





FEATURE ISSUE MANUSCRIPT

Contact lens education for the practitioners of the futureShehzad A Naroo^{1,2} , Philip B Morgan^{1,3} , Lakshmi Shinde^{1,4} , Cheni Lee^{1,5} and Alison Ewbank¹ 

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Abstract

The World Health Organization has identified a shortage of trained human resources as one of the greatest challenges to increasing the availability of eye care services and reducing preventable visual impairment around the world. Increased prevalence of myopia and new strategies for myopia management have raised the prospect of various interventions, including contact lenses for therapeutic use as well as for refractive correction. More personnel skilled in contact lens fitting will be needed to address potential worldwide demand for these interventions. This review investigates the current status and future requirements of global contact lens education in light of these developments.

The COVID-19 pandemic led educational institutions worldwide to move towards online delivery. An online survey among 546 educators, conducted in May 2020, investigated changes to contact lens education delivery before and after the onset of the pandemic. A total of 214 responses were received from 32 countries. Prior to COVID-19 restrictions, 23% of educators had conducted more than 50% of their total teaching online; however, 69% expected to conduct more than half of their teaching online by the end of 2020 and 12% anticipated 90% or more of their teaching would be online. Some 76% of educators expected to provide more online lectures after the pandemic and 63% anticipated new methods to deliver practical education. Around half were planning to introduce new teaching online platforms (54%) and more online assessment methods (53%).

The global need for increasing numbers of skilled personnel points to a crucial role for educators in teaching the contact lens practitioners of the future. Contact lens education delivery was already evolving prior to COVID-19, and changes that are currently occurring may lead to permanent differences in the way contact lenses are taught in future. The International Association of Contact Lens Educators (IACLE) provides educators with a standardised global curriculum, online resources and teaching technology that could also serve as a model for wider ophthalmic education in future.

Introduction

The 2019 World Health Organization (WHO) *World Report on Vision* identified a shortage of trained personnel as one of the greatest challenges to increasing the availability of eye care services and reducing the prevalence of preventable visual impairment around the world.¹ The report identified the need to prepare for a projected consistent

increase in numbers of those requiring eye care, due to population ageing and lifestyle changes such as less time spent outdoors and increased near-work.

The number of people worldwide with myopia is projected to rise from 2.62 billion in 2020 to 4.76 billion – nearly half the world's population (49.8%) – by 2050.² The overall prevalence of myopia is highest in high-income countries of the Asia-Pacific region (53%) and in East Asia

(52%).² Estimates among adolescents in urban areas of China and South Korea have reported rates of myopia as high as 67% and 97%, respectively.³

Increased prevalence of myopia and strategies for its management have raised the prospect of various interventions, including contact lens approaches. In addition to being an option for correcting myopia, contact lenses are showing some success in slowing the progression of myopia in children. A meta-analysis of randomised controlled trials including 41 studies (6,772 participants) found that, among optical interventions, multifocal lenses – either spectacles or contact lenses – might confer a small benefit. Orthokeratology contact lenses, although not intended to modify refractive error, were more effective than single-vision contact lenses in slowing axial elongation.⁴

A further review of the evidence base for myopia control interventions concluded that multifocal and orthokeratology contact lenses, or other modalities proven to slow myopic progression, might become the standard of care for myopic children and adolescents.⁵ Recent results from a 3-year randomised controlled clinical trial of a daily disposable, dual-focus soft contact lens in myopic children⁶ led to the first indication for a myopia control contact lens by the US Food & Drug Administration, following previous CE marking.⁷

Other therapeutic uses for contact lenses are also emerging that might, in future, place further demands on contact lens practitioners and require new skills. Examples in the public health area include ‘smart contact lenses’ for monitoring intraocular pressure and blood glucose levels, and for drug delivery.^{8–10}

If contact lenses are to be commonly prescribed for therapeutic applications, as well as for correcting increasing numbers of people with refractive error, then this raises the question as to who will fit them in order to address a potential worldwide demand for these interventions. Will there be sufficient numbers of educators to teach students contact lens fitting skills if the number of optometry schools increases? And how can the level of education provided be standardised and maintained around the world? This review investigates the current status and future requirements of global contact lens education in light of these developments.

