The Journal of the Association of Schools and Colleges of Optometry

OPTOMETRIC EDUCATION

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Curriculum Reform

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DEPARTMENTS

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EDITORIAL

Striking the Balance in Curriculum Reform

Roger Wilson, O.D.
Anthony F. Di Stefano, O.D., M.Ed., M.P.H.

This issue of **Optometric Education** features an article about the Pennsylvania College of Optometry's (PCO) new curriculum design. The authors present several curricular innovations in content, delivery and pedagogy that build on the Association of Schools and Colleges of Optometry 's (ASCO) *Attributes of Students Graduating from Schools and Colleges of Optometry*. There is a strong commitment to integrate basic and clinical sciences, increase both exposure and depth to clinical education, promote greater active learning strategies and reduce dependency on traditional instruction. The influence of new discoveries and technologies, the Internet, worldwide web-based instruction capabilities, and the ever-changing scope of practice of optometry have all contributed to the demand to reassess how and what we provide to the professional education of optometry students.

The last two decades have witnessed significant change in health professions' education. Benchmarking these trends offers optometry schools pedagogical evidence upon which to aggressively evaluate the need for significant curricular change.

The process of curriculum reform should begin with a needs assessment that is based upon an evaluation of an institution's vision and mission statements. Statements that define an institution's aspirations, values, purpose and goals serve as the guidepost for any institutional process, including curriculum reform. For optometric institutions, the challenge in curriculum reform will always be how to stay ahead of important advances in the basic and clinical sciences, and how to apply those discoveries to patient care. The schools and colleges must differentiate traditional faculty "teaching" roles from student "learning" expectations. Balancing academic freedom in the classroom with the need for a shared commitment to new curricular goals requires a program that is dynamic and adaptable and a faculty that will embrace change and remain amenable to the challenge of convention.

The ASCO *Attributes* report includes significant new attention to concepts such as life-long learning, critical thinking, and professional responsibility. PCO's new curriculum calls for a shift to an active learning style that encourages students to assume greater responsibility for life-long learning, that expands faculty roles so that they assume greater responsibility for mentoring students and becoming partners in the process of exploration, discovery and long-term learning, and that creates an institutional environment promoting mutual respect and collective success.

A supportive institutional environment includes a shared responsibility among faculty, administration, students and staff. Administration and the dean's office are critical participants in curriculum reform. The administration is responsible for setting the tone of a project by creating an environment that respects individual needs, yet encourages (and perhaps rewards) risk-taking. Curriculum reform cannot be successfully supported or implemented through administrative edict. Deep and enduring curricular change must include attention to the faculty assuming ultimate ownership of the new curriculum. A school's administration must support the process of reform by providing faculty with leadership, faculty development opportunities, and assurance that the emerging change in a program's emphasis or direction will ultimately result in meaningful reform.

A curriculum planning process should also strive to commence from a point of newness, taking a fresh outlook at endpoints in professional education and lifelong learning. How often have we heard faculty remark that if they had the chance to do "it," they would do "'it" differently? That type of scrutiny ought to be channeled into leadership energy in curriculum reform. The entire faculty should meet, using a curriculum planning retreat to evaluate where the program needs to be and to generate ideas on how to get there. Faculties' creative energies thus become the cornerstone of curriculum planning, implementation and assessment.

Curriculum transformation must attend to the strategic challenges that the faculty will face during the process. Some faculty members always embrace change and are excited about the challenge ahead. Others, however, might feel uncomfortable with change and have difficulty envisioning how they fit into a new curriculum

(Continued on page 9)

Dr. Wilson is editor of *Optometric Education*. Dr. DiStefano is vice president and dean for academic affairs at the Pennsylvania College of Optometry.

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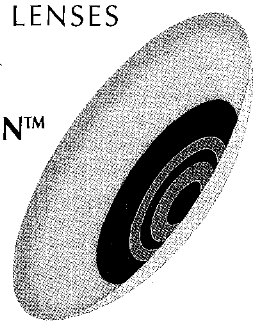

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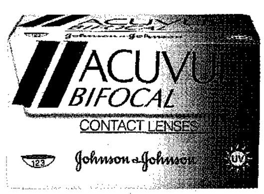

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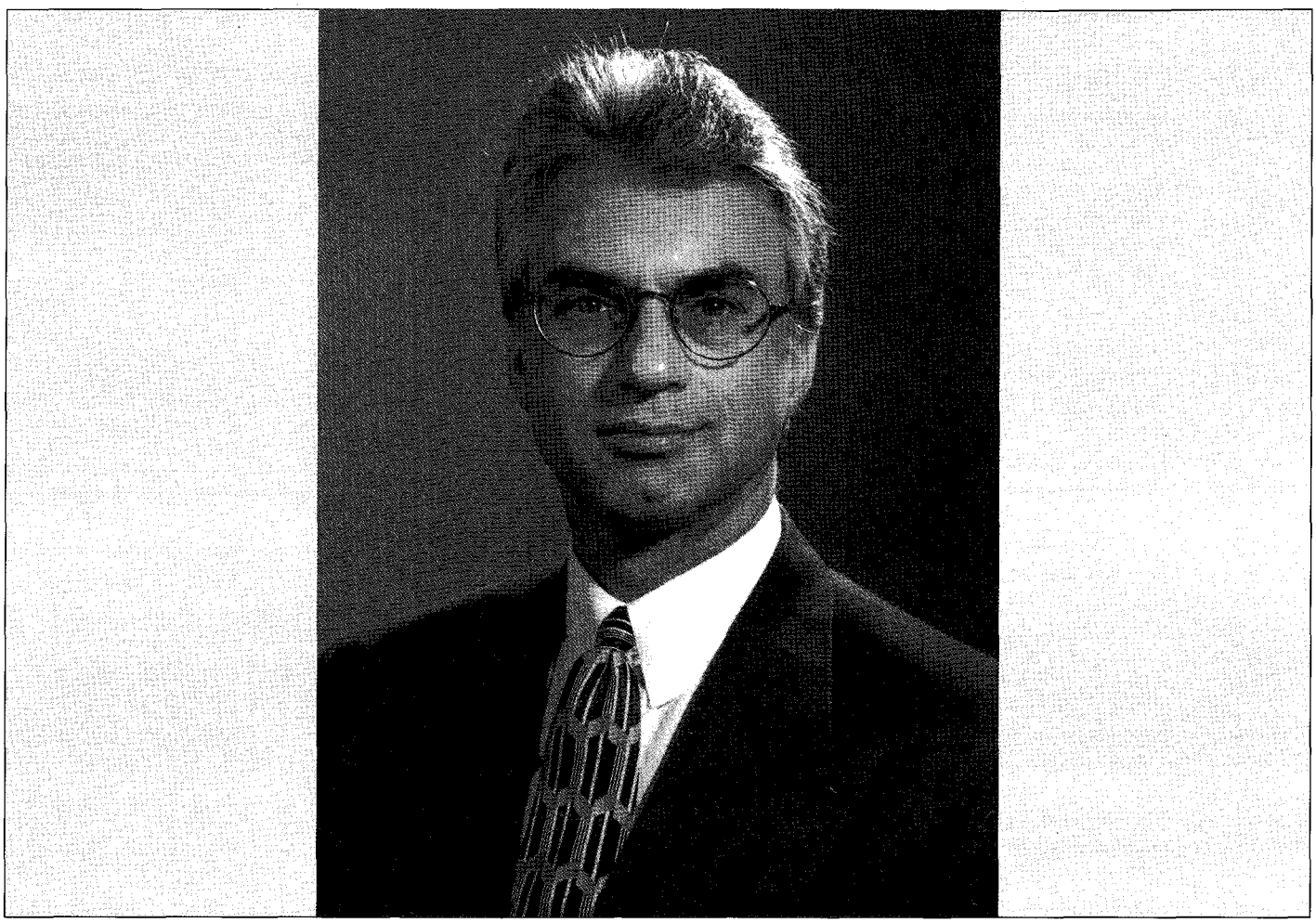

David S. Loshin, O.D., Ph.D., began a one-year term as ASCO's president in June 2001. Dr. Loshin has been dean of the Nova Southeastern University College of Optometry in Ft. Lauderdale, Florida, since 1997.

Dr. Loshin received a B.S. in Photographic Science & Instrumentation (Optical Engineering) at the Rochester Institute of Technology in 1971. He pursued further education at The Ohio State University, receiving an M.S. in Physiological Optics in 1974, an O.D. degree in 1975 and a Ph.D. in Physiological Optics in 1977.

He served on the graduate faculty at the University of Houston College of Optometry from 1977 — 1995 and also as chair of the residency programs and as assistant dean for finance and administration. He was dean of the University of Missouri-St. Louis School of Optometry in 1996.

Dr. Loshin is widely published and is a recognized authority in optics.

Dr. Loshin was interviewed recently by Patricia O'Rourke, managing editor of *Optometric Education.*

OPTOMETRIC EDUCATION: What do you see as the role of ASCO toward the profession of Optometry?

Loshin: Just as the face of optometry has changed, ASCO has changed significantly in the 60 years since its inception. The advancement of the optometric profession is due in part to the visionary approach taken by the educational leaders at our member optometric institutions.

The fact remains that ASCO represents the educational arm of the optometric profession. As such, we are looked to for leadership in all aspects of optometric learning, from the basic medical sciences used as a foundation for all health related professions, to the clinical training necessary for entry into the profession; to postgraduate continuing education and graduate degrees in vision science.

I believe that this is an extremely important responsibility and one that is vital to the growth of the profession. Just as our individual expertise as deans and presidents is often called upon to verify the training of the optometric physician, ASCO adds credibility to professional education for the entire optometric profession.

OPTOMETRIC EDUCATION: What are the key issues that you hope to emphasize during your presidency?

Loshin: During my term as President of ASCO I would like to concentrate on three major themes, which I can summarize with three "C's:

Common Goals, Communication, and Community.

Common goals are key to the integrity and viability of an organization. Review of the five-year Strategic Plan will provide an opportunity for us to revisit past goals and objectives and to modify the direction of our organization as deemed necessary by members.

Even if our goals do not change dramatically, we may determine that the emphasis should be shifted to meet current needs. One example is the priority of *Student Recruitment.*

This matter remains a concern to all of us and for that reason I am proposing that a taskforce be appointed consisting of representatives from several existing ASCO committees, as well as appointees who have expertise in marketing. This group can further develop the recommendations of the Student Affairs Committee with a multi-faceted plan for dissemination of information about the profession and the optometric schools and colleges.

The next "C" is ***communication.*** Communication can appear to be one sided. I know that many of our members are passionate about certain aspects of the profession and articulate opinions often. I would like to see multi-sided conversations among the membership. We don't have to agree, but we do need to respect each other and allow everyone to have the right to be heard. The dominant voice may not always represent the common goals.

We must have effective communication with the other optometric organizations.

Proactive approaches to problem solving through effective communication lead to partnerships in success.

Communication is also important to educate the public, prospective and current students, and alumni - to strengthen support of optometric education, ASCO, and our institutions.

The last "C" is for ***community.*** I know that we have been working with many organizations to help promote our educational enhancement programs. I would like to see this cooperation reinforced for the mutual benefit of all involved.

For example, an increase in our admissions pool with superior applicants can help ensure a solid future for the profession. A strong applicant pool leads to optometrists who can be counted on to promote, expand, and lead the profession. Therefore all optometric organizations have a stake in assisting with student recruitment.

OPTOMETRIC EDUCATION: Who were the people who influenced the development of your educational and administrative ideas?

Loshin: My parents instilled the importance of life-long education at a very early age and I have carried these values throughout my life.

During my junior year in the undergraduate program at Rochester Institute of Technology, Dr. Robert Kintz, a recent Ph.D. graduate from the University of Rochester Center for Vision Research, spoke to my class about vision. This lecture so intrigued me that I contacted Dr. Kintz and began working in his lab. He became my advisor for my senior project and his encouragement led me to pursue optometry as a profession.

The most influential individual in my career was Dr. Glenn Fry who served as my mentor, employer, graduate advisor, and friend. I never knew anyone who enjoyed these roles as much as Dr. Fry.

I also have to add Dr. William Baldwin, who was the Dean at the University of Houston College of Optometry for many years. Bill gave me the opportunity to become involved in administration as the assistant dean of finance and administration. In this role I learned about the operations of a university - from human resources to physical plant, from clinic operations to budgets. Serving in this position under two other deans — Dr. Merton Flom and Dr. Jerry Strickland — I was able to interact with individuals with different administrative styles.

