The Journal of the Association of Schools and Colleges of Optometry

# OPTOMETRIC EDUCATION

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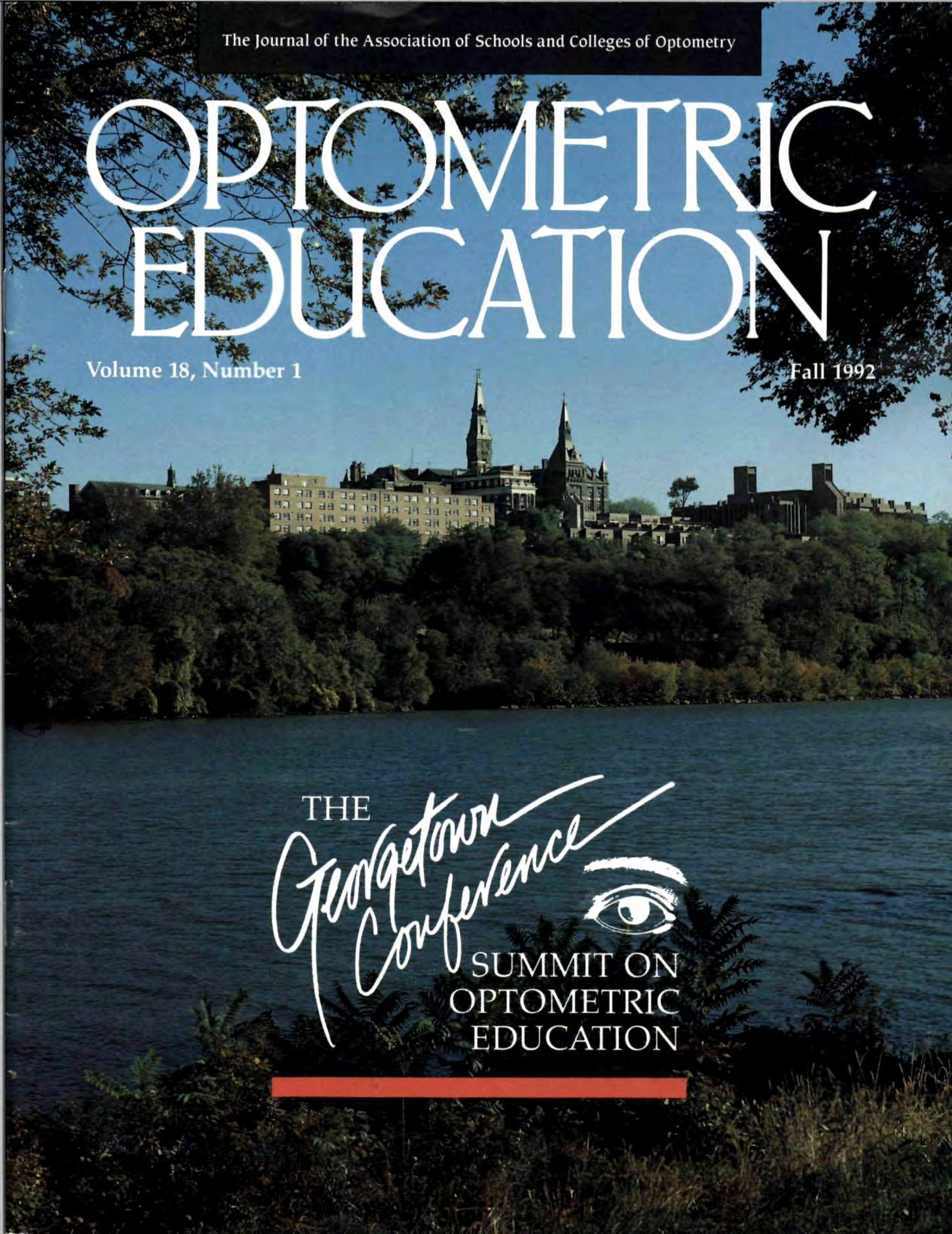

## THE Georgetown Conference

## SUMMIT ON OPTOMETRIC EDUCATION

# Association of Schools and Colleges of Optometry

**The Association of Schools and Colleges of Optometry (ASCO) represents the professional programs of optometric education in the United States, Canada and a number of foreign countries. ASCO is a non-profit, tax-exempt professional educational association with national headquarters in Rockville, MD.**

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*About the cover: Georgetown University in Washington, D.C. was the site of the March 1992 Summit on Optometric Education which was co-sponsored by ASCO and the American Optometric Association. Special thanks to Georgetown University for the use of this slide.*

OEA MEMBER

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GUEST

# EDITORIAL

## The Summit on Optometric Education A Catalyst for Sustained Professional Growth

Anthony F. Di Stefano, O.D., M.P.H.

This issue of *Optometric Education* highlights key issues and challenges addressed at the March 1992 Summit on Optometric Education. The Georgetown Conference was convened jointly by the American Optometric Association and the Association of Schools and Colleges of Optometry under a generous grant from Vistakon and Alcon to study several broad issues facing optometric education. This historic conference brought together leaders from the practitioner and educator arms of the profession. The convergence of perspectives on the future of optometric education sparked intense debate and analysis that led to a shared understanding of the nature and extent of the challenges.

Working through small diversified action groups, the Summit organizers covered many controversial topics. These included: the scope of optometric practice; optometric basic sciences and clinical education; optometric students and scholarship; optometric faculty and research; and the financing of optometric education. In the end, the critical need to strengthen optometric education was underscored in order to support the dynamic and growing demands of the profession. Urgency was the consensus!

A key topic of discussion was "What will the scope of optometric practice be in the year 2000?" What is the future of eye care in our society? Who will deliver it? Who will pay for it? Practitioners and educators from all over the country discussed and debated this important issue. What emerged was " a general consensus that our unique ability is to address problems of the total eye; our worth and value lie in primary care" (Leadingham, 1992, *AOA News*, April 1, p. 6).

Optometry has been interpreting and re-interpreting its scope for nearly a hundred years. It has been locked into an incremental, political process of expanding its responsibilities. This process has been fueled to a certain extent by optometry's own image of itself as a "limited eye care practitioner." Consequently, the state optometric acts are constantly changing, but still within the context of a "limited perspective" of our future. It seems to me that the time has come to break out of this "limited practice" perspective and begin defining optometry in terms of what we are taught. We must break what seems to be an endless cycle of incrementalism in state practice acts. It is too costly both in time and money. It is inefficient, it is frustrating, and it is irrational.

It was argued that a vertically integrated optometric discipline that includes post-graduate education in advanced management is a natural evolution for our profession. Moreover, the dynamics of the current health care system are increasing the need for a rationalized, cost-effective approach to eye care. Optometry is poised to redefine itself as a full-scope health care profession that includes advanced levels of ophthalmic care. **The practice of optometry should be based on the educational preparation, clinical experience, and the professional and ethical judgment of the practitioner rather than on a too often unpredictable legislative process.**

Advances in biotechnology are redefining eye care dramatically. Old perceptions of what optometry can and should be are challenged by technologies that are revolutionizing diagnostic and therapeutic options for patients with eye care problems. Diagnostic imaging systems and other non-invasive procedures are just a few of the advances that are replacing traditional approaches to solving eye problems. In addition, new instructional technologies from CD ROM's to interactive video, from virtual reality to artificial intelligence, will dramatically change the way knowledge is acquired and utilized. Any past

*(continued on page 31)*

OPHTHALMIC

# INDUSTRY NEWS

*Companies appearing on these pages are members of ASCO's Sustaining Member Program. Sustaining Members are listed on the inside front cover of each issue. Membership is open to manufacturers and distributors of opthalmic equipment and supplies and pharmaceutical companies.*

## Varilux Announces Winners Of Optometry Student Award

Varilux Corporation announced the winners of the Eighth Annual Varilux Student Grant Program. The $500 Grant is awarded to a third or fourth year optometry student chosen by the school's clinical staff. This year the National Award went to C. Denise Pensyl, a third-year student at The Ohio State University College of Optometry, for her case report, "Successful Fitting of Progressives." Ms. Pensyl also received a trip for two to the 95th Annual American Optometric Association Congress meeting in Montreal.

Varilux also reported a successful move to its new headquarters in Florida. Their address is 477 Gim Gong Road, Oldsmar, Florida 34677-2809 (800) BEST-PAL.

## New Vistakon Program Congratulates Recent Graduates

A new program called "Partners in Sight" will enable recently graduated eye care professionals to receive complimentary diagnostic sets of ACUVUE® disposable and SUREVUE® daily wear, two-week replacement contact lenses when they go into their own private practices, announced Vistakon, a division of Johnson & Johnson Vision Products, Inc. Also eligible are recent graduates joining an existing private practice that does not currently fit either ACUVUE or SUREVUE lenses. The graduating class of 1992 became Vistakon's first "partners in sight."

"We initiated this program as a means of congratulating recent graduates on receiving their Doctor of Optometry degree," said Sheldon Wechsler, O.D., vice president of professional affairs at Vistakon. "We share the dedication these new doctors have to their patients and are equally concerned with providing them the highest level of quality products and services available."

## Rewetting Drops for RGP Wearers Now Available From Allergan

Allergan, Inc. introduced the newest addition to the Wet-N-Soak PLUS® Deluxe Care System, Wet-N-Soak® Rewetting Drops, an in-the-eye lubricant and rewetting solution for silicone acrylate, fluorosilicone acrylate and fluoropolymer rigid gas permeable (RGP) lens wearers. Wet-N-Soak® Rewetting Drops provides patients with quick relief of minor discomfort, irritation or dryness that can occur during RGP lens wear. Wet-N-Soak® Rewetting Drops also offers an alternative to patients who may be sensitive to other rewetting drops currently on the market.

## Ciba Newsletter Highlights Special Tinted Lens

Ciba Vision Corporation's newsletter, Tech View®, provides technicians with successful methods and beauty advice for presenting and fitting patients with ILLUSIONS® colored soft contact lenses for dark eyes, SOFTCOLORS® tinted soft contact lenses for light eyes and Focus™ SOFTCOLORS® tinted soft contact lenses for programmed replacement.

"Research indicates that out of approximately 18 million women expressing interest in changing the color of their eyes, only about 9 percent have actually purchased tinted contact lenses," said Stuart Heap, senior vice president of sales and marketing at CIBA Vision Corporation. Contact: 1-800-241-5999.

## Sola Names New R & D Vice President

Sola Optical announced that Peter Coldrey, Ph.D., will assume the responsibilities of vice president, research and development. Since 1988 Dr. Coldrey has been director, research and development for Sola International Holdings Research Center based in Adelaide, Australia. Prior to joining Sola, he served in a number of research and development and business positions with ICI Australia Ltd. Most recently, Dr. Coldrey led efforts to develop Sola's award-winning Spectralite proprietary high-index material and ASL product design. "Peter's outstanding background will be a real asset to Sola. He fully understands Sola's commitment to staying at the forefront of technological innovation while maintaining our focus on our customers' needs," said Jim Cox, Sola president.

## Sunsoft Offers Patient Education Literature for Sportsoft Lenses

To help sports-active contact lens patients learn about an improvement in lens wear during sports, Sunsoft Corporation introduced patient education literature for Sportsoft, Sports Equipment for the Eyes. The literature describes the lens' ability to alleviate excessive lens movement. Originally developed for professional athletes, the 15.0 diameter, visibility tinted spherical lens offers excellent centration and superior optics, according to Susan Bruketta, director of marketing. It is now available to patients who participate in a wide variety of sports and outdoor activities. For further information and to order a supply of free patient education literature, call (800) 526-2020.

### Bausch & Lomb Symposium Furthers Contact Lens Research

Bausch & Lomb held its 19th annual North American Research Symposium (NRS), formerly referred to as the National Research Symposium, on August 21-23, 1992, at the Walt Disney World Swan Hotel in Orlando, Florida. Topics presented during the three half-day sessions included, "Lens Care Systems and Solutions," "Refractive Surgery and Therapeutics," "Recent Developments in Immunology," "Soft Contact Lenses, Disposables, and New Materials," and "RGP Lens Technology."

