Evaluation of Factors Affecting Online Teaching of Medical Courses for MBBS Students During the Novel Coronavirus Epidemic

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Abstract

Background: Bachelor of Medicine and Bachelor of Surgery (MBSS) students are the largest group of international students. Due to the breakout of COVID-19, most international students have returned to their home countries. From March 2020, the MBBS undergraduate students of Yangzhou University were taught online since March 2020. For MBBS students the effect of online teaching remains unknown.

Methods: This study was conducted in Yangzhou University in June 2021, including 295 MBBS international undergraduate students. The objective conditions, environment, teacher factors, personal factors, advantages, and disadvantages of online teaching were evaluated for each student by using a self-completed structured anonymous questionnaire. At the same time, Pearson chi-square analysis was conducted to evaluate the factors affecting online teaching satisfaction (teaching attitude, teacher-student interaction, teacher evaluation, learning effect, online teaching management).

Results: Most students' hardware was well equipped and their network could meet the need of online learning (240 of 280, 85.71%). Most students (263 of 280, 93.93%) had a quiet environment during online teaching. With respect to factors conducive to online teaching, students rated the importance of teachers from the aspects of knowledge level, teaching methods, class attitude, interaction with students, English proficiency, homework correction and pre-class guidance. In terms of students' attention, 76.78% students' attention was concentrated and 85.36% students had a positive attitude towards online teaching. Four factors (teaching attitude, teacher-student interaction, learning effect and management of online teaching) appeared to be associated with teaching effect satisfaction.

Conclusion: This study investigates the various factors involved in conducting online education during the pandemic and provides suggestions for improving the quality and effectiveness of online education for MBBS students.

Background

With the implementation of the "One Belt, one Road" strategy and the development of the international university union, an increasing number of international students come to China to receive medical education.The scale of medical students' Education in China is expanding rapidly, which has ranked the forefront of all majors of international students in China. The cultivation of international students has become an important part of medical education in China.Yangzhou University began to recruit MBBS international students from 2011, and the length of schooling is six years. Currently, the number of students in the university has reached 332.

There has been an epidemic outbreak in our country and globally since December 2019. Most MBBS students left China during winter break due to the COVID-19. Since the beginning of the spring semester, the epidemic has not been completely alleviated. In order to guarantee overseas students to study at home during the epidemic prevention and control period, we have carried out remote online teachingthrough Wechat and THEOL network teaching platform.

The courses of online teaching are carried out in an orderly manner and some achievements have been made. However, there are also many problems in large-scale online teaching, and it is unknown whether the needs of students are met.

We conducted a questionnaire survey on MBBS international students participating in online teaching, and the students' feedback is helpful to our teaching reform.

Methods

Participant

In June 2021, a cross-sectional survey was conducted among MBBS international students who enrolled from 2015 to 2019 in Yangzhou University Medical college, Yangzhou. A total of 295 students' questionnaires were collected for analysis, and the effective rate was 95%.

Courses

In addition to the sixth grade students entering clinical practice, there were43 online teaching courses for the five grades in the spring and autumn semester, including 4 public course, 17 basic medical courses and 22major courses (See Table 1). All the teachers have Doctor’s degree, who have overseas study experience or have passed PETS-5 in English, and can skillfully use English to communicate.

Table 1 (At the end of the article)

Questionnaire

The questionnaire was designed according to the factors that affect the teaching effect of online courses. It including 16 questions related to study conditions factors (network, hardware equipment,, environment), teacher factors (attitude, pre-class guidance, teaching methods, knowledge level, interaction with students, English proficiency, correcting homework), student factors (gender, country, concentration, study attitude), satisfication (the teaching attitude, interaction, teacher evaluation, the learning effect and online teaching management), benefits and disadvantages of online teaching.

The demographic data were collected on age,gender, country and Year of enrollment. All participants completed the questionnaire online. The ranking questions were scored in order to analyze data. For example, if the first option is selected, that option is scored as one. If the second option is selected, that option is scored two.The double-blind data input was adopted to ensure the accuracy of the questionnaire data.

Statistical analysis

Data were analyzed with SPSS 19.0 (SPSS Inc., Chicago, IL, USA).

