The Journal of the Association of Schools and Colleges of Optometry

OPTOMETRIC EDUCATION

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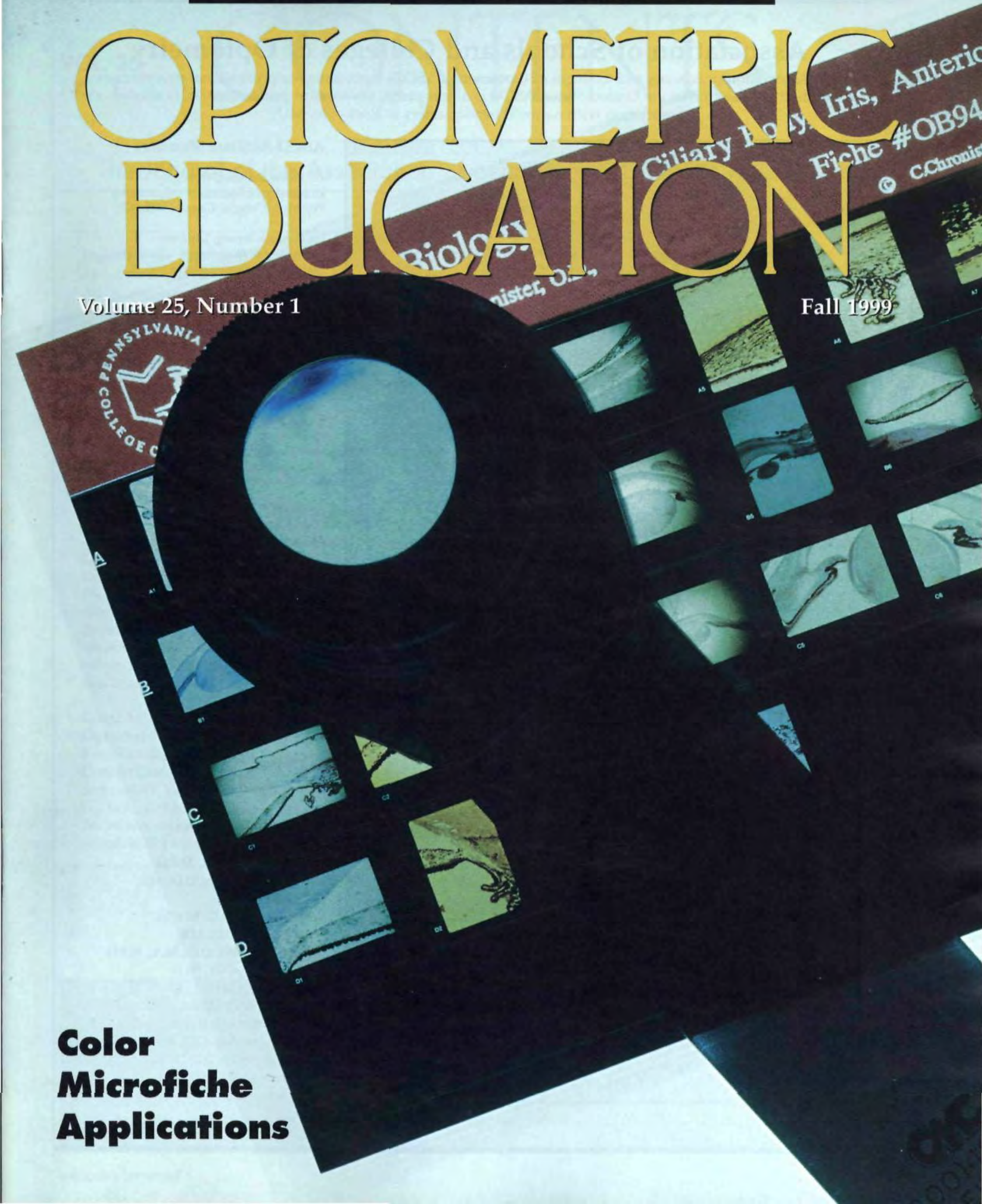

Color Microfiche Applications

Association of Schools and Colleges of Optometry

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

OPTOMETRIC EDUCATION

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DEPARTMENTS

Cover Photo: *Color microfiche and handheld viewer, courtesy of Ron Davidoff, Pennsylvania College of Optometry.*

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MEMBER

OPTOMETRIC EDUCATION is published by the Association of Schools and Colleges of Optometry (ASCO). **Managing Editor:** Patricia Coe O'Rourke. **Art Director:** Carol Nansel, Nighthawk Communications. Business and editorial offices are located at 6110 Executive Boulevard, Suite 510, Rockville, MD 20852 (301) 231-5944. **Subscriptions:** JOE is published quarterly and distributed at no charge to dues-paying members of ASCO. Individual subscriptions are available at $20.00 per year, $30.00 per year to foreign subscribers. Postage paid for a non-profit, tax-exempt organization at Rockville, MD. Advertising rates are available upon request. OPTOMETRIC EDUCATION disclaims responsibility for opinions expressed by the authors. Indexed in Current Index to Journals in Education (ERIC).

Guest

EDITORIAL

Meeting the Educational and Professional Needs Of Our Faculty

William M. Dell, O.D., M.P.H.

As the twenty-first century rapidly approaches, I sometimes think that we, as optometric educators, are still mired into a mindset more consistent with the first half of this century in a number of ways we conduct our business! What exactly do I mean? The specific issue I am addressing is the lack of a national meeting in which optometric educators convene solely to address issues relevant to optometric education. These issues include curriculum planning and development; educational technology and informatics; organizational issues; admissions and recruitment; evaluation and assessment — classroom, laboratory and clinical; theories of learning and instructional methodologies, e.g., case-based learning(CBL), problem-based learning(PBL), etc.; assessment of teaching effectiveness; curriculum program evaluation; clinical education and teaching; research methods; continuing education and advanced competency; manpower studies; and professional characteristics, to name a few.

Such meetings are part of the national, annual agenda for medicine, dentistry, and nursing, for example. Yes, ASCO has annual meetings for the presidents and deans of the schools and colleges of optometry but these meetings attend to the business and operations issues of its members. And yes, ASCO organizes and supports "special" meetings and summits every year or so. But these are also largely attended by presidents, deans, other administrators with only a smattering of "rank and file" faculty. And yes, ASCO supports the development and activities of special interest groups(SIGs) in such areas as ethics, ophthalmic optics, clinical directors, and optometric informatics, etc. And yes, there is an optometric education section within the American Academy of Optometry. And yes, many optometric educators attend the annual meeting. But the time allotted to the broad array of significant issues that are affecting and that are important to optometric education is limited. Faculty participation is also limited for varied reasons, including conflicts with other sections, time, and the limited presentation of subjects of interest to faculty of the issues addressed in any given year.