"Attendees at the previous 18 symposiums were among the first to learn about innovative advances in contact lenses and lens care. Bausch & Lomb, through the NRS, is able to further the understanding and application of contact lens-related research, advance the overall quality of eye care, and help doctors maintain a successful practice by staying abreast of new technologies," said Dr. Steve Zantos, director of clinical research.

### W-J Rewards Student Research Papers

Monica Diamos, O.D., and Noemi Larragoiti, O.D., 1992 graduates of the Southern California College of Optometry, are the top winners of Wesley-Jessen's third annual Aquaflex Excellence Award, which carries a $3000 scholarship award. The winning paper is titled "A Comparative Study of Techniques for Decreasing Contact Lens Storage Case Contamination."

Second-place honors went to Gordon Dramen, O.D., and Gayle Dramen, O.D., 1992 graduates of Pacific University's College of Optometry, for "Evaluation of an Enhanced Cleaning and Storage Method for In-Office Disinfection of Hydrogel Contact Lenses." The third-place paper, "Ultraviolet Disinfection of Contact Lenses," was the product of a team from the University of California-Berkeley School of Optometry: Larry Fluss, O.D., Anita Lam, O.D., and Hou Leong, O.D.

### Corning Brochure Highlights Medical Filters

An updated patient brochure from Corning Medical Optics discusses how photochromic filter lenses can reduce glare and help light-sensitive people enjoy everyday activities again. "Seeing Is Believing . . . Try Corning Glare Control Lenses," a full-color, eight-page pamphlet, is targeted for low vision patients. The larger, easier-to-read text included information on how Corning® Glare Control™ Lenses can comfort light sensitive eyes and the photochromic nature of Corning medical filters. Quotes from users illustrate what patients can expect from the lenses.

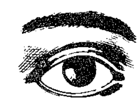
Also available from Corning is "Welcome Sight," a newsletter providing sharper vision for partially sighted people. Featured in the latest issue are articles on Corning Glare Control Demonstration Kits, antireflection coatings, Corning's new pricing guide, and a special report on Corning's involvement in the High Vision Games for low vision children Published three times per year, the four-page bulletin provides a fast, handy reference on causes and problems of glare, how selective filter lenses differ from "dark" glasses, as well as case histories describing unusual applications. Contact: Rhoda Derbigny, Corning Medical Optics, Corning, Inc., MP 21-2-2, Corning, NY 14831 (607) 974-7823.

### Vistakon Support for Summit on Optometric Education

Vistakon, a division of Johnson & Johnson Vision Products, Inc., announced that it gave a $100,000 grant to support the March Summit on Optometric Education, hosted by the American Optometric Association and the Association of Schools and Colleges of Optometry.

"Our support of this program goes beyond our monetary donation," said Bernard W. Walsh, president of Vistakon. "We share the AOA's dedication to education and recognize that, in the rapidly changing technological environment of optometry, education is essential to advance the field."

"Several people told me that the Summit on Optometric Education was the best meeting they ever attended," said Sheldon Wechsler, O.D., vice president of professional affairs at Vistakon, "and I agree with them. The very serious and timely issue of education was thoroughly explored. We addressed the problems of student education, as well as the continuing education needs of practicing optometrists, both for today and years to come. I'm glad



that, as a former member of the academic community and a current representative of Vistakon, I was able to be a part of the Summit."

### Wesley-Jessen Grant To CLSA

Wesley-Jessen has issued a $5,000 unrestricted educational grant to the Contact Lens Society of America (CLSA). The funds were generated from the company's Prosthetic Lens Program, which began in 1991. To date, Wesley-Jessen has donated over $35,000 to various professional organizations from profits generated by the program.

"Wesley-Jessen is proud to make this educational grant to the CLSA. We are pleased to be able to assist the CLSA in its many worthwhile educational activities. We hope this grant to the CLSA is the first of many," said Wesley-Jessen's Dwight H. Akerman, O.D., F.A.A.O., director, professional services. For information, contact Dr. Akerman at 312-751-6283.

# THE Georgetown Conference

## SUMMIT ON OPTOMETRIC EDUCATION

*The papers contained in this issue of Optometric Education, while obviously only a small fraction of the 87 papers submitted by participants at The Georgetown Conference — Summit on Optometric Education, are representative of the well- written, intensely thought-provoking material presented at the meeting. Space considerations prompted us to focus on two of the meeting topics: Optometric Basic Sciences and Clinical Education, and Optometric Faculty and Optometric Research. Addressing themselves to the first topic are Drs. Penna, Lowther, Berman, Lewis, Greenberg and Applebaum. Exploring the second topic are Drs. Clausen, Soni and Adams.*

T·O·P·I·C·1

# What are the Appropriate Skills and Knowledge Required for Entry into the Practice of Optometry?

Richard P. Penna, Pharm. D.

## Introduction

This paper discusses issues related to the knowledge and skills required for entry into the optometric profession. While these views represent a perspective of someone from outside optometry (but with a deep interest in it), they correspond closely to many of the outcome and curricular recommendations contained in ASCO's Strategic Plan for Optometric Education - Year 2000. However, this paper will not discuss knowledge, skills, or curricular content related to the optometric sciences. It will discuss those outcomes and competencies related to practice as a health professional that should be common to all health care practitioners, and that should comprise a major portion of the outcomes and competencies of entry-level optometric practitioners.

Issues related to entry-level competencies have been discussed by various American Association of Colleges of Pharmacy (AACP) committees and commissions.[6-7] I currently serve as staff to the American Association of Colleges of Pharmacy's Commission to Implement Change in Pharmaceutical Education. Many of the issues that the Educational Summit will consider have been discussed by this Commission.[7] This paper contains much of what the Commission debated and discussed and is presented with special application to optometry.

*Dr. Penna is associate executive director of the American Association of Colleges of Pharmacy.*

## What is Entry Level?

Webster defines "enter" as "to come in or go in"; "to be admitted (as to a school or profession)"; and "to make a beginning." Webster defines "level" as "a position with respect to a given or specified height"; "a position or plane in a graded scale of values"; and "an extent, measure or degree of achievement."

Consequently, entry-level into any profession involves two major concepts: 1) the entry position is the position for "beginners" in the profession; and 2) the person occupying the entry (beginning) position possesses a set of knowledge, skills, attitudes, ethics, and values (competencies) identified and described by the profession that the beginner seeks to enter.

Optometry students should be prepared to enter their profession as generalists; that is, they should be prepared to resolve the majority of problems presented to them by their patients. Problems that generalists cannot resolve are handled by specialists.

Entry-level competencies required for entry into the optometric practice must be consistent with the contemporary definition of entry-level practice. However, with the assumption that optometry meets the health care needs of society, and with the expectation that these needs change over time, the optometry profession must have in place a process to monitor health care needs, determine how optometry can meet these changing needs, revise the contemporary definition of entry-level practice, and revise curriculums and curricular process to accommodate such changes. It is critical that entering practitioners always be prepared to render optometric care to patients safely, effectively, and efficiently. Moreover, entering practitioners must have the competencies that will enable them to practice their profession over lifetime careers.

## Outcomes/Competencies for Health Professionals

Optometry education must prepare students with the competencies (knowledge, skills, attitudes, ethics, and values) that prepare them to perform those practice functions consistent with the definition of entry-level optometric care. In addition, there is a variety of competencies that transcend all health professions that are critically important for the functioning of individuals as health professionals. The University of Michigan Professional Preparation Network Projects derived from the literature minimum competencies (outcome statements) that exemplify health professionals and citizens.

*Thinking Abilities* — includes logical thinking, analytical thinking, problem solving, and decision making.

1. Scientific Comprehension — Optometry graduates must have a comprehension of scientific methods and be cognizant of their use to discover knowledge.
2. Mathematical Competence — Entry-level optometry practitioners must be capable of utilizing mathematical variables to analyze physical, biological, and socioeconomic phenomena. They must be able to use mathematics to understand processes and risk.
3. Critical Thinking — Optometry graduates must be able to examine issues rationally, logically, and coherently. Health professionals, especially, require a repertoire of thinking strategies that will enable them to acquire, evaluate, and synthesize information and knowledge. Critical thinking is a prerequisite skill for problem solving and decision making.
4. Ability to Solve Problems and Make Decisions — Patients present an array of diagnostic and treatment problems. Optometric practice is a series of problem-solving exercises to achieve specific goals (outcomes). Entering practitioners must be able to separate real from illusionary problems, make judgments and decisions based on available data or identify additional data that may be required.

*Communication Abilities* — includes sending, receiving, and responding to communications for varied audiences and purposes; includes writing, reading, speaking, listening, and using data, media, and computers.

1. Communications Competence — Entry-level optometry graduates must be able to read, write, speak, and listen in order to convey conclusions, opinions, and dissents; they must be able to gather data and impressions. The ability to dissent clearly, unemotionally, and effectively, both in speaking and in writing, is a major competency necessary for the effective functioning of health care teams. Moreover, the ability to communicate with patients from diverse demographic populations (especially age and culture) is critical in rendering competent optometric care.

   Entry practitioners must be capable of educating their patients, colleagues, and the public on matters related to optometric care. Practitioners must be able to collaborate with patients and other health professionals. Optometrists must be able to advise and seek advice from other optometrists and/or other health professionals.
2. Aesthetic Sensitivity — Entering optometric practitioners must possess an aesthetic awareness of art and human behavior for both personal enrichment and application in enhancing the profession. Health professionals must understand the human condition as expressed through literature, art, and music.

*Faculty with Values and Ethical Principles* — includes developing sensitivity to and awareness of personal values and ethics in professional and social contexts.

1. Professional ethics — Optometric students must understand accountability and responsibility for their actions and the results of their care in patients. Liberally- educated individuals are expected to have developed value systems and ethical standards that guide their behavior. Professionals must make choices and must appreciate the need to accept the consequences of their actions. Optometrists entering their professions must be able to reach decisions even when their personal values may conflict with ethics. Graduates must deal with these conflicts while assuring that patients are afforded optimal care. Optometric practitioners must understand the nature of the obligation that they owe to patients and the responsibility that the obligation be discharged.

*The ability to communicate with patients from diverse demographic populations (especially age and culture) is critical in rendering competent optometric care.*

*Personal Awareness and Social responsibility* — includes developing an appreciation of self, of the strengths and problems of cultural diversity, and an historic understanding of a society and health care system in rapid change.

1. Contextual Competence — Graduates must have an understanding of the social environment in which their profession is practiced. The capacity to adopt multiple perspectives allows graduates to comprehend the complex interdependence between their profession and society. An enlarged understanding of the world and the ability to make judgments in the light of historical, social, economic, scientific, and political issues is demanded of the professional as well as the citizen. The entry-level graduate must understand the changing cultural composition of the society which he or she will serve.

   Contextual competence also refers to an understanding and appreciation of the roles that optometrists play in the health care system as well as the problems faced by the profession as it seeks integration into a changing health care system. This understanding must include an appreciation of how optometrists are different from other health professionals in terms of their science, curricular preparation, entry-level competencies, and practice responsibilities.
2. Professional Identity — The entry-level curriculum must infuse the graduate with a desire to improve the profession by advancing the knowledge, skills, and values of the profession. Practitioners entering their profession must be proud of it. They must understand the nature of their profession and its major contributions, as well as its failings.

*Self-Learning Abilities and Habits* — includes the ability to self-assess and satisfy learning needs on an ongoing basis.

1. Adaptive Competence — Entry-level practitioners in optometry must be able to anticipate, adapt to, and promote changes important to optometry's societal purpose. They must appreciate that professional practice is not static. They must be comfortable with change and be capable of using change to further the goals of the profession as well as their individual careers. Adaptive competence often is referred to as the "entrepreneurial spirit." It focuses on taking risks, while emphasizing the skills of assessing and evaluating potential outcomes.