Results

Demographic data

The demographics of the study participants are shown in Table 2. Of the 280 participants, 117 (41.79%) were female and 163 (58.21%) were male. The average age of the participants was 21 years old. 66(23.57%) were aged from 18 to 20 years, 167 (59.64%) were aged from 21 to 23 years, and 47 (16.79%) were aged at least 24 years. The distribution of online teaching countries during the epidemic is as follows: 9 (3.21%) students were in China, 259(92.5%) students were in India, 10(3.57%) were in Bangladesh, and 2(0.71%) were in Indonesia.

Table 1 MBBS online course setting and credits for 2020

Course Name	Course Type	Course Credits	Curriculum Semester	Class Information
Introduction of China	Public Elementary Course	2	Spring semester	2019MBBS
Chinese	Public Elementary Course	8	Spring and Autumn semester	2019MBBS 2018MBBS 2017MBBS
Physical Education	Public Elementary Course	8	Spring and Autumn semester	2019MBBS
Cell Biology	Basic Subject Course	4	Spring semester	2019MBBS
Human Anatomy	Basic Subject Course	7.5	Spring semester	2019MBBS
Histology and Embryology	Basic Subject Course	5	Autumn semester	2019MBBS
Medical Biochemistry	Basic Subject Course	7.5	Autumn semester	2019MBBS
Human Physiology	Basic Subject Course	7.5	Autumn semester	2019MBBS
Pathophysiology	Basic Subject Course	4	Spring semester	2018MBBS
Medical Immunology	Basic Subject Course	3.5	Spring semester	2018MBBS
Medical Statistics	Basic Subject Course	4.5	Spring semester	2018MBBS
Human Parasitology	Basic Subject Course	3	Autumn semester	2018MBBS
Medical Microbiology	Basic Subject Course	4.5	Autumn semester	2018MBBS
Pathology	Basic Subject Course	6.5	Autumn semester	2018MBBS
Pathophysiology	Basic Subject Course	4	Autumn semester	2018MBBS
Pharmacology	Basic Subject Course	4.5	Autumn semester	2018MBBS
Public Health	Basic Subject Course	3	Spring semester	2017MBBS
Epidemiology	Basic Subject Course	2	Spring semester	2017MBBS

Diagnostics	Major Course	6	Spring semester	2017MBBS
Medical Imaging	Major Course	3	Spring semester	2017MBBS
Medical Chinese	Public Elementary Course	8	Spring and Autumn semester	2017MBBS 2016MBBS 2015MBBS
Regional Anatomy	Basic Subject Course	3.5	Autumn semester	2017MBBS
Traditional Chinese Medicine	Major Course	4	Autumn semester	2017MBBS
Drug Toxicology	Basic Subject Course	1	Autumn semester	2017MBBS
Basical Surgery	Major Course	3.5	Autumn semester	2017MBBS
Internal Medicine I	Major Course	6.5	Autumn semester	2017MBBS
Internal Medicine II	Major Course	6	Spring semester	2016MBBS
Surgery I	Major Course	4	Spring semester	2016MBBS
Obstetrics and Gynecology	Major Course	6	Spring semester	2016MBBS
Pediatrics	Major Course	4	Spring semester	2016MBBS
Medical Psychology	Major Course	1	Autumn semester	2016MBBS
Medical Ethics	Major Course	1	Autumn semester	2016MBBS
Social Medicine	Major Course	1	Autumn semester	2016MBBS
Forensic Medicine	Major Course	1	Autumn semester	2016MBBS
Surgery II	Major Course	4	Autumn semester	2016MBBS
Dermatology & Venereal	Major Course	3	Autumn semester	2016MBBS
Psychiatry	Major Course	2	Autumn semester	2016MBBS
Nuclear Medicine	Major Course	1	Spring semester	2015MBBS
Neurology	Major Course	2.5	Spring semester	2015MBBS
Ophthalmology	Major Course	1	Spring semester	2015MBBS
Otolaryngology	Major Course	1	Spring semester	2015MBBS
Stomatology	Major Course	1	Spring semester	2015MBBS
Infectious Diseases	Major Course	2	Spring semester	2015MBBS

Table 2 Basic characteristics of the MBBS students during the epidemic (*n*=280)

Characteristics	n	Percent (%)
Gender		
Male	163	58.21
Female	117	41.79
Age, years		
<20	66	23.57
21~23	167	59.64
≥24	47	16.79
Country during online teaching		
China	9	3.21
India	259	92.50
Bangladesh	10	3.57
Indonesia	2	0.71

Evaluation of online teaching

Table 3 shows the condition for online learning. 72 (25.71%) studentsconsidered their hardware equipped was good and the network is relatively smooth. 168 (60%) students rated their hardware and network as average. 29 (10.36%) students believed their hardware was well-equipped but the network was not smooth. Only 11 (3.93%) students thought they had single equipment and poor network. In terms of online learning environment, 174 (65.13%) students had quiet and comfortable environment which was suitable for learning.89 (31.78%) students had basically quiet environment with occasional noise interference.13 (4.64%) students were frequently disturbed by family members or other noise. With only 4 (1.43%) students, the surrounding environment was chaotic and noisy.