Dr. Jerald Strickland also allowed me to grow as an administrator by encouraging me to attend advanced management training at Harvard's Management Development Program.

Lastly, I believe that having feedback, both good and bad, from the over 2,000 students that I have taught during the last 24 years has been influential in molding my educational ideas.

OPTOMETRIC EDUCATION: You are the dean of the newest optometry school in the U.S. Could you tell us more about Nova Southeastern University and the growth of the optometry school?

Loshin: The College of Optometry opened its doors to its first class in 1989 as one college within the Southeastern University of the Health Sciences. In 1995, Southeastern merged with Nova University to become the Health Professions Division of Nova Southeastern University (NSU). Today NSU has an enrollment of over 18,000 students and is the largest independent university in Florida. The Health Professions Division consists of Colleges of Osteopathic Medicine, Pharmacy, Allied Health, Medical Sciences, Dental Medicine as well as Optometry. These colleges all report directly to the same administration reinforcing the interdisciplinary philosophy in both didactic and clinical education. The classrooms, library, computer labs, general and research labs are shared by all the health professions. Basic science courses are taught by faculty within the College of Medical Sciences to several professions as a single class. The College of Optometry Eye Institute is part of four health center sites; all include medical and several include dental medical and pharmacological services. This encourages referrals among services.

NSU is noted for distance learning. With this concept in mind, the College has just been approved for a new on-line Masters program in Clinical Vision Research. This will permit individuals to enroll in a graduate program while maintaining employment anywhere in the world.

OPTOMETRIC EDUCATION: What gives you the most satisfaction in your position as an educator and dean?

Loshin: I can answer this very succinctly: the successes of my students, graduates, and faculty. Their successes are my successes. All deans are proud of their alumni when they pass National Boards and become viable practitioners and leaders in their state optometric associations, the AOA, the Academy, and the community. When faculty become prominent in their area of interest, receive awards, and grants, it reflects upon the administration and college. Leadership, support and recognition promote accomplishment.

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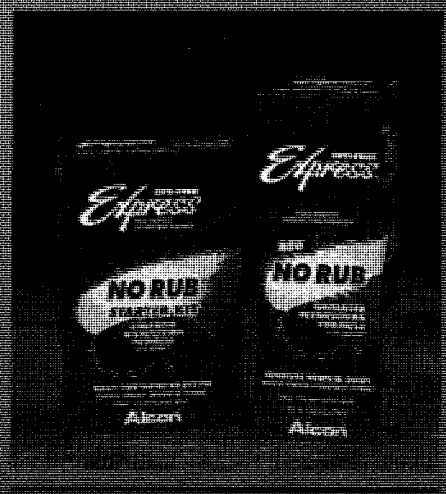

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Editoral

(Continued from page 4)

design. Whenever a curriculum track or course content is scrutinized, whenever options for content delivery are modified, whenever efforts are made to streamline content, faculty will respond differently. Allowing sufficient time for faculty to interact, debate the issues and achieve rational conclusions is essential throughout the planning and implementation process. One faculty member's threat is another's opportunity. Recognizing faculty differences and managing the change in a supportive environment is essential to success.

Change is always accompanied by some unknown risks. What will happen if a dynamic curriculum that has been reformed, albeit "improved," does not produce any meaningful results? Such perceived risks can be significantly reduced by a careful study of the extensive literature on curriculum reform. Effective curriculum transformation must be based on sound pedagogical evidence. Moreover, curriculum reform must commit to rigorous program evaluation. Without an "evidence-based" approach to curricular change, the results will be uncertain. A sound methodology for curricular change, however, will yield constructive change and, more importantly, a process for continual renewal.

The risks of change make it essential that curriculum reform include substantial dialog, meetings, revisions, compromise, and a respect for what's right with current educational practices. The new PCO curriculum attempts to balance these forces and has developed a "hybrid curriculum" that incorporates traditional curriculum strengths with the need for innovation and change in the light of changes inside and outside the profession of optometry.

Curriculum reform within the schools and colleges of optometry must not occur in isolation. Attention to changing accreditation requirements and possible changes in the national boards will be essential. Effective communication and coordination among these complementary groups will yield strategic improvements in the process of producing tomorrow's optometrists. ASCO has played a pivotal role of catalyzing curriculum reform in the new century. A number of our schools and colleges are now actively engaged in significant curriculum change. Most people in professional optometric education want our programs to advance and want curriculum revisions to succeed. Finding balance between innovation, change, and tradition is what will produce the best outcomes in curriculum reform.

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The Pennsylvania College of Optometry Transforms Its Curriculum for the Preparation of 21st Century Optometrists

Anthony F. Di Stefano, O.D., M.Ed., M.P.H.
Pierrette Dayhaw-Barker, Ph.D.
Susan Oleszewski, O.D., M.S.
William M. Dell, O.D., M.P.H.

Abstract

In response to the dynamic changes in the health care system, the faculty of the Pennsylvania College of Optometry has totally redesigned its optometric curriculum. The Curriculum 2000 *project is designed to graduate a competent and caring clinician who has the knowledge, skills and values essential for career success in an increasingly diverse and health conscious society.*

The distinctive features of the new curriculum include: the interdisciplinary integration of basic and clinical courses using a modular approach; the immediate introduction of clinical concepts and skills in the first year; expedited entry into patient care experiences; and a significantly expanded clinical training program. A major pedagogical shift occurs during the first 2½ years. Students will spend less time in traditional classroom and laboratory settings so that they can experience more independent, case-based, small group activities, while assuming more responsibility for independent learning. In addition, students will have early clinical experiences with diverse patient populations through a variety of community-based patient care settings. In this redesigned curriculum model, all course work is completed in 2½ years, thereby allowing for 1½ years of off-campus externships in a variety of private practice, hospital and group practice settings. Overall, the new curriculum expands clinical experiences by over 50 percent. Implementation began in September 2001. Significant attention has been devoted to the organizational, pedagogical and faculty development needs for successful achievement of the goals of the new curriculum.

Key words: *curriculum planning, problem-based learning, curricular integration, entry-level competencies*

Introduction

At the dawn of the 21st century, the profession of optometry is faced with unprecedented opportunities and challenges in its continuing evolution as the primary eye and vision care provider in the United States. Our last century was marked by an expanded scope of practice, a strengthened educational infrastructure and significant public and governmental recognition. *The hallmark of this growth was optometry's ability to understand and respond to the public's need for quality, cost-effective eye and vision care.* It was made possible by the leadership of individuals, institutions and organizations within the optometric family. The Summit on Optometric Education conferences of the early 1990s strategically critiqued that state of optometric education in the United States and set the stage for envisioning future changes and challenges.[1]

The 21st century brings a significantly new context for health care delivery and health professions education. The unprecedented exponential growth in new knowledge; the dramatic transformation in diagnostic and therapeutic options brought about by converging technologies; the changing role-relationships among patient, physician and payor; and the increasing forces of marketplace economics now challenge optometry to redefine itself.

Optometric education must now go beyond the 20th century paradigm. It must now define a new vision for the *optometric physician* of the future. It must retain and strengthen the essentials of its optometric roots, but at the same time it must boldly continue to expand its scope of practice to encompass more services for more people so that it can solidify its primary care role. It must be prepared to use new tools and effective approaches in both clinical practice and its educational systems. Lastly, it must produce a new optometry graduate whose entry-level abilities promote personal and professional success in a constantly changing health care system.

These challenges are occurring at a time when health professions' education is witnessing significant change. The financing of medical education is stressed by the burden of managed care; academic health science centers (AHCs) struggle to redefine themselves as patient care shifts to outpatient settings; the cost of education increases while faculty time and salaries decrease; the fear of corporate managed medical education increases; and restlessness within medical schools about educational reform is juxtaposed with the decreasing numbers of applicants.[2-5]

Within this context of increasing change and stress in health professions education, the faculty of the Pennsylvania College of Optometry (PCO) initiated a strategic critique of its curriculum in 1998. Building on its history of academic innovation, the PCO faculty is now challenged to continue this leadership tradition into the new millennium through its ***Curriculum 2000*** project.

Over the 1998-2000 period, the faculty undertook a comprehensive review and restructuring of the PCO curriculum. Through a methodical series of faculty surveys, retreats, working groups, advisory groups, workshops and external consultants, the faculty and the Office of Academic Affairs laid a foundation for a major curricular transformation.

The authors are affiliated with the Pennsylvania College of Optometry. Dr. Di Stefano is vice president and dean for academic affairs, Dr. Dayhaw-Barker is associate dean of basic sciences, Dr. Oleszewski is associate dean of clinical sciences and Dr. Dell is associate dean of educational programs.

Strategic Framework for Curricular Change

The faculty benefited from the groundwork contributed by the American Optometric Association (AOA) and the Association of Schools and College of Optometry (ASCO). Over the past decade these organizations have helped the profession to better delineate its scope of practice and the role of optometry within the broader health care system. The *Education Summit* process of the 1990s, the efforts to elucidate entry-level competencies for a new optometrist beginning in general practice, and the most recent ASCO report on *Attributes of the Graduating Student from Schools and Colleges of Optometry*, have provided national resources for the *Curriculum 2000* project.[6-7]

Through a series of surveys and working groups, the faculty critiqued and subsequently adopted (with minor revisions) the policy statements endorsed by ASCO and the AOA on *Optometry — A Responsible Profession* — a policy statement that interprets the definition of the Doctor of Optometry into broad functional concepts. After significant debate, the faculty adapted the AOA definition of optometry to meet its institutional philosophy. This succinct and comprehensive definition of the Doctor of Optometry defines the desired outcome and the framework for the educational program. The following definition of the Doctor of Optometry was formally adopted by the faculty and the Board of Trustees of the College. It expands the AOA definition by including the co-management of related systemic conditions:

> ***Doctors of optometry are independent primary health care providers who examine, diagnose, treat and manage diseases and disorders of the visual system, the eye and associated structures as well as diagnose and co-manage related systemic conditions.***

This definition of optometry became the cornerstone of *Curriculum 2000*. It was operationalized by the adoption of the ASCO entry-level attributes as outlined in the ASCO report, "Attributes of Students Graduating from Schools and Colleges of Optometry." This report asserts that the new doctor of optometry must be professional, ethical, knowledgeable and skillful as follows:

Professional and Ethical Attributes

To serve the public and the profession well, new graduates must embrace and demonstrate the ethical and professional standards appropriate to being recognized as a health care provider. The new graduate must also recognize that the completion of the Doctor of Optometry degree program is only the first step in a life-long commitment to self-directed learning and continual professional improvement.

Knowledge Attributes

To provide quality eye and vision care to their patients, graduating Doctors of Optometry must have an established knowledge of the basic and clinical sciences. The foundation must be broad and include the biological, medical, vision and optical sciences, as well as a basic understanding of the health care delivery system. The Doctor of Optometry must recognize the dynamic nature of knowledge, and possess the commitment and skills needed to responsibly assess and apply new information and treatment strategies throughout his/her career.

Skillful Attributes

To provide the highest quality of care to their patients, Doctors of Optometry must possess appropriate cognitive and motor skills needed to prevent, diagnose, treat and manage clinical conditions, which are within the scope of their professional responsibilities.

Utilizing the ASCO *Defining Entry Level Scope of Practice* survey instrument, the PCO faculty conducted its own series of surveys to translate the above attributes into detailed entry-level abilities. A list of conditions and procedures pertaining to entry-level abilities expected of the new graduating Doctor of Optometry was compiled. These lists are intended to be "works in progress," reflecting the changing nature of the profession and institutional variability. At the same time, the lists establish a framework for curricular evaluation and transformation. These lists also are designed to differentiate the various management levels expected of the new and more experienced practitioner.

Strategic Planning for Curriculum 2000

Concurrent with the development of the strategic framework for *Curriculum 2000*, the faculty undertook an extensive review of the current curriculum. The strengths, weaknesses, opportunities and challenges contained within the current curriculum were evaluated using the following inputs:

1. Faculty Surveys — faculty members were surveyed regarding entry-level skills, procedures, knowledge, and values
2. Faculty Retreats — survey results and their implications were presented; presentations were made by external experts on such topics as curriculum planning, competency-based and problem-based education
3. Faculty Working Groups — faculty groups were established to review and critique all aspects of the curriculum
4. Faculty Curriculum Workshops — problem-based learning (PBL) workshops were presented to evaluate the status of PBL learning in the current curriculum and its role in *Curriculum 2000*
5. Faculty Advisory Committee — a representative group of faculty members formally reviewed the results of the curriculum assessment activities and made recommendations for the new curriculum
6. Review of Literature — academic administration reviewed the optometric and medical literature to benchmark the current curriculum and future changes.
7. External Consultants — eight external curriculum consultants were utilized to critically review targeted areas of the curriculum in both the basic and clinical sciences
8. Student Formal and Informal Evaluations — Department Chairpersons critically reviewed formal and informal student evaluations of the current curriculum, e.g., course content, sequencing, overlap, emphasis, pedagogy, etc.
9. NBEO Evaluations — the basic and clinical science departments criti-

cally reviewed student performance on targeted sections and subsections of the NBEO examinations with the goal of identifying strengths and weaknesses in the current curriculum vis-à-vis NBEO.

