



## Original Article

## The evaluation of online course of Traditional Chinese Medicine for MBBS international students during the COVID-19 epidemic period

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## ABSTRACT

**Background:** During the COVID-19 epidemic period, Traditional Chinese Medicine (TCM) course for international students of Medical Bachelor, Bachelor of Surgery (MBBS) program in Zhejiang University has shifted from traditional classroom to online environment. This study aimed to investigate MBBS international students' perception on online TCM course, and to assess the online learning efficacy.

**Methods:** A total of 84 MBBS international students attending course of "Basic Traditional Chinese Medicine" during 2020 academic years at Zhejiang University were enrolled in this study. A quantitative questionnaire was respectively completed before and after the TCM course using a pretest-post-test design. By means of two online learning platforms, Learning in ZJU and DingTalk, TCM course was broadcast in both live and archived format to students.

**Results:** A total of 48 participants completed both baseline and follow-up questionnaires. The majority of participants preferred face-to-face classroom learning (26, 54.17% of total) when compared with online learning. Students felt that the course had brought in much benefits (mean 3.88, SD 0.87), and they were satisfied with the course content (mean 3.83, SD 0.95). Students' TCM related knowledge and their behaviors of discussion and consulting were significantly improved by online TCM course (all  $P < 0.001$ ). Students' awareness of the necessity of TCM education and their feeling of difficulty in learning TCM were significantly strengthened ( $P = 0.042, 0.025$ , respectively).

**Conclusion:** Online learning is a good alternative for TCM course of MBBS international students when classroom learning is suspended, whereas it cannot replace the need for onsite and face-to-face learning.

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## 1. Introduction

From its beginning in late 2019, the novel coronavirus disease (COVID-19) is rapidly spreading globally and dramatically changing lives throughout the world. The World Health Organization (WHO) has declared the COVID-19 pandemic as a public health emergency of international concern.<sup>1</sup> Campus class suspension is a precautionary measure for COVID-19, thus the need to create effective online distance learning is paramount. Although the online instruction is not a new concept, it is a shift away from the traditional classroom teaching model and has come with significant challenges for the educators.<sup>2</sup>

Traditional Chinese Medicine (TCM) plays significant roles in the treatment of COVID-19. More than 85% of infected patients in China have been treated with TCM.<sup>3</sup> Treatment practice of COVID-19 suggests intervention of TCM has beneficial effects.<sup>4</sup> TCM education is an important component of biomedical education in China.<sup>5</sup> For higher educational institutions that enroll international students for the undergraduate medical education program, i.e. offering an English Medical Bachelor, Bachelor of Surgery (MBBS) degree, TCM is included in the curriculum planning of clinical medicine courses.<sup>6</sup>

Zhejiang University is one of China's top higher educational institutions.<sup>7</sup> The course of "Basic Traditional Chinese Medicine" has been set up in Zhejiang University School of Medicine as one of the curriculum of MBSS program.<sup>8</sup> During the COVID-19 epidemic period, the course has shifted from traditional classroom to online environment. In order to know how MBBS international students perceive the online learning and to assess the online learning efficacy of TCM course, this study investigated the perception of

