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Advancing optometry education through global frameworks and international collaborations

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ABSTRACT

Global curriculum initiatives aim to enhance the education of optometrists across the world. This is done by establishing competencies and frameworks necessary for consistency in education and training. Through collaboration and knowledge exchange between educators and institutions, future optometrists can be equipped with the latest evidence-based knowledge and skills to deliver quality eye care, regardless of geographical location. This paper explores the concept of a global curriculum by investigating the global similarities and differences in definitions of optometry, regulation of the profession, assessment of competency, accreditation standards for education providers, curriculum frameworks, and scope of practice. Despite the challenges of advancing optometric education, there appear to be many opportunities to explore collaboration on an international scale. Three case studies are presented which demonstrate international collaborations among education providers to train local optometrists. Future technological advancements and the use of artificial intelligence may assist the development and delivery of a global curriculum.

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Introduction

The significance of eye care is highlighted by the increasing global recognition that visual health is integral to the socio-economic development of communities.[1] Concerted international efforts are essential to tackle preventable blindness, address disparities in access to eye care services, and promote comprehensive vision care for all.[2] The World Council of Optometry (WCO) Concept of Optometry states that 'Optometry is a healthcare profession that is autonomous, educated, and regulated, and optometrists are the primary healthcare practitioners of the eye and visual system who provide comprehensive eye and vision care, which includes refraction and dispensing, detection/diagnosis and management of disease in the eye, and the rehabilitation of conditions of the visual system'.[3]

Optometrists are well placed as primary eye care professionals to address global eye care challenges due to their specialised training, comprehensive approach to vision and ocular health, and position within communities. Across many countries, the optometry profession has seen a growing emphasis on preventative eye care, early disease detection, and the integration of therapeutics.[4–6] However, many variations still exist in the definition, regulation, education, and scope of practice of optometrists around the world, hindering the effort to address the global burden of visual impairment. A global curriculum framework could help to establish a standard for optometric education, ensuring high-quality training regardless of geographical location.

To address some of the global challenges faced by the eye care workforce, the World Health Organisation Eye Care Competency Framework was introduced in 2022.[7] Within this framework, optometrists are categorised at the levels of 'advanced' or 'expert'. This competency-based framework was designed to provide global guidelines on the development of the workforce and guide standards of practice across primary, secondary, and tertiary levels of care.[7]

In 2024, WCO developed an updated Competency Framework for Optometry in line with the World Health Organisation framework.[8] The WCO framework defines the competencies required by optometrists to align with current international definitions of optometry and serves as a tool to support educational institutions to inform and target gaps in curricula.[8]

It is critical to acknowledge that whilst competency frameworks are useful to guide and support curriculum development, they allow for flexibility and adaptation to local healthcare needs and contexts. The process of curriculum design requires consideration of regional and local factors, including (1) the alignment of curriculum with professional standards set by national bodies, which is underpinned by legislation; (2) the establishment and analysis of constructive content alignment, which pertains to the scope of training and practice; and (3) the adherence to academic governance, which involves meeting the accreditation standards set for education providers.

Advancing curricula to meet a global standard presents a pivotal opportunity to enhance the quality of optometric education worldwide. However, this endeavour is challenging and requires collaboration between educational institutions and international organisations. This paper aims to review the

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current situation and variations in optometry education, describe the foundational components of optometry curriculum, and explore possible approaches in promoting greater harmonisation in optometric education. This paper presents three case studies of international collaborations to advance optometric education.

Historical perspective and evolution of optometric education

The WCO Concept of Optometry states that 'an optometrist has successfully undertaken an advanced level of relevant higher education, with the award of a bachelor's degree or higher from a tertiary-level educational institution'.[3] Whilst this is true in some countries, there are many discrepancies in optometric education and regulation across the globe.[9] In the first half of the 1900s, optometrists were defined by their role in refraction, binocular vision, and optics.[10] Since then, in several parts of the world, the role of optometrists has expanded beyond refractive correction to encompass the diagnosis, treatment, and management of a diverse range of ocular conditions.[9] Over time, educational curricula have undergone continuous development along with an expanding scope of practice.