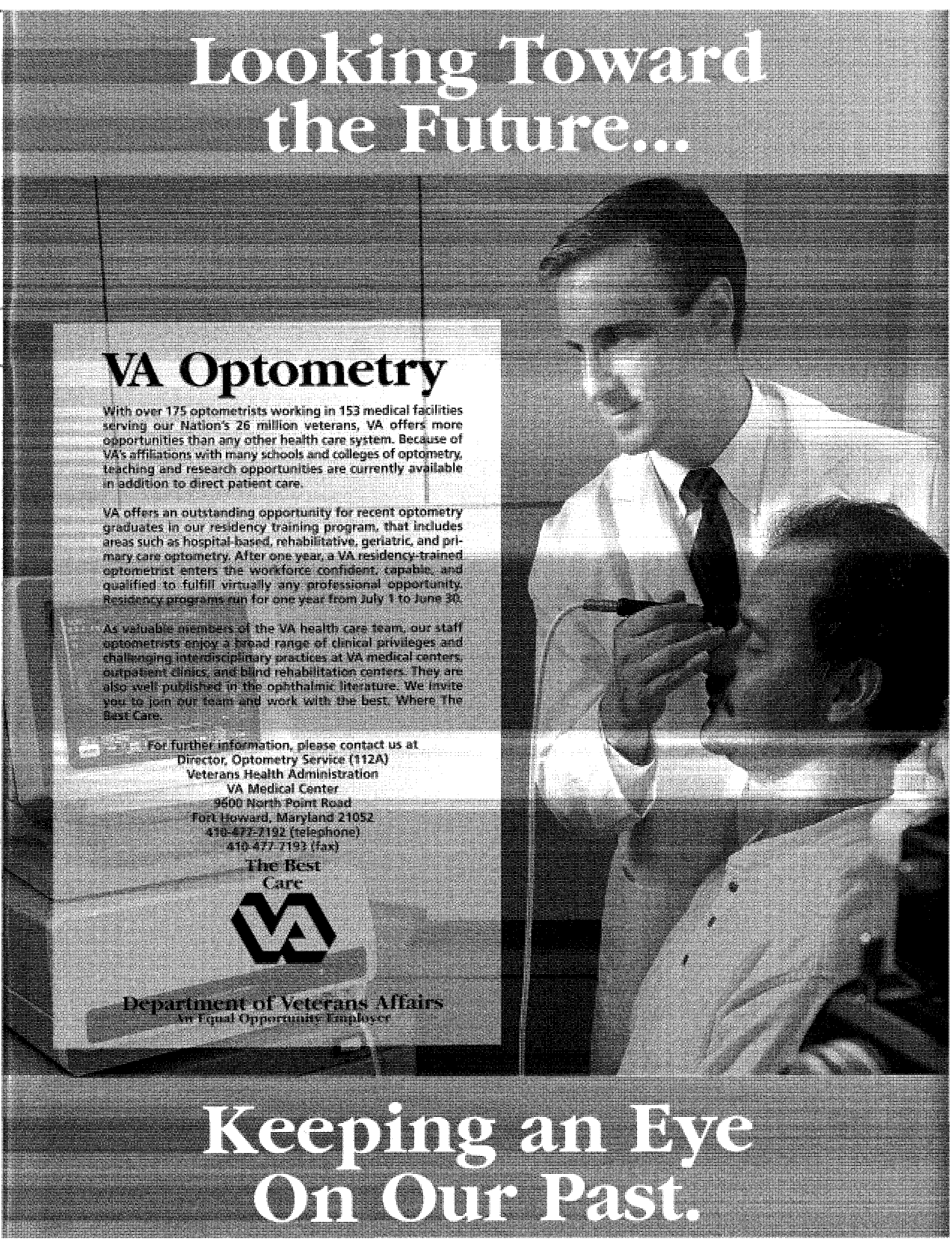
But where is the opportunity, indeed, the requirement, for optometric faculty to get together collegially in addressing the issues outlined above? How and where do the vision science educators meet to address curriculum development issues in their discipline? The same can be said for every discipline - anatomy, biochemistry, clinical procedures, or glaucoma, etc. Where is the involvement of the "rank and file" in exploring and effectively exchanging information across institutions on such issues as instructional methodologies, Web-based education, or problem-based learning?

How can we most effectively grow and develop as a profession and as educators without that kind of exchange? Do we not have this responsibility to all our faculty as a faculty development issue? If we take our educational responsibilities seriously, then we must address resolutely the educational and professional needs of our faculty.

How might this be accomplished? One way is to simply schedule an annual optometric educators meeting annually. A day (or even a half-day to start) might be added to the annual meeting of the Academy. Perhaps you, as readers, might have a better solution. Let's hear from you!

And in the not too distant future, computer-based video conferencing or information exchange might be the most cost-effective and efficient way to go. The twenty-first century is upon us. Let's join it!

Dr.Dell is associate dean for educational programs at the Pennsylvania College of Optometry.



Looking Toward the Future...
VA Optometry
With over 175 optometrists working in 153 medical facilities serving our Nation's 26 million veterans, VA offers more opportunities than any other health care system. Because of VA's affiliations with many schools and colleges of optometry, teaching and research opportunities are currently available in addition to direct patient care.
VA offers an outstanding opportunity for recent optometry graduates in our residency training program, that includes areas such as hospital-based, rehabilitative, geriatric, and primary care optometry. After one year, a VA residency-trained optometrist enters the workforce confident, capable, and qualified to fulfill virtually any professional opportunity. Residency programs run for one year from July 1 to June 30.
As valuable members of the VA health care team, our staff optometrists enjoy a broad range of clinical privileges and challenging interdisciplinary practices at VA medical centers, outpatient clinics, and blind rehabilitation centers. They are also well published in the ophthalmic literature. We invite you to join our team and work with the best. Where The Best Care.
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TECHNOLOGY TOUCHSTONE

William M. Dell, O.D., M.P.H.

The celebration of the new millenium is but a few months away. While one thousand years of history have elapsed, there have been only a few developments in that period of time that have produced profound change in the nature and systems of education and learning. One such development was the invention of movable type by Johann Gutenberg in the 15th century. It enabled the rapid and relatively inexpensive publication of books and manuscripts, which could then be disseminated throughout Europe, accelerating the Renaissance in the process.

Today we are encountering another such "Gutenberg inflection point"in which the rapid developments in technology and the advent of the Internet are dramatically changing our access to information and the ability and means of communication. To say that the impact on the academy may be significant is to grossly understate the potential impact. Indeed, there are a number of proponents who maintain that the bricks and mortar of what constitutes today's college or university may well disappear by the middle of the next century. While that might be a radical concept, change, as a consequence of technology, is certainly afoot.

As optometric educators, it is obvious that we need to keep abreast of these technological changes, how they impact our institution and how we teach, deliver and model patient care. This column in *Optometric Education* is dedicated to that task. My erstwhile colleague, Dominick Maino, O.D, M.Ed., professor, Illinois College of Optometry, and I will attempt to inform you and, just as importantly, stimulate your own interest in the various areas of technology that we will address. The column will present three to five abstracts on a particular subject matter (e.g. distance education; telemedicine; asynchronous learning; computer laboratories; educational assessment, etc.) and will be preceded by an introduction and followed by a concluding summary. Dr. Maino and I will alternate issues as lead columnist, but we will collaborate on each issue.

We hope that the column will be interactive and that you, as colleagues, will be stimulated enough to provide your own ideas and concepts for future columns and your thoughts and commentary on those already presented. Indeed a listing of educational web sites of particular interest on the subject matter at hand might be an additional part of what is presented and we might ask for your contribution in that regard.

ASCO has recently established a special interest group (SIG) in optometric informatics that is dedicated to advancing technology issues in optometric education, research, and patient care. But that's the subject, perhaps, for a future column! You tell us!! Your feedback, issues and insights are more than welcomed. We hope that you will find this column meaningful and enjoyable.

Send Column Ideas to:

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Dr. Dell is associate dean for educational programs at the Pennsylvania College of Optometry.

INDUSTRY NEWS

Alcon's Opti-free® Express® Gets High Marks

In the first two months it has been available, optometrists nationwide have adopted Alcon's new formula Opti-Free® Express® Multi-purpose Disinfecting Solutions (MPDS) with Aldox® antimicrobial as their solution of choice, according to Sue Faro, marketing manager, lens care, at Alcon.

Faro said that "Key findings from a June survey of ODs conducted by a third party research organization sponsored by Alcon showed that over 98% of them have dispensed New Express with Aldox to their patients, an indication that practitioners are convinced of the new formula's enhanced disinfection efficacy and one-bottle convenience."