# List of Attendees and Papers

**The Georgetown Conference**
**Summit on Optometric Education**
**March 19-22, 1992**

**Sponsored by the**
**American Optometric Association**
**and the**
**Association of Schools and Colleges of Optometry**

**Underwritten by Grants from**
**Vistakon, Inc. and Alcon Laboratories**

## Scope of Optometric Practice

**What will the scope of optometric practice be in the year 2000?**
*James Cox, O.D.*
*John A. McCall, Jr., O.D.*
*W. David Sullins, Jr., O.D.*

**Should optometry evolve as a parallel profession with ophthalmology?**
*Robert Carter, O.D.*
*John Gazaway, O.D.*
*Bruce May, O.D.*

**Should optometry evolve as a vertically integrated discipline that includes all components of ophthalmology?**
*Anthony DiStefano, O.D., M.P.H.*
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*James C. Leadingham, O.D.*

**What is the proper integration of optometry in ophthalmology?**
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*James Boucher, O.D., M.S.*
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*Douglas K. Penisten, O.D., Ph.D.*

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*Gerald E. Lowther, O.D., Ph.D.*

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*Jerald Strickland, O.D., Ph.D.*

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*Carl F. Gruning, O.D.*
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*Gerald Franzel, O.D.*
*Irwin B. Suchoff, O.D.*

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*Alden N. Haffner, O.D., Ph.D.*
*Donald Jarnagin, O.D.*
*James R. Scholles, O.D., J.D.*

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*Ramona L. Clymer*
*Daniel Houghton, Jr., O.D.*

**Recruiting and retaining appropriate numbers of under-represented and disadvantaged students into optometry.**
*Kellye Knueppel*
*Hector C. Santiago, Ph.D., O.D.*
*Martin A. Wall*

**Student indebtedness and practice mode choice.**
*Ben M. Stoehner*
*Larry DeCook, O.D.*
*Dawn C. Kaufman, O.D.*

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*Richard D. Septon, O.D., M.S.*
*Donald W. VanArsdale, O.D.*

**What is the history, present status, and future needs for graduate education within the profession?**
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*Richard M. Hill, O.D., Ph.D.*

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*Robert N. Kleinstein, O.D., Ph.D.*

**What are the supply sources for administrative personnel to meet the future needs of the schools and colleges of optometry?**
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*Douglas H. Poorman, Ph.D.*

**What are the supply sources of clinical science faculty personnel to meet the future needs of the schools and colleges of optometry?**
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*P. Sarita Soni, O.D., M.S.*

**The type and training of faculty required for a successful basic sciences program.**
*Anthony Adams, O.D., Ph.D.*
*Arnold Melnick, D.O.*

**How can optometry obtain the resources necessary to develop clinical-based research programs, including clinical trials and bio-sciences research?**
*Willard B. Bleything, O.D., M.S.*

**Basic science research in optometry: Are we adequately prepared?**
*Barbara J. Jennings, M.A., O.D.*

**What resources are necessary to develop new technologies and procedures in eye/vision care so that optometry has primary ownership?**
*Alan L. Lewis, O.D., Ph.D.*
*John B. Rush, O.D.*

**What changes are needed to ensure the future of optometry's graduate programs?**
*Jay M. Enoch, O.D., Ph.D.*
*John P. Schoessler, O.D., Ph.D.*

## Financing of Optometric Education

**Implications of the expanding scope of practice of optometry on the financial needs of the schools and colleges of optometry.**
*Arthur J. Afanador, O.D., Ph.D.*
*William E. Cochran, O.D.*

**Potential sources for funding optometric education other than tuition.**
*Boyd B. Banwell, O.D.*
*Timothy M. Brackman*
*Thomas Meadows, CPA, MBA, CAE*

**How do schools and colleges of optometry assure that existing facilities can accommodate a changing curriculum?**
*Stewart Abel, O.D.*
*Barry J. Barresi, O.D.*

**Present status and projected needs of the educational facilities in optometry.**
*L. Edward Elliott, O.D.*
*Bradford W. Wild, O.D., Ph.D.*

**How can co-management centers, residencies, and externships be developed to help fund the needs of the optometric curriculum?**
*Robert J. Maynard, O.D.*
*Charles F. Mullen, O.D.*
*A.R. Reinke, O.D.*

**What should be the proper size and number of optometric schools?**
*Richard L. Hopping, O.D.*

**The pros and cons of developing additional schools and colleges of optometry.**
*Jack W. Bennett, O.D.*
*Earle L. Hunter, O.D.*
*Lorraine I. Voorhees, O.D., M.S.*

## Related Areas

**The role of and need for incorporating communication skills in optometric education.**
*Reynold W. Malmer, APR*

**How optometric education fits into the political process.**
*Jeffrey G. Mays*
*Robert Whitaker, O.D., D.O.S.*

**What are the appropriate skills and knowledge of reimbursement systems needed for entry-level into the practice of optometry?**
*William W. Reinertson*

**What is and what will be the need for formally educated optometric technicians?**
*Sandra C. Pickel, BGS, Opt.T.R.*

2. Scholarly Concern for Improvement — Entry-level optometry practitioners must recognize the need to increase their knowledge to advance the profession through systematic, cumulative research on problems of theory and practice. The heart of the intellectual process is attention to a spirit of inquiry, critical analysis, and logical thinking. The entry-level curriculum must foster among graduates an obligation to participate in inquiry and professional improvement.
3. Motivation for Continued Learning — The profession expects that optometry graduates will expand their personal, civic, and professional knowledge and skills throughout their careers. They must have the skills to learn in a variety of environments and methods. Practice is, essentially, a learning experience. Optometrists must enter practice with the skills to learn from their problem-solving experiences. They must be able to use their disciplinary and professional literature as a means of acquiring a continuing flow of new knowledge.

*Social Interaction and Citizenship* — includes effective, interpersonal, and intergroup behaviors in a variety of situations and circumstances.

1. Leadership Competence — All education carries with it the responsibility to develop leadership capacities. This is especially true of health professional education where the problem-decision-action cycle may have broad environmental, social, and individual ramifications. Graduates must exhibit the capacity to contribute as productive members of the profession and assume leadership roles as appropriate in the profession and in society. The profession will continue to meet its obligations to society only insofar as it can change or meet societal needs. Change will not occur without sound leadership, and optometric education must foster the development of leaders among the student population.

Optometric education must prepare students to deal analytically with issues related to the organization, financing, delivery, reimbursement, access, quality, and regulation of health care and optometry services. Graduates must be aware of methods of shaping change in the profession through policy formulation in both the private and public sectors.

*Professional Outcomes/Competencies* — includes those abilities that foster effective and efficient practice.

1. Manage — Practice is a management function as well as it is a problem-solving, health care activity. Optometrists must manage patients and their ocular diseases. They must manage personnel, equipment, money, time, and themselves. They must be able to assess the outcomes of their care in patients and develop therapeutic plans for their patients. Entry-level graduates must be able to manage their practices as well as manage their patients.

## Conclusion

The knowledge, skills, attitudes, values, and ethics necessary to enter the practice of optometry span a spectrum of competencies and curricular outcomes that include specific practice skills unique to optometry and general competencies considered essential in all professionals. The challenge to faculties is to develop individual course objectives, educational processes, and curricular assessment techniques to assure themselves that each course achieves the objectives developed for it and that these objectives are consistent with the entry-level outcomes and competencies considered necessary at the completion of the curriculum. ☐

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THE Georgetown Conference
SUMMIT ON OPTOMETRIC EDUCATION

# How Can the Basic and Clinical Sciences Be Integrated in Order to Make the Total Educational Experience of the Students More Meaningful?

Gerald E. Lowther, O.D., Ph.D.

## The Problem

One of the main purposes of a professional education in optometry must be to give students the ability to diagnose and solve the vision and health problems of their patients, both at the time of graduation and throughout their careers. They must have the basic knowledge and understanding which underlies the necessary clinical skills used and they must be able to build upon this base as new information is developed. In order for the profession to grow and add new knowledge, the practitioner must: 1) understand the basic sciences; 2) be able to apply that understanding to clinical problems; and 3) have the necessary problem solving skills. Without this basic background for problem solving, optometry will be a technical field rather than a profession.

Any instructor who has taught a clinical course and has asked students relevant questions about basic science concepts from previous courses knows that students forget many of the basic facts they learned. A recent experience demonstrates this point. Second year optometry students in a pre-clinic laboratory during biomicroscopy instruction were given the simple task of naming the five basic layers of the cornea. Most students were not able to successfully name the layers even though the previous year they had courses in ocular anatomy, ocular biochemistry, and ocular physiology. If this is true of such basic concepts, what about more complex areas of biochemistry and ocular physiology dealing with drug effects, disease processes and related areas? A study of medical students indicated that second year medical students will have forgotten 90% of the factual items they have learned by the time they graduate.[1] Learning large amount of factual data often makes it more difficult to remember the important concept.[2] Expecting students to know large amounts of factual material creates stress and morale problems which negatively affect learning as well as long term feelings toward the institution and support of the institution. The "abuse" of students based on course demands is reviewed in a recent article.[3]

The present educational system does not always give students the skills and experience of learning on their own. Students depend on instructors to give them the "list" of items they need to know for exams. They do not dig into the problems themselves. This carries over into their professional lives; many optometric practitioners neither read journals regularly nor continue to learn effectively on their own.

The increase in factual knowledge in the basic science areas, as well as the expanding clinical responsibilities within the profession, means more material and more class hours have been added to our curriculums. Students may spend over 30 hours in class per week and average two to three examinations or more per week. Most of the courses expect the student to learn many facts and repeat them back on the examinations. There is little time to understand the material; students must memorize it and repeat it back on the examination. The material is quickly forgotten as the next text approaches. The concept that the basic material can be discarded after the first couple of years is reinforced by the National Board of Examiners in Optometry (NBEO) since they give the basic science portion of the examination in the student's second year prior to any significant clinical experience. With this timing, the examination is not, and can not, be geared to clinical application of the material.

Most professors teaching basic science courses are not clinicians and do not understand what is involved in clinical practice. They teach the facts of their field (anatomy, biochemistry, physiology, microbiology, etc.) as if the optometry student is majoring in the basic science field and is headed for a career in the instructor's field. To add to the problem, most clinicians, both inside and outside of educational institutions, went through such a

*Dr. Lowther is professor/associate dean at the University of Alabama at Birmingham School of Optometry.*

system, and therefore came out understanding little application of basic science. Clinicians contribute to this problem by downgrading the importance of basic science courses to the students, thereby increasing the students' feeling that these courses are unimportant and just a hurdle to get over.

## Teaching Methods

Prior to the early 1900s, medical education in the United States was on an apprenticeship basis. A student worked with one or two physicians learning their techniques. There were small proprietary medical schools with little formal education involved. The Flexner report of 1910, as well as preceding calls for reform, resulted in a drastic change in medical education.[4] Scheduling biomedical courses prior to clinical experience became the standard which prevails today in all health professions. The advantage of this "conventional" educational method is that basic education can be delivered in an efficient, cost effective method by experts in each field.

The problem with this method was stated earlier — students forget an overwhelming amount of material because they do not see or understand the relevance of the material. The report of the *Panel on the General Professional Education of the Physician and College Preparation for Medicine, Physicians for the Twenty-First Century,*[5] made a number of recommendations regarding this problem: A) "Medical faculties should encourage student to learn independently by setting attainable educational objectives and by providing students with sufficient unscheduled time for the pursuit of those objectives"; B) "Medical faculties should examine critically the number of lecture hours they now schedule and consider major reductions in this passive form of learning. In many schools, lectures could be reduced by one-third to one-half. The time that is made available by reducing lectures should not be replaced by other scheduled activities"; and C)"Medical faculties should offer educational experiences that require students to be active, independent learners and problem solvers, rather than passive recipients of information." These recommendations are also appropriate for optometric education.

An educational approach that is receiving much attention and that is making inroads into health education is "Problem-based Learning." This system was developed in the early 1970s at McMaster's University in Hamilton, Canada.[6] Barrows and Tamblyn at McMaster's have been the leaders in this approach. This system uses two previous methods of teaching: 1) the *case study method* as practiced by the Harvard Law School[7] and 2) the *discovery-learning approach.*[8] Barrows and Tamblyn point out the two main postulates of problem-based learning: 1) learning through problem solving is much more effective for creating in a student's mind a body of knowledge usable in the future than is traditional memory-based learning; and 2) skills most important for patients are the problem-solving skills, not memory skills. They reported that many faculty made the half-serious observation that medical schools should have an "inverted curriculum" with the first two years in patient care and the last two in basic sciences so the students could learn to apply the basic science. As we all know, most students are far more interested in direct patient care aspects than in basic science courses.