In many Western countries, formal optometric education began in the late 1800s and early 1900s. In the United States, the first university curriculum for optometry commenced at Columbia University in 1910.[11] The first Doctor of Optometry (OD) degree was awarded by Pennsylvania College in 1923[12] and is currently conferred at all American and Canadian optometry institutions. In the United State, there are an increasing number of states that have passed legislation for optometrists to perform injectable, adnexal, and laser procedures.[13] All optometry schools in the United States offer training for these procedures, with state-specific legislation dictating whether practitioners can apply these skills in practice after graduation.[13]

In Australia and New Zealand, diagnostic techniques such as gonioscopy,[10] advanced imaging,[4] and therapeutics[14,15] were integrated into curricula over time. To reflect the level of education and years of training, the qualification awarded to graduating optometrists has evolved accordingly. At The University of Melbourne in Australia, an initial offering of the Diploma of Licentiate of Optometric Science in 1941 progressed to a Bachelor of Applied Science in 1960, a Bachelor of Optometry in 1994, and a postgraduate OD degree in 2008.[10] Currently, two out of seven universities in Australia confer a Doctor of Optometry and five award a Master of Optometry. At the University of Auckland in New Zealand, a diploma progressed to a five-year bachelor's degree, with Honours.[4]

Many universities in the United Kingdom are transitioning from a Bachelor of Science in Optometry to a master's degree.[16] Traditionally, graduates of a bachelor's degree undertook a one-year postgraduate training program. The shift towards a master's program as the exit degree allows the universities to document the intended learning outcomes and provide academic support[17] during clinical training.

In some European countries, such as Italy and France, optometry is not yet formally regulated as a profession. In countries in Europe where optometry is a regulated profession, some are not allowed the use of diagnostic drugs. While a number of optometry schools offer postgraduate degrees,[18,19] the content of the program and clinical training are not aligned to countries with a greater scope of practice, such as the United States. The European Council of Optometry and Optics aims to foster greater harmonisation of optometric education in Europe and has established an internal accreditation agency to benchmark programs at the Bachelor level in European Higher Education or equivalent.[20]

The first optometric educational institution in Africa was established in 1924 in South Africa.[21] The evolution of optometric education in the African region has progressed more quickly in some countries than others. Ghana and Nigeria now offer six-year OD programs that incorporate diagnostic evaluation and therapeutic prescribing. Institutions in South Africa and Sudan offer postgraduate master's and Doctor of Philosophy degrees, while other African countries offer diplomas or bachelor's degrees.[21,22]

In Asia, the Philippines was a pioneer in optometric education, dating back to 1917, and was the first to offer an OD degree in the continent. Despite this, the scope of practice in the country is still limited to diagnostic agents.[23] Bachelor's and postgraduate programs in optometry are offered at The Hong Kong Polytechnic University.[5] In China, there are two paths for optometric education: one program is a four-year Bachelor of Science in Optometry Technology degree, and the other is a five-year Optometric Medicine degree with therapeutic scope.[24] In India, optometry remains unregulated[25] although there are over 200 schools of optometry which offer qualifications that vary from two-year diplomas to postgraduate degrees.[26] In Nepal, optometry education was only introduced in 1998 in collaboration with the University of Auckland, New Zealand.[27]

Seven out of 12 countries in the Middle East offer an optometry program.[28] Saudi Arabia offered the first bachelor's degree in the later part of the 20th century which has evolved into an OD program in recent years to meet the scope of practice requirements set by the regulatory body. The other six countries, including Jordan and Lebanon, currently offer a bachelor's degree. With many practitioners holding a diploma level in optical technology, some countries offer a bridging program to allow diploma holders to attain a bachelor's degree through conducting a prior learning assessment and undertaking a set of courses.[28]

In South America, the first optometry school opened in 1950 in Mexico, with continuous support from United States-based not-for-profit organisations such as Volunteer Optometric Services to Humanity International.[29] The recognition of optometry as an autonomous profession supported the provision and promotion of optometric education in countries such as Colombia, Costa Rica, Trinidad, and Tobago.[30] In contrast, optometry education is restricted in countries such as Brazil and Uruguay where practising optometry is considered illegal. OD programs in Colombia have integrated diagnostics and therapeutics into the curriculum as the law permits the use and prescribing of pharmaceutical agents by optometrists.