10. Self-Study Surveys — faculty and students formally evaluated the academic program as part of the Accreditation Council on Optometric Education (ACOE) and Middle States Association (MSA) accreditation requirements.

The results of this strategic planning process provided the basis and rationale for the new curriculum. Most importantly, it provided the faculty with a critical sense of the challenges of curricular change. External and internal forces impacting optometric education were identified. The strengths, weaknesses, opportunities and challenges contained within the current curriculum were identified and provided a rational basis for curricular change.

Significant benchmarking was utilized to capture and apply innovations and experiences of medical and dental education. [8-13] Both medical and dental education have witnessed significant change over the past several years as they grapple with the pedagogical, economic and professional issues that challenge both faculty and students. Their educational literature provided a rich resource for the faculty's curriculum planning.

The New Curriculum

The mission of PCO's new Doctor of Optometry curriculum is *to graduate competent and caring primary health care practitioners to fulfill an expanding role in the prevention, diagnosis, treatment and management of diseases and disorders of the visual system, the eye and associated structures, as well as the diagnosis and co-management of related systemic conditions.*

Overview

The distinctive features of the new curriculum include: a promotion of interdisciplinary integration of basic and clinical courses using a modular approach; the immediate introduction of clinical concepts and skills during the first year; the expedited entry into patient care experiences; and a significantly expanded clinical training program.

During the first 2½ years, students will spend less time in traditional classroom and laboratory settings so that they can experience more independent, case-based, small group activities. The cornerstone of this educational strategy is an interdepartmental module called *Clinical Problem Solving (CPS)*. This 2½-year sequence incorporates case-oriented, problem-based learning exercises that are integrated with lectures and laboratories. This sequence provides a bridge between the basic and clinical sciences and their application to patient problems.

In addition, students will have early involvement in a variety of community-based patient care settings. In this redesigned curriculum model, all course work is completed in 2½ years, thereby allowing for 1½ years of off-campus externships in a variety of private practice, hospital and group practice settings. Overall, the new curriculum expands clinical experiences by over 50 %.

Major Themes of the New Curriculum

The new core curriculum incorporates five major themes:

The Primary Care Philosophy

The primary care philosophy is the cornerstone of the new optometric curriculum. In the context of our responsibility to patients, the new curriculum reaffirms our primary care heritage and the importance of providing maximum patient accessibility to optometric services. It emphasizes a biopsychosocial, holistic approach to prevention, treatment, rehabilitation, and visual performance in enhancing patient quality of life. It stresses the need for the primary care optometrist to develop broad competencies in offering comprehensive services to patients, families and communities.

The primary care driven philosophy encourages the utilization of the full range of interventions including the use of ophthalmic materials, pharmaceutical agents, laser technologies, functional rehabilitative therapies, preventive care, patient education and other diagnostic and therapeutic tools necessary to meet patient needs. The new curriculum prepares students to integrate and apply basic, behavioral and clinical sciences to address patient needs. Strategic attention is given to the relationship between biomedical and visual sciences, both in terms of their specific applicability to primary care and on their relative impact on a successful practice. [14-15]

The new curriculum places the patient-doctor relationship at the heart of the educational experience. From day one, students are encouraged to look at the whole person, not just the immediate signs and symptoms. Compassion for the patient, cooperation with other health professionals, and awareness of the ethical, social and economic dimensions of health care delivery are woven throughout the curriculum. Additionally, the importance of communication skills with both patients and other health professionals is stressed within expanded co-management responsibilities. [16]

The primary care optometrist must also recognize that the completion of the Doctor of Optometry degree program is only the first step toward maintaining competence in a life-long commitment to self-directed learning and continual professional improvement. The primary care emphasis positions optometry for future changes in health care delivery.

An Expanded Clinical Training Sequence

The new curriculum begins clinical skills training and patient care orientation from day one. Patient care skills are complemented by a carefully integrated sequence of basic and clinical sciences. This allows immediate application of knowledge into practice. Students are immediately immersed into communication, history-taking and interpersonal skills. The foundational clinical skills are presented throughout the first year and are accompanied by a variety of standardized clinical experiences and community-based clerkships. The medical education literature has provided significant examples of the value of early integrated clinical skills training through faculty role models, community-based preceptorships and enhanced clinical learning environments. [17-26]

The early introduction of clinical skills permits a continuous and expanding array of patient care experiences both on and off campus. Throughout the first two years, students participate in escalating levels of patient care delivery, evolving from an assisting role in community screenings and primary care examinations, to expanded responsibility for comprehensive patient care. By the

middle of the second year, students are integrated into the College's Eye Institute as full participants in the service delivery system.

Because of the immediate introduction of clinical concepts, skills, and patient care experiences, PCO students also will have an expedited entry into its extensive externship program. The restructuring of the earlier years permits the last 18 months (1½ years) to be devoted to externships in a variety of private practice, hospital and group practice settings. Clinical training is thus expanded more than 50%. This exceptional clinical education yields a graduate who is uniquely prepared to immediately assume a leadership role in the delivery of comprehensive eye and vision care in the community. Moreover, greater emphasis on interdisciplinary patient care experiences will produce an optometrist who is better prepared for the expanding co-management responsibilities associated with the changing health care system.

New Learning Strategies

The new curriculum requires that the new graduate have the ability to acquire, analyze and apply new information while making reasonable and informed decisions that are consistent with the interests and needs of the patient and broader community. In addition, the graduate must possess problem-solving and critical thinking skills, which integrate current knowledge, scientific advances, and the human/social dimensions of patient care to assure the highest quality of care for each patient.

These problem-solving competencies are essential for effective clinical decision-making and life-long learning. A critical dimension to achieving these objectives is the need to transform the curriculum so that the emphasis is on "active student learning." Over the past decade, the College has taken incremental steps to introduce various forms of problem-based learning into the curriculum.[27] A review of the literature underscores the challenges and opportunities that these active-learning approaches offer to health professions education.[28-35]

A key innovation in the new curriculum is the inclusion of small group, interactive, self-directed learning experiences. The cornerstone of this educational strategy is the interdepartmental module called *Clinical Problem Solving (CPS)*. This 2½-year sequence incorporates case-oriented, problem-based learning exercises that are integrated with lectures and laboratories. This sequence provides a bridge between the basic and clinical sciences and their application to patient problems.

The *CPS* module uses an incremental approach that begins with critical thinking skills and ultimately yields self-directed life-long learning skills. During the first year, students learn how to apply rules of critical reasoning in the evaluation and application of clinical, investigational and published scientific data in patient management. This phase builds on an integrated course on *Evidence-Based Optometry*, which applies the growing body of knowledge in evidence-based medicine.[36-40] Next, students build their clinical reasoning skills so that they master the ability to acquire, interpret, integrate, apply and record significant clinical-decision making information in an effective and efficient manner.

Throughout, the student learns through "self-assessment" and interaction with faculty and peers the knowledge, skills and values that must be achieved in order to be effective in diagnosis and management. This new learning sequence, therefore, produces graduates who understand their personal strengths and weaknesses (what they know and what they do not know), and how to acquire additional knowledge and skills to maintain continuing competency. These new learning strategies also incorporate new approaches to measuring and evaluating learning outcomes.[41-43]

The Integration of New Technologies

Health care delivery is being transformed in dramatic and challenging ways. The new curriculum expands the integration of information, clinical and instructional technologies throughout the curriculum. Students will learn how to *access* knowledge, including the use of information technology, to *manage* information, and to *apply* that information in making decisions about patient care and health care delivery. The new discipline of medical informatics will prepare our new graduates for a career that will increasingly rely on computer-based information systems such as intelligent on-line consultants, electronic medical records, and a variety of practice management utilities.[44-51]

Student experiences in internet-based education and telemedicine projects will capture the emerging trends in health care and education delivery. The expanded community-based clerkships and externships will be enhanced by web-based communication, learning and coordination with faculty during their off-campus activities.

The new curriculum incorporates emerging light technologies related to brain and visual processing in the diagnosis and management of vision-related conditions including amblyopia, glaucoma and learning problems. Advances in the biomedical sciences have created new diagnostic and therapeutic technologies for the optometrist. Lastly, new ophthalmic materials are bringing renewed emphasis on the important role that spectacles and contact lenses play in the successful primary eye care practice.

Personal and Professional Development

The capstone to the new curriculum is the College's intensified commitment to each student's growth and success. This emphasis is expressed in a new four-year sequence of core courses, electives, community experiences and targeted workshops. This *Curriculum for Personal and Professional Development (CPPD)* focuses on the ethical and professional values and business practices necessary in the changing health care system. The interdependency among the profession of optometry, the patients it serves and the society within which it functions is underscored.

The sequence begins the first week of the first year with an intensive all-day workshop that challenges new students to begin defining their career goals and the concept of personal and professional success. Students explore common interests and unique needs in career planning. Most importantly, this special program sets the tone for individual and shared responsibilities on the journey to becoming a health professional.

Students will be guided through the areas of professional and ethical values, business and practice management, community health and jurisprudence, and career and financial planning. This sequence responds to the increasing demand within the optometric and other health professions to address these urgent issues.[52-58] The

objective is to produce optometrists who are goal-oriented, understand changing societal trends in health care, and know how to take the necessary practical steps to assure personal and professional success.

Structural Changes in the New Curriculum

In order to achieve the goals of the new curriculum, significant structural and pedagogical changes were required. The curriculum design responds to the need for greater emphasis on the process of learning and not just the content of teaching. Basic and clinical sciences are seen as occurring concurrently, rather than strictly sequentially.[59] Consequently, a more flexible system of organizing the curriculum has been adopted. The key characteristics of these structural changes include:

1. A shift away from the traditional course structure to a more ***flexible modular system*** of defining educational units. Consequently, current course content, course titles, credit hour allocation, sequencing, etc. were all subjected to review and reorganization. This modular approach is designed to achieve maximum integration of knowledge, skills and experience to produce more effective and efficient mastery of entry-level competencies.
2. ***Integration of basic and clinical sciences*** within and among modules. This is designed to facilitate more effective learning of concepts, eliminate unnecessary redundancies, promote interdisciplinary education and the application of the basic sciences in a clinical context, and to create greater time for problem-based applications. The College is sensitive to the relationship of the new curriculum to student performance on the National Board examination. Consistent with the integration emphasis of the new curriculum, the National Board of Examiners in Optometry (NBEO) also has been exploring the need and methods of creating a more clinically applied Basic Science examination. Two NBEO task forces have reported on this and the National Board is expected to implement a three-year study aimed at re-structuring the "National Board" to reflect the current status of the practice of optometry.[60]
3. A 15 to 20 percent ***reduction in traditional lectures and laboratory exercises.*** This significant reduction is made possible by the flexibility and efficiency of the modular approach, as well as the elimination of unnecessary overlaps in some content areas brought about by the integration of basic and clinical sciences. This relieved time is shifted to small group clinical problem solving experiences and increased patient care.
4. A significant ***shift of clinical skills training*** and its application in direct patient care earlier in the curriculum. The new clinical skills sequence begins the first week of classes. A new required summer clerkship after the first year involves a one-month experience with approved preceptors.
5. ***Expansion of the externship program*** so that it begins in January of the Third Year. Students can take either 3-month or 6-month externships at approved sites. A total of four to five clinical rotations can be scheduled.
6. The quarter system will be replaced with a ***trimester system*** designed to include meaningful one-week breaks between sessions to allow for both student and faculty 'regeneration" as well as for structured faculty development activities.

Module Descriptions

The new curriculum has been organized into nine (9) modules. Each module represents an integrated sequence of knowledge, skills and values expected for entry-level practice. Integration is also expected across modules. Table 1 displays the new modular curriculum and summarizes the sequencing and relationship among modules. The following sections describe the salient pedagogical changes incorporated in each module.

