A CENTURY OF CONTINUING EDUCATION: THE AMERICAN OPTOMETRIC ASSOCIATION'S DISTANCE LEARNING PROGRAM AT 100

Kirsten Hebert, BA

Heritage Services Specialist
Optometry Cares - The AOA Foundation

khebert@aoa.org

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ABSTRACT

2019 marks the 100th anniversary of the American Optometric Association's first Department of Education and the launch of its first distance learning program. This article traces the evolution of the AOA's distance continuing education strategy over the last century, highlighting three generations of educational technology and modes of delivery the association has employed: textual materials by mail, audiovisual media through library loan, and interactive digital modules over the world wide web. The author also explores the relationship between warfare and the development of educational technology and pedagogy at each stage of development and introduces the reader to the AOA's newest iteration of its distance learning web portal, EyeLearn.™

KEYWORDS

distance learning; continuing education; text-based learning; correspondence education; web-based education; multimodal learning; American Optometric Association; EyeLearn; educational technology; audiovisual technology

INTRODUCTION

In October 2019 the American Optometric Association (AOA) marked the 100th anniversary of its first Department of Education (DOE) and its first distance learning program—the series *Optometrical Courses of Study*—with the relaunch and redesign of the association's continuing education (CE) member web portal EyeLearn.™ Education has always been one of the “four pillars” upholding the AOA mission and distance learning has remained a critical component of the association's flexible, holistic approach to ensuring its members maintain continued competence. Although the AOA's educational arm has changed over time, adapting to meet the changing needs of its membership, the association has consistently employed the latest technology to deliver CE content to students, doctors and paraprofessionals. To this end, the AOA's distance learning programs have taken advantage of three generations of communications technology beginning with text-based correspondence courses made feasible by advances in transportation during World War I, moving to electronic, multimedia audiovisual presentations developed in the propaganda campaigns of the Second World War, and finally into digital media delivered by telecommunications technology that evolved during the Cold War. With each iteration, the AOA's distance learning programs came a little closer to achieving a model that incorporated the multimodal didactic, interactive, personalized and social pedagogic strategies deployed in the most successful distance learning programs. This article explores the AOA's use of educational technology in providing long-distance, member education over the course of the last century.

Distance Learning: Democracy, War, Technology and Pedagogy

Perhaps because of our agrarian tradition and democratic roots, distance learning was an early part of the American educational system and it has remained a vital mechanism for ensuring equity, pluralism and social justice in public education throughout the United States.¹ Most scholars credit Englishman Sir Isaac Pitman with the first distance learning program for his shorthand-by-mail correspondence course in

1849, but the earliest reference to distance learning in North America belongs to Bostonian Caleb Philips who solicited students to tutor by mail through a newspaper advertisement posted in 1728.² Correspondence courses by post would become widespread by the end of the nineteenth century, enjoying particular popularity in the United States where the majority of the population remained rural until the middle of the twentieth century.³

Both Philips' and Pitman's correspondence courses illustrate something important about the seminal role that democracy, technology and, indirectly, warfare, have had in the inspiration for and persistence of distance learning. The first newspapers were published by postmasters in the late seventeenth century and were met with “high resentment” by the British colonial government largely because of their tendency to act as a source of news about the brewing revolution and criticism of the colonial government. Scholars of early newspapers acknowledge that profit and polemic were early motivators for publishers, but also cite strong evidence of “altruistic motives” to educate the public and improve communication.⁴ However, colonial Americans lived in scattered farming settlements and newspapers were not commonplace until the middle of the eighteenth century. The spread of newspapers throughout the colonies was made possible in large part to the work of the postmasters and post riders who cut 1,600 miles of trails through the colonial countryside between the first sanctioned postal service in 1692 and the end of the colonial period in 1774 under the direction of the first Postmaster General Benjamin Franklin.⁵ Newspapers became instrumental as a sort of informal tool for educating colonists, particularly in matters of civics,⁶ and Franklin's postal routes had made this possible. Beginning in April of 1775 and ending with the famous night ride of 16-year-old Sybil Ludington, citizens warning of advancing British troops would use the postal routes to sound the alarm and spread information to American patriots.⁷ During the next two centuries, pursuit of educational equality, war, transport and communications technology and distance learning would remain similarly intertwined.