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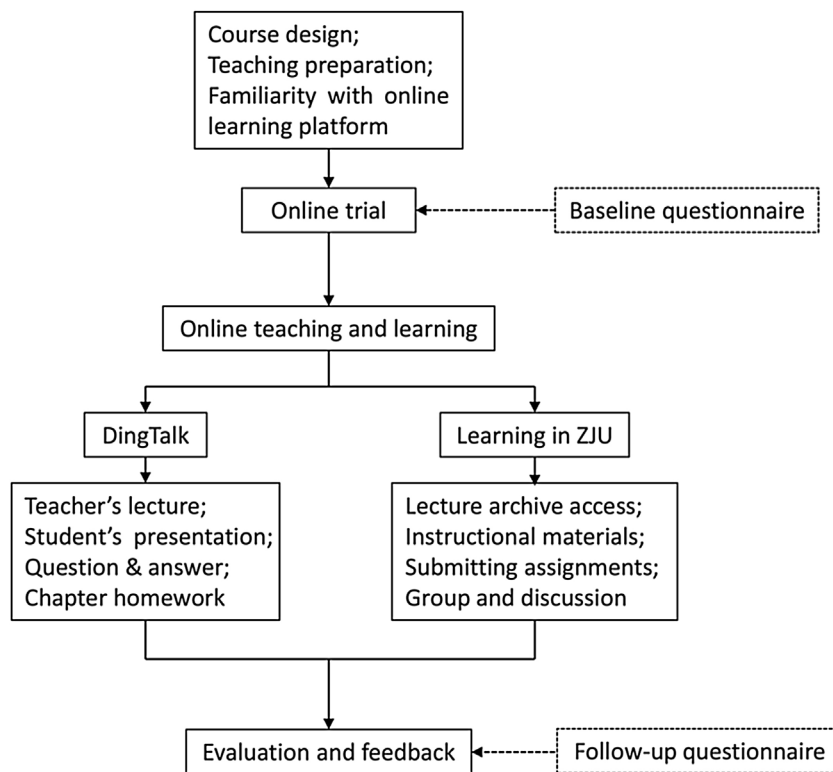


Fig. 1. Structure and settings of the online TCM course.

students on online course, and their attitude, cognition and behavior towards TCM before and after the TCM course.

## 2. Methods

### 2.1. Study design

A pretest–post-test design was applied to investigate the perception on online TCM course, and the attitude, cognition and behavior about TCM involving two sets of cross-sectional data on the same population.

### 2.2. Participants

A total of 84 MBBS international students attending the course of “Basic Traditional Chinese Medicine” during 2020 academic years at Zhejiang University were enrolled in this study. Participation in the study was voluntary. Informed consent was obtained from all participants. The work was approved by Zhejiang University (Course code: 72120240).

### 2.3. Course design and online learning platform

The course of “Basic Traditional Chinese Medicine” was arranged in the second academic year (in pre-clinic phase) of the six-year MBBS program. It covered 32 lectures, totally 1440 min completed in eight teaching weeks. The course focused on lecturing basic characteristics of TCM and its application, consisted of six parts of content: introduction to TCM and Traditional Chinese philosophy; TCM etiology and pathomechanism; TCM diagnostics; TCM therapeutic principles and methods; TCM life nurturing; and modern research on TCM. The structure and settings of the online TCM course were shown in Fig. 1.

Online distance learning was supported by two important platform, Learning in ZJU (<http://course.zju.edu.cn/>), Information

Technology Center of Zhejiang University) and DingTalk (<https://www.dingtalk.com/en>, Alibaba Group). Learning in ZJU is a learning platform that numerous online courses can be established and accessed here for all teachers and students of Zhejiang University. DingTalk is a multifunctional platform that can start a live easily on app or desktop, record the live stream and share the live playback to others. The course of “Basic Traditional Chinese Medicine” was joined and established in Learning in ZJU by teachers. The process covered including the class members, adding section content, publishing bulletin, syllabus, rollcall and performance, uploading multimedia materials and recorded videos of live class, assigning chapter classwork, organizing discussion and interaction, etc. On the student side, they could consult instructional materials, submit assignments, take test/exam in the Learning in ZJU. Following to the time schedule of course, teachers broadcasted their lectures on DingTalk and students could take the live class or watch the live playback. During the live broadcast, teachers and students could interact with each other by sending message or connecting the microphone. Voice and screen can also be transferred to the student side for their presentations. Assistants of the course were responsible for students management, attendance recording and classwork assessment. In addition, contacting channels including DingTalk group, WeChat group, and e-mail specific for the course, were opened to promote communication and management.