Module 1: Molecular and Cellular Processes

This module integrates the fundamental biochemical, histological, and physiological processes of cells integrating molecular biology with normal and abnormal cellular functions. Specific cellular systems are utilized to illustrate fundamental concepts. *The overall goal of the module is to provide an understanding of normal cellular organization, processes and function as a basis for recognizing abnormal conditions. This provides the conceptual framework for diagnostic and therapeutic management of the patient.*

Pedagogically, Module 1 is designed to reorient the presentation of material related to the concepts of molecular biology, biochemistry and cellular biology so that students progress beyond the mere acquisition and memorization of facts to the ability to integrate related findings across the disciplines, generate hypotheses as to normal and abnormal cellular function, and apply such facts to clinical problem solving.

The emphasis is on independent study and active learning by engaging the student in various exercises, problem solving scenarios, computer-driven tasks and information retrieval assignments. The module integrates all cellular related biology in one unit rather than having the topics of cellular functions distributed over several traditional courses.

Module 2: Integrative Organ Systems and Disease

This module continues the integrated approach of anatomy, histology, and physiology with pathology and pharmacology at the systemic level by looking at specific organ systems. The module emphasizes the cardiovascular, respiratory, renal and endocrine systems, as well as the gastro-intestinal and integumentary systems.

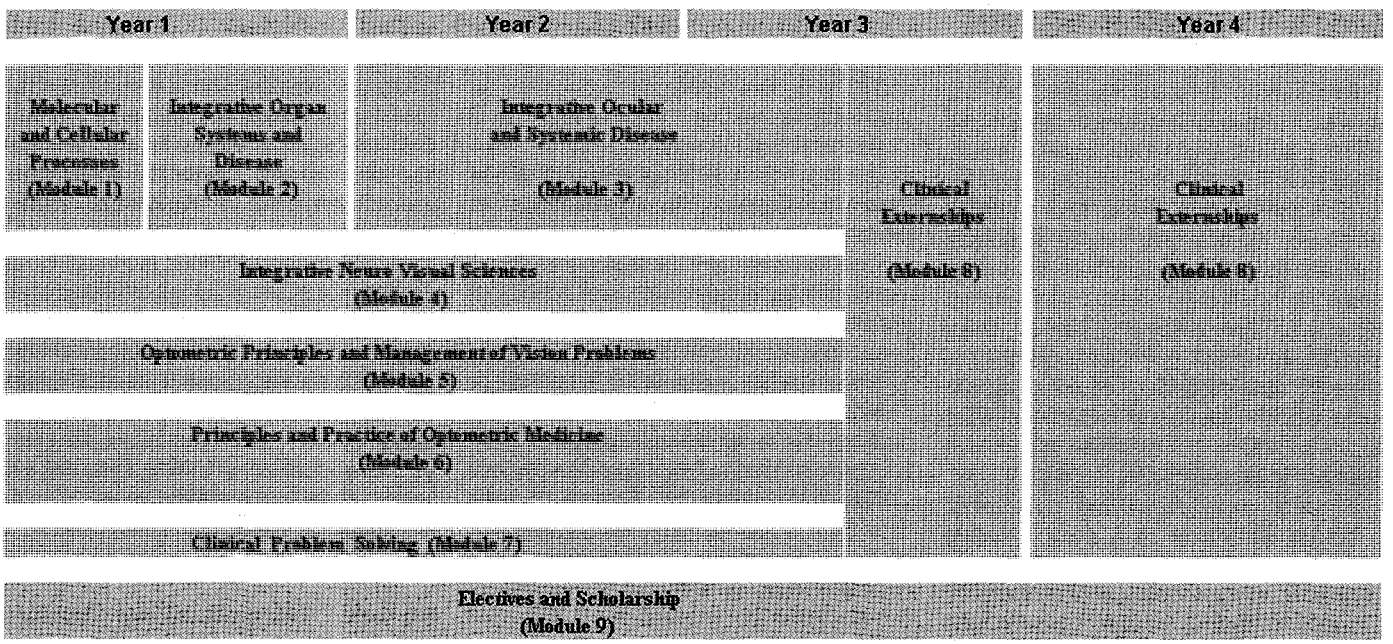
Pedagogically, Module 2 is designed to address the knowledge base needed to diagnose and manage most of the prevalent systemic and ocular conditions. It develops the student's ability to order needed laboratory and diagnostic procedures in a thorough, prudent, methodical yet reasonable fashion. It underscores the role of pharmacological agents in the management of systemic conditions, and their possible impact on the eye. In addition, the module provides the basis for the presentation of cases in the Clinical Problem Solving module that includes aspects of pathology and pharmacology.

Module 3: Integrative Ocular and Systemic Disease

Integrative Ocular and Systemic Disease builds on the first two modules, but specifically emphasizes ocular structures. The first part integrates the development, anatomy, histology,

Table 1

CURRICULUM 2000 OVERVIEW



physiology and biochemistry of ocular tissues. The second part integrates aspects of microbiology, ocular pathology and ocular pharmacology with the course and management of specific ocular diseases. The ocular diseases begin with anterior segment diseases, followed by posterior segment conditions, the glaucomas and true ocular emergencies.

In the third year, the clinical medicine sequence integrates much of the basic biomedical information in a medical context whereby current medical management of systemic conditions is juxtaposed with current optometric management. The goal is student understanding of the most commonly encountered co-management issues especially where these might involve protracted or complicated care.

Pedagogically, Module 3 is designed to lay the groundwork for hypothesis generation of the etiology and pathogenesis of many ocular conditions. In addition, it integrates ocular disease with ocular microbiology, ocular pharmacology and ocular pathology.

Module 4: Integrative Neuro-Visual Sciences

Integrative Neuro-Visual Sciences starts in the first year with the anatomy of the head and neck followed by a discussion of anatomical aspects of neurosciences, neuropathology and neuropharmacology. In the second year there is a presentation of general sensory physiology, followed by the physiology of monocular vision and perception. Basic concepts in human development will be presented highlighting the steps in ocular development. Ocular motility has been sequenced to immediately precede the courses on the fundamentals of binocular vision. The related area of neuro-ophthalmic disease, which addresses pathological as well as management issues, is presented as a third year sequence.

This module provides the students with clinically relevant information on many clinical issues and addresses some current developing topics such as the neurophysiology of aging, learning, tremors such as Parkinsonian tremor, nervous regeneration and protection and neuropharmacology.

Pedagogically, Module 4 is designed to integrate basic anatomy, physiology, pathology and pharmacology of the nervous system in an organized, logical and efficient fashion. It integrates sensory neurophysiology, monocular vision and perception as a unit with many clinical applications. Laboratories are expanded to facilitate the transition to the clinical domain. The module integrates all aspects of the neuro-visual sciences vertically.

Module 5: Optometric Principles and Management of Vision Problems

The Module on Optometric Principles and Management of Vision Problems includes basic and clinical science course work that serves as foundational preparation for students as they prepare to become clinical problem solvers in the areas of refraction, binocular vision, contact lens practice, low vision, and ophthalmic materials. As part of this module, the student will be expected to complete a distance learning course during the summer between the first and second program years.

Pedagogically, Module 5 is designed to significantly change the approach to theoretical optics and ophthalmic optics by integrating the two into a new cohesive sequence entitled Optical Principles and Ophthalmic Applications. The completion of this sequence by the end of the first year provides the foundation

for the summer clerkship that follows. The latter is, in part, designed to help the student develop problem-solving strategies in the application of optical principles in the context of optometric practice.

Module 6: Principles and Practice of Optometric Medicine

The Principles and Practice of Optometric Medicine module prepares optometry students with the skills, experiences, and values necessary for responsible delivery of primary eye care. Module 6 has three components: (1) Clinical Skills in Optometric Medicine; (2) Community Clerkships and The Eye Institute (TEI) Internships; and (3) Optometry, the Patient and Society.

Clinical Skills in Optometric Medicine

This module component includes didactic and laboratory instruction that trains the student in the cognitive, motor, interpersonal, and problem-solving skills necessary to prevent, diagnose, treat and manage patient problems within the scope of optometric practice.

All skills associated with optometric practice are initiated immediately upon beginning the program. The curriculum organizes and integrates the skills taught in a manner that will prepare a student to effectively examine patients and at an earlier time in their program. Skills will begin to be taught in the fall of the first program year. Professional communications (Skill Block 1) and clinical decision making skills (Skill Block 2) will be the earliest skills imprinted during this quarter.

During the first year, the physical diagnosis skills will begin approximately one month into the fall quarter and end in the middle of the second year. The physical diagnostic skills have been sequenced and grouped (Skill Blocks 3-5) in a manner that will prepare a student to be more effective in interacting with patients. The student thus has the preparation for early and meaningful involvement with patients.

Pedagogically, the Clinical Skills in Optometric Medicine sequence is designed to complete the teaching of all skills by the middle of the second program year. This will enable 2nd year students to begin seeing patients in The Eye Institute approximately 5 months earlier. The resequenced physical diagnosis better prepares the student to be involved with patients in on-campus as well as off-campus community based activities. Earlier involvement with patients will also serve to reinforce patient interaction and communication skills.

Community Clerkships and TEI Internships

Community clerkships and TEI internships provide the clinical opportunity for students to develop their clinical skills through observation of competent clinical role models, as well as through direct patient interactions, thus building on the skills developed through didactic preparation. Community clerkships also provide the student with the opportunity to observe varied modes of optometric practice, experience different patient populations, and through these community based experiences, establish the foundation for career planning.

Community Clerkships and TEI internships represent the clinical experience associated with the first 2½ years of the optometric curriculum. These professional practice experiences are divided into seven professional practice courses.

Pedagogically, this sequence is designed to provide students the opportunity to participate in patient care at an earlier time. Professional practice assignments on and off-campus will begin during the fall quarter of the first program year. Earlier preparation will allow for greater patient care involvement, and translate into greater numbers of patient care encounters during their on campus professional practice assignments.

This sequence includes a mandatory clerkship (20 days) during the summer between the first and second program years. This clinical assignment is designed to accomplish three educational objectives:

1. First, during this clerkship the student will have the opportunity to reinforce the importance of ophthalmic materials in optometric practice. Students will have had their ophthalmic optics didactic and laboratory. The clerkship will provide them an opportunity to apply this knowledge in a clinical setting and secure practical experiences first hand in this important area of optometric practice.
2. The summer clerkship will also provide opportunities for the student to reinforce other clinical skills that they have learned during the first program year. These skills include professional communication skills, clinical diagnostic procedures (visual acuity, ocular motility, stereopsis, etc.), and automated testing.

Given the earlier and greater patient care involvement, students are better prepared for more efficient and effective TEI internships. The enhanced patient contact hours will translate into greater numbers of patient encounters and an optometric student who is better prepared to meet the challenges associated with external rotations and clinical practice. As a result of the earlier preclinical preparation and earlier and more extensive patient care involvement in TEI, clinical externships will begin approximately five months earlier, that is, during the last five months of the third program year.

Optometry, the Patient and Society

Within Module 6, the *Curriculum for Personal and Professional Development (CPPD)* focuses on the ethical, professional values and practices necessary in the changing health care system. The mission of the CPPD is to provide students with the knowledge and skills necessary to achieve career success. Students will be guided through a series of courses and activities designed to address the areas of professional and ethical values, business and practice management, community health and jurisprudence, career and financial planning. The overarching goal is to produce optometrists who understand changing societal trends in health care and their impact on career and practice planning.

Pedagogically, this sequence is designed to guide students through a four-year building block strategy for career planning. It integrates business management and professional issues through a balance of classroom, small group instruction and field experiences that promotes students' transition from the academic setting to the marketplace. It integrates financial planning and career planning as a seamless four-year building-block strategy that utilizes existing institutional resources (e.g., Office of Student Financial Aid and the Office of Externship Programs). This sequence assists the student in accumulating the necessary tools to pro-

mote career success through personal and professional career planning.

Module 7: Clinical Problem Solving

The Clinical Problem Solving module is intended to provide students with learning opportunities to develop problem-solving skills through the exploration of clinically relevant cases. The general learning objectives are expected to be met by the completion of this 3-year course sequence. The level of competency is expected to progressively increase from the first to third year, as the emphasis of the cases shifts from critical retrieval and assessment of literature to more complex clinical decision-making.

This sequence of courses utilizes a case-based, small group learning approach to specific problems. An interactive format is facilitated by faculty and is designed to develop independent, self-directed learning, and problem solving skills.