Released in May, Express with Aldox combines high microbiological efficacy with the convenience of a multi-purpose solution. The new formula solution maintains Opti-Free Solution's already established powerful cleaning and protein removal characteristics while achieving the highest criterion for disinfection, an important step in the evolution of contact lens care.

B & L Introduces *PureVision* Lens

Bausch & Lomb announced the availability of the *PureVision* lens, a "significant breakthrough in contact lens technology." Bausch & Lomb has received FDA approval to market the lens for up to 7 days and 6 nights of wear.

PureVision lenses are made of a new material, balafilcon A, incorporating advanced AerGel™ technology. AerGel technology's unique blending of silicone and hydrogel offers a new level of ocular health and comfort in continuous wear. The lens combines the excellent oxygen transmissibility of silicone and the fluid transport capacity, dehydration resistance and viscoelastic properties of ordinary hydrogels, for healthy and comfortable continuous wear. The oxygen transmissibility (Dk/t) of *PureVision* lenses is 110 (at -3.00D).

"Bausch & Lomb has invested over 25 years of research and development to create a breakthrough lens technology that overcomes the limitations of current options in extended wear," said Carl F. Sassano, president and COO of Bausch & Lomb. He added, "We are committed to fulfilling patients' and practitioners' needs for a lens that offers both greater convenience and excellent ocular health."

Vistakon Consultation Team Dispenses Advice

Vistakon, a division of Johnson & Johnson Vision Products, Inc., has established an innovative Specialty Contact Lens Consultation Team to assist their accounts in fitting the new ACUVUE® *BIFOCAL* (edafilcon A) contact lenses, Vistakon's premier specialty contact lens product. The consultation team is comprised of four optometrists (Drs. Nancy Barr, George Ehlert, Glen Knezich and Jon Walker) and two technicians.

The Consultation Team assists colleagues with fitting questions and issues they may have about the ACUVUE® BIFOCAL (etafilcon A) contact lenses. They also schedule and moderate telephone conference calls where several colleagues join to discuss ways to increase their fitting success with the lens. A recent study showed that the average increase in ACUVUE® BIFOCAL business, among accounts that have worked with the Consultation Team, was 70.5%.

Each of the fitting consultants offers support to accounts in specific regions of the U.S. to allow for more personalized service. Accounts can call the Consultation Hotline from 8 a.m. to 8 p.m., eastern time, Monday through Friday. The fitting consultants can be reached at a special consultation hotline toll-free number (877) 334-EYES (3937).

VICA Releases Optical Research Data

The Vision Council of America (VICA) highlights the best optical research available with the 1999 VICA Optical Industry Compendium. This is the third and most comprehensive edition of the compendium, presenting data in prose, charts and graphs to help clarify trends and the impact of technology on the ophthalmic marketplace. New this year are sections that examine retail trends, Internet commerce, optical companies, ophthalmic pharmaceuticals and publicly traded optical companies.

VICA members receive a complementary copy. Copies are available to eyecare professionals for $10 and optical laboratories for $7. A preview of the compendium is available on the VICA Web site: http://visionsite.org/profes/compspring99.htm

Wesley Jessen Announces Student Research Awards

Five optometry school students have been named 1999 winners of the Wesley Jessen Excellence Award for their original research papers on contact lenses or cornea related topics.

"Wesley Jessen was founded by an optometry school professor, Dr. Newton Wesley, and his prize student, Dr. George Jessen. Wesley Jessen has remained committed to that heritage of highly valuing optometry school research," said Dr. Dwight Akerman, Wesley Jessen's director of professional services, about the Excellence Award program, which was begun in 1989.

The 1999 first place award winner is Daniel Harvitt of the University of California at Berkeley, School of Optometry. Other winners are: second place — Tera R. Nakano and Cindy C. Hung (SCCO); third place — Faten Fares, O.D. (UM) and Jason

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IN REVIEW

Atlas of the Peripheral Fundus. 2nd ed., William L. Jones, Boston: Butterworth-Heinemann, 1998, 258 pages, $100.

This book is the second and revised edition of a clinically-oriented atlas and text that has as its subject matter the normal and abnormal conditions of the peripheral retina, choroid, and vitreous. Although it covers many of the developmental anomalies of the retina and vitreous, its focus is on those degenerative processes and other anomalies of the retina and vitreous, which can result in a retinal break or detachment. As retinal breaks or detachments are the most significant findings in the evaluation of the peripheral retina, this focus is appropriate. Consequently the author has chosen to materially expand the chapters on peripheral retinal breaks and retinal detachment in this edition.

As in the first edition, the author presents a discussion of each clinical entity. This includes the clinical description, histopathology, clinical significance, and a discussion of the treatment for each condition. This second edition expands the text for each chapter. The enhanced discussion of each condition/disorder, I believe, substantially enhances its usefulness. It provides the reader with a greater understanding of the developmental or disease process, the diagnostic, treatment, and referral options, and information for patient education. An exception to the overall enhancement is the first chapter, "Viewing the Peripheral Fundus." Its two pages are too superficial to have any real value, even in the attempt to briefly present the topics of scleral depression and specialized fundus lenses. I believe the book would be better served by the author either expanding this chapter, or by eliminating it all together. The histopathologic diagrams have also been refined and there is occasional use of a chart or table to highlight certain points. The use of B-scan ultrasonograms where appropriate is also expanded, another plus. Each chapter also includes an updated and significantly increased list of references for those seeking more information on a particular topic.

Although titled an atlas, it is not an atlas in the classic sense, i.e., having many photographs and limited discussion. Each condition, however, is illustrated with at least one color photograph and histopathologic drawing. As in the first edition, a great deal of the usefulness of the book is in its presentation of the photographs of the conditions under discussion as photographed through a condensing lens. For both the novice and the experienced clinician, the appearance of a lesion as it is normally visualized with a binocular indirect ophthalmoscope is particularly helpful and effective. The book has been altered and enlarged in format from the 1985 edition to a more familiar 8½ x 11-inch format.

Texts that address the peripheral retina are sparse; texts that do so as effectively for the novice and experienced clinician, alike, from this perspective are rarer yet. I recommend the book with great enthusiasm.

Reviewer: Dr. William M. Dell
Pennsylvania College of Optometry

Clinical Procedures in Primary Eye Care. David B. Elliott, ed. Oxford: Butterworth-Heinemann, 1997, 230 pages, $52.50.

Teaching primary optometric examination procedures to first and second year optometry students is often relegated to residents, teaching assistants, and junior faculty. This isn't because these procedures are unimportant. They are just not easy to teach. As a result, any text that makes this activity easier on the instructor should be welcomed with open arms. *Clinical Procedures in Primary Eye Care,* therefore, is a tool that deserves more than a passing glance.

In the preface, the author describes the purpose of this text as a teaching aid for undergraduate optometry students in the United Kingdom. Indeed, the content is laid out very much like a clinical methods manual. It contains six sections: introduction, which includes a review of the minimum eye examination in the UK; refraction; post-refraction binocular vision testing; ocular health assessment; and optometric treatment.

The organization of the book is straightforward. It uses bold headings to distinguish between the different topics within each chapter. The authors also include references to other texts relevant to the topic at hand. For each test, a step-by-step description of the activity is given, along with expected responses by the patient. Suggested recording formats help to define what data the clinician should glean from the test. One key element is the addition of a section called "most common errors." This section would be especially helpful to the novice clinician.

Most of the key elements of the optometric exam are included. There is a slant towards refractive/binocular vision aspects, but this is not necessarily a detriment in a book for its intended audience. Many texts exist today in the diagnosis and treatment of ocular disease and abnormalities, but those concentrating on the traditional aspects of optometric practice are fewer in number.