### 2.4. Data collection

An electronic, anonymous, self-administered questionnaire (shown as [Supplemental file](#)) was handed out through WeChat group before the first live broadcast class (February 24, 2020) and after the last class of the course (April 16, 2020). Students who agreed to participate in the study completed and submitted the questionnaire. Wen Juan Xing (<https://www.wjx.cn/>), a professional online platform to support questionnaire survey, was used to design, issue and receive questionnaires and extract the data of

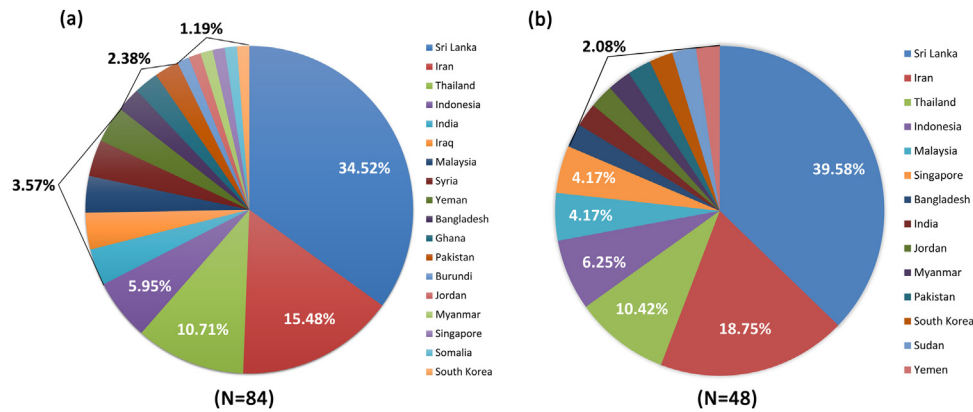


Fig. 2. Distribution of population by the country of origin. (a) All 84 students enrolled in the course, and (b) 48 students participant in the study.

**Table 1**  
Population Characteristics

Demographics	Populations (n = 84)	Responders (n = 48)
Age (year), mean ± SD	22.42 ± 1.92	21.52 ± 1.81
Gender, n (%)		
Male	31 (36.90)	15 (31.25)
Female	53 (63.10)	33 (68.75)
Previous TCM learning, n (%)		
Yes	–	3 (6.25)
No	–	45 (93.75)
Previous TCM related knowledge, n (%)		
Much	–	0 (0)
Middle	–	0 (0)
Little	–	20 (41.67)
None	–	28 (58.33)
Current residence, n (%)		
In China	–	3 (6.25)
Outside China	–	45 (93.75)

questionnaires in this study. Items in questionnaire used a 5-point Likert scale to convert to scores, where 1 was ‘Not at all important’ or ‘Strongly disagree’ and 5 was ‘Very important’ or ‘Strongly agree’. Questionnaires were coded with a unique number to allow pretest–post-test pairwise analysis.

### 2.5. Statistical analysis

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) V.22.0. Descriptive information for variables was provided as mean ± SD or in percentages according to the nature of the variable. The pre- and post-test scores were tested for normality with the Kolmogorov–Smirnov test and the differences were analyzed by paired *t* test if data were consistent with a normal distribution. The McNemar test was used to analyze categorical items from matched pairs of participants. A significance level of  $P < 0.05$  was put forward.

## 3. Results

### 3.1. Population characteristics

Initially, among the 84 students who enrolled in the course, 50 participants completed a questionnaire at baseline. Of these participants, 48 also completed a follow-up questionnaire; 2 failed to do so and were subsequently excluded from any further analysis. The final response rate was 57.14%.

Table 1 showed the population characteristics. Of the participants who completed both questionnaires, 15 (31.25%) were males

and 33 (68.75%) were females. Ages ranged from 18 to 27 years (mean 21.52, SD 21.52). At baseline, the majority of participants (45, 93.75%) had no previous TCM learning, also had little (20, 41.67%) or no (28, 58.33%) TCM related knowledge. During the COVID-19 pandemic, 45 participants (93.75%) were outside China. Distribution of population by the country of origin was shown in Fig. 2. The top four countries with large student populations were Sri Lanka, Iran, Thailand and Indonesia.

