

Evaluation of students' satisfaction with three teaching modes in the contact lens course by Students' Evaluations of Educational Quality questionnaire

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通过 SEEQ 问卷调查评估学生对《角膜接触镜》课程三种教学模式的满意度

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摘要

目的:分析眼视光学生对《角膜接触镜》课程三种教学模式的满意度,并为今后提高教学质量提供建议和意见。

方法:2021年6月在天津医科大学眼视光学院使用教学效果评价问卷(SEEQ)进行调查。调查结果采用描述性统计分析,单因素方差分析以确定三种模式之间总得分的差异。

结果:共收集到有效问卷 221 份,其中男生 87 人(39.4%),女生 134 人(60.6%)。线下、线上和混合教学的总分分别为 151.46(12.45)、148.71(13.14)和 147.97(14.56),差异无统计学意义($F=1.10, P=0.33$)。在线下教学中,学生与教师的互动时间比线上教学和混合教学中长($P=0.03$)。不同性别和学习成绩的学生对三种不同的教学模式评分差异无统计学意义($P=0.33, P=0.91$)。此外,18.1%的学生建议应增加实验时间。

结论:眼视光学生对所有三种不同教学模式均满意。然而,与线上教学和混合式教学相比,在传统教学中学生与教师互动时间更长。教师需要更多时间来提高线上教学能力。

关键词:教学效果评价问卷;角膜接触镜;线下教学;线上教学;混合教学

Abstract

• **AIM:** To determine the students' satisfaction with the three teaching modes in the contact lens course and provide suggestions to improve teaching quality.

• **METHODS:** We conducted a survey at Tianjin Medical University in June 2021 using the Students' Evaluations of Educational Quality (SEEQ) questionnaire. We used descriptive statistics to analyze SEEQ items and the One-way ANOVA was used to determine differences in scores among the three modes.

• **RESULTS:** Among the 221 valid responses collected, 87 (39.4%) respondents were males and 134 (60.6%) were females. The total scores were 151.46(12.45), 148.71(13.14), and 147.97(14.56) for offline, online, and blended teaching, respectively, with no significant difference ($F=1.10, P=0.33$). Students had a longer interaction time with the teacher in offline teaching than in online and blended teaching ($P=0.03$). The three different teaching modes have no significant difference among genders or academic performance ($P=0.33, P=0.91$, respectively). Furthermore, 18.1% of students suggested that the amount of experiment time should be increased.

• **CONCLUSION:** Students were satisfied with all three teaching modes. However, they had more interaction time with teachers in traditional offline teaching compared with online and blended teaching. More time is needed to increase teachers' online teaching ability.

• **KEYWORDS:** Students' Evaluations of Educational Quality questionnaire; contact lenses; offline teaching; online teaching; blended teaching

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INTRODUCTION

The use of technology in education has resulted in online learning becoming a common teaching method^[1-7]. Many schools have incorporated this into their teaching, including medical schools^[1, 8-12]. The COVID-19 pandemic accelerated this process. According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the closure of schools and universities, including Tianjin Medical University, has had an impact on 1.2 billion students. Before the year 2020, the theoretical and experimental components of the contact lens course were taught using a conventional offline (face-to-face) teaching method. In the spring semester of 2020, due to the spread of COVID-19, schools at all levels across China held off opening their classes. Following the Ministry of Education's "stop schools, non-stop learning" campaign during the pandemic, online courses were introduced. Medical education was also severely affected by the global crisis. Most countries adopted digital remote learning modes to ensure the stability and continuity of education^[1, 10, 13-17]. The faculty of Tianjin Medical University School of Optometry also shifted from offline to online to facilitate students' education. The shift was an immense challenge for all the teachers. Besides reorganizing the content, and learning the software, they also had to learn to interact with students from the other side of the screen.

Although online teaching was only a temporary method to cope with the pandemic, it presented an opportunity to move China's education forward. Even after the lifting of the travel restrictions, the number of students who use remote learning continues to grow. This has changed the learning habits of students and the teaching habits of faculty^[18]. We tried a blended (online for some theoretical parts, offline for the experimental parts) teaching mode for the contact lens course in fall 2020.

In 1.5 years, students experienced three teaching modes: offline, online, and blended teaching. However, it remains unknown which one is the most acceptable.

Some studies reported no significant differences between online and offline teaching modes among health sciences students^[1]. Others reported significant improvement in the online learning groups^[3]. Studies failed to reach consistent conclusions, resulting in complex decisions when selecting a teaching method for medical education^[19].

Therefore, we used an internationally validated questionnaire to assess student satisfaction with the three teaching modes in the contact lens course, as well as suggest ways to improve the course.