If Philips' program was significant for its connection to democracy and the evolution of the American transportation and communication systems, Pitman's course, also made possible by improvements to the British postal system, was revolutionary in its own way for his pedagogy. With efficient and cost-effective mail service, Pitman was able to develop an innovative approach to his correspondence courses, providing students with relatively quick feedback on their work by mail. In this way, Pitman enhanced the traditional didactic approach to teaching by interacting with each student and creating a more personalized experience.⁸ All of these elements—access, interactivity and personalization—would become hallmarks of all successful distance learning programs regardless of medium.¹ Like these first distance learning programs, the AOA would use improvements in communication and transportation to build successively more complex and effective distance education for its members.

Member Education: The AOA's Founding Principle

The central importance of education to the AOA mission has been a constant since its founding, and opportunities for members to enhance and update their skills was association's first order of business. Less than a year after its organization in 1898, the AOA formed an Educational Committee under the leadership of J.W. Sanborn⁹ to plan a series of lectures, papers and clinical demonstrations for the third annual meeting in Detroit, MI in 1900.¹⁰ In 1909, a member of the association's Executive Council, Harry M. Bestor, articulated the AOA's position on education as critical to the prestige and future of the profession right alongside advocacy: "weeding out of the charlatan and spectacle peddler by optical laws, and the planting in their places of a *dignified and educated* class of practitioners, will eventually give to optometry the moral and active support of other professions and the general public."¹¹ [emphasis added] The AOA's commitment to providing high-quality CE to all members deepened as the tremendous need to ensure practitioner competence in the face of rapid advances in knowledge and technology became more critical, and the usefulness of education as a tool to break down factions within its membership more salient.

Prior to 1919, the AOA's continuing education was largely restricted to "postgraduate" lectures and courses offered at the annual meetings. The educational program at the conventions, presented first by the Physiological Section (1902-1908) and Scientific Section (1908-1919), were exclusive in nature requiring both membership in the section through a rigorous application process, and possession of the financial resources to attend the conferences.^{12,13} This privileged more affluent, urban optometrists who were in close proximity to institutions of higher learning and, therefore, had more opportunities to access CE between meetings. The association did maintain a mail-order "library" consisting of a small collection of books available for loan to all members, but these were intended to assist with licensure exams rather than to provide guided instruction.¹⁴ Some of the more education-minded officers, like John C. Eberhardt, Andrew J. Cross and William Needles,^{15,16} sold correspondence courses in clinical methods, but providing an adequate program of standardized CE free to members who were unable to make the trek to the annual meetings remained an intractable problem for a profession composed of practitioners with various levels of training and financial resources.

THE FIRST GENERATION: CORRESPONDENCE COURSES

Albert Myer's Sunday School

The AOA's first attempt to create a CE program by correspondence was run aground by a wave of suspicion issuing mainly from the optical press. In 1915, Secretary Albert Myer proposed the AOA publish a "quarterly study booklet" to be sent "by mail direct" to each member

in good standing. The prototype for the booklet, designed by Myer, was presented both as a way to recruit members and to introduce complicated concepts and advanced clinical techniques "simply, so that all could understand them." Myer compared the proposed publication to a "Sunday school paper...devoted to optometry."¹⁷

The proposal was met by vigorous opposition from P. A. Dilworth, representing the interests of the optical journals in which he regularly published his own articles accompanied by advertisements. Dilworth accused Myer of attempting to create a "clique" within the membership that would increase his own power. He also questioned the source of the funds for mailing the publication, hinting at a conflict of interest. Others agreed with Dilworth, citing the "graft and greed" that had recently arisen within the American Medical Association as a result of journals operating as power brokers for factions within the association. Myer countered that the publication would be "scientific" rather than journalistic and that its dissemination was well within the authority of the association according to its bylaws and constitution. He also pointed out that the trade journals were not bound by the association or any other entity to exclude advertisements or articles that did not conform to the association's standards and argued that the leadership should be able to communicate with members "without incurring the displeasure of the oligarchy in the editorial room." In the end, the argument that won the day was based less on conspiracy theories than pragmatic concerns. The House of Delegates decided that, given the limited resources the association had to throw behind any initiative, its energy and money should be directed at ensuring the passage of optometry laws in the remaining 16 states and one district without them—at least for the time being.