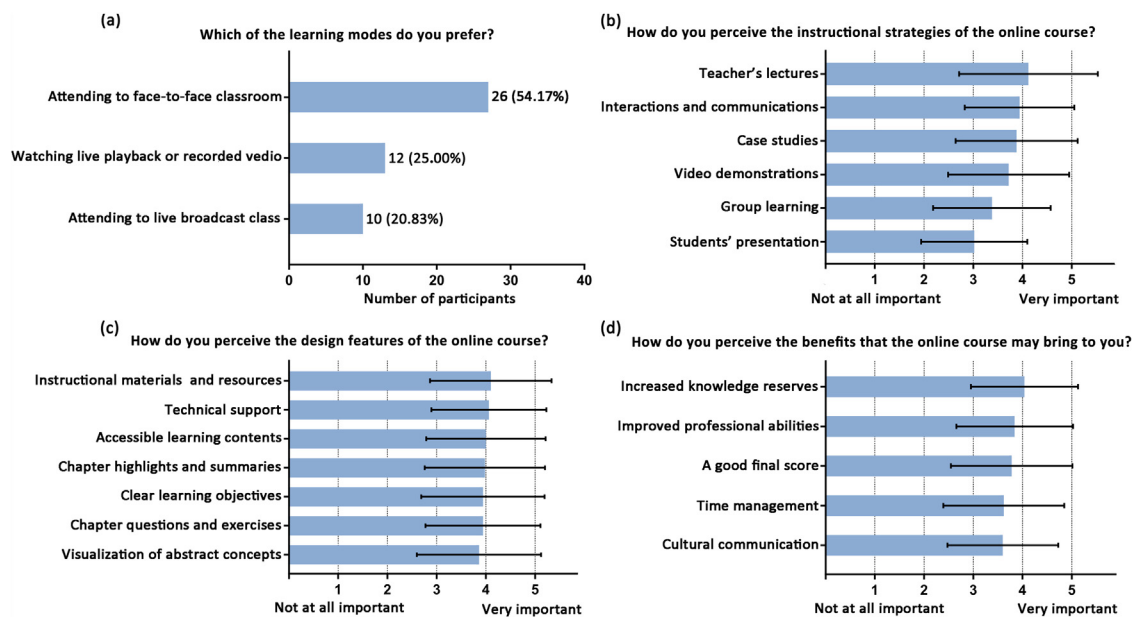
### 3.2. Perception on online TCM course

Students’ perception on online course at baseline was seen in Fig. 3. The majority of students preferred attending to face-to-face classroom (26, 54.17%). In regard to students’ perception on the instructional strategies and design features of the online course, they put the most emphasis on teacher’s lecture (mean 4.13, SD 1.42) and instructional materials and resources (mean 4.10, SD 1.24). In addition, students most expect the course to increase their knowledge reserves (mean 4.04, SD 1.09).

Students’ assessment of online course at follow-up was shown in Table 2. Generally, students felt that the course had brought in much benefits (mean 3.88, SD 0.87), and they were satisfied with the course content (mean 3.83, SD 0.95). However, they did not think online learning was better than traditional classroom learning (mean 2.58, SD 1.21), and they agreed that online learning could be combined with classroom learning in the future (mean 3.87, SD 0.94).

### 3.3. Attitude, cognition and behavior towards TCM

Responses obtained from participants demonstrated changes in their attitude, cognition and behavior towards TCM as seen in Table 3. The attitude towards the necessity of TCM education was significantly improved ( $P = 0.042$ ), meanwhile, the feeling of barriers in learning TCM was significantly strengthened ( $P = 0.025$ ). The thought that TCM theories are challenging and mysterious was stronger ( $P = 0.002$ ). The understanding of TCM related knowledge was significantly improved ( $P < 0.001$ ), and the awareness of the role of learning TCM in idea exchanges between different cultures was significantly improved ( $P = 0.012$ ), too. In behavior, there was a significant increase in the number of participants who discussed much about TCM and who looked up much information for learning TCM (both  $P < 0.001$ ). The subjects had some self-report limitation of online teaching, including lack of clinical practice and face-to-face effective communications with the teachers and other classmates.



**Fig. 3.** Students' perception on online TCM course at baseline ( $n=48$ ). Data was showed in  $n$  (%) or mean  $\pm$  SD; Likert scale: 1 = not at all important, 2 = little important, 3 = somewhat important, 4 = quite important, 5 = very important.