*With the technologies and resources available today, self-directed learning can be more effective than the lecture approach.*

Self-directed learning is a part of most problem-based learning and is an important component of any system that is to teach students to learn on their own. With the technologies and resources available today, self-directed learning can be more effective than the lecture approach. With the use of textbooks, journal articles, videotapes, computer assisted instruction, interactive videodiscs and other materials, students can self-pace their learning depending on their knowledge of a given area. Studying and discussing these materials in small groups is very effective in helping retention.

A number of medical schools have adopted a problem-based and self-directed learning system. One such school is the John A. Burns School of medicine at the University of Hawaii. In its "Problem-Based Learning Curriculum - General Guide to the M.D. Program" the school outlines the key features of the system:

- Knowledge is acquired in problem-based modules.
- Self-directed learning is fostered in small group tutorials.
- Students are actively involved in the learning process, not simply passive recipients of information.
- The small group leaders function as facilitators of learning.
- Content experts function as resources to the learning process.
- Laboratory exercises, demonstrations, the library, and audiovisual-computer centers supplement faculty input.
- Basic sciences are learned in the context of solving clinical problems.
- There are no discipline-specific courses.
- Students are trained to think critically and to evaluate new information and research data.
- Evaluation of students is based on competence in a variety of problem solving exercises.

## Solving the Problem

A number of approaches can be taken to solve the problem of effectively integrating the basic sciences and clinical sciences, none of which is particularly easy. Ideally one might refer clinicians who are experts in the basic science fields. Obviously, very few such clinicians exist due to the knowledge base required and the time needed to maintain the skills in each area. Another method would be to educate the basic science teacher more completely about clinical care so that he/she can inject more clinical relevancy into the basic science course. This approach in itself is not likely to solve the problem. thus, using a team teaching approach may be the most effective solution. Clinicians and basic scientists can be paired or grouped to teach courses where the basic science and clinical problems are taught together. This solution requires close cooperation, respect, and ability to put aside egos. Negative attitudes have to be overcome.

How could this work? A clinician would present an ocular disease case. The student would have to search for the background ocular anatomy, physiology and biochemistry associated with the disease process and its therapy. The student would use self-study materials and consult (or meet in small groups) with the ocular anatomist, biochemist, etc. An intermediate step (if one does not want to adopt completely a self-directed approach) is to have the clinician present the disease cases(s) followed by the basic science instructors covering their related areas dealing with the cases.

It is apparent that, for the motivated student, the self-directed, problem-solving approach is markedly more efficient with respect to time as well as the "quality" of the learning. The material is "understood," not just memorized, and thus will be retained and used. But such a system requires an almost complete change in the teacher's attitude and approach from that of a lecturer proclaiming knowledge to a facilitator, consultant, and counselor.[9] This change in attitude and teaching approach is difficult, even when you know it is a better system. Change is always difficult, and there is resistance by any faculty. Likewise, students come in with years of "conventional" university education, and it is very difficult for them to switch gears to a self-study method where they are responsible for learning. One must guard against indicting the system because it is new to the people involved. It may take some students a year or more to adapt to the system. Such a system will not necessarily make the student who would not study under the previous system do so under the new system.

Instructors must meet with students in small groups. For institutions with very large classes, this system might be more expensive. However, the total time spent with each student is less than using the lecture system.

To be effective, students must be exposed to clinical experiences very early in their education. This exposure enables students to relate the basic sciences to a clinical base.

In order to completely implement a problem-based self-study system, the curriculums of the institutions would have to be significantly changed with respect to the sequencing of materials. However, a partial approach would be to use the problem-based, self-directed technique in selected courses and gradually implement this teaching technique in the majority of the curriculum.

Considerable effort must go into organizing and developing the materials for the problem-based self-study system. There are many materials already available, obviously textbooks and printed material, but also interactive videodisc systems for anatomy, neurology and other areas that are far superior learning tools than classroom lecturing. Likewise, the facilities including computers, videodiscs, VCR's. etc. must be available. However, the costs of this equipment have decreased significantly. In some cases, students may purchase their own equipment.

## Summary

Integrating basic science and clinical science is necessary if the student is to understand and apply basic science in solving patient problems. This integration is best facilitated if the material is taught together, allowing the student to see and understand the relevance of basic science. The method in which the material is taught will greatly affect the future of the student and the profession. A problem- based, self-study system appears to be the most effective teaching method for many of the topics in optometry.

*But such a system requires an almost complete change in the teacher's attitude and approach from that of a lecturer proclaiming knowledge to a facilitator, consultant, and counselor.*

Switching to such a system requires a change in the attitudes of administrators, faculty and students. It requires a lot of initial effort and a cost mainly in time, and to some extent, money. It requires a few dedicated faculty who understand the problem, and techniques, and who are willing to spearhead the effort.

The results can be very gratifying for both the student and faculty (and eventually the profession). The whole education process becomes more enjoyable for the faculty; they learn more and interact more with each other and with students. □

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THE Georgetown Conference SUMMIT ON OPTOMETRIC EDUCATION

# What Implications Does the Expanding Scope of Practice Have for the Curriculum at the Schools and Colleges of Optometry?

Morris Berman, O.D., M.S.

Optometry has evolved from a scope of practice limited to managing healthy ocular conditions to being recognized as an independent coordinate, primary health care profession. The change in emphasis and responsibility became formalized in 1971 when legislation was enacted in Rhode Island permitting qualified optometrists to utilize pharmaceutical agents for ocular diagnostic purposes.[1] Since, that time, diagnostic legislation has been enacted in all 50 states and has been supplemented by the passage of ocular therapeutic laws for optometrists in 31 states. While faculty and administrators at schools and colleges of optometry have greatly assisted in these changes through their involvement in the educational and political process, the profession at large has held the expectation that educational institutions would automatically provide the professional training and continuing education to prepare optometrists for full scope practice as allowed by state law. This assumption places burdensome demands on educational institutions and has complex curricular implications for every school and college of optometry.

Each optometric institution has the responsibility to design and implement a sufficiently broad-based curriculum so as to prepare its graduates for all primary care practice opportunities. The formal educational process should also lead students to develop habits of lifelong learning to enable them to practice competently throughout their professional careers. Institutions must also ensure that their graduates are eligible to take licensing examinations and are able to successfully complete them. The expanding scope of practice continues to place great demands on educational institutions which cannot always be met. These new professional opportunities will be compromised unless the schools and colleges secure the financial resources, manpower, and faculty training to provide the needed education.

Despite the transitions that have occurred during the past 20 years in which optometry has expanded its areas of responsibility from managing healthy conditions to the area of ill health (vision and systemic), the four-year academic training period has remained unchanged. New courses continue to be added to the crowded curriculum, necessitating the modification or deletion of other courses. The greatest curricular expansion has occurred in the biological sciences with the introduction or added emphasis in courses such as endocrinology, biochemistry, general microbiology, immunology and clinical medicine. A survey of the schools and colleges of optometry in 1990 documents these changes in most curricula.[2]

However, differences in emphasis indicate that student education is quite uneven at the professional primary care training level. The various schools and colleges reported a wide range of hours designated for the teaching of the following subjects: anatomy (11-60 hours); histology (11-40 hours); neuroanatomy (10-60 hours); physiology (11-72 hours); endocrinology (6-30 hours); biochemistry (10-60 hours); general microbiology (8-57 hours); immunology (8-27 hours); general pharmacology (30-80 hours); general pathology (20-48 hours). In addition to these changes in the basic biological sciences, greater emphasis has been placed on clinic courses dealing with ocular disease diagnosis and treatment as well as evaluating and managing of ocular manifestations of systemic conditions. This expanded scope of practice presupposes the need for more education in the areas of practice administration and clinical-legal issues as they relate to these new responsibilities. Other factors for change include the greying of America and the profession's advances in the third party reimbursement arena. As the profession continues to advance and change, each step impacts the optometry curriculum as new course work is added to programs at optometric institutions.

An analysis of the curriculum at all schools and colleges of optometry

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demonstrates that the total number of clock hours and proportion of the curriculum dedicated to didactic tracks varies considerably for the basic and clinical sciences.[3] The greatest consistency is found among contact lenses courses with the largest discrepancies occurring in vision therapy, practice management and the basic biological sciences. Where a particular emphasis is seen in one specialty area (e.g., contact lenses), a notable de-emphasis generally occurs in another (i.e., low vision, vision therapy). Likewise, most schools and colleges report that recent added emphasis in the biological sciences has resulted in significantly decreased in curricular content in the optical and visual sciences, which have traditionally been optometry's strength in research and clinical practice. These data demonstrate how each institution's priorities define its curriculum. Whether the curriculum accurately reflects patient needs encountered in optometric practice is a matter that must be closely considered by faculty at each institution.

The proportion of clock hours assigned to the clinical training of students comprises approximately 43% of the curriculum and is reasonably consistent for all schools and colleges. The clinical curriculum in optometry has adapted to the dynamic changes in the profession with a proliferation of training programs at external sites. These clinics represent a broad sampling of different health delivery systems at various facilities including veteran's administration hospitals and outpatient clinics, all branches of the military, the public health service, co-management centers, and community facilities. These experiences have benefitted students but represent only a partial solution to the dilemma facing academic planners.

The curricular implications for the expanding scope of practice can be summarized as follows:

1. The role and responsibility of the optometrists needs to be redefined so as to provide direction for the optometry curriculum. If the goal is to prepare optometrists for inclusive primary care medical management, then the teaching programs may need to be relocated and to be more closely identified with medical schools. An alternative approach would be for the schools and colleges to recruit new experts from optometry and other health professions to teach students and conduct research, thereby elevating the profession's role as a contributing partner in the health sciences. This is a complex problem which has philosophical, manpower and financial implications.
2. Enormous and unrealistic demands are being made of students to successfully master all the material included in the curriculum. An answer to the spiraling problem would be to extend the four-year professional program. This would obviate the need for curricular concessions, but would likely doom the profession as optometry must compete with other primary care professions including medicine and dentistry which offer four-year professional programs. A further consideration related to expanding the four-year curriculum is the indebtedness of students, which is already reaching alarming proportions.[4] Another solution would be to mandate residency training as a licensing prerequisite. This would promote the concept of specialization within the profession and would enable the schools and colleges of optometry to limit curricular focus to the fundamentals of primary care. This too has philosophical implications for the profession and would directly impact curricular planning at the schools and colleges.
3. A new paradigm in educational methodology will need to be adopted in order to improve the efficiency of optometric training. Emphasis will need to be directed towards expanded use of newer teaching technologies as an integral part of the learning environment.[5] The current teaching methods appear ineffective and inefficient in delivering the new curriculum, and future needs call for the educational process to be directed towards greater self-discovery and self-reliance on the part of students. Lectures need to be replace,d for the most part, by small group discussions using problem-based learning approaches which have been successfully implemented in other health care programs.[6,7] In that system, faculty members become facilitators to student learning rather than responsible for being the fountain of wisdom. In this respect, the expanded scope of practice will have a positive effect on the curriculum and pedagogy by forcing the introduction of alternative teaching strategies.
4. A major implication of the expanding scope of practice will be the effect on institutional resources, particularly its faculty. At present, the schools and colleges do not have sufficient full-time health science and medical faculty with vested interests in the optometry curriculum and optometric institutions. These faculty are often part-time experts drawn from nearby medical schools who are not involved with curricular reform at the schools and colleges of optometry. The manpower problem is exacerbated by the paucity of graduate programs designed to train optometrists in the health (biological) sciences. This is an important consideration since O.D. and M.D. degrees alone do not necessarily credential faculty members to teach the biological sciences. Changes within the profession are also impacting the finances of schools and colleges. Large budgetary outlays will be needed for the acquisition of new instrumentation. The profession cannot afford to relinquish its responsibility to education, and a symbiotic partnership must be formed between professional organizations and educational institutions to provide a means of better supporting education for students and practitioners on a local and regional basis. The implication of the expanding scope of practice needs to be clearly recognized and understood by educators and practitioners alike. Solutions need to be sought by this partnership as they collaborate to shape the future of the profession. □

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# INTERVIEW

# Is the Four-Year Core Curriculum in Optometry Adequate to Meet the Entry Level for the Profession?

*Another question posed at the Summit on Optometric Education under the topic Optometric Basic Sciences and Clinical Education concerned the adequacy of the core curriculum in meeting the entry level needs of the profession. Three Summit participants wrote on this topic: Thomas L. Lewis, O.D., Ph.D., David A. Greenberg, O.D., M.P.H., and Morris Applebaum, O.D. In order to enhance our coverage of the various issues addressed, these three authors were interviewed at the Summit. Felix M. Barker, O.D., M.S., editor of Optometric Education, conducted the interview.*

**Dr. Barker**: From your positions as leaders in optometric education, please comment on the current and future ability of our educational programs to prepare our graduates for "entry level" practice in optometry.