Table 3 Condition for online teaching (*n*=280)

Statements	Very good frequency (%)	Generally frequency (%)	Poor frequency (%)	Not good frequency (%)
Hardware equipment and network	72 (25.71)	168 (60.00)	29 (10.36)	11 (3.93)
Environment	174 (65.13)	89 (31.78)	13 (4.64)	4 (1.43)

Table 4 showsthe ranking of factors influencing students' online learning by course teachers.The results showed that the top first pick wasKnowledge level (32.1%), the most popular second pick was Teaching methods (31.1%), the most popular third pick was Class attitude (23.2%), the top fourth pick was Interaction with students (22.5%), the top fifth pick was English proficiency (24.6%), the top sixth pick was homework correction (24.6%), and the top seventh pick was Pre-class guidance (31.1%).

Table 4 is uploaded in Supplementary File 1

As for online learning, 15% of the students were very focused and undisturbed by other factors. 61.79% of the students were concentrate most of time and get distracted occasionally. However, 20.71% of the students were inattentiveand easily affected by other factors and 2.5% of the students were unable to concentrate and basically didn't listen to the teacher(Table 5).

Table 5 Student concentration in online courses (*n*=280)

	n	Percent (%)
High	42	15.00
Medium	173	61.79
Poor	65	

Table 6 shows that 85.36% of the students had a positive attitude towards online teaching and 14.64% have a negative attitude.

Table 6 Students attitude towards online courses (*n*=280)

Attitude	n	Percent (%)
Positive	239	85.36
Negative	41	14.64

In terms of students' satisfaction with the effect of online teaching, table 7 shows the results of χ^2 analyses examining the relationship between relevant factors and teaching effect. The results showed that evaluation of the teacher had no significant association with teaching effect (p>0.05). However, other variable (teaching attitude, teacher-student interaction, learning effect and online teachingmanagement) appeared to be associated with teaching effect (all p<0.05).

Table 7 Satisfaction of online teaching effect

Measures	Satisfaction of online teaching effect		χ^2	*P*
	Yes (n,%)	No (n,%)		
Teaching attitude				
High	146(52.14)	3(1.07)	15.517	0.000
Medium	118(42.14)	6(2.14)		
Poor	4(1.43)	3(1.07)		
Teacher-student interaction				
High	145(51.79)	10(3.57)	7.413	0.025
Medium	101(36.07)	14(5.00)		
Poor	7(2.50)	3(1.07)		
Evaluation of the teacher				
High	187(66.78)	4(1.43)	5.849	0.054
Medium	81(28.93)	3(1.07)		
Poor	4(1.43)	1(0.36)		
Learning effect				
High	118(42.14)	5(1.79)	6.493	0.039
Medium	141(50.36)	8(2.85)		
Poor	6(2.14)	2(0.71)		
Management of online teaching				
High	174(62.14)	9(3.21)	8.718	0.013
Medium	86(30.71)	5(1.79)		
Poor	4(1.43)	2(0.71)		

Students considered the advantages of online teaching are as follows:they can better acquire extracurricular knowledge (22.5%), and it is able to make full use of their study time (48.93%). It is easier to communicate between classmates and teachers (16.07%) which is conducive to family learning and supervision (21.43%). Most of the students felt that online teaching enhanced the enthusiasm of independent learning (52.86%) (Table 8). In addition, the students also pointed out disadvantages of online teaching, including the followingreasons:31.43% of students could not adapt toonline teaching methods and 74.64% of students considered that there was no classroom atmosphere. 43.93% of students felt that online teaching lacked external supervisionand learning efficiencywas low. The online

learning process might be interrupted due to external factors (52.86%) and online studying affected students' daily life (11.79%) (Table 9).