Optometric curricula

As qualifications vary between countries, differences also exist in the design and delivery of optometric curricula. Entry-level competency standards have been developed in several countries to identify the skills, knowledge, and attributes required for optometrists to practise safely and

competently. Competency-based education has emerged in health and medical education as a learning and teaching strategy that focuses on the learner demonstrating those pre-defined competencies.[31–34] In Australia, for example, these competency standards[35] have helped guide optometry curriculum development in some institutions.[36] In India, the Ministry of Health and Family Welfare has acknowledged the role of competency-based curricula for optometrists in setting clear expectations of professional standards.[37]

Optometric education modalities typically involve basic foundational science followed by applied pre-clinical skills training, then community clinical placements. Another approach is a spiral curriculum, where essential skills are introduced earlier and reinforced throughout the curricula.[38] This approach integrates knowledge with practical skills to maximise the total clinical exposure across the program. Early integration with clinical observational rotations is one way to implement the spiral curriculum.[17,39]

Historical reviews of optometry curricula have shown a shift from traditional didactic methods of teaching towards more patient-facing clinic time.[40,41] A comparison of curricula in the United States over time found an increased focus on placements in recognition of the importance of clinical exposures within optometric education.[40] The organisation and implementation of placements differs across programs to fit the local context and health care systems.

In certain countries such as South Africa, where there is a significant burden of vision impairment in rural areas, a decentralised clinical training model is utilised where students are placed in rural public health care facilities.[42] Furthermore, clinical exposures are measured differently by various institutions. Some universities measure clinical competency within hours, whereas other universities measure the number of clinical patient encounters.

Core subject matter in optometry programs share similarities across many Western countries. Most first-year curricula include coursework in subjects such as broad vision sciences, clinical optics, pharmacology, anatomy, physiology, and other areas of biomedical science. Pre-clinical skills training is often introduced in the second or third year, with continued development of these skills in the third and fourth years.. The final year of optometry typically includes general clinical placements as well as specialty clinics such as contact lenses, low vision, glaucoma, binocular vision, paediatrics, and medical retina.[43]

For institutions that have moved from undergraduate towards postgraduate models of optometry, foundational knowledge of basic sciences is used as a prerequisite for entry into postgraduate programs[44] to allow for dedicated curricula time on clinical skills and speciality knowledge.

Appraising competency can be undertaken using a variety of assessment modalities such as multiple-choice questions, short-form answer questions, standardised patient assessments, and Objective Structured Clinical Examinations.[45] A range of assessment types and observations from multiple assessors are required to provide insight into a student's journey towards competency. A scoping review to map the assessment approaches in optometry education programmes globally is currently underway.[46]

Cultural competencies are now emphasised in many curricula, and students are trained to respect diversity and acknowledge cultural differences in the provision of eye care. Countries such as Australia,[47] the United States,[48] New Zealand,[49] and India[37] have national recommendations on the integration of cultural training within optometric curricula. Universities in Australia and New Zealand are encouraged to engage and consult local First Nations communities prior to the design, development, and implementation of curricula focused on cultural safety.[50] The increased focus has resulted in positive feedback from students and educators across Australia[50] and Canada.[51] However, challenges such as educator preparedness, resource sharing, and program development within organisational leadership are yet to be fully addressed.[50,52]

Accreditation processes and regulatory policies

Accreditation is a system used to recognise that educational institutions and programs have attained a level of educational quality and effectiveness that meets the standard of the community they serve. Accreditation bodies independently set curriculum standards which assess domains such as public safety, program of study, academic governance, student experience, cultural safety, program learning outcomes, and assessment.[53] Accreditation status is reviewed periodically; therefore, accredited programs are required to continually demonstrate improvement and quality assurance.

In the United States and Canada, the Accreditation Council on Optometric Education accredits optometry programs. Graduates who have completed their studies at an accredited course must pass national licencing exams[54] to gain eligibility to apply for registration as an optometrist in their state or provincial regulatory body.