Optometrical Courses of Study

The idea of an AOA distance learning program was far from dead. By the end of the First World War the need for quality CE at the national level had only become more acute. War-time advances in optical technology and the growth of the domestic optical industry had flooded the market with new knowledge and instrumentation.^{18,19} The annual conventions were breaking attendance records largely thanks to the growth and success of the educational programming. In 1919, the 22nd AOA Congress in Rochester, NY—the undisputed heart of the American optical industry, and home to the optical-military-industrial complex of Bausch & Lomb and Eastman Kodak—had the highest attendance of any previous meeting.

In the early twentieth century, however, long-distance domestic passenger travel was still by and large conducted by rail and not all members could afford to attend an in-person meeting every year.²⁰ Even for those who could make the journey, the 12-month interval between conventions frustrated members in rural areas who needed more frequent access to critical continuing education. At the Rochester meeting, the AOA bent to the demands of membership for a more comprehensive educational program, officially establishing the Department of Education. Dr. William S. Todd was appointed as director and the new department was charged with developing a curriculum of continuing education to serve the AOA's expanding membership.²¹

The new DOE's directive was to develop a quality distance learning program that could be dovetailed with hands-on courses at the annual meetings. Correspondence courses had been popular with the public for a while but also were beginning to gain legitimacy in the eyes of the wider educational community. In 1891, the International Correspondence Schools of Scranton (ICS) launched a correspondence program to educate miners in industrial safety. By 1899, the ICS had 190,000 students and several buildings (ICS).²² In 1892, the University of Chicago was

the first public university to offer correspondence courses. By 1922, Pennsylvania State College offered courses not only by mail, but even over the radio.²³ By 1919, correspondence courses in optometry had proliferated. Some were of dubious quality while others, like those offered by Eberhardt, Cross and Needles, were quite good. The AOA was anxious to winnow out less reputable programs and to establish standards for optometric education across the country and it wasted no time in tapping member-educators to craft a prototype CE correspondence program.

There were confounding variables which had impeded the orchestration of a national program of correspondence CE prior to 1920, most notably the lack of an AOA central office and the expense and pace of mail delivery. The AOA did not have headquarters from which to manage the dissemination of information until 1953.²⁴ Before establishing itself in St. Louis, the various departments operated out of the homes or offices of their most current directors. In its first decade of existence, the DOE called almost every region of the country home, beginning in Hartford, CT with Dr. Todd (1919-1922), moving to Ohio during the tenures of Drs. Fred Stengel, (1923-1924) and Harry Spitler (1925-1927), and finally landing in Los Angeles, CA under the direction of Drs. Arthur Hoare and William Kinney (1927-1930).²⁵

While the DOE would have to wait another three decades to solve the centralization problem, advances made during the Great War improved mail service and cleared the way for the delivery of correspondence courses. Military mobilization for ground and air combat jump-started technological innovation that would revolutionize post-war travel and connectivity. General Motor Company (GMC) and Ford Motor Company began rolling out trucks and automobiles for combat along the Mexican-American border in 1910 and in 1914 the first fleet of GMC trucks were deployed in Europe.²⁶ After the war, the United States Postal Service (USPS) inherited the U.S. Army's fleet, drastically improving the efficacy and cost of delivering packages to even the remotest areas. In 1918, the USPS established regular air mail service using the U.S. Army's flying aces and aircraft, and established non-profit second-class rates and metered mail, significantly lowering the cost for commercial for entities like the newly incorporated AOA.²⁷

With the assistance of future AOA Secretary Ernest H. Kiekenapp and Harry J. Covelle of the Maine affiliate, Todd began developing the AOA's first five CE correspondence courses in its series *Optometrical Courses of Study*: *Course 1: Anatomy of the Orbit* later renamed *Anatomy of the Eye* written by Dr. Marshall B. Ketchum of the Los Angeles School of Ophthalmology and Optometry; *Courses 2, 4 and 5: Outline Studies in Arithmetic, Algebra and Geometry*, printed together in one volume, was prepared by Dr. Howard D. Minchin, Professor of Applied Optics at The Ohio State University in Columbus; and *Course 3: Ocular Muscles*, written by Dr. William B. Needles, now President of the Needles Institute of Optometry in Kansas City, MO and soon to be leader of Chicago's Northern Illinois College of Optometry. The first three of this series were available as paper or cloth-bound, saddle-stitched booklets for \$1.00 (\$0.50 for members) in early 1920.²⁸