**Dr. Lewis**: I believe our current educational program in the United States is adequate given certain conditions. First, we must be able to recruit and retain a high quality of student. Second, we need enough faculty who are appropriately trained in the areas of expertise required. Third, we need other resources such as up-to-date facilities, modern equipment, and an adequate patient volume. If we can be certain of the availability of these key requirements, then we have at least the capability of educating an entry level practitioner within a four-year time frame. After this it depends on the definition you use for "entry level" and whether or not other new major areas emerge within our scope of optometric practice.

**Dr. Greenberg**: I basically agree but I believe firmly that the definition of "entry level" is not at all clear. While each of us individually might have a notion of what we feel constitutes "entry level," this conference has served to underscore the fact that there really is no uniformly accepted definition. As more states individually change the scope of practice within their boundaries, it seems that a uniform definition may be even more elusive. It would certainly be of benefit to the profession to address this question, and, given the collegial exchange of ideas and dialogue at this meeting, the pursuit of a definition of "entry level" would be an important outcome of the summit process.

Tom makes an important point in that the "job" of the schools is significantly affected by changes in the profession as it is practiced, and any new major changes in the scope of practice that might occur in the future will certainly impact our curricula and tax our resources and resourcefulness. There is a practical limit to how much can be placed into a four-year time span. We have been and must continue to examine our curricula for vestigial material that can be deleted. We must look for better and more efficient ways to educate our students such as computer enhanced interactive media and self-paced instruction in some areas.

**Dr. Applebaum**: I also think it is important that we look to defining "entry level," and as we do we have to remember that our task is different in some ways than medicine and a lot more like dentistry. For example, we do not have medicine's luxury of a primarily didactic education during the undergraduate program, thus leaving a majority of the clinical training to the residency programs. Even though our residencies are assuming a greater role in our education system, they still only represent clinical training opportunities for about 10% of our graduates. No, we still need to "pack" all the clinical training needed to start practice into the basic four-year program.

**Dr. Greenberg**: "Start practice" may be a key phrase in the discussion of entry level. I think we would all like to believe that we are capable of producing a fully mature practitioner at graduation, but that is simply not a realistic goal for any health care discipline. Frequently practitioners will raise the issue of a new graduate's skills in one area or another. In reality, they are using their own level of performance, one which has grown and evolved over years, and perhaps are expecting the same talents and sophistication from new graduates. To have such expectations is certainly understandable, but is it realistic? What I think we should be searching for in our quest for "entry level" is a reasonable set of objectives for graduates to achieve which prepares them to begin practice competently and positions them to mature professionally through practical experience and continuing education.

**Dr. Barker**: What I'm hearing from your comments is that the definition of entry level is an important issue and that this definition is perhaps most directly related to how we define the scope of optometric practice.

**Dr. Lewis**: That's right and I was encouraged by the attitude of the AOA leaders at the Summit in this regard. There seemed to be general agreement that while we can broadly define our scope based on today's various legislative definitions, any significant expansion in the scope of practice may need to be addressed through advanced post-graduate training.

However, I also want to add that we need to realize that we cannot be all things to all people. We need to understand and accept the need to seek consultation for patients both intra- and inter-professionally. As optometrists, we need to know the limits of our competencies.

**Dr. Barker**: In addition to our expanding scope of optometric practice, there are significant pressures from within our curricula because of new scientific knowledge which needs to be conveyed to our students. What are some of the options available to address the overcrowding curriculum?

**Dr. Lewis**: Well, the first step is to critically analyze our curricula for the appropriateness of each topical area as it is currently applied. This accounting approach helps us get the big picture. However, making cuts and substitutions requires a lot of careful collective thinking by faculty and administration about how to improve the efficiency and effectiveness of the program without deleting or unnecessarily diluting any critical components. Looking at the National Board can help and I am hopeful that the ASCO Curriculum Conference scheduled late this July in Denver will also give us some further guidance.

**Dr. Applebaum**: We can also look for redundancies in the curriculum. It is common in a clinical educational program to see certain topics appear many times during the entire curriculum. In some instances this is real redundancy and time can be saved if a correction is made, but in other cases redundancy is useful, and helps in the iterative learning process. So you have to look carefully in each case and make a wise decision about what to cut out and what to leave in.

**Dr. Greenberg**: Careful examination of our curricula to ensure their currency is certainly an important and ongoing responsibility. One particular concern that our faculty has raised and which we believe we have avoided is the alure of the "easy fixes" such as making certain basic science material "entrance requirements" rather than providing them during the professional program. The perverse attractiveness of such measures is that they diminish the demands on our resources and free some time within our program but they may also remove many students from a "level playing field." By that I mean that a biochemistry course may be quite different from one undergraduate program to the next and there may indeed be differing levels of sophistication of the same course title at the same undergraduate institution. Consequently, students could be faced with graduate level expectations based upon the erroneous assumption of a relatively homogenous college experience.

**Dr. Barker**: What about clinical training as it stands today? Are we able to train for the entry level based on the clinical experiences currently available to our students?

**Dr. Applebaum**: That's an issue we are all concerned with. We've drastically improved the clinical training opportunities at our institutions by investing in new facilities, equipment and faculty as well as by taking steps to improve the patient mix. The question is: how much is enough, especially when it comes to more specialized or rarer conditions? We think the present mix is good for entry level, but the more that we can improve the exposure our students receive through shared cases, teaching rounds, and creative educational methods, the better it will become.

**Dr. Greenberg**: Of necessity, medicine has certainly embraced such ideas over its history in clinical education. For example, even though they had carefully defined the clinical training expectations for entry level into emergency medicine, the residency programs in that specialty found by survey that 23% of the desired diagnoses never presented and that another 35% were so rare that it was unlikely for the resident to see the case personally. Nevertheless, the method of teaching by case example, teaching rounds and the like in this sort of clinical program seems to be producing appropriately trained doctors and we to a large extent are following this pattern.

**Dr. Lewis**: Educational technology can also help address the need for clinical training experiences because it is possible to teach patient management principles through video tapes, a remote live hook up, or an interactive video arrangement to teach small or even large groups. It is helpful to use these techniques to present less common conditions as well as to improve consistency in dealing with more common case management.

**Dr. Barker**: Well, we must close this most stimulating discussion for now. It was an enlightening interchange. I sincerely thank our discussants for their contributions to this debate.

Because the leaders of our profession had the foresight to convene the Summit on Optometric Education and because they will be continuing the process of dialogue through the coming year, we will have many further opportunities for similar discussions which, I am sure, will add to our better understanding of the issues we face in optometric education.

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*Dr. Applebaum is dean of academic affairs, New England College of Optometry. Dr. Greenberg is vice president for academic affairs/dean, Illinois College of Optometry. Dr. Lewis is president, Pennsylvania College of Optometry.*

# T·O·P·I·C·2

# What are the Supply Sources for Administrative Personnel to Meet the Future Needs of the Schools and Colleges of Optometry?

Larry R. Clausen, O.D., M.P.H.

One does not need to look far to identify the source of tomorrow's educational leaders. It is the schools and colleges of optometry themselves. History reveals that the educational leaders in the nation's professional schools, with few exceptions, have emerged from within the individual professions themselves. So it is in law, medicine and theology; and so it shall be in optometry.

A survey of educational backgrounds of the academic deans within five health professions found that, overall, most professional school deans possessed either a single professional degree (67%) or a professional and graduate level degree (18%).[1] Optometry had the lowest proportion of deans with only a professional degree, but was similar overall to other professions in that 93% of optometry deans possessed the Doctor of Optometry degree.

Even more revealing than the fact that our future academic leaders will come from within the profession is the fact that these leaders are likely to emerge from one's own institution. Past studies have demonstrated that although American colleges and universities conduct national searches for presidents, they most often select someone who has a current or past connection with the institution.[2] That is, the individual selected for the position of dean or president is, more often than not, an individual who is a graduate of that institution or currently holds or has held a faculty or administrative position at that institution. We have observed this within optometry. Therefore, each optometry school needs only to look within its "family" to identify tomorrow's leader.

The above assumptions are not debatable. The empirical evidence is overwhelmingly in their favor. Indeed, few disagree with the projection that the majority of our profession's future educational leaders will be optometrists. One could debate the question whether a dean or president must have a doctor of optometry degree, but this debate would have little impact on future outcomes. The issue is one of identifying, nurturing and developing optometrists to become educational leaders, as opposed to searching for educational leaders outside of the profession.

Before we can intercede in the development of educational leaders, we must have some understanding of the career paths which lead to the position of dean or president. Although no two paths are exactly alike, common patterns emerge. Most presidents of colleges and universities have had prior college teaching experience.[3] This is true in optometry as well. Often a career in teaching leads to a series of career moves through the educational hierarchy. Cohen and March describe the standard promotional hierarchy for academic administrators as a six-rung ladder: professor, department chairman, dean, provost or academic vice-president, and president.2 Although individuals do not necessarily pass through each rung of this metaphorical ladder, vertical progression within higher education is the most common path to the positions of dean and president.

A second popular path emerges for heads of professional schools. Outstanding professionals in their respective fields sometime make the leap from practice to academic administration. For example, a nationally or regionally renowned practitioner may be called to head his or her alma mater, even though demonstrated competence in teaching or administration is not evident by experience. This remains the exception rather than the rule, and is a path that provides little room for intervention. A unique set of personal and institutional needs combine to form the opportunity for this to occur. Indeed, it is not the path of choice for a person planning a career in higher education administration.

This last comment raises the observation that most ascents through the academic hierarchy are not planned. They are after-the-fact invention, looking backward to describe what has happened more than looking forward to plan a succession of career changes.[2]

What can be done to ensure an adequate supply of future administrators for the profession's schools and colleges? At first the answer seems to be not much. The natural socialization process is logical, but unplanned. Presidents or deans did not enter optometry school with this particular career in mind. A unique series of

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actions over many years led to the position. It is difficult to intercede in such an unplanned progression of career. However, Cohen and March's ladder helps identify the pool from which future leaders are likely to evolve. I believe that we can do more to support those individuals who "come up to the plate."

We must recognize tomorrow's educational leaders early in their careers and invest in their future. For indeed we are investing in the future of optometric education itself. We need to foster broader managerial growth and experiences among our junior administrators, such as program directors, department chairs and associate deans. One approach is to direct and support the participation of mid-level academic administrators in programs which build effective management skills. One such program is Harvard's summer Management Development Program. This program seeks to sharpen skills in areas such as personal leadership, financial management and organizational administration. Intense programs such as these provide the opportunity to interact with administrators from other disciplines who are similarly advancing up the hierarchy of academic administration.

The profession should also broaden its support for administrators who seek advanced degrees at some mid-career point. Degrees in business administration, management, and higher education administration provide excellent opportunities for building administrative competencies. Further, the opportunity to share and learn from the experiences of others is enhanced when administrators step out of their own environment and become immersed in another. Programs that attract mid-career people across disciplines offer a rich environment for learning.