Pedagogically, the CPS sequence is designed to enable students to:

1. Develop learning and communication skills that include:
   - Problem based learning
   - Self-directed learning
   - Self-evaluation
   - Group learning
   - Critical analysis of information
   - Effective professional communication
2. Integrate knowledge including basic science information and its clinical application (relevance) in order to promote:
   - Sound scientific reasoning
   - Sound clinical decision making
3. Develop critical thinking skills needed to:
   - Assess patient's visual, physical and emotional status
   - Interpret and synthesize data to formulate and execute effective diagnostic and management plans
   - nterpret and evaluate laboratory and diagnostic procedures
4. Develop the ability to access knowledge and manage information, and to apply that information in making decisions about patient care and health care delivery.

Module 8: Clinical Externships

Clinical externships are the culmination of the clinical programs at the College. The on and off campus clinical experiences at the College during the first 2½ years of the core program prepare the student in the foundational clinical skills so that the student can assume the more intensive clinical demands of externships.

The new curriculum will provide 50% more externship time for the optometry student. The student will now be assigned to externships for 17 months, that is, the last 1½ years of their program. Externships will begin midway through the 3rd year and continue throughout the 4th program year. The first externship, spring semester of the 3rd program year, will be a 5-month rotation. The remaining 12-month period (4th program year) will be represented by 3-4 externships of 3 or 6 month duration. A student will do a minimum of 4 externships and no more than 5.

The College recognizes its responsibility to keep the off-campus optometry student connected to the institution. This will be done in a number of ways including online access to library resources, web-based electives, electronic management of information associated patient encounters, and telemedicine.

Externships will continue to be classified in four categories. Each of the categories has specific educational objectives associated with it. The categories are: (1) The Eye Institute; (2) Hospital based sites; (3) Disease Practice sites; and (4) Private Practice sites

Module 9: Electives and Scholarship

This module provides the students with opportunities to pursue special areas of interest. Electives are offered throughout the year. Additional online electives will be developed. The "Journal Club" electives, for example, provide students with the opportunity to explore areas not covered in the core program. Students can also elect to pursue research activities. There is a formal five-credit series, with specific goals for developing research skills. The students may elect to take one, several or all of these elective opportunities. This module also serves as a platform for joint degree programs.

Pedagogically, Module 9 is designed to create greater flexibility in developing programs tailored to student needs especially in the area of a Scholar's Program; permit students to have direct one-on-one mentorship from a faculty member on a regular basis; and provide students with the opportunity to explore research activities without committing to a formal masters or doctoral program.

Conclusion

On September 4, 2001, the Pennsylvania College of Optometry formally launched its new curriculum. Its goal is to graduate new optometrists strategically prepared for the personal and professional challenges of tomorrow's health care system. These practitioners must posses strong independent problem-solving skills and a commitment to life-long learning and evidence-based patient care.

Successful implementation of the new curriculum will require sustained attention to the many pedagogical, logistical and human dimensions of the project. Making *Curriculum 2000* a reality will involve significant commitment to the organizational, budgetary and faculty development implications of the new program. Over the past two years, the College has studied the implications of the new curriculum and developed a strategy for its cost-effective implementation. New resources will be required by the Clinical Problem Solving (Module 7) sequence and are estimated at approximately 1.4 FTE of additional faculty time. At the same time, there will be a significant reduction in the number of total contact time or traditional faculty FTE's because of the decrease in the number of lecture and laboratory hours in the new curriculum. The initial analysis of these increases and decreases in faculty FTE's suggest that *Curriculum 2000* can be implemented in a very cost-effective manner, and probably not require any substantial need for new institutional dollars.

Curriculum 2000 will require an intensive faculty development program. Over the past two years, numerous individual faculty members and several working groups of faculty have devoted themselves to the design of the new curriculum. The process has identified both strengths and weaknesses in the College's academic program. Concurrently, significant opportunities for faculty development have emerged. Each of the new themes in *Curriculum 2000*, for example, lends itself to faculty development activities. Significant faculty development programs have been implemented or planned in such areas as information technology, problem-based learning, case-based learning, web-based instruction, clinical assessment, telemedicine, biomed-

ical ethics. The College expects that continued and expanded faculty development programs will be the greatest need for successful implementation and evaluation of *Curriculum 2000.*

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Vision Screenings in Clinical Education: A Survey of Schools and Colleges of Optometry

Amelia G. Bartolone, O.D., F.A.A.O.

Abstract

Vision screenings are a component of the training of optometric students at all schools and colleges of optometry. However, no guidelines exist to determine how vision screening experiences should be reflected in curriculum requirements. A survey was conducted to determine how vision screenings are incorporated into curricula. A wide range was found in the number of screenings conducted, the number of individuals screened, and the onsets of vision screenings in clinical education. Optometric curricula lack uniformity regarding the inclusion of vision screenings. This study provides the foundation necessary to further investigate the different means of incorporating vision screenings in clinical education.

Key Words: *vision screenings, curriculum, clinical education, clinical competence, optometric education*

Introduction

Vision screenings are a component of the clinical education at each of the schools and colleges of optometry. Screenings provide a necessary public health service and promote a positive high profile for the teaching clinics[1]; in addition, they offer a unique clinical educational experience for the optometry student. Even though vision screenings play a role in clinical education, there are no guidelines to determine how and if vision screening experiences should be reflected in curriculum requirements. This paper seeks to determine the extent of the optometry student's required exposure to vision screenings at the various schools and colleges of optometry.

Issues such as the onset of student clinical experience, quantity and quality of exposures, assessment, and outcome-based teaching that affect clinical education in general also affect vision screenings. The onset of clinical education is an area of current debate.[2] It can be said that early exposure to clinical care has positive educational impact. Vision screenings often provide the optometry student with his/her first patient encounter. However, placement of vision screenings within the curriculum can be varied.

Student clinical competence is often determined using quantity and quality of patient encounters as a benchmark. It is argued by Strickland that prevalence and incidence data will determine, on average, the number of encounters that provide adequate exposure to different conditions.[3] This would imply that an ideal number of screening encounters exists. Yet, it has also been argued that numbers do not assure competence.[4]

The curriculum conference sponsored by the Association of Schools and Colleges of Optometry and the American Optometric Association in July 1992 recommended a curriculum model focusing on outcomes-based education.[5] This recommendation can be used to examine current curricula. The role of vision screenings in a given curriculum can be evaluated as evidence of achievement toward meeting a desired accomplishment.

This study assesses the extent of optometry students' experience in vision screenings at each of the schools and colleges of optometry in the continental United States. The study determines how this experience is reflected in the clinical curriculum. The study did not intend to evaluate the usefulness of screenings in training clinicians or compare the different methods of conducting vision screenings. A survey was conducted of individuals who organize vision screenings at each of the schools and colleges of optometry. Evaluating the structure of vision screening programs may help highlight issues in clinical education (such as the onset of the program, quantity and quality of exposures, assessment, and outcome-based teaching) and provide a basis for curricular revisions.

Methods

Directors of vision screenings at each of the sixteen schools and colleges of optometry in the continental United States were identified by web-based, written, and telephone inquiry. Surveys (see Appendix 1) were distributed in the summer of 1999 by e-mail or standard mail. Follow-up phone calls were made as necessary. The data were then compiled and analyzed.

Results

Responses were received from all sixteen schools and colleges of optometry in the continental United States. The number of screenings conducted and the number of individuals screened demonstrate a wide range among programs. The number of screenings performed annually per school ranged from 12 to 240. The average number of screenings per-

Dr. Bartolone is assistant clinical professor at the SUNY State College of Optometry.

formed annually per school was 89.5 and the median was 67.[5] The number of people screened per year ranged from 600 to 15,000. An average of 5,651.25 people were screened per school annually; the median was 4,7110. (Tables 1 & 2) The screenings reported do not include those done by Student Volunteer Optometric Services for Humanity groups, Special Olympic volunteers, voluntary screenings or individual screenings within a teaching clinic. If a range was reported, the average was used and is listed in Table 1.

The majority (80.75% on average) of vision screenings performed are completed at primary and secondary schools. Other locations in which optometry students participate in vision screenings include health fairs, corporate settings, senior centers, churches, hospitals, insurance centers,

Table 1: Summary by School of Screenings in Clinical Education

School	Number screenings /yr	Number screened /yr	Location Percent	Students begin	Students Together	Number screenings/ student/4 yrs	Credit
ICO	65	1,750	50% schools <10% for all others	Fall 2nd year	No	4	No credit but mandatory
IU	70	3,750 school only	60% schools 40% church, health fair, senior	Fall 3rd year	Occasionally 3rd & 4th year	5	Incorporated into clinic grade
MCO	12	600	100% schools	1st semester 2nd year	No	Approx 10	No credit but mandatory
NEW ENCO	200	6,600	60% schools 10% health fair 10% corporate 5% other	Fall 2nd year	2nd & 4th year	10	2nd year part of clinical care grade 4th year part of peds clinic grade
NSU	150	6,000	100% schools others by request	2nd semester 1st year	No	10	Separate P/F grade
NOVA	90	14,000	97% schools 2% health fair ½% corporate ½% other	Fall 2nd year	Yes-health fairs only	140	Separate P/F grade
OSU	64	3,991	100% schools	Fall 3rd year	No	17	3rd year lab grade 4th year clinic grade
PU	30	2,500	80% schools 5% health fairs 3% corporate 10% senior 2% other	1st semester 1st year	1st & 4th year 2nd & 3rd year	13	No credit but mandatory
PCO	125	7,000	40% schools 10% health fair 20% corporate 25% senior 5% other	Summer 3rd year	No	11	Separate P/F grade
SCCO	40	15,000	100% schools	Summer 3rd year	3rd & 4th year	11	Incorporated into clinic grade
SCO	105	7,000	100% schools	1st quarter 2nd year	2nd & 4th	12	Incorporated into clinical orientation course
SUNY	56	2,800	85% schools 15% corporate	Fall 2nd year	No	14	2nd year separate screening grade 3rd & 4th year in clinic grade
UAB	240	5,429	70% schools 25% senior 5% other	Spring 2nd year	No	48	Separate community service letter grade
UCB	60	9,500	95% schools 5% health fairs	4th year	No	8	Separate P/F grade
UMSL	25	1,500	80% schools 5% health fairs 5% senior 10% other	Fall 1st year	Yes	8	No credit but mandatory
UH	100	3,000	75% schools 5% health fairs 20% senior	Fall 2nd year	Yes	9	No credit but mandatory

Table 2: Overview of Screenings in Clinical Education

Schools	Number screenings /yr	Number screened /yr	Location Percent	Students	Students Together	Number screenings/ student/4 yrs	Credit
16	Range 12-240 Average 89.5 Median 67.5	Range 600-15,000 Average 5,651.25 Median 4,710	Range 40-100% schools Average 80.75% schools	Range Fall yr 1st yr-4th Average 2nd year	50% Yes 50% No	Range 4-140 Average 20.625 Median 10.5	31.25% No credit but mandatory 31.25% Incorporated into grade 37.5% Separate grade

foster family agencies, community centers, state political offices, multiple-handicapped camps, migrant worker centers, and others. Optometry students may begin vision screenings in their first year, or as late as their fourth year, depending upon which school they are attending. Second year is the average time at which optometry students begin performing vision screenings. Half of the schools and colleges of optometry have students from various years conducting individual vision screenings together at least some of the time.

The range of screenings each optometry student completes during his/her four years is also broad — from a minimum of four to a maximum of 140. The average number of vision screenings each optometry student completes in four years is 20.625 and the median is 10.5. Credit is given for vision screenings by three methods: separate grades, incorporation into clinic grades, or mandatory attendance with no credit. These three methods are used almost equally at the schools and colleges of optometry. When a separate grade is given, it is usually "Pass/Fail." When incorporated into a grade, it is primarily into a clinic grade, but occasionally into a lab/pre-clinic grade.

Discussion

Optometric curricula show a lack of uniformity with regard to vision screenings in clinical education. No ideal number of patients screened exists, nor is there an ideal onset of vision screenings in clinical education. This survey did not answer the question "How many screenings are enough?" However, the survey provides a database of the experiences of optometry students in vision screening. This information will be helpful to optometric educators in planning curricular requirements.

The large range in the number of screenings and number screened annually at each school and college of optometry creates differences in clinical educational experience for optometry students. Likewise the number of screenings performed by an optometry student during his/her four years varies greatly depending on the school attended. However, the true impact of this variance can not be assessed without comparing the screening numbers to the number of patients seen in clinic.

The majority of the schools and colleges of optometry conduct vision screenings in a variety of locations. However, the majority of an optometry student's vision screening experience is in primary and secondary schools. Although extra-curricular screenings such as VOSH and Special Olympics create a diversity of patients for an optometry student's vision screening experience, schools and colleges of optometry should actively recruit different locations for vision screenings. A variety of screening locations not only benefits the optometry student's experience but also creates a more encompassing public health initiative.