By June, the course selection had grown to include ten additional booklets, covering not only basic math, anatomy and optics, but also more practical courses on opticianry, refraction and ophthalmometry: *Course 6: General Anatomy and Physiology* and *Course 15: Hygiene*, prepared by Dr. Frederic A. Woll, Professor of Hygiene at the College of the City of New York and instructor at Columbia University's optometry program; *Course 7: Optical Shop Work* by W.W. Slade, Superintendent of the Globe Optical Company in Boston, MA; another course in mathematics from Dr. Minchin entitled *Course 8: Trigonometry for Students in Optics*; *Course 9: Refractive and Accommodative Errors and*

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Their Correction by Subjective Methods prepared by W.G. Maybee, editor Canadian Optometrist and Optician and Chairman of the Ontario Board of Examiners in Optometry; *Course 10: Ophthalmometry* contributed by Dr. E. LeRoy Ryer former President of the AOA's Physiological Section and faculty at the New York Postgraduate School of Optometry; *Course 11: Static and Dynamic Skiametry* and *Course 14: Ocular Accommodation* by the eminent Dr. Charles Sheard, The Ohio State University and American Optical Company; *Course 12: Practical Lessons in Blood Pressure Testing* by Eugene G. Wiseman, AOA's third Vice President and future president of the American Academy of Optometry (1924-1926); and *Course 13: Grinding of Ophthalmic Lenses (Including Invisible Bifocals)* by A.E. Surdam of the Klorotik Optical Company of Rochester, NY.²⁵

At the 1920 convention in St. Louis, MO, all 15 courses were being offered in person. By 1921, the DOE had produced booklets for all the courses and offered them for sale individually or, by 1925, as a "book bound in keratol" for \$6.00.²⁸ The AOA recommended that those planning to attend the annual congress purchase the booklets ahead of time and bring their questions. In 1926, the DOE published the last in this series entitled *Course 16: Squint: Its Etiology Diagnosis and Treatment* by Professor Morgan C. Davies, instructor in Applied Optics at The Ohio State University, which it offered as a supplement to the bound volume for a mere \$1.50 in paper or \$2.00 for a cloth-bound version. The course materials, which were edited by the DOE director and expressly meant for "those now in practice," were intended to be frequently updated and, indeed, new editions with more current information were published for some of the early courses in 1920. The booklets themselves took the form of an annotated syllabus or study guide, and required the purchase of additional readings, textbooks and reference materials—many available from the AOA's growing library—in order to engage with the course. Each lesson was followed by study questions, problems or quizzes and many lessons included diagrams, illustrations and photographic figures. The forewords to courses encouraged readers to take advantage of in-person clinics and study groups to apply and discuss what they had learned. The series was extremely popular, and the DOE adapted other material for sale to members. Lectures delivered at the annual conventions were also rendered in print. For example, Lionel Laurance, instructor at London's School of Optics and member of the Worshipful Company of Spectacle Makers delivered a lecture entitled "The Routine of Subjective Testing" at the June 1921 AOA convention that was later included as an addendum to the book of correspondence courses.²⁵

While the correspondence courses were intended to stand on their own, the AOA recognized that the element of social interaction among students and with instructors was still an important part of any truly effective CE program. In 1922, the DOE launched a "new plan" for the educational programming at the 25th Congress in Indianapolis, IN. For the AOA's silver anniversary meeting, the DOE pre-printed the text of three invited lectures, each presented by authors of the original CE courses, on topics not explicitly addressed in any of the previously published materials: Dr. Charles Sheard's "Prescribing of Prisms," Dr. Howard Minchin's "Astigmatism," and Dr. William Needles' "Presbyopia." The lectures were included in a single booklet in the same style as the CE series and included blank pages for readers to take notes between the texts. The DOE sent the booklet out to "experts" on each topic—mainly educators—one month prior to the convention. Each registrant for the educational program would also be given a copy of the publication. At the meeting, each one of the lectures would be delivered as the first event on one of three consecutive days of the convention CE program. The experts who had previewed the text would be invited to participate in a discussion after the lecture was delivered, and would address the relationship between the material presented and the new standards established during the First Conference on Educational Optometric

Standards held in January. The participants would be encouraged to take notes and ask questions of the assembled panel.²⁹

The series remained popular throughout the decade but by 1930 the courses would become dated and the DOE's mandate had expanded far beyond its capacity.³⁰ As a result, the AOA began to turn over CE programming between congresses to the local affiliates who contracted with providers like the Optometric Extension Program which combined distance learning modules with localized clinics, study groups and lectures. In this way, the state organizations took on the responsibility for meeting their constituencies' unique needs.³¹ For almost 30 years, the AOA's distance learning program was largely dormant.