The book falls short of its goal in several areas. First, although the stated audience is the optometry student, there is not enough detail to support a beginning clinician during an eye exam. The descriptions do provide the key elements of the tests, such as test distances, targets and the like, but these are buried in the text, where it would be easy for a student to overlook them. A better approach would be to list these separately, as a ready reference to the student.

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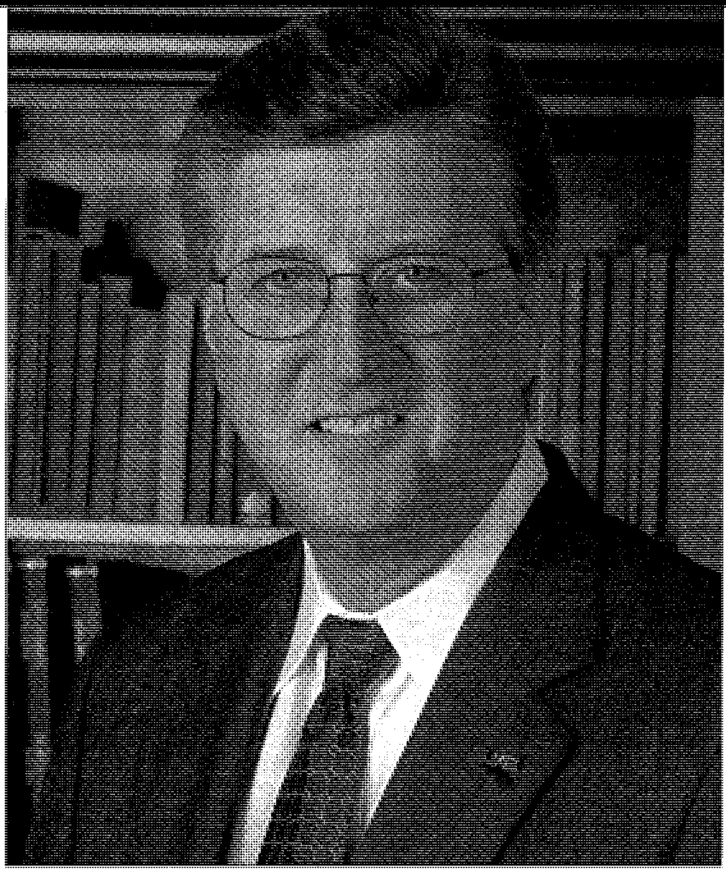
Focus on the President



AROL R. AUGSBURGER, O.D., began a one-year term as ASCO's president in June 1999. Dr. Augsburger is dean of the University of Alabama at Birmingham School of Optometry.

A native of Lima, Ohio, Dr. Augsburger studied at Earlham College and graduated from The Ohio State University College of Arts and Sciences in Columbus with a B.S. degree. He received his O.D. degree (cum laude) from The Ohio State University College of Optometry and a Master of Science from The Ohio State University Graduate School in 1971.

Dr. Augsburger served for over two decades on the faculty at The Ohio State University College of Optometry before being chosen in 1974 as dean at the University of Alabama at Birmingham School of Optometry where he is responsible for all academic and fiscal programs with a $10 million operating budget and over $25 million of extramurally funded research.

Dr. Augsburger serves as chair of the American Optometric Association Commission on Ophthalmic Standards. He is the immediate past president of the National Board of Examiners in Optometry. He also represents optometry to the National Institutes of Health as a member of the National Eye Health Education Program.

State, local and national awards and appointments fill his curriculum vitae including a selection by the American Optometric Association as the National Optometrist of the Year in 1986.

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

OPTOMETRIC EDUCATON: Dr. Augsburger, I understand that you have made "Impact by Involvement" the theme of your year as president. Specifically, what does this mean for ASCO?

Augsburger: The concept of "Impact by Involvement" is consistent with one of the strategic objectives of ASCO. It encourages involvement by our member institutions in government affairs activities with other health profession organizations and with other educational organizations. In addition, there is a whole range of foundations and public interest institutes such as the Pew Foundation and the Kellogg Foundation, where optometry has never realized its full potential. Consequently, optometry has not been involved in many of their initiatives that help to serve the public. It is our obligation as ASCO institutions, and as individuals who represent those institutions, to encourage active participation by optometry in these endowment agencies. It is only through an active group effort and through teaming with other organizations also interested in governmental affairs (such as the American Optometric Association) that we have the best opportunity to promote the interest of optometric education to the American public. We must be involved to have impact. Impact is severely limited if we merely continue talking to ourselves. It is imperative that our dialogue be with the larger communities representing the best interests of the American and international populations.

OPTOMETRIC EDUCATION: What are the challenges facing the schools and colleges of optometry as they enter the 21st century?

Augsburger: Challenges are really opportunities. We must consider how the schools and colleges of optometry can continue to provide added value to optometry's professional students, postgraduate residents, and (in certain of our schools) graduate students, in vision science and physiological optics. Expanding expectations of optometrists as primary eye care providers and as the creators of new information and understanding of the eye and vision system fuel this challenge. If we merely continue doing what we now do very well, we will clearly be out-of-date early in the 21st century. The curriculum and patient experiences of our professional students, and research of our faculty members, must evolve as the expectations of professional confidence change across the country.

The research and scholarly activities conducted by our schools and colleges of optometry must not be limited to the traditional physiological optics programs that have been the strength of the development of traditional optometry. They must continue to evolve along the biomedical models that expectations of practice have followed. This means that there is a real need for innovations in molecular biology, structural biology, neuroscience and the impact of genetics on eye and vision disorders. To be at the cutting-edge as a respected biomedical profession, we must be able to compete at the highest levels and with the best biomedical scientists who are also following these same directions into the 21st century.

The financing of optometric education will continue to present opportunities, which must be seized during the 21st century. While optometrists in practice have benefited substantially in the past two decades in terms of the overall income they may expect to earn during a successful career, the costs of the educational experience during those same two decades have grown faster than optometrists' income. In the early part of the 21st century, if these trends continue, the cost and benefit ratio may unfortunately slip into an unfavorable position. That is why ASCO is placing such significance during this year on the issues regarding student debt and the management of that debt. Internally, the schools and colleges must be creative and vigilant in establishing new opportunities to fund the professional development of our optometry students and the research studies of our faculty, clinicians and scientists. As a profession, we must become less dependent upon tuition, for tuition alone cannot fund the public benefit which optometry provides to so many of our citizens. Our schools and colleges must be involved increasingly in collaborative activities with the other health profession schools and colleges, or we risk the continuing isolation of optometry as a biomedical health career. Involvement can be accomplished in many different ways, but it is essential that collaborative experiences benefit the professional education of our students, the clinical development of our residents, and the competitiveness of our cutting-edge biomedical research programs.

OPTOMETRIC EDUCATION: You have represented ASCO on the boards of a number of affiliated groups. What special perspective does this give you as ASCO president?

Augsburger: Since optometry is still a relatively small profession, creative and ambitious people often have the opportunity to serve in multiple organizations during their careers. This has been a special pleasure of mine. The perspectives I bring to ASCO are from some of these organizations.

As a past president of the National Board of Examiners in Optometry (NBEO), I have been able to be a participant in the continuing development of a national standard examination, which is now accepted by all fifty states as part of the licensing procedure in optometry. While there still is opportunity for enhancement of this as a universal examination for licensure, the previous accomplishments of the NBEO point out the importance of consensus building as an essential element of what should be assessed as core knowledge at the entry level for new optometrists. The individual schools and colleges of optometry, through their faculty, are the key ingredients in the building of this knowledge base, tempered with the reality of practice situations and public health perspectives for the protection of our citizens. Having an impact by involvement is a fundamental responsibility of our optometric institutions in order to continue to forge future consensus.