The large range in the onset of vision screenings at the schools and colleges of optometry also creates clinical educational differences. Students in the second half of their first year at the SUNY, State College of Optometry, are eager to participate in vision screenings. First and second year students are anxious to practice the profession they have chosen to study. Third year may be too late to start vision screenings since it takes them away from seeing patients in the clinic. When screenings are performed with students from various years, older students act as models and mentors. However, screenings performed by optometry students from individual classes creates independence. Both models offer different advantages.

Data regarding screening location, administration, and follow-up care were not collected. This information was volunteered by certain locations, and could present greater insight into screening programs if available for all schools and colleges of optometry. For example, the University of Alabama at Birmingham, School of Optometry, which is able to conduct the greatest number of screenings annually, has a non-optometrist program coordinator for community service. The program generates a profit. The school also provides van service for the optometry students to travel to the screening site. Screening results are stored in computer databases. Having a non-optometrist program coordinator provides many community, educational, and institutional benefits.

Identification of the individuals organizing vision screenings at the schools and colleges of optometry was problematic because there is no central listing of this position. These individuals were also often difficult to contact through websites or switchboards. A vision screening contact person, clearly listed on the websites of each of the schools and colleges of optometry, would help promote discussion and sharing of ideas. This listing could also serve the public by increasing awareness of the need for and availability of vision screenings.

At the time of the survey, many schools and colleges of optometry were implementing changes in their screening programs. One college recently began to have second and fourth years work together while another has students starting in the fall of their first year. Data on educational objectives of each of the screening programs were not collected. If time is devoted to vision screenings within optometric curricula, the same educational objectives as found in

other class or clinic work should exist. Further studies should investigate current educational and institutional objectives of vision screenings.

Vision screenings are a part of the curriculum at each of the schools and colleges of optometry. However, their formal incorporation into the clinical program varies with each school. When no credit is granted to vision screening programs, there is a greater probability the screenings would not be included in a curriculum review. Vision screening programs should be included in curriculum review to assure that the clinical education goals of these programs are being met. Further outcome data, such as student satisfaction and clinical preparedness, is needed to evaluate different means of incorporating vision screenings in clinical education.

Acknowledgements

I thank Dr. Diane Adamczyk for her insight, encouragement, and advice. I thank Drs. Marie Bodack and Michael Heiberger for their thoughtful comments. I would also like to commend all the vision screening directors for their efforts in education and public health.

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Appendix A

Screenings in Clinical Education: A Survey of the Schools and Colleges of Optometry

School/College of Optometry _____

Contact Person _____

1. Approximate number of vision screenings/year: _____
2. Approximate number of people screened/year: _____
3. Percentage of total vision screenings performed at each setting:
   ___ schools
   ___ health fairs
   ___ corporate
   ___ senior centers
   ___ other
4. Students begin vision screenings in which quarter/semester of which year: _____

   If all sites do not begin at the same time, please specify _____
5. Do students from various years conduct individual vision screenings together? _____

   please specify _____
6. How are students assigned to vision screenings? _____
7. Approximately how many vision screenings does each optometry student conduct during his/her four years?
8. How is the student given credit for vision screenings? (ex. separate P/F grade, incorporated into clinic grade, no credit but mandatory, voluntary) _____

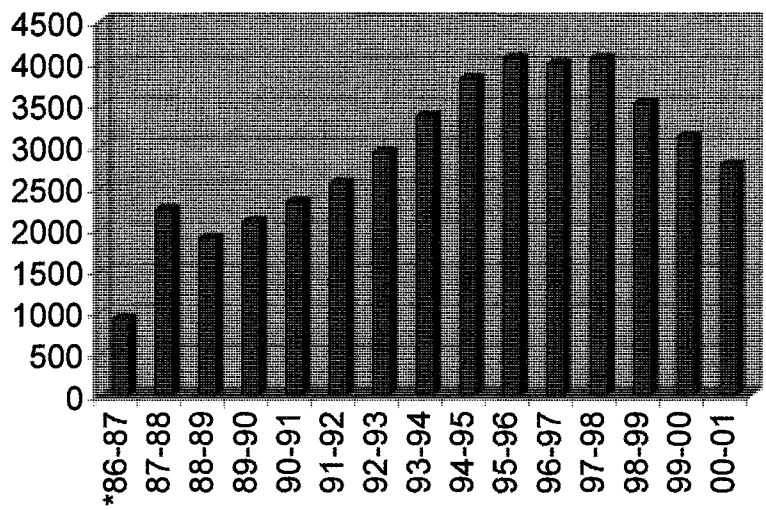
Trends in Student Enrollment and Application

In the early 1980s, ASCO published a summary of portions of the Annual Survey of Optometric Educational Institutions as a regular feature in this journal. At that time, the information was collected by the AOA's Council on Optometric Education (renamed the Accreditation Council on Optometric Education in June 2001). In 1989 ASCO took over the compilation and distribution of the annual student and faculty surveys. Collecting so much information on student enrollment, academic achievement, financial aid and student expenditures in an accurate and timely manner from schools that had dissimilar collection methods proved to be a daunting and time-consuming challenge.

In 1999 ASCO began a data entry program for an on-line collection of the information that has great potential to improve the timeliness and accuracy of the data.

The annual student survey data attains greater value when viewed in the context of past years so that trends can be identified. In 1994, ASCO published a Trends Report covering 1989 — 1993. For our purposes this year, we decided to focus on student applications and enrollment. For a look at trends in financial aid and student expenditures, see "Student Indebtedness: The Challenge of Financing an Optometric Education," by Lawrence H. McClure, Ph.D., in Optometric Education, Volume 25, Number 2, p. 45.

Table 1
Number of Candidates for Optometry Admission Test (OAT)
Academic years 1986-2000



Academic Year	Fall Period	Spring Period	Total Annual	Total Change	Total % Change
* 1986-1987	Not available	917	917	N/A	N/A
1987-1988	1254	980	2234	63	6.87%
1988-1989	1194	695	1889	-345	-15.44%
1989-1990	1061	1030	2091	202	10.69%
1990-1991	1192	1132	2324	233	11.14%
1991-1992	1332	1219	2551	227	9.77%
1992-1993	1540	1385	2925	374	14.66%
1993-1994	1847	1509	3356	431	14.74%
1994-1995	2131	1673	3804	448	13.35%
1995-1996	2380	1674	4054	250	6.57%
1996-1997	2380	1607	3987	-67	-1.65%
1997-1998	2428	1624	4052	65	1.63%
1998-1999	2129	1377	3506	-546	-13.47%
1999-2000	1914	1200	3114	-392	-11.18%
2000-2001	1635	1140	2775	-339	-10.88%

** Note: The number for 1986 is a partial figure; only Spring data is included.*

OAT Takers, Applications, and Unduplicated Applicants

The number of students registered to take the Optometry Admissions Test (OAT) has traditionally been looked at as a bellwether of the strength of the optometry school applicant pool. Table 1 indicates that in 2000-2001, the total number of examines for both the fall and spring tests was 2775. That number had dropped in each of the last three years, from its high in 1997 — 1998 of 4052. A 35% drop occurred over the last three years, although the numbers generally are higher than the lows of the late 1980s-early 1990s.

Table Two shows that the total number of applications has declined over the past three years from a high of 8509 in 1998-1999 to 5723 in 2001-2002. In 1999 ASCO began again the collection of information on unduplicated applicants. No information was collected from 1995-1999 due to legal questions regarding social security numbers. Not enough data is currently available to see trends in the number of unduplicated applicants so we must rely on total number of applications to determine longer term trends.

Student Enrollment

The total first year student enrollment in 1999-2000 was 1410 — an increase of 11.9% in the years 1989-1999. Much of this increase was due to the opening of a new optometry school in 1989-1990 and some of the increases in later years were also connected as additional years were added at that school (Table 3).

Table 2
Trends in Numbers of Applicants and Applications for Admission to the O.D Program
AY 1991-1992 through AY 2001-2002

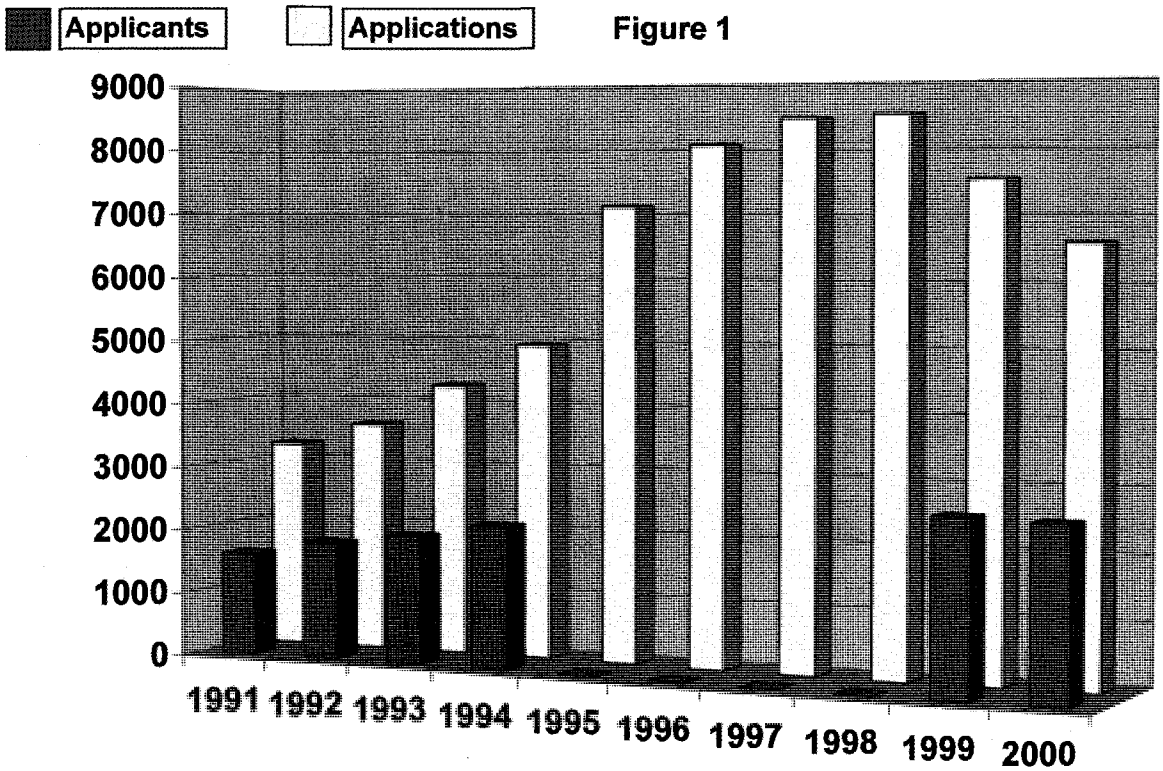
	Unduplicated Applicants			Applications		
Academic Year	Total	Change	% Change	Total	Change	% Change
1991-1992	1601	no data	no data	3262	no data	no data
1992-1993	1824	223	13.93%	3616	354	10.85%
1993-1994	1990	166	9.10%	4272	656	18.14%
1994-1995	2208	218	10.95%	4942	670	15.68%
1995-1996	no data	no data	no data	7122	2180	44.11%
1996-1997	no data	no data	no data	8059	937	13.16%
1997-1998	no data	no data	no data	8458	399	4.95%
1998-1999	no data	no data	no data	8509	51	0.60%
1999-2000	2671	n/a	n/a	7538	-971	-11.41%
2000-2001	2628	43	-1.60%	6605	-933	-12.38%
2001-2002				**5723**	**-882**	**-13.35%**

The number of male and female optometry students in the entering class was about equal in 1989 (50.1% to 49.9%). But the number of female optometry students in the entering class increased from 629 in 1989 to 765 in 1999 — an increase of 21.6%. This increase was most dramatic in the early 1990s and seems to have stabilized in recent years.

Total student enrollment for 1999-2000 was 5464 (Table 4) — an increase of 15.7% in the years 1989-1999. As noted earlier, the opening of a new school in 1989 affected much of this increase.

The total enrollment in 1989 was 55% male, but the number of female students increased from 2126 in 1989 to 2969 in 1999 — an increase of 39.7%. The total enrollment

Figure 1
Trends in Numbers of Applicants and Applications for Admission to the O.D Program
AY 1991-1992 through AY 2001-2002



is currently 54.3% female and 45.7% male.