THE SECOND GENERATION: CASSETTES, SLIDES AND VIDEOTAPE

Just as World War I brought advances in communications and transportation that made the DOE's correspondence courses more feasible, technological innovations developed during World War II facilitated improvements in the delivery of distance learning. During the war, the government had invested in developing audiovisual (AV) technology for use in propaganda, and it continued to gain ground during the Cold War. By the 1960s, AV had birthed an entirely new academic field—Educational Technology—which utilized motion pictures, short filmstrips, audiocassettes and 35mm slides to produce multimedia presentations to facilitate multimodal learning.³² The AOA took full advantage of this technology in its public information, student recruitment and CE programs, producing countless educational AV kits that included vinyl LPs, audiocassette tapes, film strips and accompanying course materials that ranged in subject from the treatment of ocular disease, to patient education, to "career guides" for use by optometry schools in their guidance offices.³³ The CE courses at the AOA congresses, published as unwieldy verbatim lecture transcripts since 1930, were now recorded on audiocassettes accompanied by printed syllabi and visual aids.³⁴

To capture newly available federal funding for training, research and libraries, the AOA began to build a collection and a case for the International Library, Museum and Archives of Optometry (ILAMO), which would eventually become an important repository for the AOA's educational materials and a tool for their dissemination. In 1964, the AOA hired a librarian, Maria Dablemont, who worked diligently to build the infrastructure for the new ILAMO, growing the staff to serve the needs of members.³⁵ In 1971, the AOA House of Delegates passed a resolution commending the "use of new technologies... in optometric continuing education" and promoted the AV collection held at the AOA library.³⁶ When the ILAMO was finally up-and-running in 1972, requests for educational material and research had already outstripped the repository's administrative records management and heritage resource functions.³⁷ The ILAMO received its first grant from the National Institute of Health to expand its CE offerings in 1973.³⁸ That same year, the Carnegie Commission on Higher Education recommended that the federal government invest 300 million dollars a year to promote electronic instruction.³⁹ At the 1973 meeting in San Francisco, CA, the DOE presented a "film festival" as part of the educational program featuring some of the more than 600 audiovisual CE resources held in the ILAMO and in his report to the House of Delegates, Committee on Education Chair James Hasler suggested that the AV materials could solve the "delivery problem" standing in the way of providing access to CE for all optometrists outside of annual meetings.^{39, 40}

By 1975, hospitals, health centers and clinics began to explore hybrid courses, using audiovisual distance learning materials on the front end to orient students and introduce topics, rounding out the training with in-person clinical practicums at regional training centers to allow students

to "digest" the material in a clinical setting.⁴¹ In 1978, the AOA created two prototype courses using this format—one on systemic hypertension and another on hydrogel lenses—funded by a \$31,000 grant from Bausch & Lomb. The courses embraced a variety of different methodologies, using at-home self-assessments and videotaped clinical demonstrations and panel discussions in conjunction with live, three-hour didactic presentations to create a comprehensive CE course. Course evaluations and delayed, at-home assessments were included to gauge the success of the program by measuring behavioral changes made by doctors in clinical methods two months after completion of the course.⁴²

In 1980 the AOA launched its Professional Enhancement Program, or PEP, which became one of the its most successful and long-running practice management CE programs, purchased by more than 25% of the AOA members by 1987.⁴³ The PEP was a multi-part distance learning module consisting of audiocassette tapes, 35mm slide presentations and printed material including readings, self-assessments, guided assignments and examinations.⁴⁴ The first module was designed "to help doctors write, implement and manage their individualized business and marketing plans" and also included instructions on preparing for retirement. The next modules contained seven subsections dealing with business management topics ranging from interoffice communication to dispensing plans.⁴⁵ The AOA continued to add on to and promote the PEP well into the 1990s. Practice management was probably the most conducive to distance learning because the concepts and techniques could be delivered effectively through audiovisual media and text-driven exercises; there was no need for hands-on clinical workshops with human subjects. It was also inexpensive to produce. The advent of Microsoft PowerPoint in 1987 made the production of professional slide presentations simple and, by the early 1990s, the ubiquity of handheld video cameras, VHS tapes and VCR's made lectures inexpensive and easy to create and reproduce. In 1991, the AOA declared videotapes "a major medium" for its distance learning CE.⁴⁶ Finally, practice management courses in a distance learning module filled a niche; busy practitioners in private practice could learn at their convenience and, when appropriate, repurpose them to train their staff.