SUBJECTS AND METHODS

Study Participants The survey was conducted in June 2021 at Tianjin Medical University, which has two campuses, Dagang and Qixiangtai. The study participants comprised three groups. The first group included 92 students enrolled in 2017 at Dagang campus who were taught by online teaching; The second group included 100 students enrolled in 2018 who were taught by blended teaching; The third group included 60 students enrolled in 2017 at Qixiangtai campus who were taught by offline teaching. A total of 252 students participated in this survey. This study was conducted under the approval of the authorities and ethics committee of Tianjin Medical University Eye Hospital and adhered to the tenets of the Declaration of Helsinki. Informed consent was obtained from the subjects after an explanation of the nature and possible consequences of the study.

Students' Evaluations of Educational Quality Questionnaire Students' Evaluations of Educational Quality (SEEQ) is one of the most widely used evaluation scales for teaching effectiveness. The SEEQ questionnaire was compiled by the eminent Australian educator Marsh^[20] in 1987. It has been used in universities in many countries and regions and has good reliability, validity, and applicability^[21]. After being revised by Meng and Liu^[22] according to the cultural characteristics of China, the SEEQ questionnaire became widely used in China^[23-24].

There are 32 questions in SEEQ, all of which use a 5-point Likert scoring method, from 1 (strongly disagree) to 5 (strongly agree). Hence, the higher the score is, the higher the evaluation. Participants were also asked to comment on their experience using an open-ended question.

We sent an invitation letter *via* weblink to explain the purpose of the study, and asked the students to complete the survey within 2wk and rate the degree to which they agreed or disagreed with each item in the questionnaire.

Statistical Analysis Data were collected using the WenJuanXing website and analyzed using SPSS 23.0 (IBM Corporation, Armonk, NY, USA) to determine the mean and standard deviation of each item. One-way ANOVA was performed to compare the difference among the three teaching modes. The difference was considered statistically significant at $P < 0.05$.

RESULTS

Questionnaires with incomplete answers were excluded ($n = 31$). A total of 221 valid questionnaires were collected, with a response rate of 87.7% (221/252). Among the respondents, 87 (39.4%) were males, and 134 (60.6%) were females.

The total scores were 151.46 (12.45), 148.71 (13.14), and 147.97 (14.56) for the offline, online, and blended teaching groups, respectively, with no significant difference ($F = 1.10$, $P = 0.33$). The differences between males and females were not significant among the three teaching modes ($P = 0.44$, 0.27 , and 0.22 , respectively; Table 1).

Table 1 The differences in evaluation scores of the three teaching modes

Parameters	Offline teaching		Online teaching		Blended teaching	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Females	28	152.68 (9.85)	54	147.59 (13.94)	52	146.31 (14.86)
Males	22	149.91 (15.24)	24	151.21 (11.00)	41	150.07 (14.06)
Total	50	151.46 (12.45)	78	148.71 (13.14)	93	147.97 (14.56)
<i>t</i>		0.78		-1.12		-1.24
<i>P</i>		0.44		0.27		0.22
<i>F</i>				1.10		
<i>P</i>				0.33		

SD: Standard deviation.

To further analyze each item in the SEEQ, we compared the scores of each question among three teaching modes. The mean (SD) score of Q5 was 4.74 (0.53), 4.51 (0.70), and 4.40 (0.86) in offline, online, and blended teaching, respectively. There was a significant difference among the three modes in terms of interaction time with the faculty during office or after class ($F = 3.48$, $P = 0.03$). The scores of the other items were also higher in offline teaching compared to the other two modes. However, no statistically significant differences were observed (all $P > 0.05$).

The following items got the highest scores: Q22 in offline teaching, Q24 and Q21 in online teaching, and Q21 in blended teaching. The results indicate that faculty members were sincere and responsible in teaching. The theoretical knowledge, viewpoints, and background of the course were presented in detail. The reading materials handed out were valuable. The score of Q31 ranked the lowest in all three teaching methods. Students thought they were given excessive homework which added to their pressure (Table 2).

To explore whether their academic performance affected satisfaction, we classified the students into 3 groups according to their scores in the contact lens course. Students ranked in the top 30% of the class, 30%–60% of the class and the bottom 30% of the class gave an average score of 149.23 (13.89), 148.59 (13.91), and 149.75 (11.84), respectively. There were no statistically significant differences among the three groups ($F = 0.09$, $P = 0.91$).

Offline teaching got the highest score both in the top 30% of students and students ranked 30%–60%, though the difference was not significant ($P = 0.60$ and 0.25 , respectively). For the bottom 30% of the students, the score for blended teaching was the highest but there were also no significant differences among the three modes ($F = 0.72$, $P = 0.50$; Table 3).