International Association of Contact Lens Educators (IACLE): a global network of educators

The joint Public Health and Environmental Vision Section (PHEV) and World Council of Optometry (WCO) Symposium: International Optometry: Public Health, Education, and Personnel Issues convened at the American Academy of Optometry 2019 and 3rd World Congress of Optometry, addressed the education and personnel

resources needed to reduce vision impairment and prevent vision loss. The WCO Global Optometric Education Summit at the Congress heard that meeting eye care needs and ensuring good quality education required a global curriculum, educators to deliver it and people to lead.¹¹

Founded in 1979, the International Association of Contact Lens Educators (IACLE) fulfils these roles in contact lens education. IACLE aims to increase the number of qualified contact lens educators and improve the quality of contact lens teaching, thereby increasing the number of skilled contact lens practitioners throughout the world and facilitating the use of contact lenses worldwide, in partnership with industry.

IACLE currently has 960 members in 726 institutions in 79 countries (as at 30 June 2020). A total of 358 members have achieved Fellowship of IACLE (FIACLE) status by examination. A multi-disciplinary organisation, IACLE offers a range of online resources, programmes and events to its global network of contact lens educators. IACLE is particularly well represented in the Asia Pacific (AP) region, where 59% of its membership (569 AP members in total) are located, and in developing contact lens markets. Countries with the highest numbers of IACLE members are China (282) and India (133), with the UK (48) and South Korea (45) also having active participation.

Studies have investigated the benefits of IACLE membership and FIACLE status. Optometrists graduating from Indian institutions with greater IACLE collaboration and support reported greater satisfaction with their training, especially with theoretical aspects.¹² Higher levels of education, greater experience and FIACLE status among practitioners were associated with advanced contact lens fitting.¹³ IACLE members found contact lens fitting provided more professional satisfaction and a better business proposition compared to non-members.¹⁴

A 2018 survey of IACLE members showed 92% were extremely or very likely to recommend other contact lens educators to join IACLE, and providing the resources needed to teach contact lenses was seen as the principal benefit of membership; the six-module, 33-lecture online IACLE Contact Lens Course was the highest rated IACLE resource for satisfaction and importance, and the most widely used.¹⁵ Tools for assessing students’ practical skills and how to use technology in teaching were among the resources that members would like IACLE to provide in the future.

The impact of COVID-19

Education has been especially affected by the COVID-19 pandemic, with reports of institutions around the world closed to students and moving towards online teaching. A review of the socio-economic implications of the pandemic

identified education as one of the service provision sectors most affected.¹⁶

Surveys in April 2020 investigated the impact of COVID-19 on academic activities in optometry and ophthalmology training.^{17,18} A majority of optometry educators in India (94%) had switched to e-learning mode, with most teaching, learning and assessment carried out using video conferencing tools, dedicated educational portals and social media apps.¹⁷ In ophthalmology, before the pandemic nearly half of educators worldwide (48%) did not use any e-learning.¹⁸ During the COVID-19 pandemic, there was a statistically significant increase in the use of all e-learning alternatives.

Recent findings

Today's students of contact lens practice will be tomorrow's contact lens practitioners, and so it is important to consider the effects the pandemic will have on their education. In May 2020, IACLE conducted a survey to determine the impact of COVID-19 specifically on contact lens education: how much education was already conducted online, and how educators and institutions planned to adapt their teaching in the future.

Methods

An online survey of 28 closed and open questions was sent to 546 contact lens educators (educator members of IACLE). The survey was conducted in English and Spanish, with translations into Simplified Chinese, Korean and Bahasa provided as a guide to completion. Questions covered demographic information about respondents and their institutions, the current situation in light of COVID-19, technology and resources used, and future education provision.

The survey was disseminated using Survey Monkey (www.surveymonkey.co.uk), with invitations sent via e-mail. Completed questionnaires were received between 11 and 31 May 2020. Responders could answer the survey only once. Participation in the survey was voluntary and without reimbursement.

Results

A total of 214 responses from educators in 32 countries were received by the cut-off date, representing a 39% response rate. Results were analysed by region and for countries with the highest IACLE membership (China and India), as well as on a global basis. Teaching was the principal activity for the majority of respondents (65%), with 29% working mainly in clinical practice. A majority (73%) said their principal location was a university/college and

others cited clinical practice (13%), industry (8%) or hospital settings (5%).