In Australia and New Zealand, the Optometry Council of Australia and New Zealand is the accrediting body for optometry programs, and students are eligible to apply for registration with the national regulation body upon completion of an accredited course.[55] A Trans-Tasman Mutual Recognition Arrangement exists between the two countries aimed at promoting consistency in practice standards.[56] In the United Kingdom, graduates of programs accredited by the General Optical Council are eligible to apply for registration.[57]

Regulation of the optometry profession exists to protect the public and ensure professional standards are being met. It is a registration requirement of some regulating bodies for optometrists to engage in compulsory continuing professional development to continually maintain and improve their skills, abilities, and knowledge. However, there are still many countries where optometry remains unregulated. This means that any person, even without the necessary training, can perform professional tasks. In addition to the risk of poor-quality service delivery, a lack of regulation can prevent the profession from advancing and developing. It is of key importance to note that regulation and accreditation are distinct processes. Some countries have optometry regulation; however, the absence of relevant accreditation processes can contribute to disparities in optometry education.

Utilising global competency-based frameworks

Motivations for greater harmonisation of health and medical education include addressing global health issues, promoting physician mobility, and improving quality of patient care. The latest WCO Competency Framework for Optometry[8] presents a guide that aligns with both the WCO Concept of Optometry[3] and the World Health Organisation

Competency Framework.[7] This superseded the earlier version developed in 2005, which featured four ascending categories, each corresponding to different scopes of practice.[58]

Legislation of the profession in some European countries was based on these categories.[59] Although well intended, the tiered system of competencies perpetuated a divergence in educational standards across countries. The updated WCO framework was designed to set a minimum level of competency that does not restrict or limit the scope of practice, acknowledging that some jurisdictions have scope beyond the framework, including oral therapeutics, injections, and minor surgical procedures.[60]

There have been many publications on creating curricula standards and harmonising training in medical education over the past two decades.[61] While competency-based frameworks can be helpful tools for developing optometry programs, it is important that any global efforts to standardise or enhance optometry curricula avoid a one-size-fits-all approach that fails to consider local contexts. Some stakeholders in the global health workforce call for greater harmonisation of medical curricula, whereas others have pushed for increased efforts to diversify and 'decolonise' medical school curricula with the recognition that healthcare providers need to meet the complex needs of diverse populations.[62,63]

International optometry collaborations between various stakeholders, educators, and practitioners need to respect different perspectives and prioritise tailoring curricula to local cultures, practices, and population needs. With this aim in mind, collaborations can create globally competent yet locally relevant optometry programs that meet the vision needs of communities with a culturally sensitive approach.

Challenges of advancing optometric education

Benchmarking in education can be achieved through global collaborations around competency-based curricula, expert knowledge sharing, scholarly efforts, and mentorships. However, several challenges must be overcome in advancing optometric education. Although legal recognition of optometry has progressed in many countries, there are still some countries where optometry remains unregulated. Recognition by local government and regulation by professional bodies is needed to set educational standards, as well as ensure ethical conduct and professional responsibility.

In some countries where optometry is regulated, there is still an absence of accreditation bodies which can lead to inconsistencies in the quality and scope of training across institutions. Establishing national accreditation bodies would help to ensure that all optometric educational institutions within a country are taught to a set standard.

A shortage of qualified faculty and clinical staff, especially in countries where optometric education is still developing, can limit the capacity to deliver quality education and training.[64,65] Additionally, resource constraints, including a lack of equipment, can hinder the ability to provide comprehensive, hands-on learning experiences, especially considering the rapid advances in diagnostic technology used in eye care.[64,65] Virtual reality simulation has greatly enhanced preclinical optometric training but may be financially prohibitive in institutions with limited resources.

Grants, such as the WCO Educator Mentor Grant, and non-governmental organisations, like Brien Holden Foundation and Volunteer Optometric Services to Humanity International, are instrumental in fostering collaborations for faculty development and providing resources and equipment to enhance education.

Case studies in curriculum development

The case studies presented below are designed to showcase international partnerships between educational institutions, professional organisations, and not-for-profit organisations to promote the development of optometric education.

Case study 1: grant program by the world council of optometry

The WCO, through its philanthropic division, the World Optometry Foundation, has established a grant program which aims to promote the growth and development of optometry as a profession. The Education Mentor Grant, previously known as the Fellowship Program, was established in 2015 and has funded several projects leading to long-term sustainable improvement in optometric education. The grant program pairs faculty from an established school of optometry with faculty from a developing school in a country where optometry is less established. These partnerships provide support in areas such as curriculum development, clinical teaching, and student assessment.