The AOA also continued to produce distance learning modules on clinical methods. In 1981 the association marketed a new AV distance learning program on vision therapy.⁴⁷ In 1983, the AOA offered a multimedia program entitled "Primary Eye Care," a two-module kit designed to train optometrists to diagnose, treat and manage corneal disease. The program consisted of four, one-hour audiocassettes, 80, 35mm slides with a slideviewer, and more than 100 pages of notes, outlines, scripts and self-assessment exercises.⁴⁸ The AOA Contact Lens and Cornea, Multidisciplinary Practice, Sports Vision and Low Vision Sections as well as the Paraoptometric Section all produced CE modules that were eventually deposited in the ILAMO and available for free to members as distance learning tools in VHS, audiocassette and, eventually, CD-ROM and CD-DVD formats.⁴⁹ By 1986, the ILAMO held over 3000 audiovisual programs, adding more than 200 per year to its collection and receiving thousands of requests per month for the distance learning programs.^{50, 46}

THE THIRD GENERATION: TELECOURSES AND WEB PORTALS

The one aspect of traditional education the AOA struggled to provide in its distance learning programs was social interaction between student and instructor and, more importantly, among the students themselves. In the 1920s, the distance learning modules were meant to be used with local study groups or combined with clinics or in-person lectures and workshops held at the annual meetings. After World War II, the audiovisual media engaged learners with multiple modalities, but

to receive credit for courses students were often asked to complete their studies with clinical experiences. The third generation of distance learning technology would bring distance learners one step closer to realizing a fully personalized, interactive and immersive learning experience.

Just like the correspondence courses of the 1920s and the audiovisual educational programs of mid-century, internet CE was ultimately a beneficiary of American research efforts aimed at gaining an advantage in war. The third longest American conflict was not fought on land or by air, but rather over telecommunications networks. During the Cold War, the U.S. Department of Defense (DOD) developed an early computer network called ARPANET, so named for the DOD's research arm: Advanced Research Projects Agency (ARPA). Founded in the late 1960s, the ARPANET was developed from an even earlier system designed to detect an imminent nuclear attack by the Soviet Union. ARPANET linked defense-related research institutions in a way that avoided a centralized attack on the system. During the 1970s, ARPANET technology began to bleed into more federal agencies engaged in scientific research, like the National Science Foundation, which developed their own applications, like the NSF's NSFNET.⁵¹ Where research goes, education follows, and soon networking technology was being deployed in distance learning.

Health Education Network: 1979

The first mention of computer-based optometry CE emerged in the late 1970s, portending the launch of the first distance learning network for optometry in 1979—the Health Education Network (HEN). Between 1965 and 1975, the National Library of Medicine compiled a database of computer-assisted health-related learning modules—or courseware—called the Experimental Computer-Assisted Instruction (CAI) Network. In 1975, architects of the project collaborated with The Ohio State University and the Massachusetts General Hospital under a grant from the Department of Health, Education and Welfare to preserve and make accessible these courses through a virtual CE library (the HEN). The HEN not only held a vast array of CAI courses, but also provided remote access to them through a national network of computers that used telephone modems to transfer data.⁵²

At the 82nd AOA Congress in Anaheim, CA in 1979, the pharmaceutical company Allergan sponsored a demonstration workshop using the HEN and their CAI CE program Optometry Documenta.TM The courses combined lectures with interactive, audiovisual and computer-assisted learning modules. After attending a lecture, workshop attendees migrated to workstations equipped with desktop computer terminals connected to the HEN and dot-matrix printers. Video terminals and slide presentations visible from the workstations presented students with case problems. Multiple-choice examinations on the computer terminals were coordinated with the audiovisual displays to guide students through the module. Each student was then provided with a printout of their test and results upon completion. Computer-assisted CE had tackled one of distance learning's most sticky problems—immediate feedback.⁵³ This feedback loop, when combined with other digital media tools, would lay the groundwork for “gamification” and personalization, two of the most effective elements of computer-based distance learning.