Current education provision

In light of the COVID-19 pandemic, 58% of educators responding were already delivering more online education than they would normally provide and only a small proportion (7%) were providing no online education at all. A majority were using live lectures to deliver online education, either narrated or via video, especially when combined with discussion (68%). PowerPoint and recorded lectures were used by 32% and 31% respectively. Very few were not delivering any online lectures (3%).

With 71% of institutions closed to students to attend in person at the time of the survey, practical education and student assessment were less likely to be taking place than lectures; 54% said their institutions were running online exams or assessments but only 24% were holding these for students to attend in person, and only 27% were conducting practical sessions.

Asked about their contact lens teaching prior to COVID-19, 23% of educators estimated they had previously conducted more than 50% of their total teaching online and 8% said that 90% or more of their teaching had been online (*Figure 1*). However, 69% of respondents said that, by the end of 2020, they anticipated conducting more than half of their total teaching online, and 12% expected that 90% or more of their teaching would be online (*Figure 2*). Only 2% said none of their teaching would be online by the end of 2020, compared to 20% prior to COVID-restrictions.

While the anticipated shift towards more teaching online post-COVID was general across all regions, some countries were starting from a lower base, even within the same region. In China and India, 16% and 17% of educators, respectively, were conducting none of their teaching online pre-COVID. However, in countries within the Asia Pacific region other than China and India (including South Korea, Indonesia, Malaysia), 29% were not conducting any teaching online prior to the pandemic.

Among the resources the educators were employing to teach their students online were the IACLE Contact Lens Course (77%), Case Report Series (46%) and Image Galleries (44%). A high proportion of respondents (87%) expected to use IACLE resources more in the future, in light of the pandemic, and none expected to use these less in the future. Some educators were collaborating across institutions and with colleagues, such as sharing live sessions (34%) or discussing clinical cases together (32%). However, only 10% were donating presentations to other institutions or colleagues, and 43% were not collaborating in any of these ways.