Minority enrollment for all U.S.-accredited schools accounted for 38% (2078 students) in 2000 compared to 22.7% in 1989 (1073 students) (Table 5). However, most of that increase is due to the increase in the number of Asian American students. Asian American students increased from 11.2% of the total enrollment in 1989 to 25% in 2000. Foreign nationals also increased from 2.1% in 1989 to 4.6% in 2000.

The number of some minorities decreased. African American students decreased from 2.8% of the student population in 1989 to 2.3% in 2000. Hispanic Americans

Table 3
First Year Student Enrollment in Schools of Optometry by Gender
Academic years 1989-90 to 1999-2000

	First Year Student Enrollment							
Academic Year	Male	Annual % Change - Male	Female	Annual % Change - Female	Total	Annual % Change - Total	Percent Male	Percent Female
1989-90	631		629		1260		50.1%	49.9%
1990-91	604	-4.3%	641	1.9%	1245	-1.2%	48.5%	51.5%
1991-92	634	5.0%	721	12.5%	1355	8.8%	46.8%	53.2%
1992-93	631	-0.5%	764	6.0%	1395	3.0%	45.2%	54.8%
1993-94	639	1.3%	716	-6.3%	1355	-2.9%	47.2%	52.8%
1994-95	658	3.0%	732	2.2%	1390	2.6%	47.3%	52.7%
1995-96	679	3.2%	759	3.7%	1438	3.5%	47.2%	52.8%
1996-97	628	-7.5%	735	-3.2%	1363	-5.2%	46.1%	53.9%
1997-98	639	1.8%	724	-1.5%	1363	0.0%	46.9%	53.1%
1998-99	624	-2.3%	773	6.8%	1397	2.5%	44.7%	55.3%
1999-2000	645	3.4%	765	-1.0%	1410	0.9%	45.7%	54.3%
% Change AY 1989-90 to 1999-2000		2.2%		21.6%		11.9%		

Table 4
Total Student Enrollment in Schools of Optometry by Gender
Academic years 1989-90 to 1999-2000

Academic Year	Male	Annual % Change - Male	Female	Annual % Change - Female	Total	Annual % Change - Total	Percent Male	Percent Female
1989-90	2596		2126		4722		55.0%	45.0%
1990-91	2491	-4.0%	2271	6.8%	4762	0.8%	52.3%	47.7%
1991-92	2448	-1.7%	2416	6.4%	4864	2.1%	50.3%	49.7%
1992-93	2396	-2.1%	2602	7.7%	4998	2.8%	47.9%	52.1%
1993-94*								
1994-95	2416		2791		5207		46.4%	53.6%
1995-96	2483	2.8%	2829	1.4%	5312	2.0%	46.7%	53.3%
1996-97	2454	-1.2%	2760	-2.4%	5214	-1.8%	47.1%	52.9%
1997-98	2497	1.8%	2822	2.2%	5319	2.0%	46.9%	53.1%
1998-99	2454	-1.7%	2815	-0.2%	5269	-0.9%	46.6%	53.4%
1999-2000	2495	1.7%	2969	5.5%	5464	3.7%	45.7%	54.3%
% Change AY 1989-90 to 1999-2000		-3.9%		39.7%		15.7%		

*No data available for this year

decreased from 6.2% in 1989 to 4.9% in 2000.

A review of the trends for underrepresented minorities in Optometry shows the need for increased efforts to develop an applicant pool that reflects the national diversity of the U.S. population.

Note: Copies of the most current student survey may be purchased through the ASCO office for $100. (Add $10 for postage outside the U.S.) The price for faculty is $50. A 20% discount is offered to ASCO corporate contributor companies and affiliate members. The faculty survey is available for $25. (Add $6 for postage outside the U.S.) Send request to ASCO, Publications, 6110 Executive Blvd., Suite 510, Rockville, Maryland 20852.

Credit: The information contained in this article was prepared by ASCO staff including Joan Anson, director, career promotion and student affairs, Linda Reynolds, administrative assistant, and Patricia Coe O'Rourke, managing editor.

Figure 2
First Year Student Enrollment in Schools of Optometry by Gender

Academic years 1989-90 to 1999-2000

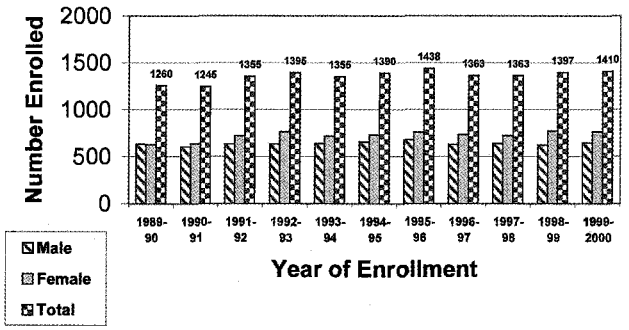
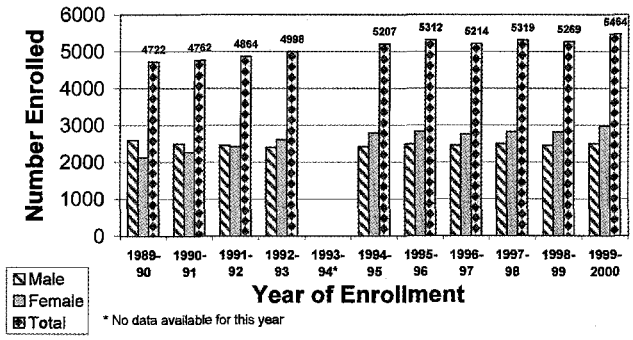


Figure 3
Total Student Enrollment in Schools of Optometry by Gender

Academic years 1989-90 to 1999-2000



* No data available for this year

Table 5
Total Student Enrollment in Schools of Optometry by Ethnic Identification

Academic years 1989-90,1994-95 and 2000-01

		1989-90		1994-95		***2000-01	
		#	%	#	%	#	%
African American	Male			39		47	0.9%
	Female			100		78	1.4%
	Total	132	2.8%	139	2.7%	126	2.3%
Hispanic American	Male			130		82	1.5%
	Female			188		180	3.3%
	Total	293	6.2%	318	6.1%	286	4.9%
Native American or Native Alaskan	Male			6		13	0.2%
	Female			14		9	0.2%
	Total	21	0.4%	20	0.4%	27	0.5%
Asian American	Male			251		420	7.7%
	Female			567		892	16.4%
	Total	529	11.2%	818	15.7%	1357	25.0%
Pacific Islander **	Male			0		0	0.0%
	Female			3		1	0.0%
	Total	*	*	3	0.1%	16	0.3%
White American	Male			1866		1536	28.3%
	Female			1805		1561	28.8%
	Total	3649	77.3%	3671	70.6%	3338	61.5%
Foreign National	Male			124		117	2.2%
	Female			108		130	2.4%
	Total	98	2.1%	232	4.5%	247	4.6%
Other	Male					9	0.2%
	Female					8	0.1%
	Total	*	*	*	*	19	0.4%
Unknown	Male						
	Female						
	Total	*	*	*	*	30	0.6%
Grand Total		4722	100.0%	5201	100.0%	5428	100.00%

*No Data Available for these categories. ** Does not include Native Hawaiians. ***Total male pluse female may not add up to totals for each race/ethnic group. This is due to the fact that one school could not provide gender year breakdowns. This school is included only in the totoal number and percentage for each race/ethnic group.All other percentages are based on 16 schools

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Vistakon Introduces "Innovation Platform"

Vistakon®, Division of Johnson & Johnson Vision Care, Inc., announced plans to roll out its "Innovation Platform" - a series of programs that promote optimal eye health, stimulate growth in the eye care industry and elevate the role of the eye care professional. The Platform includes new product rollouts, expanded educational programs and improved business policies that facilitate more responsible and responsive eye care practices.

"Our Innovation Platform will set the stage for a renaissance in eye care, made possible through the latest vision science advances," said Philip R. Keefer, president, Vistakon® Americas. "The program assists eye care professionals in their ongoing efforts to build ethical, responsible and competitive practices that provide state-of-the-art products and services that their customers can rely on."

The priorities of the Platform include: growth in the contact lens business, product innovation and improvement, increasing eye care awareness, superior customer value and ongoing corporate responsibility.

Transitions Reports Strong Polycarbonate Sales

Wide product availability in polycarbonate designs and a leading-edge photochromic technology for polycarbonate lenses led Transitions Optical, Inc. to report a near doubling of its polycarbonate sales in first quarter 2001 versus one year ago. Transitions is the only company offering variable tint optics in polycarbonate designs.

"Polycarbonate sales overall are hot," said Dave Cole, general manager of the Americas for Transitions. Polycarbonate lenses represented 28 percent of all prescription lens sales in first quarter 2001, up 7 percent over one year ago. Overall sales of other lens materials during first quarter 2001 were relatively flat.

"Our exclusive, patented process technology allows for consistency in photochromic properties in all lens types including polycarbonate," Cole added. "And, Transitions are available in every refractive index to meet the needs of every patient desiring polycarbonate lenses."

Transitions has manufacturing operations in Pinellas Park, Florida; Tuam, Ireland; Manila, Philippines; Sumare, Brazil and Adelaide, Australia. For more information, visit transitions.com or contact Transitions Customer Service at (800) 848-1506.

Biocompatibles Announces Winners of 2001 Innovative Research Awards

Biocompatibles Eyecare, Inc. and the American Optometric Foundation recently announced the winners of the 2001 Innovative Research Awards. The awards, sponsored by Biocompatibles Eyecare, encourage students to expand or explore the current body of knowledge surrounding contact lenses or associated technology and to discuss their findings in a 2,500-page research paper.

The awards were presented for the first time at the close of the 2001 spring term. Sixteen school-level winners received $2,000 awards and the national winner received an additional $5,000. Thomas Stickel, who recently graduated from the Indiana University School of Optometry, received the national award for his submission.

"We are extremely pleased with the success of this new program," said David Israel, managing director for Biocompatibles Eyecare, Inc. "All of the U.S. schools took part and the quality of the submissions we received was exceptional. We are proud to reward innovative thinking in the field of contact lenses and to support these promising practitioners as they begin their careers in optometry."

The Biocompatibles Research Awards will be offered annually through the 17 ASCO-accredited schools and colleges of optometry in the U.S. and Puerto Rico, and, beginning in 2002, will be expanded to include the Canadian optometry schools in Waterloo and Montreal. Third and fourth year students are eligible to apply and will have until March to submit a

(Continued on page 29)

paper; applications are available in the dean's office during the fall term.

PRIO Studies Will Investigate Productivity and Computer Vision Disorders

New clinical studies will examine the correlation between improved visual status of office workers and increased productivity and efficiency.

"Computers have changed the way we work. Yet, until now, no definitive study has shown whether worker performance is affected directly by how well they see the computer screen," said Jon Torrey, president/CEO of PRIO Corporation, which funded the studies. "We believe this study will show conclusively that there is a strong correlation between improved computer vision and worker productivity. This will also prove that it's good business for employers to provide computer eyewear to their computer-using employees."

While health organizations such as NIOSH (National Institute of Occupational Safety and Health), have done numerous studies that suggest that computer eyestrain may decrease productivity and efficiency, no study has been conclusive. NIOSH has called for more research in this area.

That is the objective of two double-blind masked studies underway at the University of Alabama at Birmingham School of Optometry. Dr. Kent Daum, who is conducting the studies, is examining the correlation between the refractive corrections of workers using computers and productivity in the workplace. Separate studies are being conducted in the workplace and under laboratory conditions.

PRIO, a market leader in the computer vision industry, has developed the only FDA Class 1 computer vision diagnostic instrument on the market and the Complete Computer Vision Solution for independent eye doctors. Visit www.prio.com or call (800) 621-1098.

Marchon Eyewear Pursues International Counterfeiters

As part of ongoing efforts to protect the integrity of Marchon's proprietary and licensed products and brands, several significant enforcement actions and arrests have taken place abroad. Marchon has identified several sources of counterfeit products in various countries including Italy, Korea, China and South Africa. In all countries, the cases involved the distribution of Calvin Klein and cK/Calvin Klein counterfeit products.

Marchon participates in the IACC (International Anti-Counterfeiting Coalition) in Washington, which collaborates with a number of U.S. and International law firms and private investigation services to assist companies with counterfeit suits. Marchon also works closely with U.S. Customs and foreign Customs authorities worldwide to maximize enforcement efforts.

Al Berg, Marchon CEO, stated, "We will continue to mount extensive investigations, enforcement and prosecutions of counterfeiters, and will seek damages, restitution and injunctions to the fullest extent of the law in order to protect our licensed and house eyewear brands."