Telecourses and Teleconferences: 1980-1995

In the run up to the launch of the World Wide Web in 1989, improvements in telecommunications would bring about a fascination with live “teleconferencing” as a distance learning tool, particularly because of its promise in stimulating interaction between geographically dispersed participants in real time. A 1984 article in the AOA's journal insisted that the future of clinical CE was live, closed-circuit television broadcasts and that a network of “cooperative interscholastic videotape”

reference libraries were “absolutely vital” to the future of distance learning.⁵⁴ While telecommunications and computing began to have some impact in the 1980s, most understood that the real explosion was yet to come and were looking forward with anticipation to integrating computers more fully into the delivery of CE.⁵⁵ In the same year, AOA journal Editor Dr. Milton Eger described his “fantasy” in which, by the year 2000, the annual meeting was conducted by “teleconference.” Eger imagined that CE would be “telecast” in order to facilitate courses taught by the world's most renowned experts, and after which “each attendee will insert a computerized card into an electronic receptacle and the state boards will automatically register his CE credits for license renewal.”⁵⁶ At the time, the AOA had just initiated a Project Team on Teleconferencing to explore the applications for all aspects of the association's business. In a 1985 special issue of the AOA journal dedicated to “Computing in Education,” Dr. David Davidson postulated the likelihood of downloadable physician's desk references and CE study modules that would allow for online examinations that provided immediate feedback and automated tracking by the state boards.⁵⁷ Other authors in the 1985 issue noted that contact lens instruction programs, simulations and other applications were being developed for optometry on various platforms.⁵⁸ In 1986, Bausch & Lomb held a satellite teleconference entitled “State-of-the-Art in Specialty Contact Lenses” which allowed participant feedback. The broadcast was later rendered in videotape as a two-hour distance learning course eligible for CE credit, provided the viewer completed a post-test. The videotape and information package were later deposited in the ILAMO and available for loan to members.⁵⁹ In the 1990s, the Washington Association of Optometric Physicians also began offering distance learning CE courses via satellite television, and one of the AOA congresses in the late 1990s featured an “interactive grand rounds” which allowed conference attendees and remote users to communicate with the hosts in real time.^{60,61}

Websites and Webinars: 1995-2010

Between 1995 and 2005, the AOA's online presence would evolve rapidly, culminating in a fully-developed CE web portal five years on. In 1996, the AOA launched its first version of the website www.aonet.org, and completed work on its first electronic member database.^{62,63} In 1997, the website was relaunched using Javascript frames, tables, RealAudio sound recordings and Shockwave movies. The Shockwave platform allowed developers to produce interactive, multimedia presentations which would later be used to “gamify” distance learning modules to include features like quizzes and leaderboards.⁶⁴ In 1998, the AOA relaunched the website again, this time including an online database of clinical articles and periodicals and an interactive quiz on clinical care.⁶⁵ By the turn of the century, the AOA website, now called just www.aoa.org, was averaging 2.3 million hits per month and had built out a password-protected, members-only component of the website to complement the public facing side.^{66,67}

The first internet distance learning courses accessible through the AOA website would emerge through partnerships with industry and optometry schools. In 2002, with funding from Bausch & Lomb, the AOA presented a live, 75-minute webinar called “Learning Disabilities: The Visual Connection” which included streaming video and a downloadable slide deck as well as a chat function and polling feature.⁶⁸ In May of 2004, the AOA launched the first comprehensive, members-only, web-based CE with a course module entitled “Advanced Treatment of Ocular Surface Disorders.” Funded by Allergan, the AOA collaborated with the Pennsylvania College of Optometry to design the two-course series. The first course, “Pathophysiology of Dry Eye and Patient Impact,” was worth one credit hour, and students could earn an additional one-and-a-half credits by completing the second course, “Diagnosis and Treatment

Guideline Options with Dry Eye: Patient Care Management.”The module was built on a separate microsite but was accessible to members only via a special portal on the AOA member website. The format for the courses included video presentations, clickable slide shows accompanied by scrolling text, and interactive post-tests. The second module ended with a discussion of the AOA’s Clinical Practice Guidelines. More than 250 members completed the course in its first 6 months with 500 more registered by the end of the year.^{69,70}