**Table 2**  
Students' Assessment of Online TCM Course at Follow-Up

Items	Score <sup>a</sup> , mean $\pm$ SD ( $n=48$ )	Percentage of scoring $\geq 4$ , $n$ (%)
The course brings you much benefit.	3.88 $\pm$ 0.87	36 (75.00)
You are satisfied with the content of the course.	3.83 $\pm$ 0.95	34 (70.83)
You are satisfied with the teaching way of the course.	3.46 $\pm$ 1.13	25 (52.08)
The online course meets your expectations.	3.29 $\pm$ 1.07	17 (35.42)
The online course is better than the traditional classroom learning.	2.58 $\pm$ 1.21	8 (16.67)
The online course learning could be combined with classroom learning in the future.	3.87 $\pm$ 0.94	32 (66.67)

<sup>a</sup> 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

**Table 3**  
Attitude, Cognition and Behavior Towards TCM

Items	Pretest ( $n=48$ )	Post-test ( $n=48$ )	$P$ -value
<b>Attitude<sup>a</sup>, mean <math>\pm</math> SD</b>			
You have well acceptance for TCM whether in the learning phase or in future professional work.	3.52 $\pm$ 0.83	3.73 $\pm$ 0.92	0.133
You are interested in learning TCM.	3.94 $\pm$ 0.81	3.94 $\pm$ 0.86	1.000
TCM education is a necessary component of medical education system.	3.35 $\pm$ 0.98	3.71 $\pm$ 0.87	0.042
You attach great importance to learning fundamental theories of TCM.	3.54 $\pm$ 0.80	3.77 $\pm$ 0.91	0.086
You attach great importance to learning skills practice of TCM.	3.69 $\pm$ 0.85	3.85 $\pm$ 0.97	0.272
You think there are barriers in learning TCM.	3.21 $\pm$ 0.87	3.54 $\pm$ 0.97	0.025
<b>Cognition<sup>a</sup>, mean <math>\pm</math> SD</b>			
TCM theories are challenging and mysterious.	3.40 $\pm$ 0.77	3.85 $\pm$ 0.77	0.002
TCM related clinical skills are practical.	3.77 $\pm$ 0.75	3.94 $\pm$ 0.70	0.088
Evidence-based TCM scientific researches are worthwhile.	3.71 $\pm$ 0.74	3.98 $\pm$ 0.86	0.052
You have a well understanding of TCM related knowledge.	2.81 $\pm$ 0.82	3.46 $\pm$ 0.87	<0.001
Learning TCM will be useful in the future as medical professionals.	3.60 $\pm$ 0.87	3.88 $\pm$ 0.91	0.074
Learning TCM helps to promote idea exchanges between different cultures.	3.92 $\pm$ 0.79	4.27 $\pm$ 0.68	0.012
<b>Behavior<sup>b</sup>, <math>n</math> (%)</b>			
That discussed much about TCM with classmates, friends or family.	16 (33.3)	39 (81.3)	<0.001
That looked up much information for learning TCM.	16 (33.3)	43 (89.6)	<0.001
That have been given the opportunity to practice TCM skills.	5 (10.4)	7 (14.6)	0.754
That would recommend family or friends to see a TCM doctor.	26 (54.2)	30 (62.5)	0.423
That would like to participate in the spread of TCM culture.	23 (47.9)	29 (60.4)	0.407
Considering a master's degree in TCM or a career in TCM related field.	6 (12.5)	8 (16.7)	0.754

<sup>a</sup> Paired  $t$  test was used to analyze difference between pretest and post-test scores; 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

<sup>b</sup> McNemar test was used to analyze difference between pretest and post-test percentage of participants.

#### 4. Discussion

The results from this study suggest that MBBS international students perceived the online learning of TCM suboptimal when compared with face-to-face classroom learning, although it seems

that students generally thought they benefited from the course and expressed satisfaction with the online course. Students' TCM related knowledge can be substantially improved and their behaviors of discussion and consulting could be positively influenced by online TCM course. In addition, online TCM course strengthened

students' awareness of the necessity of TCM education and their feeling of difficulty in learning TCM.