I continue to serve as the Chairman of the AOA's Commission on Ophthalmic Standards. This commission participates with other voluntary and quasi-governmental standard-setting organizations in the U.S. and worldwide. We are the voice of optometry through the American Optometric Association in establishing standards for issues as mundane as the number of threads per millimeter for temple screws, the safety and efficacy of ophthalmic or contact lenses, and the Seal of Recognition program that can evaluate whether or not products like antiglare reflection screens for computers meet the needs of the public as advertised by the manufacturers. Standards are important to the respective ASCO institutions, for they require that a certain outcome be related to the adoption of standards. These standards also speak to the importance that optometry extends to enhance public health and the safety of our citizenry.

When the American Academy of Optometry initiated its program of scientific exhibits as part of its annual meeting, I was part of the inaugural planning committee. While I served as Chair of the Scientific Exhibits Committee, these exhibits grew from a minor part of the Academy meetings to what is now a significant event in the annual meeting of the American Academy of Optometry. Through this process, the critical role that the ophthalmic and health-related industries play has been re-emphasized to those of us who are involved in optometric practice, optometric education, and the development of research and scholarly activities. Indeed, the public is best served when we are working in conjunction with, and not at cross-purposes to, the various ophthalmic industries, which are essential for what we provide uniquely as optometrists.

OPTOMETRIC EDUCATION: You are the dean of one of optometry's important research schools. In your view, what role does ASCO play in fostering research?

Augsburger: ASCO's mission statement particularly references our service to the American public through the continued advancement and promotion of all aspects of academic optometry, i.e., teaching, service and research. This includes teaching fundamental principles of vision science and biomedical science, providing experiences at the clinical education level, at the residency education level, at the continuing education level and, for some institutions, providing mentoring at the graduate student level in vision science. A second aspect of academic optometry is its commitment to service. Its services include the delivery of patient care to the public served. Additionally, ASCO institutions provide the important service of eye and vision information dissemination among the various institutions and to the general public.

The third component of academic optometry's mission is research and scholarly activity, an underpinning of any group that calls itself a profession. A core issue related to optometric education is the fundamental principle of underlying research, which any vital profession continues to foster, publish and ultimately translate into better patient care. It is in this area that the members of ASCO fulfill a fundamental requirement in the evolution of the profession of optometry. Working with our partners like the American Optometric Association and the American Academy of Optometry, we can better represent the impact that optometric research can have. This advocacy must be made to government funding agencies and to other foundations and corporations that have an interest in sponsoring public health related and specific project eye and vision research. The mission statement of ASCO also commits the schools and colleges of optometry to provide leadership in education policy and research. Clearly, ASCO serves as an advocate and spokesperson on a national level for the very best in optometric education and in academic optometry.

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

Augsburger: We are all influenced by the company that we keep during our education and professional careers. People who share common experiences frequently influence each other during the process. It has certainly been true for me. Four of my colleagues who were also in graduate programs at The Ohio State University during the same earlier decade are now deans at other institutions: John Schoessler at Ohio State, Jerry Lowther at Indiana University, Al Lewis at Michigan College of Optometry at Ferris State (ed. note: Dr. Lewis will become president of The New England College of Optometry on November 1), and David Loshin at NOVA Southeastern. We were all fortunate at Ohio State to have the experience of graduate programs initiated by Glenn Fry who served as a mentor and role model even well after his retirement. My own graduate advisor, Richard M. Hill, also served previously as dean at The Ohio State University. He was my mentor for teaching professional students and my key advisor for the development of scholarly and research activities. He has been a true supporter of my involvement in optometry from the very beginning. Frederick W. Hebbard, who was dean at The Ohio State University College of Optometry when I joined the faculty, had the confidence to appointment me to clinic administrative roles at a relatively young age in my career. This opportunity and the help and experience of many other faculty members at The Ohio State University and at The University of Alabama at Birmingham were influential in developing my current perceptions of the significance of optometric institutions in today's society.

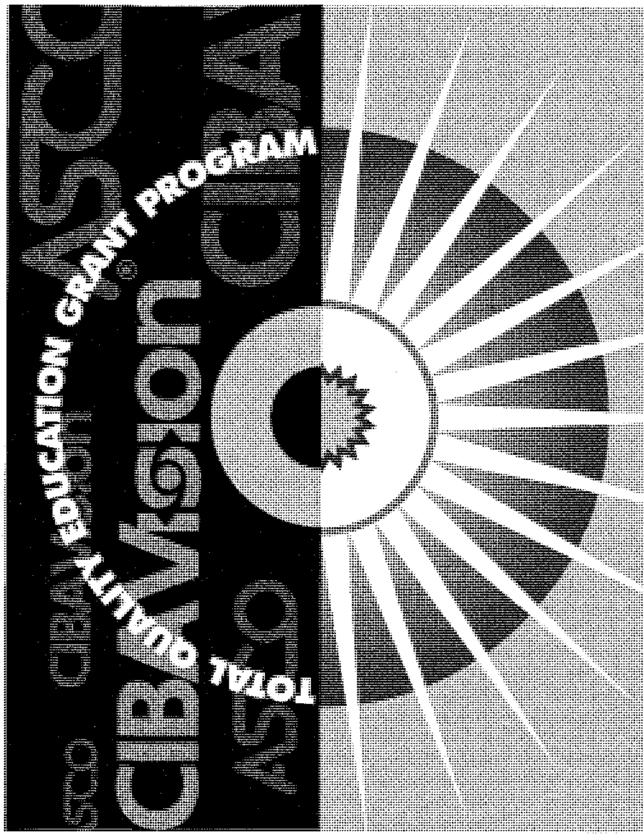
If we merely continue doing what we now do very well, we will clearly be out-of-date early in the 21st century.

We are all influenced by the people we work with in other optometric organizations. In my case that network includes the National Board where Executive Director Norman Wallis has played a key role in the evolution of optometry as a unified profession in the U.S. and now increasingly throughout the world. Other presidents of the National Board, who have exercised dramatic and sometimes controversial leadership, have, nonetheless, had a significant impact on my career development. Among them are John Robinson of North Carolina, Tom Lewis, president of Pennsylvania College of Optometry, and the current NBEO president, Les Walls, president of the Southern California College of Optometry.

My involvement with the American Optometric Association (AOA) goes back three decades. Early role models included notable alumni who served as AOA president: H. Ward Ewalt of Pennsylvania, Tim Kime of Toledo, Ohio, and James Scholles of Cincinnati. Former Ohio Optometric Association President Dan Runyan demonstrated to me, by his example, how impact through involvement could become reality in organizations like the American Optometric Association. I am pleased the AOA influence continues with the recent election of my good friend and colleague Kevin Alexander of Toledo, Ohio, as the AOA's new trustee.

I remember attending my first two American Academy of Optometry meetings in New York City at the Waldorf Astoria and in San Francisco at the Fairmont Hotel where Henry B. Peters and Brad Wild served in major leadership roles and eventually as presidents of the Academy. Little did I know at that time that I would follow Deans Peters and Wild as CEO at the UAB School of Optometry. I continue to be impressed and influenced with the current leadership of the Academy, including its current president Tony Adams and my classmate and good friend Bob Newcomb who is president-elect.

No one has had as long or as dramatic an influence on developments of my thinking during the last 32 years as my wife, Stephanie. She continually has challenged me to look at the education enterprise from her viewpoint as a businessperson, understanding the perceptions of the public and the realities of entrepreneurial efforts. She has been supportive in all the directions my career has taken and has been adamant that a journey is not worth taking if it's not done well!



Quality Assurance In a Cornea and Contact Lens Service

Heidi Wagner, O.D.
Lester E. Janoff, O.D., M.S. Ed.
Arnie Patrick, O.D.
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Arnie Patrick, O.D.; Julie A. Tyler, O.D.;
Heidi Wagner, O.D.; Christopher E. Woodruff, O.D.