A word cloud analysis of the students' comments (Table 4) showed that 18.1% (40/221) suggested increasing the experiment time, while 5.9% (13/221) suggested increasing communication and interaction time. Some students proposed adding high-quality teaching videos and images, and some hoped that their theoretical knowledge could be extended.

DISCUSSION

Our study showed that students were satisfied with all three teaching modes. However, they had more interaction time with teachers in offline teaching compared with online and blended teaching. It provided us with insights into the strengths and weaknesses of different teaching modes.

There was a slight advantage for traditional offline teaching over online and blended teaching in both total and individual assessments. This means that the students were accustomed to accepting traditional face-to-face teaching. It was difficult for them to adapt to the rapid transition to a complete e-learning environment. The COVID-19 pandemic accelerated the transition^[25]. Some students complained about network crashes and the unavailability of electronic equipment, while some were unfamiliar with the software being used^[26].

Despite online and blended teaching garnering lower grades, the students claimed that remote e-learning may partially replace the traditional method of disseminating theoretical material, but not with regard to clinical expertise. Our results were consistent with Goodwin *et al.*'s^[27] research, which found that e-learning in blended learning environments does not appear to improve students' grades in clinical skills teaching in optometry. The study emphasized that it is important to better understand the situations in which e-learning tools can be best utilized within the optometry curriculum. Meanwhile, Subramanian *et al.*^[28] showed that online learning was better than offline for medical students. More research is required to draw a firm conclusion on this subject.

In offline teaching, students and teachers interacted more, according to item 5's results. A better level of learning efficiency is achieved through discussions between students and teachers during offline instruction. Surprisingly, convenient networks did not increase effective communication between teachers and students in online teaching. A study by Fatani^[13] also showed that web video conferencing technology caused a barrier to interact with the instructor.

As a result, teachers sometimes give their students homework assignments after school to assess their understanding; nevertheless, as item 31 demonstrated, this added pressure on

Table 2 Differences among three teaching modes in each item of Students' Evaluation of Educational Quality

Questionnaire items	Offline Mean(SD)	Online Mean(SD)	Blended Mean(SD)	F	P
	(n=50)	(n=78)	(n=93)		
Learning					
1.Mastered the contents of the course	4.62 (0.60)	4.54 (0.68)	4.33 (0.86)	2.89	0.06
13.Interest and motivation increased by this teaching mode	4.78 (0.51)	4.78 (0.50)	4.72 (0.54)	0.37	0.69
14.Learned something valuable through this course	4.82 (0.44)	4.71 (0.54)	4.73 (0.51)	0.82	0.44
Group interaction					
4.Encouraged to participate in the course	4.74 (0.53)	4.69 (0.54)	4.59 (0.74)	1.06	0.35
10.Encouraged to ask questions and give meaningful answers	4.82 (0.44)	4.77 (0.51)	4.70 (0.53)	1.03	0.36
17.Encouraged to share their ideas and knowledge	4.82 (0.48)	4.71 (0.58)	4.67 (0.65)	1.11	0.33
29.Encouraged to discuss in class	4.84 (0.42)	4.74 (0.47)	4.66 (0.60)	2.10	0.13
Individual rapport					
5. Teachers and students have sufficient interaction time during office hours or after class	4.74 (0.53)	4.51 (0.70)	4.40 (0.86)	3.48	0.03*
9.Teacher sincerely cares about every student	4.80 (0.45)	4.72 (0.53)	4.70 (0.57)	0.61	0.54
12.Teachers have a sense of humor in lecturing	4.74 (0.53)	4.62 (0.65)	4.69 (0.59)	0.71	0.50
18. Teachers welcome students asking for help inside or outside the course	4.84 (0.42)	4.73 (0.53)	4.76 (0.50)	0.76	0.50
21.Teachers take a sincere interest in students	4.84 (0.42)	4.81 (0.43)	4.84 (0.43)	0.14	0.87
Organization					
3.The teacher's lecture helps students to take notes	4.70 (0.51)	4.72 (0.56)	4.53 (0.76)	2.24	0.11
7.Exams or homework can test the content emphasized by the faculty	4.76 (0.52)	4.72 (0.51)	4.66 (0.60)	0.64	0.53
11.Teachers covered the objectives of the contact lens course	4.84 (0.42)	4.74 (0.57)	4.73 (0.49)	0.82	0.44
20.The evaluation methods are fair and appropriate	4.84 (0.42)	4.72 (0.53)	4.76 (0.52)	0.90	0.41
24. The referenced reading materials by the teacher are valuable	4.84 (0.42)	4.81 (0.40)	4.73 (0.55)	1.02	0.36
25. Reading materials and homework help me master the course	4.82 (0.44)	4.73 (0.53)	4.74 (0.55)	0.51	0.60
28.The teacher's explanation was clear	4.84 (0.42)	4.78 (0.45)	4.72 (0.52)	1.08	0.34
Enthusiasm					
2. The teaching method can keep students interested in the class	4.76 (0.48)	4.69 (0.57)	4.62 (0.62)	0.96	0.39
15.The teacher is full of energy when teaching the course	4.84 (0.42)	4.74 (0.55)	4.75 (0.48)	0.67	0.51
16.The course was well prepared and carefully explained	4.84 (0.42)	4.78 (0.47)	4.76 (0.50)	0.43	0.65
26. The lectures are enlightening and motivating and stimulate students intellectually	4.82 (0.44)	4.74 (0.50)	4.72 (0.56)	0.63	0.53
27.Teachers were enthusiastic about teaching the course	4.84 (0.42)	4.78 (0.45)	4.76 (0.48)	0.47	0.63
Knowledge breadth					
6. Teachers introduce the latest developments in the course comprehensively	4.78 (0.47)	4.64 (0.56)	4.69 (0.55)	1.03	0.36
8.Teachers also teach other various viewpoints besides theirs	4.80 (0.45)	4.65 (0.62)	4.68 (0.57)	1.10	0.33
19.Teachers explain the background, concepts, and ideas used in the course	4.84 (0.42)	4.74 (0.55)	4.82 (0.44)	0.78	0.46
22. Teachers can compare various related theories in the lecture	4.86 (0.40)	4.78 (0.45)	4.78 (0.46)	0.57	0.57
Assignment					
23. Teacher's feedback on exams, and assignments are valuable	4.82 (0.44)	4.74 (0.50)	4.73 (0.55)	0.53	0.59
30.How difficult was the course?	4.08 (0.99)	4.00 (1.03)	4.13 (0.95)	0.37	0.70
31.How much homework was assigned by the teacher?	4.02 (1.08)	3.79 (1.20)	3.84 (1.17)	0.61	0.54
32.How do you rate the progress of the course?	4.12 (0.94)	4.06 (0.92)	4.02 (0.96)	0.18	0.83