Although advanced education can be a valuable tool for developing faculty and administrators, significant limitations to its wider application exist. The costs associated with effective programs are high and advanced education programs and policies benefit only a small number of people. Therefore, it can not be the only program of professional development implemented, nor allowed to consume the majority of resources. Rather it needs to be part of an overall plan of professional development that provides a variety of mechanisms for developing faculty and administrator competencies.

Baldwin and Blackburn[4] stress the importance of professional development in higher education and the need for effective use of this resource. In fact, they assert that it is essential to long-term institutional survival. This is a key point when we look at the issue of developing future administrative personnel. We need to provide the stimulation, the rewards, and more importantly the financial support.

Lastly, because our future administrators will most likely emerge from within the profession, the justification for committing major resources for the recruitment of quality students is intensified. □

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THE Georgetown Conference SUMMIT ON OPTOMETRIC EDUCATION

# What are the Supply Sources of Clinical Science Faculty Personnel to Meet the Future Needs of the Schools and Colleges of Optometry?

P. Sarita Soni, O.D., M.S.

Before addressing the specific question, it is important that the term "clinical science" faculty be defined. On the one hand, the term may include those who teach clinically relevant courses or conduct clinical research. This definition includes the vast majority of the faculty at schools and colleges of optometry, and excludes only those whose course contents are basic (gross anatomy, geometric optics) or whose research involves questions that are decades away from application. On the other hand, clinical science faculty may be defined to indicate those who have a clinical degree such as doctor of optometry.

Various permutations can be and are fitted between these two views. At some institutions, which lean heavily towards research, a further distinction is made between "clinical science" and "clinical" faculty. At these institutions, members in the "clinical science" group are expected to develop research programs that will qualify them for consideration for tenure and promotion. Members in the "clinical" group are held responsible mainly for teaching related to the delivery of patient care and, while encouraged to become involved in research programs, are not required to do so. They are usually not eligible for tenure.

For the purpose of this paper, clinical science faculty will encompass those members of the faculty involved in teaching clinical courses (ocular disease, clinical optometry, contact lenses); participating in the delivery of patient care in the clinics; and engaging in clinical research. This definition also begins to address the major responsibilities of these faculty members. Most academic institutions expect their faculty to be active in teaching, research and service. The criteria for annual evaluations, tenure and promotion require that a faculty member achieve excellence in one of the three areas and demonstrate satisfactory performance in the other two. The specific criteria may differ among the schools and colleges of optometry, but generally all expect their faculty to teach, provide service (to patients, institution and the profession) and have an active research program. The major difference between various optometric and other academic institutions is in the requirements of the research activity. This is a very important difference when considering the sources of clinical science faculty personnel to meet the future needs of the schools and colleges of optometry.

The qualifications or educational experiences necessary for a clinical science faculty member to meet the future needs and standards of academic institutions and also provide a strong basis for personal and professional growth should be one and the same.

The necessary qualifications include a thorough optometric education, excellent clinical skills, comprehension of pedagogy, and not only a hunger for, but an understanding of the methodology involved in developing new knowledge. It is not surprising that pedagogy and research trouble the present day clinical science faculty in the schools and colleges of optometry the most, since the vast majority of them have little or no training in either.

The schools and colleges of optometry recruit their clinical science faculty from residency programs, private practice(mostly part-time) and graduate programs. Faculty recruited from residency programs and private practice tend to be excellent clinicians, but only a few, and these are rare and far between, have been successful in meeting the research criteria established at research institutions. For the most part, the clinical science faculty who have met research criteria at the research institutions have been those with graduate degrees beyond the doctor of optometry degree. Graduate programs with emphasis on research and teaching appear to prepare individuals better for a career in academia than the residency programs and private practice.

Applications for funding research projects are customarily evaluated in the light of the applicant's track record as a researcher. Usually, such records are initially established during involvement in a graduate program. Without such research and pedagogical training, most of the present clinical science faculty face major handicaps. The lack of a track record in research means they start their careers with zero set-up funds for their laboratories, therefore

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falling behind in their research programs right from the start. In addition, since research is more alien and appears more difficult (mostly due to lack of exposure) than teaching, clinical science faculty spend most of their early years developing their teaching skills. Hence, the present clinical science faculty join schools and colleges of optometry with two glaring disadvantages, lack of research training and lack of start-up funds, and yet at the time of annual review or tenure and promotion find themselves judged by the standards established for research oriented faculty.

Therefore, it is important to acknowledge that the future clinical science faculty at the schools and colleges of optometry will be expected not only to teach in the clinically relevant courses, both in the classroom and the clinics, but also to develop a clinical research program that will give them a fair chance at meeting the promotion and tenure criteria. This acknowledgement provides the planners with definite guidelines for training programs necessary for the future.

Essential programs need to be established to meet the stated qualifications. A thorough optometric education, excellent clinical skills, and an understanding of pedagogy and research technique as well as hunger for new knowledge are essential in the future clinical science faculty. The schools and colleges of optometry should be responsible for providing a thorough optometric education. The residency programs and private practice should assure the development of excellent clinical skills.

Several options concerning the development of teaching skills should be explored. an interested optometry student can begin to develop teaching skills during her or his professional program. Most optometry students who assist faculty in laboratories, unlike graduate students, do not receive any training at the present time. An organized and systemic approach should be made by the schools and colleges of optometry to develop programs to impart teaching skills before optometry students are asked to even assist in classroom or laboratory teaching. Such an approach may accrue many benefits, one of which may be to kindle an interest in pursuing an academic career.

It is equally important that training in clinical instruction be provided and supervised. If the status quo of one-year residencies is maintained, the responsibility falls upon the schools and colleges of optometry to provide further training in clinical teaching before assigning graduates of such programs to clinical supervision. If two-year residency programs are developed, teaching skills should be encouraged by the responsibility placed upon the senior resident for instruction of the junior residents. Emphasis on teaching in the graduate programs is commonly confined to classroom and laboratory, but should be expanded to teaching in the clinics.

The clinical science faculty of the future has to be prepared to engage in expansion of knowledge; they should be creators rather than followers. Very few optometry students, including the ones who choose residencies after graduation, show an interest in research. Most residency programs place very little emphasis on research and the ones that have active research programs produce too few graduates to meet the future needs. Some of the present residency programs offer superb interdisciplinary opportunities for research, but mainly these opportunities are being ignored, possibly due to poor research preparation of optometry graduates. The schools and colleges of optometry must encourage clinical research among their faculties so that professional students are exposed to it at all times. Better prepared optometry graduates and two-year residency programs with an emphasis on research will help create a potential source of clinical science faculty for the schools and colleges of optometry.

The preparation of future clinical science faculty should be a mission of the schools and colleges of optometry, especially the research institutions, since it is at these institutions that the present clinical science faculty have most difficulty meeting the established promotion criterion. Clinically oriented MS programs with heavy emphasis on "doing research" and clinical teaching are needed as sources of clinical science faculty. Such programs should be eighteen to twenty-four months in duration. The curriculum should be broad to allow the student and her or his advisors to plan a program that will form the basis of a research program in an area of interest to the student. The faculty's role in developing and guiding the program will be to keep the student's interest, the future needs of the schools and colleges of optometry and the needs of the profession in mind. These students will be expected to teach in the clinics and the classroom as they develop their teaching skills. In order to attract the best students to these programs, the fellowships and the stipends to be offered have to be competitive and probably better than those offered by the residency programs. Ideally, these programs should recruit from residency programs and private practices so that in the final analysis the graduates will also be able to meet the clinical skills qualification of clinical science faculty members.

A particular option, which tends to automatically include most of the above recommendations, is the combination of the residency program with a Master's program, such as was initiated a few years ago by one of our universities. If the needs recommended herein were accepted, such an eventuality could become practical and universal.

One other source of clinical science faculty is women and minorities in optometry. Women make up more than fifty percent of the current classes of optometry, and these numbers may be even higher in the future. The women in optometry have not yet developed a definite role of being either private practitioners, academics, or working for commercial practices. Women may be academic optometry's best source. Minorities are under-represented as clinical science faulty at the schools and colleges of optometry. This is another source that needs to be addressed as future needs and sources are identified.

To summarize, clinical science faculty at the schools and colleges of optometry are neither uniform nor clearly defined. The present needs are being questionably met through the residency programs. The graduate programs that traditionally provided the schools and colleges of optometry with clinical science faculty can not recruit students because of uninteresting curricula, low stipends and absence of encouragement. The future needs of the schools and colleges of optometry have to coincide with the professional development of "clinical science" faculty as differentiated from "clinical" faculty. Present optometry students need to observe the excitement of excellent teaching, understand the importance of research to the growth of the profession and observe faculty rewarded for their efforts. The schools and colleges of optometry should develop programs that will produce future "clinical science" faculty who contribute to the knowledge and growth of their discipline. All other disciplines produce their own such contributors. Why not optometry? □

THE Georgetown Conference SUMMIT ON OPTOMETRIC EDUCATION

# What Type of Faculty and Training are Required for a Successful Basic Sciences Program?

Anthony Adams, O.D., Ph.D.

## Introduction

Planning for our faculty demands a recognition that the solutions to optometric patient problems will need to draw on a broader and more biologically-based knowledge (myopia, cataract, retinal degenerations, corneal adaptation to contact lenses and response to disease). Planning will also call for significant expansion on our commitment to collaborative research and team approaches to the solution to optometric problems. We are moving to research findings and a scope of practice that allows optometry to address the *entire* problem more frequently. For example, no longer should our interest in such topics as myopia and refractive error stop with optics and biometry aspects of refractive error; rather we should be willing to follow the problem to its ultimate solution — the treatment and elimination of refractive error. Those solutions are going to move quickly to the molecular and pharmaceutical area.

If we could not comprehend this development 10 years ago we could be forgiven, but now we know not only that the environment has devastating effects on the development of coordinated growth in the neonate animal eye, but that vision is apparently central to the coordinated growth which prevents the development of refractive error (at least for 70% of us!). That unilateral like closure results in "deprivation myopia" is no longer a theory for neonate primates during their critical period of ocular growth. Whether similar forces can influence the refinement of ocular growth during the school years of children is still an open question and one that optometry should actively pursue. Treatments will be based on research leading to an understanding of what influences this coordinated growth process. The search is on for those chemical mediators in the retina that influence the dimensions of the eye, and researchers now look to chemicals like dopamine. At the same time we must acknowledge the clear role that heredity plays in the development of refractive error, and, as we understand this better, we undoubtedly will need the tools of molecular genetics to unravel the problem; research in this area has rapidly moved beyond the case history tool for understanding genetic inheritance of ocular conditions. The billions of dollars invested in the genome program will lay open exciting tools for understanding the genetic determinants of conditions such as refractive error. Myopia is just one of many examples of how research in basic sciences, and in particular biological sciences, is going to be required to further our understanding of optometric problems. The same case can be made for many optometric conditions such as amblyopia, strabismus, dyslexia, aging changes in vision, retinal degenerations (e.g. ARM), and the vision changes that are increasingly prevalent as the population ages and corneal cell physiology responds to disease and contact lenses.

## Opportunities for Research with an Epidemiological Base

The opportunities for research in optometry, with an epidemiological base, are enormous. But there are many problems which require careful characterization before creative insight as to the mechanisms and subsequent treatment approaches can be systematically applied. Perhaps adult onset myopia, amblyopia, and reading disabilities are among those problems. Here our faculty need to draw upon the power of well-designed epidemiological studies before an optimal research agenda can be drawn. Our faculty should be recruited to respond to opportunity. We have sometimes loosely labeled this **clinical research** though this distinction between clinical and basic research is sometimes counterproductive. (This is a separate topic worthy of discussion since it influences our planning and our productivity as a profession trying to advance knowledge).

In short, perhaps our research

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agenda and faculty recruitment in basic sciences should be patient problem driven (e.g. myopia, cataracts, aging related retinal degenerations, strabismus and amblyopia, dyslexia, binocular vision anomalies, corneal reactions to contact lenses and disease, glaucoma management, etc). Such an approach transcends categorization of clinical versus basic research or at least makes such distinctions of secondary importance.