ABSTRACT

The impetus for the establishment of a cornea and contact lens specialty service quality assessment and improvement (QAI) program was inclusion in managed care provider panels. The purpose of the program was to improve the quality of patient care in the cornea and contact lens service through the application of traditional QAI tools. Tools utilized included a patient satisfaction survey, a medical record review, provider credentialing, and clinical privileging. A successful QAI program has the potential to improve clinical education by increasing the quality of patient encounters, enhancing clinical management and documentation skills, reducing medical-legal risk and defining quality patient care.

Key Words: *Managed care, quality assessment and improvement, record review, patient satisfaction survey, provider credentialing, clinical privileging*

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In 1951,[1] the Joint Commission on Accreditation of Hospitals was created to monitor the delivery of health care in hospital settings. The organization later changed its name to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in order to reflect its role in accrediting health care settings other than hospitals. JCAHO does not formally recognize optometry. Its standards, however, permit licensed practitioners who are permitted by law to independently provide patient care to be recognized as members of the health care organization's professional staff.

In 1991,[2] the National Committee for Quality Assurance (NCQA) was formed to develop standards of accreditation used to assess the quality of health care delivered by managed care organizations. The mission of the organization is to enable "purchasers and consumers of managed health care to distinguish among plans based on quality." NCQA developed these standards in conjunction with managed care industry representatives, health care purchasers, state regulators, and consumers.

An optometric practice is not eligible for an NCQA or JCAHO audit as a stand-alone entity. It should, however, be committed to the same principles of quality as any other organization that delivers health care. Furthermore, an optometric practice may be required to participate in quality assessment and improvement (QAI) programs through its affiliations with managed care organizations accredited by the NCQA or multi-disciplinary practice settings accredited by the JCAHO.

In 1993,[3] the American Optometric Association (AOA) established its Commission on Quality Assessment and Improvement. The mission of the commission is to encourage the implementation of clinical practice guidelines in order to improve the quality, effectiveness, and uniformity of patient care provided by optometrists. As part of this mission, the AOA developed a *Model Quality Assessment and Improvement Program for Optometric Practices.* This publication serves as the foundation for the Quality Assessment and Improvement (QAI) program at Nova Southeastern University College of Optometry.

Upon review of the College's QAI guidelines, the contact lens faculty determined that certain aspects of the recommendations were not being met in the contact lens service. For example, previous patient satisfaction surveys and record audits did not include evaluation of contact lens related eye care. In addition, there was no formal mechanism for delineation of provider privileging. Thus, the faculty noted that the quality measures utilized in the clinic were inadequate compared to NCQA and JCAHO standards. The need to develop dedicated QAI guidelines for the cornea and contact lens service became apparent. The faculty anticipated that revised guidelines would facilitate inclusion in managed health care provider plans as well as promote improved quality care.

Total Quality Education (TQE) Program Description

The goal of the TQE program was to improve the quality of patient care by applying our current primary care QAI guidelines to the cornea and contact lens service.

Program objectives included: (1) documentation of faculty credentials and delineation of clinical privileges; (2) identification and remediation of areas of patient dissatisfaction; (3) implementation of a record review process adapted to the cornea and contact lens service; (4) identification of potential institutional and provider liability; and (5) education of faculty and students regarding QAI issues.

Specific tools utilized to monitor quality assessment and improvement included: (1) faculty credentialing and clinical privileging; (2) patient satisfaction survey; (3) patient record review; (4) risk management record and process review; (5) student testing; and (6) faculty feedback regarding clinical privileging.

Program participants included optometry students and faculty participating in contact lens education during the appraisal period. Patients identified for participation in the project were those receiving care in the cornea and contact lens service during the course of the project.

Methods

Documentation of Faculty Credentials and Clinical Privileges

Credentialing is the process by which a faculty member's identity and qualifications to practice are assessed and verified by a committee of peers. By contrast, privileging is the process by which an institution grants a health care provider permission to provide patient care within well defined limits. Therefore, privileges define the scope of practice of an individual, rather than the scope of the profession.[4-6]

The committee of peers was composed of optometric faculty maintaining a rank of instructor or higher who participated in clinical or didactic contact lens education. A representative of the contact lens faculty was appointed to coordinate the credentialing and privileging activities and to report to the College QAI Committee. Faculty participation was optional during the grant period.

Nine faculty members completed a credentialing document modified from the AOA's *Model Quality Assessment and Improvement Program for Optometric Practices* and submitted supporting documentation. The coordinator of activities reviewed each document and requested clarification as needed. Upon primary source verification of the faculty member's credentials, the faculty member requested clinical privileges. The coordinator, in conjunction with the committee of peers, reviewed the privileging document prior to submitting the recommendations to the QAI Committee. Clinical privileges were granted to licensed providers on the basis of one of the following: (1) completion of a contact lens residency accredited by the Council on Optometric Education; (2) diplomate status in the cornea and contact lens section of the American Academy of Optometry; (3) completion of a course or examination administered by a recognized optometric or ophthalmologic certifying body; (4) evidence of clinical experience; or (5) self-report of ten procedures performed during the previous year.

In addition to previously described requirements, faculty members were asked to participate in a clinical orientation as part of their teaching responsibilities in the specialty service. Faculty members developed and administered an orientation on the following topics: (1) instrumentation including corneal topography, pachymetry, and anterior segment photography; (2) verification of lens designs; (3) prescribing of therapeutic agents and contact lens solutions; (4) recognition and interpretation of fluorescein patterns of rigid lenses and anterior segment pathology; and (5) lens selection and ordering procedures.[7] The orientation also focused on student performance objectives, new developments in cornea and contact lens care, and policies and procedures unique to the specialty service. Although the clinical orientation included a demonstration of proficiency in selected skills by written and practical examination, performance was not a means of limiting faculty privileges.

Documentation of completion of the credentialing and privileging process was submitted to the College QAI Committee. Written feedback was solicited from the contact lens faculty.[8] Faculty members outside the service were invited to participate in the review process in order to ensure the fairness and objectivity of the program.

Patient Satisfaction Survey

The College's primary care service patient satisfaction survey was adapted to the specialty service (Table 2). All patients receiving care during the fifth week of each student clinical rotation were provided with a survey upon completion of their examination. Patients were asked to record their responses on Scantron forms. Completed surveys were deposited in a receptacle placed at the reception desk.

Patient Record Review

The College's primary care service patient record review was also adapted to the specialty service. Fourth year optometry students conducted the record review under the supervision of a clinical preceptor. (Appendix A). The review was administered prior to and after the QAI educational program. Records from the final week of the preceding clinical rotation and the initial week of the current rotation were selected randomly by the contact lens technician for evaluation. The contact lens technician ensured that the provider names were masked. The survey results were recorded on Scantron forms.

Process Review

Optometry faculty and staff familiar with contact lens service clinical policies and procedures conducted a process review. The identities of the individuals conducting the review were masked from the students, staff, and faculty being evaluated. The primary objective was to identify policies and procedures with potential institutional and practitioner opportunities for improvement.