In December, the AOA added two more courses to the portal, this time with funding from Novartis Ophthalmics. The two webinars on age-related macular degeneration had been part of the CE line-up at the 2004 Optometry’s Meeting™ the previous June and included recorded lectures, slide presentations and a 20-question post-test.⁷¹ In 2006, a free pilot program of online CE was introduced on the AOA web portal produced by the Contact Lens and Cornea Section (CLCS) and funded by a grant from CooperVision. The new courses were described as a “hyper learning portal” designed in iSTORY, a platform developed for web-based education and training which used storytelling techniques and gamification to engage learners and “maximize comprehension and retention” in an online environment.⁷² The platform integrated testing, certification, tracking and reporting of CE hours and allowed the user to provide feedback to developers in the form of a survey. The CLCS added two additional courses, “Drop-Kicking Contact Lens Dropouts” and “Challenges and Rewards of Presbyopia Management” to the portal in 2007,⁷³ and added two more, “1-Day Contact lenses” and “Silicone Hydrogel Update,” in 2008.⁷⁴ In September, the AOA and NOVA Southeastern University introduced a web-based course on ethics and values to the portal. Funded by CIBA Vision, the course featured four video vignettes followed by multiple choice tests and were worth one credit hour of CE.⁷⁵ In February 2006, the AOA News announced that 32% of optometrists had earned CE credits through online distance learning portals during the previous year.⁷⁶

EyeLearn: The One-Stop CE Shop

In June 2011, the AOA launched EyeLearn “a new comprehensive education web portal for optometry.”⁷⁷ The timing of EyeLearn’s roll out and its content were designed to support optometrists seeking certification from the newly created American Board of Optometry. To this end, EyeLearn boasted a “full range” of CE opportunities in four channels: research publications, audiovisual material, fully interactive online courses, and an up-to-date listing of live CE programs organized by region. The publications included clinical research articles from peer-reviewed journals, white papers and lecture transcripts and the audiovisual collection consisted of slide presentations, MP3 podcasts, and streaming video. EyeLearn also offered fully interactive online courses which included self-assessment quizzes, and the ability for users to track their personal progress and design individualized curriculum. In addition to serving as an archive of courses presented at the Optometry’s Meeting, special two-hour learning modules would be developed especially for the platform. AOA future President Christopher Quinn called EyeLearn a “one-stop online learning resource.”⁷⁸ EyeLearn content would include courses in 10 content areas including not only clinical courses, but also professional development resources in the form of practice management and regulatory compliance units, updates on industry and advocacy toolkits.⁷⁹ By the end of the year its first year, EyeLearn had tracked 5000 logons and had 29 hours of interactive courses developed specifically for the portal and 143 hours of CE archived from Optometry’s Meeting.⁸⁰ The AOA was adding several courses per month to EyeLearn developed by faculty, industry and AOA member optometrists. In February of 2012, the AOA journal Optometry became an online-only publication available only through EyeLearn.⁸¹ By April, the AOA had implemented the final

component of EyeLearn—social networking. By allowing online learners to “stay informed, connect with colleagues and discuss relevant timely topics”⁸² the AOA had finally constructed a flexible, personalized distance learning program that combined didactic instruction, discourse through immediate feedback, interactivity and social interaction.

While EyeLearn made a big splash in its first two years, between 2014 and 2018 it lost momentum, becoming little more than an archive for course materials and audiovisual recordings of CE courses offered at Optometry’s Meeting. In part, this was because the AOA’s educational arm had contracted during the 1990s to become a part of the administration of the Optometry’s Meeting and never quite regained the staff support it needed to fully develop a robust online CE program. The ILAMO, closed to reference services since 2012, no longer collected physical CE media, nor loaned materials to members. In its place, the Archives & Museum of Optometry was established as a repository holding, among other things, the AOA’s historical collection of distance learning materials in their original (and largely obsolete) formats.

In 2018, the AOA poised itself to develop the next generation of optometry CE, reviving the old DOE in a new form: the AOA Education Center (EC). The EC’s mission is to “deliver integrated, AOA-aligned, high quality post-graduate continuing education and personal development” to members both as part of Optometry’s Meeting and as part of a modern distance learning program accessible through EyeLearn.⁸³ In 2019, the portal was reconfigured and relaunched. The new EyeLearn promises to be a true “one-stop shop” for students, optometrists and paraprofessionals seeking quality continuing education and professional development and the AOA stands ready to forge new frontiers in distance learning to service all its members.

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