A project conducted in 2023 in Beirut, Lebanon, is a successful example of the WCO Education Mentor Grant's impact. Recognising the shortfall of Lebanese optometry programs in aligning with the WCO and WHO competencies for optometric education, a one-week intensive workshop was proposed. The workshop was designed to align the curriculum competencies offered by three optometry schools in Lebanon with global standards. The workshop brought together university faculty, policy makers, and eye care stakeholders in Lebanon and was guided by two mentors experienced in optometric education from Jordan and South Africa. Key topics such as accreditation schemes, quality assurance in education, and student evaluation strategies were addressed. The mentors also outlined pathways for Lebanese universities to align their curricula with the WCO definition of optometry.

An ethics workshop, contextualised within Lebanese culture, was also conducted. The workshop culminated in a pledge from all participants to collaborate on improving and standardising optometry education in Lebanon. This commitment marked a significant step towards continuously updating optometry education in the country to meet global competencies.[66]

Optometry education in Nepal has also benefited from the WCO Grant, which was at the time called the Teaching Fellowship. Nepal had only one school of optometry for almost two decades which offered a bachelor's degree program for a cohort of less than 10 students per academic year who were offered a scholarship from the Government of Nepal. With a population of over 30 million, the program did not provide enough optometrists to serve the eye care needs of the population. There was also a lack of clinical skills evaluation in the optometry program, as it did not follow a competency-based model. The WCO grant allowed an educator to spend 5 months educating and training third- and fourth-year students on paediatric optometry by providing evidence-based knowledge and insight into research.

Feedback from students who benefited from the WCO Grant to Nepal indicated that there was a need for training and upskilling the local instructors. The WCO recognised this need, and the fellowship program was rebranded as the Education Mentor Grant, prioritising faculty and program development as demonstrated in previous efforts in Lebanon. It is hoped that more emerging optometry programs will benefit from the WCO Education Mentor Grant in the future.

Case study 2: optometry development in Vietnam

Non-governmental organisations have been instrumental in bringing optometry education to parts of the developing world. Vietnam is a country with a population of nearly 100 million people. Refractive error and cataracts are the leading causes of vision impairment. Uncorrected refractive error, particularly in children, is a national priority; however, the workforce to manage this is lacking. Eye care is mainly delivered by ophthalmologists supported by nurses. As in many countries, there is a maldistribution of the eye healthcare workforce with a concentration in urban areas. Primary eye care needs are served by general practitioners or nurses, who have competing demands.

The advent of photorefractive keratectomy surgery in the 1990s in Vietnam led to increasing interest in the need for accurate presurgical refractions for optimal post-surgical results. Two nurses from the Ho Chi Minh City Eye Hospital were sent to France to undertake a Diploma in Opticianry and teacher training in 1996 with the intention of improving the quality of short-term refraction courses. From these humble beginnings, optometry was born. The hospital was interested in continually improving the quality of its refractive services.

Meanwhile, in the capital city of Hanoi, the Vietnam National Institute of Ophthalmology, now the Vietnam National Eye Hospital, was also looking to expand their capacity in refractive error services and training. In 2008, the International Centre for Eyecare Education, now known as Brien Holden Foundation, collaborated with both hospitals to improve the quality of refraction training and introduce new techniques. This was done with a long-term view to introduce formal optometry education into Vietnam.

As there were no optometrists in Vietnam, undergraduate scholarships were provided to selected candidates to study optometry in India and Malaysia to build faculty for the future optometry programs. Two universities, Pham Ngoc Thach University of Medicine and Hanoi Medical University, were identified as academic partners to host the optometry education. The International Centre for Eyecare Education worked with the two universities to adapt a four-year Bachelor of Optometry curriculum to the local context. The optometry curriculum was submitted to the Ministry of Education and Training for approval.

As optometry did not exist in Vietnam, relevant personnel from the universities, Ministries of Education and Training and Health had to be exposed to the profession. To this end, contingents were taken to India, South Korea, Malaysia, and Australia, at various times, to study the practice of optometry, its scope, and how it fits into the health system.