* P<0.05; SD: Standard deviation.

Table 3 Differences among three teaching modes classified by students' academic performance

Teaching modes	Top 30%		30%–60%		Bottom 30%	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Offline	18	151.50 (16.06)	20	153.15 (9.40)	12	148.58 (11.18)
Online	46	149.72 (12.29)	29	147.55 (14.24)	3	144.33 (18.45)
Blended	41	147.68 (14.63)	43	147.16 (15.20)	9	153.11 (10.96)
Total	105	149.23 (13.89)	92	148.59 (13.91)	24	149.75 (11.84)
<i>F</i>		0.52		1.39		0.72
<i>P</i>		0.60		0.25		0.50
<i>F</i>				0.09		
<i>P</i>				0.91		

Table 4 Some of the students' comments

Teaching modes	Comments
Offline	“I need personal guidance from the teacher in the experiment part of the contact lens course, but she has limited time and it is difficult to guide students one by one.”
Offline	“In offline teaching, we need to arrive in the classroom on time, and the learning time is fixed and inflexible.”
Online	“I did not feel good in the experimental part; My eyes understood, but my hands did not.”
Online	“There was already a lot of content delivered in the classroom, the homework is too much.”
Blended	“Need to increase experiment time.”

the students. O'Doherty *et al.*^[29] thought online learning not only has significant advantages in terms of flexibility and rich learning resources but also exposes the faculty's inadequacy in teaching design.

Blended learning has shown to be a successful strategy for advancing the “classroom revolution” in higher education by addressing the shortcomings of both offline and online learning. It avoids the drawbacks of both offline and online learning while absorbing their benefits. The Chinese Ministry of Education has vigorously advocated for the development of high – quality online and offline blended courses. In a systematic review and Meta – analysis^[30], in 26 of the 41 studies, blended learning groups outperformed their comparable control groups in terms of learning outcomes. In our study, blended teaching did not show its expected advantage. The reasons could be as follows. First, the faculty did not fully adopt the new teaching mode, and some of them simply recorded a lecture and uploaded it on an online platform. Second, the faculty had not yet mastered internet resources like video conferencing and virtual classrooms in such a short period of time. Our study has the following limitations. First, our participants' knowledge and learning capacity varied, which might have an impact on the outcomes and appraisal of the three different teaching approaches. Second, the answers were self – reported; therefore, the possibility of recall and reporting bias cannot be excluded. Third, online and blended teaching was performed for one year only. Hence, more time was needed to assess these three teaching modes.

In summary, students were satisfied with all three teaching modes in the contact lens course. They had more interaction

time with teachers in offline teaching compared with online teaching and blended teaching. More time is needed to increase teachers' online teaching ability.

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