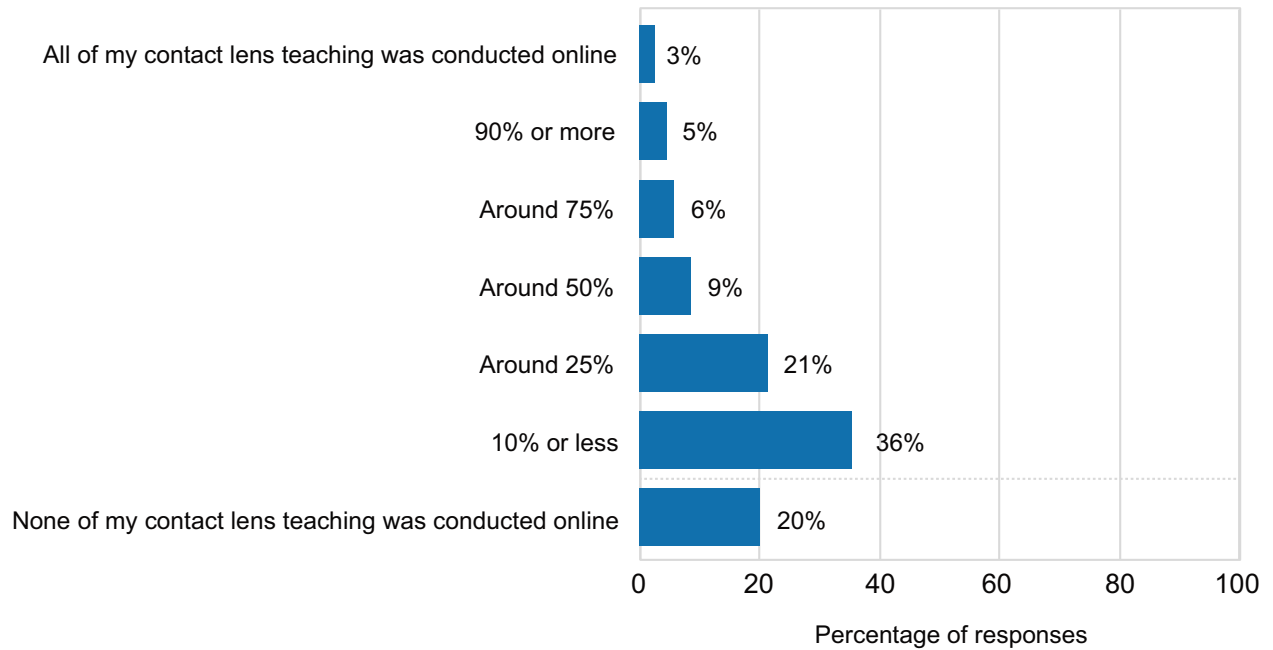


Figure 1. Responses to the question: 'What percentage of your total contact lens teaching would you estimate was conducted online prior to COVID-19 restrictions?'.

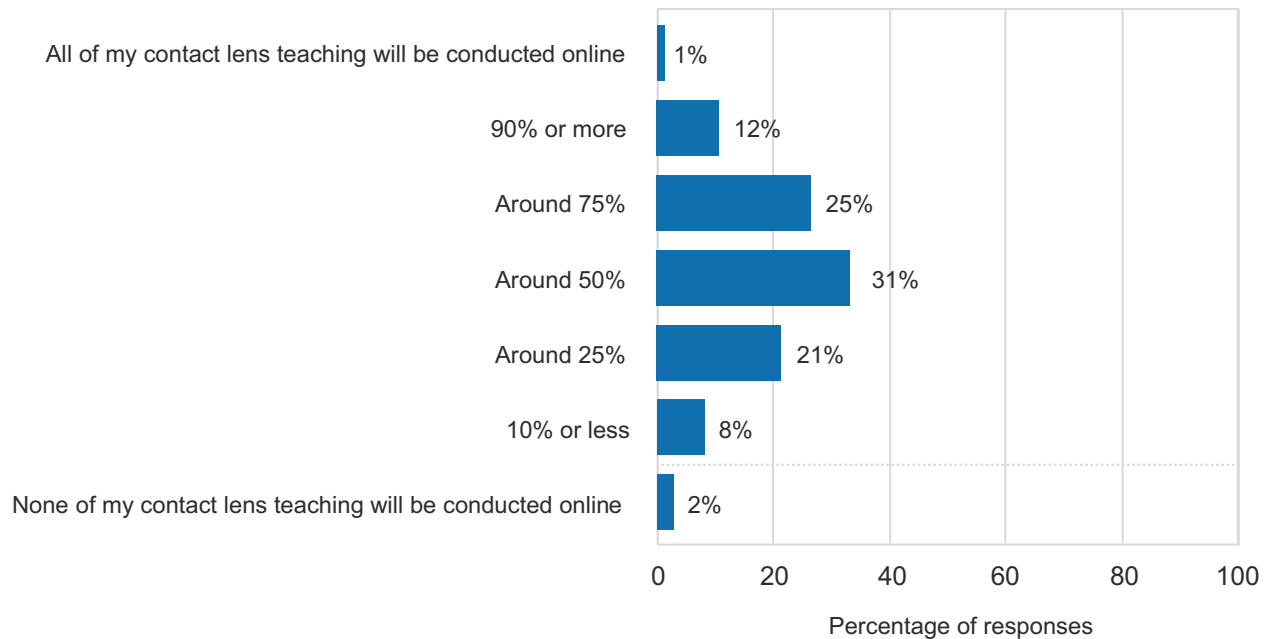


Figure 2. Responses to the question: 'What percentage of your total contact lens teaching would you estimate will be conducted online by the end of 2020?'.