Table 8 Benefits of online teaching

Statements	n	Percent (%)
Better access to extracurricular knowledge	63	22.5
Able to make full use of their time to learn	137	48.93
It is easier to communicate between classmates and teachers	45	16.07
Conducive	60	21.43
Enhancing the enthusiasm of independent learning	148	52.86

Table 9 Disadvantages of online teaching

Statements	n	Percent (%)
Inability to adapt to online teaching methods	88	31.43
No classroom atmosphere	209	74.64
Lack of external supervision and low learning efficiency	123	43.93
The learning process may be interrupted due to external factors	148	52.86
Affect daily life	33	11.79

Discussion

Medical education for MBBS students at universities is strongly affected by the COVID-19 pandemic and medical colleges have to face a new challenge to implement distance learning tools to continue medical education, which is strongly demanded by students. Therefore, MBBS students have been taught online during the coronavirus pandemic and students' perspective towards the new learning mode was evaluated through a questionnaire survey.

Factors affecting online teaching

Regarding the technical devices, the survey showed that the hardware used by most students in online teaching, such as laptop computer, tablets,smartphones and desktop computers could meet the needs of online learning. Most students participated from home and used wireless local area networks for connection. A majority of students stated that they did not have major problems with an internet connection. But there were still a small number of students' technical devices and network conditionthat could not meet the needs of teaching.The degree of network congestion will exert negative impact online learning.

Among the factors affecting the effect of online teaching, the students rated the importance ofteachers from the aspects of knowledge level, teaching methods, teaching attitude, interaction with students, English level and homework correction. The development of online teaching has transformed the traditional teacher-centered teaching mode into student-centered teaching mode.Students don't want to only seethe teachers' slides without seeing the teacher's face expressionandhearing the voice[1]. Teachers should use medical professional knowledge to find suitable self-learning materials for medical students.Theymade full use of online learning communication tools and used online teaching guidance skills to help medical students maintain good learning motivation and interest.Therefore, teachers' knowledge level and teaching methods are very important, and teachers need to constantly improve their teaching ability.

In terms of student factors, students' attitude towards online teaching are generally recognized, but the international students' performance in learning attention and learning initiativeare poor. Attention in online learning is easily distracted, and there are many uncontrollable factors affecting attention in online teaching environment.

Most of the students were also satisfied with the effect of online teaching and teaching evaluation. They thought that teacher attitude, teacher-student interaction, learning effect and management of online teaching were all related to online teaching effect. Most of students were also very satisfied with these aspects. They believed that online teaching could expand their knowledge and made full use of their time to learn. Traditional "face-to face" teaching mode require that teaching and learning should take place at the same time and place. Online teaching doesn't have the time and space limitations and had its ownadvantages for enhancing students' learning andshould be considered as a potential teaching method inmedical education[2].

Online teaching improves the students' ability to study independently.Learners are free to ask questions without fear of judgment from their classmates. But it doesn't have a classroom atmosphere.If teachers can't see a student's face, it's impossible to know if they understand the knowledge. The teachers must ensurestudents remain engaged with their studies[1, 3, 4]. Online learning at home would be influenced by the activities of family members and the surrounding environment of the family. Entertainment games and social information on computers and mobile phones also attracted students greatly.Learning in the classroom has a very good learning atmosphere and is supervised by teachers.

Conclusions

During the COVID-19 outbreak, Yangzhou University conducted online teaching for MBBS students. This study finds that the quality and effect of online teaching are related to students' learning conditions, teachers' factors and students' factors.Online teaching has both advantages and disadvantages. In the challenging time of COVID-19, online teaching was a good alternative for "face-to-face" learning. It can't replace classroom teaching, but can complement each other. Itprovides some reference for other universities who also implement online teaching for MBBS of international medical students.

Abbreviations

MBBS: Bachelor of Medicine and Bachelor of Surgery; COVID: Corona Virus Disease

Declarations

Ethics approval and consent to participate

As only descriptive data was collected, and no intervention were performed, the study was regarded as exempt from ethical approval according to Medical college of Yangzhou University. Special measures were undertaken to guarantee the anonymity of the participants. All methods were carried out in accordance withHelsinki declaration.Written informed consent to participate in the research was obtained from all participants.

Consent for publication

Not applicable.

Availability of data

All data generated or analysed during this study are included in this published articleand its supplementary information files.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

The manuscript has been read and approved by all authors. FT, LQ and BCY conceived and designed the study. CYM and GYN devised the methodology of the paper, FT, XFD and CYM acquired the data. FT and LQ analyzed and interpreted the data. FT and GYN drafted the article. All authors read and approved the final manuscript.

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