The optometry curriculum was approved in 2014, with the first course commencing in September at Pham Ngoc Thach University of Medicine with a cohort of 16 students. A year later, with an intake of 62 students, Hanoi Medical University commenced a course with returned scholarship recipients and ophthalmologists as faculty. Optometry is a sub-department of ophthalmology in both universities. It was imperative that an optometry job code be issued to ensure that the students were able to practice and work in public and private institutions upon graduation.

Around this time, results of a Quality of Refractive Error Care study in Vietnam showed that only 44% of the glasses prescribed provided good vision and comfort.[67] This evidence and strong advocacy by the universities, the Eye Care Working Group, and hospitals addressed the job code issue in 2020.[68]

There are now approximately 450 optometrists and 350 optometry students in Vietnam, with graduates working in both the public and private sectors. Early-career optometry leaders in the profession have emerged with specialised knowledge in areas such as myopia management. Optometrists in Vietnam are now able to provide evidence-based eye care in response to the larger eye care needs in the country.

Case study 3: curriculum alignment between Australia and the United States

The University of Western Australia began a curriculum alignment project with the University of Houston in 2023. Although in its infancy, the aim of the project is to work collaboratively to strengthen the OD programs in both institutions. The project will include curriculum evaluation, benchmarking, standardisation, education research collaborations between the faculties, and potential student exchange programs for clinical rotations. It is envisaged that as part of the project, The University of Western Australia OD program will incorporate modules of advanced procedures.

In this article, constructive alignment refers to mapping and matching the overall program outcomes, unit learning outcomes, learning event (lectures, seminars, clinical skills practicals) outcomes, and assessments. Faculty from The University of Western Australia will spend time at the University of Houston to compare and align academic governance strategies, competencies for optometric education, and accreditation needs, which are essential factors to align their curricula. The project is expected to extend over 5 years. Potential outcomes of the program may include expert knowledge transfer between academics, improved optometric curricula, increased cross-cultural influences, and expanded scope of training. This international collaboration can serve as a roadmap for other institutions aiming to provide an advanced level of optometric training.

The future of optometric education

As the scope of practice and optometric education evolve, it is crucial to bridge the gap between practising optometrists and new graduates. Continuing professional development requirements can help to ensure that practising optometrists are up to date with the latest evidence and clinical skills. As advanced procedures such as injections and lasers are increasingly becoming a part of the optometric scope in certain Western countries,[13] universities offering accredited postgraduate educational courses could serve as a pathway for acquiring competencies related to these skills.

Innovative changes to optometric education delivery are expected to continue in an increasingly digitised world. More education is now being offered online or in blended or hybrid modes. Digitally based pedagogies, such as virtual simulation-based learning and assessment in optometry programs, have shown potential in providing an immersive and authentic learning experience by allowing the application of didactic knowledge.[69]

Other forms of extended reality such as augmented and virtual reality are also being increasingly integrated into health profession curricula.[70] Technological advancements may help bridge the gap between institutions and regions with varying levels of resources, thereby facilitating easier access to services despite resource limitations. While there is currently a paucity of literature on how artificial intelligence is being utilised in optometric education, imminent changes to medical education[71] suggest that advances in artificial technology will further transform the way optometry is taught and practised.

Conclusion

As primary eye care providers, optometrists play a key role in reducing the burden of eye disease by providing high-quality and accessible eye care. Education and training provide the knowledge and skills to allow full utilisation of the workforce. Over the past few decades, accreditation of training programs and regulation of the profession have supported significant advances in optometric education in many countries. Yet in some parts of the world, optometric education still faces significant challenges that need to be addressed in order to advance training and meet the eye care needs.

The World Health Organisation Eye Care Competency Framework suggests a global shift towards aligning and standardising the educational training and competencies for the eye care workforce. The WCO Competency Framework for Optometry provides guidance on curriculum elements and performance criteria within an optometry program, while optometry programs with more advanced scope can provide benchmarking for competencies focused on such skills and knowledge.

The three case studies discussed in this paper provide examples of international collaborations to enhance the quality of optometric education in different parts of the world. It is hoped that collaborative efforts towards advancing optometric education based on competencies and benchmarking can have a meaningful impact on eye health globally.

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