Future education provision

Most educators expected to change their teaching in the post-COVID situation and in varying ways, most

commonly to provide more online lectures (76%) and new methods to deliver practical education (63%) (Figure 3). Around half of educators were also planning to introduce new teaching platforms and more online student

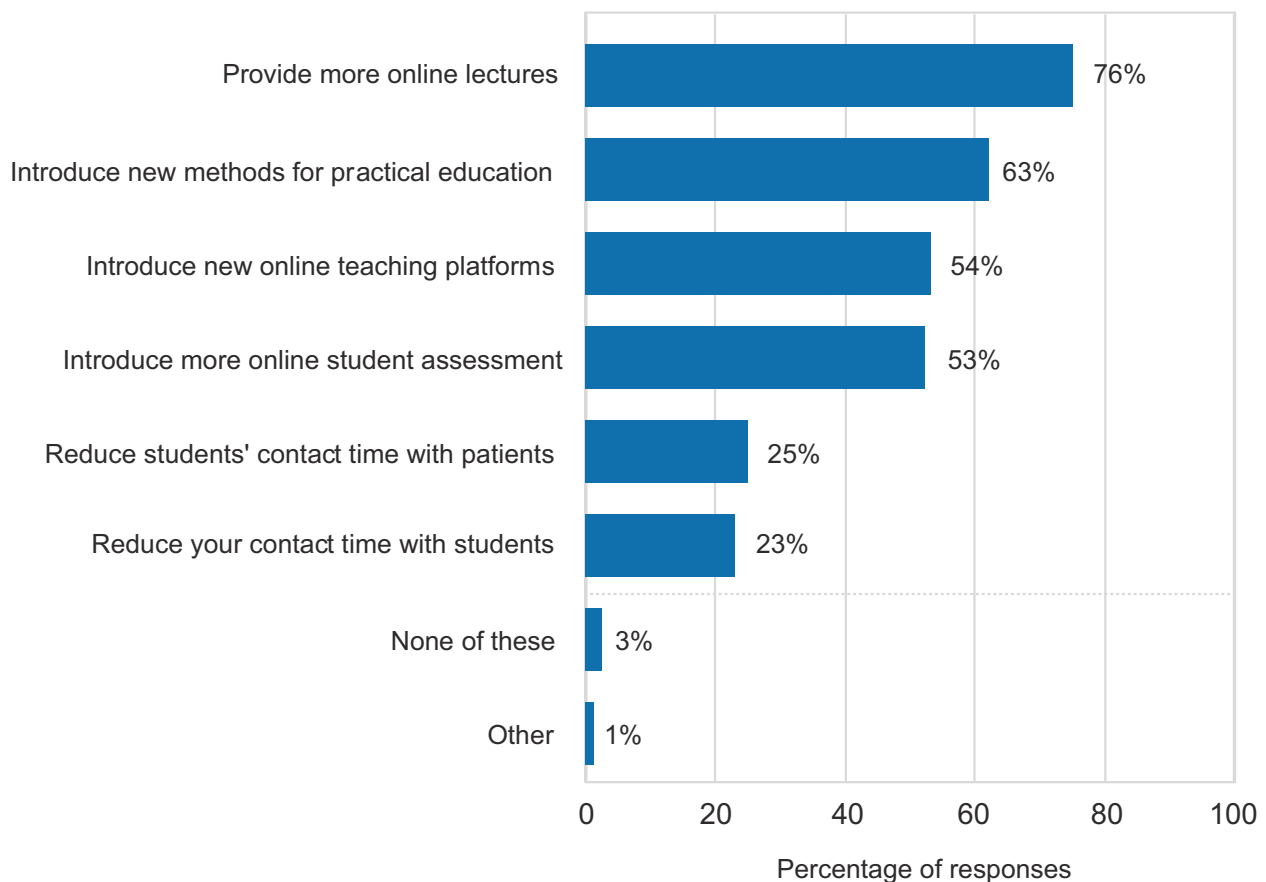


Figure 3. Responses to the question: 'How do you plan to adapt your contact lens teaching in future in light of the COVID-19 pandemic?'

assessment. Some anticipated that their contact time with students would be reduced and that students' contact time with patients would also be reduced.

There were regional differences in expectations of future education provision. In China, 85% of respondents expected to provide more online lectures in the future, whereas in the Americas 70% planned to adapt their teaching in that way.

When questioned about specific resources for future use, there was support for a range of provisions. Notably, 74% of the educators would be interested in using an online teaching platform (learning management system) to deliver educational resources. In response to an open question, educators indicated they would like more webinars, discussions and debates, videos, case reports and images, along with methods for teaching and assessing practical concepts remotely. There was also support for greater collaboration between institutions in different regions and countries. In China, educators were already more likely to be collaborating with other institutions and colleagues, whether

discussing clinical cases (49%) or sharing live sessions (43%), compared to 32% and 34%, respectively, globally.