## Setting the Agenda for Faculty in the Basic Sciences

But how does this set the agenda for the training and identification of areas for faculty, and in particular faculty in basic sciences?

First it argues for a research faculty who use their basic science training to address problems of optometric patients. The alternative approach would be to have the particular research "tool" drive the faculty recruitment rather than a focus on the problem or problem areas of interest. The "tool" approach would be similar to recruiting a faculty member to develop a laser and *then* look for applications to optometric problems (some may find this a poor example, but the historical context of the laser development and its later application is the analogy I wish to draw).

Clearly there are a large variety of faculty talents to consider, from defining the problem and its risk factors (epidemiological training), to designing and interpreting outcomes (outcome research), to developing approaches for early detection to optimize intervention (basic sciences of vision and eye), to understanding the immunological response of ocular tissues (immunology), to unravelling the molecular and cell physiology bases for the disorder (molecular and cell biology). Biological research is now a high priority in vision and eye research (NIH/NEI "decade of the brain") and consequently research funding opportunities are expanding in this area.

## Bridging the Gap to Quality of Life

There is also a need for research faculty in our schools in areas where patients' daily living **and quality of life problems** need to be related to the tests we administer. This must be a demonstrable relationship, as opposed to "inferential." Optometric faculty researchers with appropriate training can make tremendous inroads in this area and their results can be applied quickly to the expanded scope of optometric practice (e.g. in areas of vision testing of the cataract patient, video display problems, many areas of vision training, and in low vision associated with specific diseases or syndromes beyond the simple characterization of loss of high contrast Snellen visual acuity).

## The Roles of Faculty With and Without Investigative Research Obligations

Our optometry curriculum calls for sold teaching in basic science areas, including more and more biology. In some institutions this can and should be met without demanding that the faculty be active researchers in that area. Here the faculty member's profile of training research may be different and we should be clear in the distinction if we are to develop realistic programs for our institutions. Institutions which require research as a central component of faculty career advancement will have a different agenda for their faculty recruitment than those that do not. Schools and colleges that need their own basic science faculty in biological sciences (i.e., they cannot tap the resources of their larger institution) must face this distinction "head on." For those required to support a research agenda in biological science, the dedication of both start-up and ongoing space resources is substantial and typically beyond those required for "dry" research. Not only are start-up research laboratory costs 2-3 times those traditionally faced, but the accompanying animal support facilities are substantial. **Ongoing** support for such research must be won from federal agencies by the faculty member him/herself and that constrains the search for such faculty to those whose abilities to attract sustained research funding are clearly evident. Where entry level instruction is required, without the research requirement, the agenda will range from recruitment of faculty with broad biological backgrounds to reliance on instruction from other departments within the institution, or on part-time faculty instruction from neighboring institutions. **No** institution in optometry is likely to be able to afford the **ongoing** research funding to support their faculty in many areas of biological research!

*Ongoing support for such research must be won from federal agencies by the faculty member him/herself and that constrains the search for such faculty to those whose abilities to attract sustained research funding are clearly evident.*

## Involving Optometry Institutions in Training Faculty

In basic biological sciences our faculty will come largely from PhD programs outside optometry institutions. For those expected to conduct an active research program, our institutions will need to be prepared to invest six-figure start-up funds, provide animal facilities and offer an institutional environment that promises intellectual growth from interaction with colleagues in the institution (or possibly with neighboring institutions that enjoy an unusual ease of access to productive exchange among faculty). In many cases, this may preclude significant research faculty recruitment for private schools or colleges with small campuses and little biological science strength.

## The Role of Basic Science Faculty with Traditional Vision Sciences Training

In basic vision sciences there will be a continued demand for faculty (particularly in closely allied clinical areas) whose training is most likely to come from one of our vision science PhD training programs. Such individual faculty will place fewer demands on the institution for start-up funds and will be called more frequently to relate their vision science interests to the management of optometric problems. There are certainly enormous opportunities for such faculty in areas of optometry. I predict that the degree to which these faculty embrace the concept of "the optometric patient problem," the greater will be their access to funding, and the more attractive they will be to their institutions. Each institution has experience with faculty whose interests were not originally in optometry, and with the struggles those faculty often have identifying with the "optometric problem." (Ironically non-optometric vision science colleagues often embrace the "optometric problem" most vigorously).

## Faculty in Other Disciplines

Other basic science faculty that we must attract to our teaching and research programs are those involved in epidemiological and biostatistical research. A large number of optometric patient problems need good epidemiological research and a strong epidemiological context in our teaching. What are the health care implications of myopia, cataract, corneal disease, corneal complications of contact lens wear, aging loss of vision in an aging society that is becoming more and more aware of the complications (including vision) of a longer life, diabetes, hypertension and other chronic systemic diseases? Are some methods of detecting and treating these problems demonstrably superior to other methods? What are the risk factors for these conditions? Are our interventions really working? Do they actually change the daily living and quality of life of our patients? These questions often have no answers or answers which will be hard to sustain when health care reimbursement demands answers based on an established literature, as is the case of the current panels writing guidelines for the new Agency for Health Care Policy and Research (AHCPR). Answers will be increasingly dependent on carefully and appropriately conducted research and less and less on consensus, professional judgment. Third party reimbursement, especially the huge portion from the federal government, will depend on the answer to the challenge, "show me."

## Summary

In summary, I believe the expansion of optometric scope to a more clearly defined primary care and therapeutic profession has implications well beyond the need to ensure that practitioners are well trained in therapeutic management of patients. (We have been setting *that* ground work in our institutions for some time, and we now have some additional acute challenges in the basic sciences and patient encounter arenas). What we now face is the exciting possibility of teaching and research of optometric problems to their "final solutions." Myopia is no longer an optical problem with optical correction options; it is a problem of understanding the genetic and environmental risk factors for anomalous ocular growth, and it will have chemical and pharmaceutical management options prior to the turn of the century. Dyslexia, still largely a mystery, now has been shown, among other things, to be associated with anomalous physiology and anatomy of the visual pathway. Complications of contact lens wear have led to a focus on the immune reaction of tissues and the regulation of tissue environment. Cataract management has moved into a context of environmental risk factors and pharmaceutical prophylactic treatment options as has the management of vision complications of ocular tissue degenerations of aging and diabetes. Basic science faculty, teaching and conducting research in our institutions, will need to be working closely on these problems with clinicians who can best define the problems, as well as with the biostatistical and epidemiological tools which can define the risk factors for optometric disorders.

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*The expansion of optometric scope to a more clearly defined primary care and therapeutic profession has implications well beyond the need to ensure that practitioners are well trained in therapeutic management of patients.*

The commitments of institutions will be critical for the development of faculty called to these exciting challenges. The training and area of training of faculty will be critical in our recruitment, but even more important is whether those faculty bring their training and expertise to the "optometric problem." And if they do, will they be able to sustain their research program from extramural funding? Beyond that our institutions must be prepared to nurture their basic science faculty and introduce and confront them with the optometric patient problem. We must motivate faculty to embrace the problem in an energetic, unapologetic and productive fashion, and we must demonstrate respect and understanding for the time needed to mount first rate research investigation and for the need of faculty to develop a network of colleagues for their intellectual growth.

The institutional responsibility lies in creative and sustained support and development, providing opportunities, as opposed to the ongoing direct dollar cost of funding their ongoing research program. It is within this context that the research committees of the American Academy of Optometry and the American Optometric Association have demonstrated considerable insight with their recently initiated programs of support for young faculty. This support is seen in workshops with follow through guiding funding support and in the obvious increase in American Academy of Optometry travel fellowships bringing faculty researchers to meetings where they share and generate new and creative ideas with their colleagues. ☐

# Publication Guidelines for the Journal of Optometric Education

## I. Introduction

The *Journal of Optometric Education* invites educators, administrators, students, practitioners and others with an interest in optometric education to submit manuscripts for publication consideration.

The *Journal of Optometric Education* is the national quarterly publication of the Association of Schools and Colleges of Optometry. Its circulation includes all of the accredited optometric educational institutions in the United States, as well as students, practitioners, government leaders, and others in the health sciences and education. Established in 1975, the *Journal of Optometric Education* is the forum for communication and exchange of information pertinent to optometric education. It is the only publication devoted entirely to optometric education.

The *Journal of Optometric Education* publishes scholarly papers of archival quality, descriptive and timely reports, information and observations in the field of health sciences education, as well as current news from the member institutions of the Association of Schools and Colleges of Optometry. Manuscripts submitted for consideration for publication are evaluated by any or all of the following: 1) journal editor, 2) members of a peer review board, and 3) two or more independent referees who are specially selected as nationally recognized experts in the subject area of the manuscript. Manuscripts are considered for publication with the understanding that they are to be published exclusively in the *Journal of Optometric Education,* unless prior arrangements have been made.

*International Style Guide for Uniform Submissions*

In May 1987, a number of optometric editors and writers met in St. Louis, Missouri, to develop a standard set of publication guidelines for optometric journals. The *Journal of Optometric Education* subscribes to these guidelines. The following instructions to authors reflect those guidelines (first published in 1989 by the *Journal of the American Optometric Association and the American Journal of Optometry and Physiological Optics*), but have been modified slightly to reflect the educational orientation of the *Journal of Optometric Education.*

The *Journal of Optometric Education* generally publishes four basic types of manuscripts:

1. Articles
2. Literature reviews
3. Communications
4. Editorials

## II. The educational research article

### A. Title

The title should be concise, meaningful and clear. It generally should not be in the form of a complete sentence. Subtitles may be used whenever needed for specific purposes relating to the title or text. Titles should indicate the content of the manuscript, serve as a guide to reference librarians, and facilitate communication.

### B. Author

The name of the author, or names of the authors, should be typewritten and centered, one double space below the title. Proper names should be in capital and lower case letters, and the appropriate academic degree(s) should be indicated. In a multiauthored manuscript, the person should be listed first who has made the most significant intellectual contribution to the work regardless of academic rank or professional status. This list should include only those who have made a substantial contribution to the design and execution of the work and the writing of the manuscript. Authors should identify the name and address of the author to whom correspondence should be sent.

### C. Abstract

Authors are required to submit abstracts with their papers. The abstract should be typed on a separate sheet of paper in one paragraph, and it should not exceed 100 words. Abstracts should be as informative as possible and should contain statements regarding the nature of the problem studied, methods, results, and conclusions.

### D. Key Words

Authors should select key words (about 5) that reflect the primary subject matter of the paper. The purpose of key words is to assist reference librarians and others in retrieval and cross-indexing. The *Journal of Optometric Education* is listed in the computer databases Ocular Resources Review and Educational Resources Information Center (ERIC).

### E. Text

The goal of scientific writing is effective communication. More specifically, its goal is to communicate abstract propositions, logical arguments, empirical observations, and experimental results, including their interrelationships and interactions.

Authors should use the active voice ("this study shows" rather than "it is shown by this study") and the first person ("I did" rather than "the author did"). The past tense is appropriate for describing what was done in an experiment; the present tense is suitable for referring to data in tables and figures.

Lens formulas and associated acuities should be expressed as in the following example: OD:+2.25 - 1.00 × 95, 20/20 (6/6).

Generic drug names should be used, followed by the proprietary name in parentheses at the first mention. Acronyms and abbreviations should always be spelled out at first mention.

Symbols and diacritical marks, when used, must be clearly drawn and identified in pencil in the margin, for example, "prism diopter sign."

Manuscripts should be organized within the framework of a formal outline. The standard outline for reporting of studies, experiments, or other research projects is as follows:

1. Introduction
   The introduction has several functions. It acquaints the reader with other relevant work performed in the subject area. Only contributions that bear on the interpretation of the results should be referenced. The introduction also presents the general nature of the problem to be addressed, the specific aspect of the problem that was studied, and the hypothesis and the manner in which it was tested.