The learning outcomes in this study suggest that online distance learning is a well alternative when face-to-face course can no longer be carried out. Online platforms provide the distance learning technologies to expand traditional classrooms into virtual classrooms. Lectures are broadcast in both live and archived format to students. For students, the strength of learning from the online format was their ability to control the instructional pace of online lectures<sup>9,10</sup> and to complete course events asynchronously at their convenience.<sup>11</sup> However, it should not be assumed that students familiar with online environment will transition easily from onsite to online learning model.<sup>12</sup> The transition requires a gradual and adaptive process for both instructors and students.<sup>13</sup> An unexpected fully online learning due to the COVID-19 pandemic inevitably has its weaknesses, as previous study reported that students feel less engaged by instructors and are more distracted by their surroundings in the online format.<sup>11</sup> The absence of hands-on activities and the inapplicability to some students lacking self-discipline are also concerns of online instructors.<sup>11,14</sup> This may explain why students preferred a face-to-face classroom learning and the similar reaction also was reported by previous studies.<sup>11,13</sup> In the post-COVID 19 era, a hybrid learning model that combines classroom learning and online learning to provide a synergistic and complementary instruction would be more desirable.

For online course designers, attention to education should be directed toward students' demands.<sup>15</sup> Effective instructional strategies and course design features should be considered to promote the learning efficacy.<sup>16</sup> Study by Gupta et al. found that the primary decision for medical students to attend online lectures was driven by course content and lecturer quality.<sup>17</sup> Students in our study also considered teachers' lectures as the most important factor for instructional strategy of online course. In regard to online course design features, they valued instructional material and resources, technical support, accessible learning contents, and chapter highlights and summaries. Studies by Richter et al.<sup>18</sup> and Yang<sup>16</sup> reported similar results, although focused on other educational disciplines. These findings provide background information about the learners' need when facing the shift to an online learning.

Today's TCM education for international students in oversea medicine medical universities or schools in China are confronted with many challenges.<sup>19,20</sup> Online course can be considered as an exploration for appropriate learning models in TCM education. In this study, several key areas of students' attitude, cognition and behavior towards TCM could be positively influenced by online TCM course, whereas their feeling of difficulty in learning TCM and thought of "TCM theories are challenging" have also increased. The reasons for the increased barriers they reflected are multifaceted. First, the more students learned about TCM, the more profound they would find TCM theory is. Second, some students might lack confidence in their learning capabilities.<sup>13</sup> Third, lack of experiential/practical training distanced them from a better understanding of TCM.<sup>5</sup> Accordingly, for teachers of TCM education to meet learner's need, it is important to make the obscure TCM theories accessible, strengthen student-instructor communication, and provide a better integration of theory and practice.<sup>5,20,21</sup>

This study has its limitations. The sample size was small. The majority of MBBS international students in this study were from Asian countries, thus the response was not reflecting all the international medical students in China. A self-administered questionnaire and a relatively low response rate might lead to potential information bias for participants. Whether the online distance learning of TCM course can be further promoted remains to be further practiced and discussed.

In conclusion, if well designed, online distance learning is a good alternative for TCM course of MBBS international students

when classroom learning is suspended during the COVID-19 epidemic period. It is also important to acknowledge that, in future TCM education, online learning cannot replace the need for onsite and face-to-face learning, but may complement existing traditional classroom based learning model.

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## Author contributions

Conceptualization: QZ and FQ. Methodology: YJH and YHZ. Validation: MCD. Formal Analysis: XZ. Investigation: MMP and JQW. Resources: YEG. Data Curation: FFW. Writing - Original Draft: QZ. Writing - Review & Editing: FQ and XRX. Visualization: QZ. Supervision: FQ. Project Administration: XRX. Funding Acquisition: FQ and XZ.

## Conflict of interest

The authors declare that they have no competing interests.

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## Ethical statement

This study has been carried out in accordance with the Declaration of Helsinki and has obtained the informed consent of students participant in the study. The work was approved by Zhejiang University (Course code: 72120240).

## Data availability

The data of this study are available from the corresponding author upon reasonable request.

## Supplementary material

The questionnaires associated with this article can be found, in the online version, at [doi:10.1016/j.imr.2020.100449](https://doi.org/10.1016/j.imr.2020.100449).

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