students. It is also hoped that this article can provide direction, confidence and creativity for medical online education under the changing situation caused by covid-19, and provide better guidance and reference for teachers and students who are currently conducting online teaching.

Declarations

Competing interests

The authors declare that they have no competing interests.

References

1. Khan M, Adil SF, Alkhathlan HZ, Tahir MN, Saif S, Khan M, et al. COVID-19: A Global Challenge with Old History, Epidemiology and Progress So Far. *Molecules*. 2020;26(1):39. doi: <https://dx.doi.org/10.3390/molecules26010039>.
2. Grubaugh ND, Ladner JT, Lemey P, Pybus OG, Rambaut A, Holmes EC, et al. Tracking virus outbreaks in the twenty-first century. *Nature Microbiology*. 2019;4(1):10–9. doi: <https://doi.org/10.1038/s41564-018-0296-2>.
3. Pybus OG, Tatem AJ, Lemey P. Virus evolution and transmission in an ever more connected world. *Proc Biol Sci*. 2015;282(1821):20142878. doi: <http://dx.doi.org/10.1098/rspb.2014.2878>.
4. Xu XW, Wu XX, Jiang XG, Xu KJ, Ying LJ, Ma CL, et al. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-CoV-2) outside of Wuhan, China: retrospective case series. *BMJ*. 2020;368:m606. doi: <http://dx.doi.org/10.1136/bmj.m606>.
5. Lu H, Stratton CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. *J Med Virol*. 2020;92(4):401–2. doi: 10.1002/jmv.25678.
6. Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ, Lu GM, et al. Coronavirus Disease 2019 (COVID-19): A Perspective from China. *Radiology*. 2020;296(2):E15-E25. doi: <https://doi.org/10.1148/radiol.2020200490>.

7. Seymour-Walsh AE, Bell A, Weber A, Smith T. Adapting to a new reality: COVID-19 coronavirus and online education in the health professions. *Rural Remote Health*. 2020;20(2):6000. doi: 10.22605/RRH6000.
8. Chang H-H, Huang W-C. Application of a quantification SWOT analytical method. *Mathematical and Computer Modelling*. 2006;43(1–2):158–69. doi:10.1016/j.mcm.2005.08.016.
9. Helms MM, Nixon J. Exploring SWOT analysis – where are we now? *Journal of Strategy and Management*. 2010;3(3):215–51. doi: 10.1108/17554251011064837.
10. Bernard RM, Abrami PC, Lou Y, Borokhovski E, Wade A, Wozney L, et al. How Does Distance Education Compare With Classroom Instruction? A Meta-Analysis of the Empirical Literature. *Review of Educational Research*. 2016;74(3):379–439. DOI: 10.3102/00346543074003379.
11. Letterie GS. Medical education as a science: the quality of evidence for computer-assisted instruction. *Am J Obstet Gynecol*. 2003;188(3):849–53. doi:10.1067/mob.2003.168.
12. Rotimi O, Orah N, Shaaban A, Daramola AO, Abdulkareem FB. Remote Teaching of Histopathology Using Scanned Slides via Skype Between the United Kingdom and Nigeria. *Arch Pathol Lab Med*. 2017;141(2):298–300. doi: 10.5858/arpa.2016-0111-EP.
13. Sandars J, Correia R, Dankbaar M, De Jong P, Goh PS, Hege I, et al. Twelve tips for rapidly migrating to online learning during the COVID-19 pandemic. *MedEdPublish*. 2020;9(1). doi: <https://doi.org/10.15694/mep.2020.000082.1>.
14. Sawarynski KE, Baxa DM. Utilization of an online module bank for a research training curriculum: development, implementation, evolution, evaluation, and lessons learned. *Med Educ Online*. 2019;24(1):1611297. doi: 10.1080/10872981.2019.1611297.
15. Goh P-S, Sandars J. A vision of the use of technology in medical education after the COVID-19 pandemic. *MedEdPublish*. 2020;9(1). doi: 10.2147/AMEPS295728. eCollection 2021.
16. Moran D, Edwardson J, Cuneo CN, Tackett S, Aluri J, Kironji A, et al. Development of global health education at Johns Hopkins University School of Medicine: a student-driven initiative. *Med Educ Online*. 2015;20:28632. doi: 10.3402/meo.v20.28632.
17. Huwendiek S, Mennin S, Dern P, Ben-David MF, Van Der Vleuten C, Tönshoff B, et al. Expertise, needs and challenges of medical educators: Results of an international web survey. *Medical Teacher*. 2010;32(11):912–8. doi: 10.3109/0142159X.2010.497822.
18. Booth TL, Emerson CJ, Hackney MG, Souter S. Preparation of academic nurse educators. *Nurse Educ Pract*. 2016;19:54–7. doi: 10.1016/j.nepr.2016.04.006.
19. Dong C, Goh PS. Twelve tips for the effective use of videos in medical education. *Med Teach*. 2015;37(2):140–5. doi: 10.3109/0142159X.2014.943709.
20. Wong TY, Bandello F. Academic Ophthalmology during and after the COVID-19 Pandemic. *Ophthalmology*. 2020;127(8):e51-e2. doi: 10.1016/j.ophtha.2020.04.029.
21. George DR, Rovniak LS, Kraschnewski JL. Dangers and opportunities for social media in medicine. *Clin Obstet Gynecol*. 2013;56(3):453–62. doi:10.1097/GRF.0b013e318297dc38.

22. Kaul V, Gallo de Moraes A, Khateeb D, Greenstein Y, Winter G, Chae J, et al. Medical Education During the COVID-19 Pandemic. *Chest*. 2021;159(5):1949–60. DOI: <https://doi.org/10.1016/j.chest.2020.12.026>.
23. Iwanaga J, Loukas M, Dumont AS, Tubbs RS. A review of anatomy education during and after the COVID-19 pandemic: Revisiting traditional and modern methods to achieve future innovation. *Clin Anat*. 2021;34(1):108–14. doi: 10.1002/ca.23655.