Paragon Expands Marketing Team

Paragon Vision Sciences made several new additions to its marketing team to support eye care practitioners and authorized laboratories worldwide. New team members include: Jan McGlothlen, product manager, RGP Core Products; Sally Cecil, customer marketing, Cooperative Advertising and Promotion Program (CAPP) manager, Marcia Goodrich, marketing coordinator, CRT Global; Valerie Darding, marketing and sales coordinator, International, and Sabrina Moser, marketing coordinator, Core Products.

"This is an exciting time for us, with new brands such as Paragon HDS® 100 and in anticipation of the launch of new advancements such as Paragon CRT®, we need creative people on board to provide us with new ideas to move forward in this very competitive environment" said Kathy Shafer, director of marketing. Visit Paragon at www.paragonvision.com or call (800) 528-8279.

Zeiss Installs Nineteen Foundation™ Machines

Carl Zeiss Optical, Inc. announced the completed installation of 19 Foundation™ coating systems at select Zeiss partner laboratories.

The Foundation™ machine (Sonicoat 14-6A coating system) is fully automated allowing an increased output. The Sonicoat can also clean lenses prior to AR coating. Its control system is able to process FoundationTM coating and AR washing baskets simultaneously through the machine.

"The Zeiss Sonicoat is unique in the industry," states Tom Butler, vice president, technical operations. "It is the only system designed and engineered to produce state-of-the-art ultra high performance hard coatings in Rx labs thereby allowing Zeiss Foundation™ partner labs to control processes and product quality, substantially shorten delivery times and utilize existing personnel and in-house resources. The ability to apply premium hard coatings in-house will become even more important for our partner labs with the upcoming Zeiss introduction of new progressive lens making technology," states Butler.

Carl Zeiss Optical, Inc., located in Chester, Virginia, is the U.S. headquarters for the distribution of Carl Zeiss, Germany ophthalmic lens products, coating equipment, binoculars and riflescopes. For additional information, please call 1-800-338-2984 or visit our Web site at www.zeiss.com.

IN REVIEW

Manual of Contact Lens Prescribing and Fitting with CD-ROM, second edition. MM Hom, ed. Boston: Butterworth-Heinemann, 2000, 493 pp., $55.00.

This is a comprehensive manual on topics related to contact lens fitting and care. It is divided into six parts, including: basic concepts related to contact lens fitting (e.g., anatomy and physiology, anterior segment disease related to contact lenses, and examination techniques for contact lens fitting), rigid lens design and fitting, soft lens design and fitting, disposable and extended wear, and special topics (e.g., dry eyes, keratoconics, bifocals, postsurgical fitting, refractive surgery and contact lenses, and orthokeratology).

The addition of the CD-ROM to this book is an outstanding feature. Video images show different fitting relationships, and help directly demonstrate concepts that are important in contact lens care. The use of video pictures and moving images is an educational feature that is not available on the flat pages of a book. The old adage says that "a picture is worth a thousand words," and the CD-ROM demonstrates that moving pictures and video images are able to do what words alone cannot.

The CD-ROM demonstrates different RGP fitting relationships, as well as clinical cases related to bifocal, keratoconic, orthokeratology, postsurgery fitting. The CD-ROM is an invaluable teaching tool, which promotes direct clinical application and understanding. It helps make this book stand out from other books that do not offer this option. Practicing clinicians, as well as students, will find this book a welcome and helpful learning resource to expand their expertise in all topics related to contact lens care.

Reviewer: Dr. Ellen Richter Ettinger
New York, New York

The Companion Handbook to The Cornea, second edition. Kaufman, Barron, McDonald and Kaufmann: Butterworth-Heinemann, 2000, $79.95.

The stated purpose of this compact, but comprehensive text is to serve as a hands-on resource to the practicing eye care provider and ophthalmic corneal surgeon. It is meant to complement the "parent" textbook., The Cornea, authored by the same team of experts in the field of anterior segment disease. This purpose has been achieved in my opinion by covering in practical detail a wide range of topics related to diseases of the cornea and associated surgical procedures.

The opening chapters deal with basic science topics such as corneal anatomy, physiology, and immunology. With fewer than 20 pages dedicated to these less practical topics, the text then jumps into clinical sciences. A review of numerous clinical areas such as tear film abnormalities, infectious diseases of the conjunctiva and cornea, corneal degenerations and dystrophies, as well as influences of trauma and metabolic disorder on the cornea, complete the second section of the book. Finally, a significant portion of the text is dedicated to surgical procedures of the cornea, which include: lamellar and penetrating keratoplasty, conjunctival flap procedures, phototherapeutic keratectomy, and a fairly comprehensive review of refractive surgical procedures (RK, AK, PRK, LASIK, Intrastromal ring segments, and phakic IOL's). A brief, and in my opinion, insufficient portion of the handbook is reserved for a section on corneal changes from contact lenses and corneal topography issues.

As a clinical reference source that can be used chair side in your office or clinic, The Companion Handbook to The Cornea meets most all of the needs that a busy clinician might have. I felt, however, that some of the sections on the treatment of a number of the disease entities were either incomplete or not of sufficient detail to fully satisfy the clinical needs when one is face to face with a difficult case. Notably, in the section on the treatment of bacterial keratitis, little mention of the ever-greater role of fluoroquinolones was given.

Faced with the overwhelming task of covering the exhaustive topics related to the cornea, I feel that The Companion Handbook to The Cornea meets the task admirably. It would be a good choice to keep as a reference close by our examination desks.

Guest Reviewer: Dr. S. Barry Eiden
North Suburban Vision Consultants, Ltd. Deerfield, Illinois
University of Illinois Department of Ophthalmology, Cornea and Contact Lens Service

An Optometrist's Guide to Clinical Ethics. RN Bailey, E. Heitman, eds. American Optometric Association, St. Louis, Missouri, 2000, 180 pp., $ 19.95

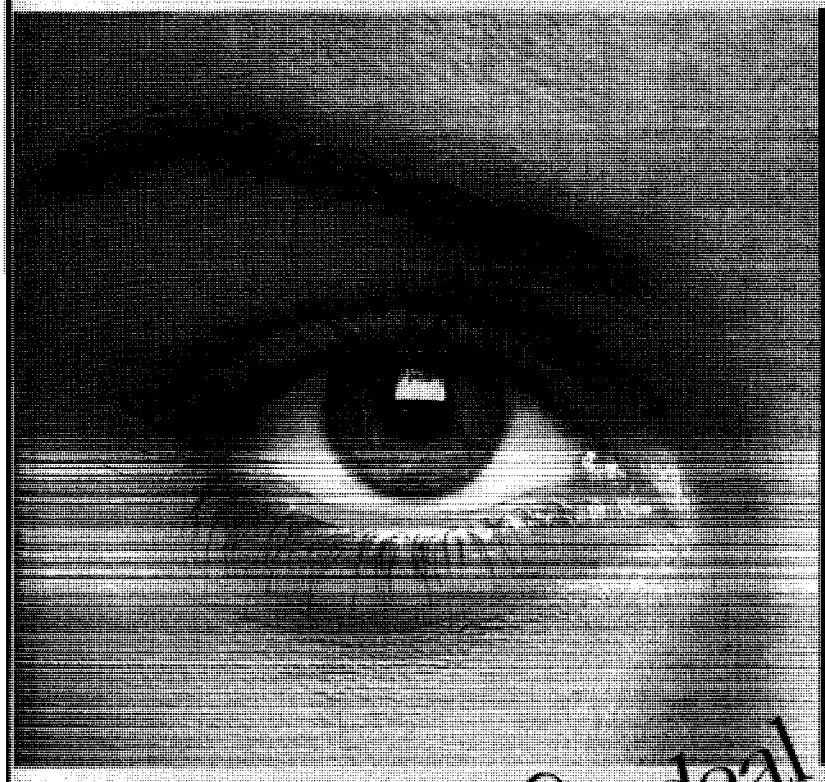
This text was intended to discuss the ethical issues that arise in the clinical practice of optometry and to give guidance to optometrists dealing with ethical issues in practice. It does the former very well but falls somewhat short in the latter. The issues discussed include ethical decision making in practice, the doctor-patient relationship, shared responsibilities in patient care, relationships with other professionals, screening practices, third party care and payment, new technology and equipment, and dealing with specialty populations such as children, the elderly, the institutionalized patient, the indigent patient, the partially sighted patient and multicultural patients.

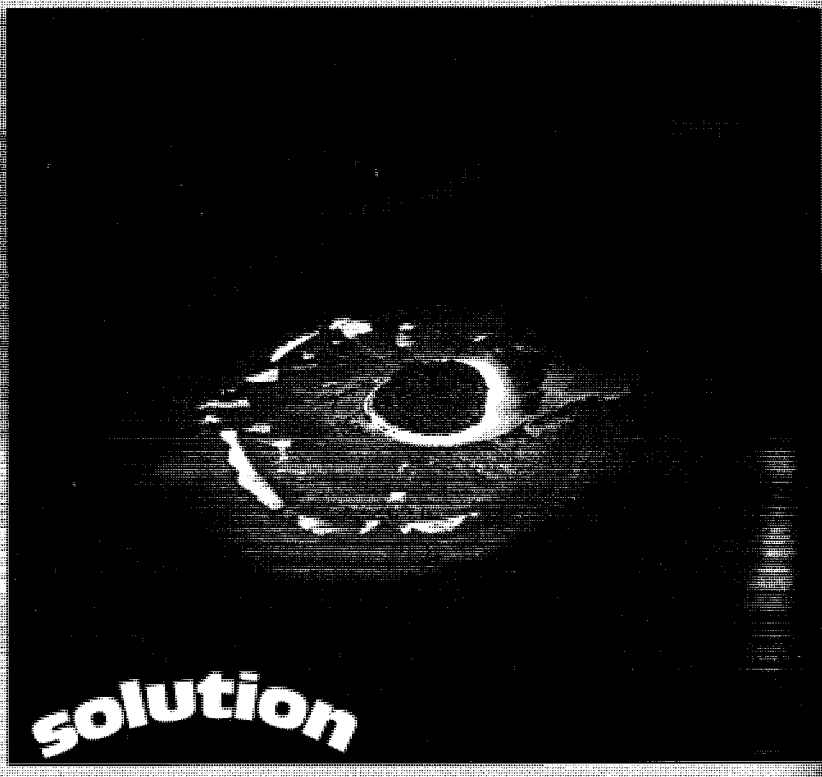
A case scenario leads each chapter. The remainder of the chapter is a discussion of the ethical issues related to the case subject. The cases are believable real practice situations that both the clinician and student can related to. The discussion is generally well organized, easily read, and comprehensive in dealing with the subject. The guidance in dealing with these ethical issues generally relates to the Code of Ethics of the American Optometric Association, the Optometric Oath and to the American Optometric Association Standards of Conduct. The optometrist who can remember these, and knows to put the patient's interests first, will generally not need or get any further guidance from this text. The text may have been able to offer more guidance to the practicing clinician if it discussed in more detail why these issues could cause moral dilemmas in the minds of the practicing optometrist. I feel that the tone of the text is more appropriate for the student clinician as a text for an ethics or public health course, rather than a practice management course. The text specifically leaves out a discussion of the ethical concerns related to the business aspects of optometric practice, which would be more valuable to the practicing optometrist.

This text was commissioned and reviewed by the American Optometric Association Ethics and Values Committee. It was financed by a grant from CIBA Vision. Contributing authors include the editors as well as leading optometrists in both institutional and private practice.

This is a text that can be a valuable resource to optometric educators and students in both didactic and clinical teaching situations. It has more limited value to the practicing optometrist who would be likely to read this through once and not find the need to refer to it in the future.

Guest Reviewer:
Dr. Stuart M. Rothman
Associate Clinical Professor
State University of New York
State College of Optometry





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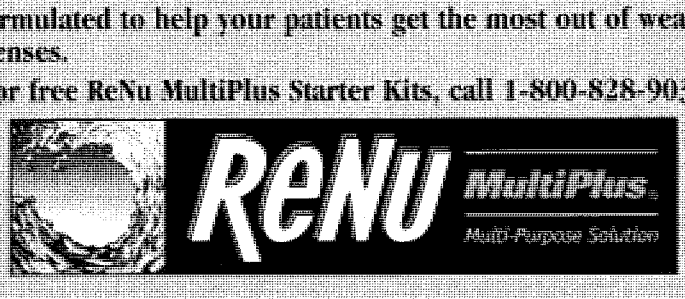

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