Student Outcome Review

An educational seminar for faculty and students provided an overview of

Table 1
Provider Credentialing

Selected Item Analysis (N=9)

Gender		Education		Professional Training		Post-professional Training		Years Since Graduation	
Male	67%	Baccalaureate	78 %	O.D.	N=9	Residency	44 %	Mean	14.7
Female	33%	Masters	11 %	Institutions Represented	N=7	Contact Lens Residency	11 %	Standard Deviation (δ)	13.4

Table 2
Patient Satisfaction Survey

KEY: 1 = I strongly disagree 2 = I disagree 3 = I have no opinion either way 4 = I agree 5 = I strongly agree

Clinical site	North Miami Beach N=12		Davie N=30	
Item analysis	Mean	Mode	Mean	Mode
The receptionist was courteous when I scheduled my appointment.	4.91	5	4.52	5
I was able to make my appointment easily and in a reasonable period of time.	4.67	5	4.48	5
The receptionist was courteous when I arrived for my appointment.	4.83	5	4.55	5
My student doctor greeted me in a reasonable period of time.	4.92	5	4.76	5
The Eye Clinic was clean.	4.67	5	4.83	5
Proper hygiene was observed during the examination.	5.00	5	4.86	5
The student doctor's conduct was professional.	5.00	5	4.90	5
I felt that the examination was thorough.	5.00	5	4.90	5
The supervising doctor's conduct was professional.	5.00	5	4.83	5
The pricing was reasonable.	4.58	5	4.45	5
The policies were clearly explained to me.	4.83	5	4.69	5
The student doctor and supervising doctor worked well together.	4.92	5	4.79	5
My questions were answered in a professional and personal manner.	4.92	5	4.83	5
I am satisfied with the overall care that I received in the contact lens service.	5.00	5	4.86	5

QAI and Total Quality Management (TQM) principles with an emphasis on record review. A brief examination was administered at the beginning and conclusion of the seminar. Evaluation of the QAI educational program was incorporated into the contact lens course evaluation.

Results

The University Office of Educational Development conducted preliminary analysis. The patient satisfaction survey and the QAI educational program evaluation were evaluated by the Office's frequency tabulation report for student course evaluations. The record audit and student examinations were scored by the test response report and item analysis, similar to conventional course examinations. Results were distributed to the contact lens faculty and QAI Committee.

Documentation of Faculty Credentialing and Clinical Privileges

Nine faculty members with diverse backgrounds and experience participated in the program (Table 1). Scheduling meetings around clinic and didactic assignments proved to be challenging. Awarding privileges based on experience and self-report was difficult due to lack of documentation. It is noteworthy to report that although this portion of the program generated greater faculty interest than other program objectives, no faculty members submitted written feedback.

Patient Satisfaction Survey

The results of the patient satisfaction survey were positive (Table 2). Although the modest sample size limited statistical power, it provided baseline data for future comparison. Remediation was deferred until a second administration. Computer analysis of Scantron forms was a time efficient means of generating simple statistics.

Patient Record Review

Administered on two occasions, the results were similar in regards to frequently missed questions (Table 3). The standard deviation was smaller on the second administration. The most frequently missed items on both administrations were documentation of medical and ocular history.

Faculty participation in drafting the record review generated consensus regarding record keeping requirements. Because the record review identified areas of obvious deficiency, a more structured record keeping form was adopted. Computer analysis of Scantron forms was, again, a time efficient means of generating simple statistics.

Process Review

The process review identified items with the potential to improve the quality of patient care as well as to limit medical-legal risk: (1) documentation and dissemination of written clinical procedures; (2) uniform use of consent forms; (3) adherence to Centers for Disease Control guidelines for infection control; (4) security of prescription pads and medications; and (5) remediation of hazardous areas of the physical plant associated with renovation. Positive outcomes included revision of clinical policies and procedures with greater emphasis on quality patient care rather than institutional or practitioner risk.

Student Outcome Review

The most frequently missed items were questions related to optometry's role in the health care accrediting process, as well as items distinguishing between provider credentials and privileges (Table 4). Students were enthusiastic about the contribution of our consultant, Dr. Carol Brown, in her role as a member of the AOA Commission on Quality Assessment and Improvement and as a private practitioner. Course evaluations revealed that students believed the program would enable them to compete in the managed care environment following graduation.

Discussion

Quality assessment and improvement is based on a philosophy entitled Total Quality Management (TQM). TQM defines quality as satisfying the needs and expectations of the "customer." Applied to health care, TQM identifies patients as "external customers" and health care providers, insurers, and administrators as "internal customers." It mandates systematic measurement and problem solving of the institutional process.[9-12]

Based on traditional TQM principles, our methodology emphasizes process rather than individual performance. Strengths and opportunities for improvement are attributed to the institution rather than to the individual. For example, our QAI model does not evaluate individual provider performance on patient satisfaction surveys and record reviews. Hence, the data is unavailable for inclusion in faculty performance evaluations. It is anticipated that semi-annual recredentialing will incorporate individual accountability; however, this will be the purview of administration rather than faculty.

It is difficult to define the role of the contact lens educator in the health care privileging process. Unlike allopathic or osteopathic medicine, optometry lacks an established board certification process that clearly documents experience, knowledge, and training in a defined area of patient care. Although a residency certificate documents completion of post-graduate training, it does not measure knowledge through performance on standardized examinations. In addition, a residency certificate in contact lenses is currently too limiting to serve as a required prerequisite for providing patient care in our institution (Table 1).

Future recommendations regarding the documentation of faculty credentials and delineation of clinical privileges include consideration of certification examinations administered by the American Academy of Optometry or the International Association of Contact Lens Educators. Certification by either of these organizations would provide documentation of knowledge beyond entry level in the area of contact lens care. In addition, third party administration might provide greater objectivity than that available in internally developed proficiency examinations. It is anticipated that the College QAI Committee will soon require a formal mechanism for the delineation of clinical privileges. Privileges will then be granted upon the joint recommendation of the committee of peers, the College QAI Committee, and clinic administration.

Future administrations of the satisfaction survey, record review, and risk management review shall be tabulated and distributed, along with plans for improvement, to the contact lens faculty and College QAI Committee on a quarterly basis. Future plans for

(Continued on page 20)

Table 3
Patient Record Review

Selected Item Analysis	Pre-test (% Correct)	Post-test (% Correct)
Is there a completed problem list that includes significant illnesses and medical conditions?	69	69
Is there an appropriate medical and ocular history?	67	62
Is the habitual contact lens wearing schedule and care system, including enzyme use, properly documented?	66	87
Is biomicroscopy properly documented?	66	84
Is over-refraction present with acuities?	70	81

Appendix A — Patient Medical Record Review

Date of Review:______________________ Yes No N/A

1. Do all pages contain patient name? ___ ___ ___
2. *Is there biographical/personal data in the record? ___ ___ ___
   Address
   Employer
   Home and work telephone numbers
   Marital status
3. *Is the provider identified on each page? ___ ___ ___
4. Are all entries dated? ___ ___ ___
5. Is the record legible? ___ ___ ___
6. Is there a completed problem list that includes significant illnesses and medical conditions? ___ ___ ___
7. Are allergies and adverse reactions to medications properly documented? ___ ___ ___
8. Does the record include documentation of the most current medications with dosages for those with significant ocular side effects? ___ ___ ___
9. Is there an appropriate medical and ocular history? ___ ___ ___
10. Does the patient history include the appropriate subjective information pertinent to the presenting complaints? ___ ___ ___
11. Are the contact lens parameters properly documented with enough information to duplicate the lens order? ___ ___ ___
12. Is the habitual contact lens wearing schedule and care system, including enzyme use, properly documented? ___ ___ ___
13. Are entering acuities present, pinhole if VA<20/40? ___ ___ ___
14. Is manifest refraction present on new fits? ___ ___ ___
15. Is keratometry and/or topography present on new fits? ___ ___ ___
16. Is biomicroscopy properly documented? ___ ___ ___
    Lids
    Lashes
    Bulbar and palpebral conjunctiva with lid eversion
    Cornea (specify with or without staining)
    Iris
    Anterior chamber on emergent conditions
17. Is there proper documentation of the contact lens fit? ___ ___ ___
    Coverage, centration, movement for hydrogel lenses
    Rotation if appropriate
    BCR-corneal relationship for rigid lenses
18. Is over-refraction present with acuities? ___ ___ ___
    Spherical if>/= 20/20
    Spherical-cylindrical or retinoscopy if <20/20 or patient's best corrected spectacle VA
    With monovision, specify monocular or bi-ocular
19. Is the assessment complete? ___ ___ ___
    Contact lens fit and optical correction
    Contact lens and/or corneal complication
20. Is the plan complete? ___ ___ ___
    Contact lens parameters dispensed and ordered
    Wearing schedule
    Care system and/or therapeutic medication
    Management for complications related to lens wear and/or corneal disease
21. Is the working diagnosis consistent with findings? ___ ___ ___
22. Are the plans of action/treatment consistent with the diagnosis? ___ ___ ___
23. Are the problems from previous visits addressed? ___ ___ ___
24. Is there a date for return visit or other follow-up plan for each encounter? ___ ___ ___