2. Methods
   The methods should be described in enough detail so that others could replicate them. However, if portions of the methods have been described elsewhere, a summary with appropriate citations is sufficient. It is essential to describe how case and control subjects were selected for study. It is important to describe any commercially available apparatus used in the study by identifying the manufacturer's name and address. Brief descriptions of methods that have been published but may not be universally understood should be presented. In addition, limitations of the methods employed should be presented, and new or modified methods should be described in detail. It is important to identify precisely all contact lenses, chemicals, drugs, or ophthalmic lenses, including generic names, dosages, and administration where appropriate. It is inappropriate to publish names of subjects or patients, their initials or other personal identification. Also, it is inappropriate to use ethnic terms when they serve only to perpetuate unnecessary, unscientific or derogatory connotations.

3. Results
   The results should be presented in a logical order, emphasizing only the important findings of the study without elaboration. Limitations of the results and any implications should be stated. The statistical analysis, if any, should be clear and relevant.

4. Discussion
   The discussion should elaborate on the data, noting the interrelationships among the results and relating them to the original question asked in the study. Acceptance or rejection of the hypothesis should be stated. In addition, the discussion should emphasize any unique or new aspects of the study, and discuss the relevancy of the results.
   It is important to draw those conclusions that can be supported by the results. Implications for basic and applied issues should be stated wherever possible.

### F. Acknowledgements

Only those who have made a substantial contribution to the study should be acknowledged. Authors are responsible for obtaining written permission from those acknowledged by name, because readers may infer that acknowledged persons have endorsed the methods and conclusions of the manuscript. Many contributions justify acknowledgement, but not authorship. Such contributions might include acknowledgement of technical help, financial support, sources of materials, and persons who have contributed intellectually to the development of the manuscript. Also, any financial relationship that may be interpreted as a conflict of interest must be acknowledged.

### G. References

A list of references is placed at the end of a manuscript following the corresponding author's address. References should be listed in sequential order as they are cited in the text by superscript numbers. Accuracy of citations is of major importance because it makes each specific reference retrievable by the reader. Authors should make every attempt to cite references that are relevant, original and current, and only references actually consulted. Manuscripts that have been accepted for publication but not yet printed, should be cited in the footnote section. Manuscripts that have been submitted for consideration for publication, but have not been accepted, should not be referenced. The list of references should be checked for accuracy against the original publications.

Most optometric journals have adopted the style of references used by the U.S. National Library of Medicine in the *Index Medicus.* The titles of publications should be abbreviated according to the style used in *Index Medicus.* A list of abbreviated names of frequently cited publications is printed annually in the January issue of *Index Medicus* as the "List of the Journals Indexed."

Examples of the correct form of referencing are listed below:

*Journal articles*

1. Standard journal article
   (List all authors when six or less; when seven or more, list only the first three and add *et al.*)
   Alpar AJ. Botulinum toxin and its uses in the treatment of ocular disorders. Am J Optom Physiol Opt 1987 Feb;64(2):79-82.
2. No author given
   Anonymous. The OD-MD conflict: economic

welfare. Optom Manag 1982 Jul;18(7);23-7.

3. Journal paginated by issue
Kloos S. How do TPAs impact practice? Optom Manag 1987 Apr; 23(4): 14-21.

*Books and other monographs*

4. Personal author(s)
Taylor S, Austen DP. Law and management in optometric practice. London: Butterworths, 1986.
5. Editor(s), Compiler(s), Chairman(en) as Author(s)
Bartlett JD, Jaanus SD, eds. Clinical ocular pharmacology. Boston: Butterworth, 1984.
6. Chapter in book
Mondino BJ. Bullous diseases of the skin and mucous membranes. In: Duane T, ed. Clinical ophthalmology, vol. 4. Hagerstown, MD: Harper & Row, 1980:1-16.
7. Published proceedings paper
Norden CN, Leach NA. Calibration of the ERG stimulus. In: Lawville T, ed. Proceedings of the XIV annual symposium of the International Society for Clinical Electroretinography. Doc Ophthalmol Proc, series 12, XIV ISERG Symposium, May 10-14, 1977. Louisville: XIV Annual Symposium of the International Society for Clinical Electroretinography, (ISERG), 1977:393-403.
8. Monograph in a series
Wurster U, Hoffman I. Influence of age and species on retinal lactate dehydrogenase isoenzymes. In: Hockwin O, ed. Gerontological aspects of eye research. New York: S Karger, 1978:26-39. (von Hahn HP, ed. interdisciplinary topics in gerontology; vol 13).
9. Agency Publication
United States Department of Health and Human Services. Fifth report to the President and Congress on the status of health personnel in the United States: Optometry, March 1986. Springfield, Va: United States Department of Commerce. National Technical Information Service, 1986; DHHS publication no. HRS-P-OD-86-1.

*Footnotes*

Optometric journals discourage excessive or improper use of footnotes, but realize that on specific occasions the footnote may be acceptable. Footnotes can be used to designate a non-retrievable citation, a personal communication, or institutional affiliation of the author. A footnote can also be used to identify sources of equipment or instruments. Footnotes should be identified with small superscript lower case letters in alphabetical order in the text, and referred to at the end of the text of the manuscript under a listing "Footnotes."

## III. Literature Review

The purpose of the review is to analyze, consolidate and synthesize the literature on a subject of interest. Topics should be relevant to the journal's readership. A review can make an important contribution to the literature by arriving at a supportable conclusion. Headings for the literature review do not usually follow the standard format (research manuscripts), but the author should use headings and subheadings that promote understanding of the topic.

## IV. Communications

This type of manuscript generally describes a program, teaching method or technique useful to the health professions educator. Manuscripts submitted in this category frequently discuss programs or methods, which might otherwise be a research article but for which an assessment of effectiveness has not been done. Communications can also review a body of literature on a specific subject for the purpose of providing the practitioner with guidelines or recommendations regarding the subject matter. Headings for a communications paper do not usually follow the standard format for a research paper, but the author should use headings and subheadings that promote understanding of the topic.

## V. Editorials

An editorial is generally a concise article consisting of a critical argument, a personal opinion, or emphasizing an important issue. An editorial does not necessarily depend upon literature support. Letters to the editor, as an editorial submission, are encouraged by the *Journal of Optometric Education.*

## VI. Tables, figures and appendices

### A. Tables

Each table should be typed double-spaced on a separate page. Tables are usually not submitted as photographs. Tables should appear in consecutive order in the text designated by Arabic numerals (example: Table 1). Location of tables within the body of the text should be specified in the manuscript. An appropriate table title should be on the same page as the table to which it applies.

### B. Figures

All figures, whether line drawings, black-and-white photographs, color photographs or 35 mm slides, should add to the presentation of a manuscript.

All figures should be of professional quality, whether they are drawings or photographs. Most computer-generated "drawings" are unacceptable. Figures should be submitted as 5x7 inch (13x18cm) black-and-white or color, glossy prints.

All figures, whether line drawings, black-and-white photographs or color photographs, should be designated as "Figures" (eg., Figure 3). They should be numbered consecutively in Arabic numerals throughout the text of the manuscript. Locations of figures within the body of the text should be specified in the manuscript.

1. Legends
The numbers and captions should be typewritten, double-spaced, in paragraph form, and on a separate sheet of paper. Legends for several figures should be typed on a single sheet of paper. Legends should be kept as short as possible, and should not contain explanatory notes that duplicate the explanations in the text. All internal labels in the figure should be identified in the figure legend.

2. Labels
Authors should label figures adequately. On the back of each print, the author should place a label that indicates the name of the author, the title of the article, the figure number, and the direction of the top of the figure. When labeling slides, clearly label with author's name, figure number and a red mark to indicate the upper right hand corner for viewing the slide, not projecting of the slide. To facilitate the review process, the authors should submit an original and three copies of each line drawing, photograph or slide.

### C. Appendices

Occasionally it is necessary for the author to supply subordinate information that is relevant to the study but that might distract the reader because of excessive detail; eg., computer programs, mathematical formulas, address lists, surveys or other data that might be cumbersome to present in the text. Appendices should be labeled Appendix A, Appendix B, Appendix C, etc. Each should have a short, descriptive title.

## VII. Submitting the manuscript

### A. General guidelines

The manuscript should be typed double-spaced on a heavy grade of white bond 8½x11 inch with margins of at least 1 inch. Print quality should be highly legible. For reviewing purposes, the original plus three photocopies of the manuscript should be submitted along with the original plus three high quality duplicates of each figure and table. All pages should be numbered consecutively, beginning with the title page, and the author's (authors') name(s) should appear only on the title page.

A cover letter should accompany all manuscripts and the letter should identify the corresponding author. The cover letter should also contain a statement that the manuscript has been approved by all of the authors of a multi-authored paper. In addition, the letter should indicate the type of article and whether or not the work has been submitted to other publications. Copies of letters of permission and other pertinent information should be included.

Authors should arrange manuscript pages as follows:

1. First page: Title, name of author(s), degrees and the institutional affiliation, if any
2. Second page: Abstract and key words
3. Text (start on a new page)
4. Acknowledgements (start on a new page)
5. Footnotes (start on a new page)
6. References (start on a new page)
7. Appendices (start on a new page)
8. Tables (each on its own page)
9. Figure legends (all on one page, if possible)
10. Figures (each separately)

### B. Mailing instructions

Protection of manuscripts from rough handling while in transit is necessary. The mailing envelopes should be strong and provided with stiff cardboard or corrugated fillers slightly smaller than the envelope. Fillers are essential if drawings or photographs are to be enclosed. Authors should always retain copies of their manuscript as a precaution against the potential loss of originals.

### C. Accepted manuscripts

If a manuscript is accepted for publication, the author will be asked to make or respond to any changes recommended by the reviewers and to resubmit the revised paper within a specified time period. Authors are asked to submit revised papers on computer discs as well as in printed form. Information on which software can be converted for computerized typesetting may be obtained in advance from the managing editor. Otherwise that information will be included when manuscripts are returned to the author for revisions.

## References


1. The International Style Guide Committee for Uniform Submissions to Optometric Journals. Uniform requirements for manuscripts submitted to optometric journals. J Am Optom Assoc 1989 Jan;60:1.
2. The International Style Guide Committee for Uniform Submissions to Optometric Journals. Uniform requirements for manuscripts submitted to optometric journals. Optom Vis Sci 1990 Jun;66:1.
3. Potter JW, O'Rourke PC, Carlson PT. Publication guidelines for the Journal of Optometric Education. J Optom Ed 1986;12:1.

*(continued from page 4)*
concepts of how we learn and what we can do must be reconsidered in the light of these leaps in technology. Third-party payment systems are also driving the optometric profession to expand its scope in support of a cost-effective eye care delivery system.

A vertically integrated profession of optometry will allow the individual optometrist to pursue career interests in a logical, academically-integrated manner. While the emphasis for optometry now and in the future must be in primary care, we must also address the need for post-graduate growth. The four-year optometric curriculum will provide a sound basis for advanced post-graduate training in ophthalmic care. The current optometric curriculum prepares optometrists as primary eye care practitioners. The knowledge, clinical skills and professional attitudes incorporated into our educational programs are the appropriate base for post-graduate ophthalmic specialization.

The Summit was a great success. Dialogue emerged between leaders from our educator and practitioner communities. The ultimate success will depend on how much we as professionals in both communities can continue to come together and work on improving issues of importance to the profession. This is already occurring. In July, a working group met to begin redefining the scope of optometric practice and a major joint ASCO-AOA Curriculum Conference was held to tackle the details of the content and process within the optometric curriculum. Entry level competencies, molecular biology, and hundreds of other curricular issues are the issues being addressed in this follow-up process. Other meetings to answer the charge of the Summit on subjects such as post-graduate education, residency training, research and financing have been scheduled and so the momentum will continue through the next year.

The Summit was a significant step forward because it brought us together over the most important issue of education for our profession's future. It is imperative that each of us in the educator community accepts the challenges of the Summit, and that we all work together with our practitioner colleagues to ensure that our education system continues to produce the most qualified graduates who reflect our evolving scope of optometric practice. □

*Dr. Di Stefano is vice president and dean, Pennsylvania College of Optometry.*

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2. Elkin, J., 1988 Clinical Study.
3. Cho, M., A Clinical Study of Patient Acceptance and Satisfaction of the Varilux Infinity Lens, [illegible] June, 1991.