The survey revealed a variety of logistical challenges to providing contact lens education online, from the difficulty in measuring learning outcomes (59%) and monitoring students (54%), to limited interaction and feedback (57%). Internet connectivity was also an issue for a substantial proportion of educators globally (41%), rising to 58% in India compared to 24% in the Europe/Africa – Middle East region.

Discussion

The IACLE survey shows that contact lens educators have adapted their teaching towards more online education in light of the COVID-19 pandemic and anticipate substantial increases in the proportion of their total teaching time conducted online, representing a major shift in the educational landscape. Since education delivery was already evolving prior to COVID-19, changes that are currently occurring

seem likely to lead to permanent differences in the way contact lenses are taught in the future.

A study among optometric educators in India found that the COVID-19 pandemic was proving to be a 'constructive disruptor', giving an opportunity for restructuring the present conventional, classroom-based educational system.¹⁷ A worldwide survey into ophthalmology-related education concluded that the pandemic may change traditional teaching practices and provide new educational opportunities.¹⁸

In the United States, the pandemic has been described as 'a powerful force for technical innovations in education', offering opportunities to consider new educational paradigms and alternative instructional models.¹⁹ Among the innovations proposed are outcome-based instruction, self-paced learning and the use of patient simulations when face-to-face clinical encounters are not possible.

Online delivery of a standardised contact lens curriculum could help to improve standards of teaching and increase the number of skilled practitioners around the world. However, the present survey shows that major challenges remain with delivering contact lens education online, particularly with respect to teaching practical skills, student assessment and interacting with students. More resources and support will be needed to meet these challenges both during the pandemic and beyond. Greater collaboration and connectivity might also help educators and students adapt to new ways of teaching and learning.

In response to these findings, in June 2020 IACLE launched its TLC (Teach. Learn. Connect) Initiative to support educators with additional online resources to supplement its educational activities. These resources included global, regional and national webinars that, in the first three months of the initiative, were viewed by 4,828 educators and their students; a learning management system (IACLE-TOP) that will host all IACLE's online resources in the future, including the IACLE Contact Lens Course; an Online Student Trial Exam to assess students' contact lens knowledge; a self-directed interactive Case Report Series and tools for practical teaching such as a series of flashcards for students on clinical techniques. The initiative also included a social media campaign to connect with members, and access to live webinars for educators and their students via social media channels.

In a further development, as a direct result of the WCO Global Optometric Education Summit, in December 2019 IACLE began a collaboration with the Santiago University of Technology in the Dominican Republic to support contact lens teaching in the country's first optometry school. With online delivery, there is potential for more collaboration connecting educators and institutions in different regions and countries.

The global need for increasing numbers of skilled eye care personnel points to a crucial role for educators in

teaching the contact lens practitioners of the future. The increased prevalence of myopia and emergence of potential therapies to slow myopic progression will require more practitioners with the skills to fit contact lenses. Furthermore, the COVID-19 pandemic has itself prompted 'an unprecedented wake-up call for eye care professionals to be prepared for post-pandemic myopia management'.²⁰ This author raises the issue of children spending prolonged hours of near activity without outdoor activities during the pandemic, and the potential effects on the global prevalence of myopia.

IACLE is already active in those countries where myopia rates are currently highest and in developing contact lens markets. It provides educators with a standardised global curriculum, online resources and teaching technology that could also serve as a model for wider ophthalmic education in the future.

Disclosure

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Author contributions

Shehzad A Naroo: Conceptualization (equal); Writing-review & editing (equal). **Philip Morgan:** Conceptualization (equal); Writing-review & editing (equal). **Lakshmi Shinde:** Conceptualization (equal); Investigation (equal); Methodology (equal); Project administration (equal); Writing-review & editing (equal). **Cheni Lee:** Data curation (equal); Project administration (equal); Writing-review & editing (equal). **Alison Ewbank:** Conceptualization (equal); Writing-original draft (equal); Writing-review & editing (equal).

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