* Items two and three completed by ancillary personnel

Table 4
Student Outcome Review

Selected Item Analysis (Answer indicated by asterisk)	Pre-test (% Correct)	Post-test (% Correct)
	Mean = 49 % δ = 18%	Mean = 99% δ = 5%
A process by which an institution grants an individual permission to provide patient care within well defined limits is entitled: 1) clinical privileging*; 2) clinical credentialing; 3) peer review; or 4) quality assessment.	45	100
An optometric practice is / is not* eligible for an NCQA audit as a stand alone organization.	4	100
Professionals not specifically mentioned in the current NCQA standards are: 1) dentists; 2) podiatrists; 3) chiropractors; or 4) optometrists.*	11	100

Note: Questions referring to NCQA reflect policies in place at the time of the execution of the project.

(Continued from page 18)

the patient satisfaction survey include translating it into Spanish, increasing the sample size and frequency of administration, providing evaluation forms at the reception desk, and providing a written response to patients with their name and address on the evaluation form. Plans for patient record review include documenting that ancillary reports were reviewed by the practitioner and developing a form for documenting telephone calls relating to patient care. In addition, future record reviews will be conducted as part of the fourth year academic program. Future plans for risk management include review of the clinical policies and procedures manual by a consultant, the creation of tools to assess outcomes related to the revised procedures, and the adoption of clinical practice guidelines.

A formidable task of any quality assessment and improvement program is to maintain momentum following the program's inception. Plans to facilitate continuous improvement include greater staff and administrative involvement, an annual faculty in-service, and formal recognition of faculty and staff for outstanding performance.

In conclusion, this program achieved its intended purpose in the establishment of a specialty service QAI program through completion of the objectives previously outlined. Although inclusion in managed care provider panels served as the program's impetus, a more important outcome was the increased emphasis on quality patient care. A successful QAI program has the potential to improve clinical education by increasing the quality of patient encounters, enhancing clinical management and documentation skills, reducing medical-legal risk, and defining quality patient care.

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Selection and Implementation of a Clinical Information System for the University of Alabama At Birmingham School Of Optometry

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ABSTRACT

Faced with a year 2000 compliance problem as well as other difficulties related to the support and maintenance of a 15-year-old mainframe based clinical computing system, the University of Alabama at Birmingham School of Optometry completed a process to replace the system. A requirements specification process was undertaken, which resulted in a complete requirements document. This was incorporated into a request-for-proposal distributed to 150 healthcare information system vendors. Responses from the RFP were evaluated against set criteria, and vendors meeting the criteria were invited in for on-site demonstrations. Faculty and staff were involved in the selection of two finalists, and contract negotiation started with both vendors. The vendor who negotiated the optimal contract was awarded the implementation.

Key Words: *computers, management information systems, clinical information systems, informatics, academic optometry clinics, requirements, request for proposal process.*

Purpose

All schools and colleges of Optometry in North America operate clinics, which provide an environment for clinical education and patient care services as part of their education and service missions. Contemporary patient care usually includes the use of a computer information system. These systems provide financial management, scheduling, insurance claims submission, and other clinical services essential to the business of clinical care. Academic optometry clinics have special academic needs such as experience tracking and grading students. Since most academic optometry clinics are larger in size and complexity than the average private practice, obtaining a clinical computer information system is a special challenge. The University of Alabama at Birmingham School of Optometry recently completed a clinical information system selection using methods usually applied in large hospital or health network settings. The methods used produced a useful and full-featured system.

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Background

UAB School of Optometry's Clinical Information System History

When one enters the clinics at the University of Alabama at Birmingham School of Optometry, one notices that the floors are hollow. The clinics are unique in that they are on a large computer subfloor under all clinic space, allowing for computer cables. This design was very expensive when built in the 1970's (covering some 25,000 square feet) but was considered important to facilitate the installation of computer terminals in each examination room for the management of clinical data. In addition, a specialized area exists to provide the conditioned power and air conditioning needs for a mainframe computer. The vision was for a powerful computer system that placed a terminal in every examination room to collect and manage data for clinical (and educational) outcomes.

In 1980, a Hewlett-Packard HP 3000 minicomputer was installed with terminals to the main clinic reception areas. A full-time programmer was hired, charged with the development and programming of COBOL-language programs that would meet the needs of the clinic. At the time of installation, the computer purchased by UAB School of Optometry was powerful, had capacity beyond the immediate needs of the school, and was time-share leased to a local bank at night for the first few years.

The first software applications developed were for the financial transactions of the clinic, all cash transactions. Third party billing or accounts receivable were not issues at that time. Also developed at that time was a tool for patient care schedules of faculty and students, which permitted tracking of appointments. The computer remained a tool used by the clinic administration for scheduling and financial management. Terminals were never placed in clinic exam rooms and full data collection did not occur.

Over time, additional software allowed tracking of ophthalmic photography, management of ophthalmic frames inventory, tracking of student patient and lens activities in the contact lens clinics, and other applications. Each of these was custom programmed in COBOL or in proprietary Hewlett Packard reporting software. Eventually, the individual who had written the majority of the programs left UAB.

Many drawbacks of the computer system emerged. It was difficult to accommodate renovations in the clinic, since each terminal was hard-wired to the mainframe and required specialized, new wiring at new locations. We reached the maximum number of terminals that the mainframe could accommodate. The programs written in COBOL were intricate and poorly documented, making improvements and changes difficult, and in some cases, impossible. The user interface (screen and keyboard) of the system was character-based, function-key dependent, dated, and difficult to learn. Parts and components of the mainframe, even after updating over the years, became obsolete and difficult to obtain. In many ways, the system no longer did what we wanted.

The difficulties that forced our decision to replace the system were the year 2000 date problem and our inability to modify the existing programs. There was little known about the behavior of the hardware in the year 2000 and less known about how the original programmer had used dates in the program. Review of the software code showed that it would be impossible to correct the software with any confidence. In 1996, it was decided to replace the clinic computer system.

Methods

Initial investigations into potential software solutions for the UAB School of Optometry clinics began with inquiries to known optometric software vendors. This process provided valuable initial information about what was on the market. It became clear, however, that most available packages were suited for individual practitioner offices rather than large multi-site, multi-specialty clinics, and none were suited to supporting educational scheduling and tracking activities. Many vendors stated they would consider making custom modifications to their products to suit these additional needs. The UAB School of Optometry was wary about duplicating the previous problem of using special, customized software. It was decided that the UAB School of Optometry would undertake a more formalized software selection process, including a needs assessment. Requirements would be formally determined first, and then this set of requirements distributed to the health information software industry for response. This process is familiar to large health care organizations or large businesses seeking software solutions.[1]

The Requirements Process

Identifying Needed Output

All information systems function on the concept of input, processing, and output seen in Figure 1.[2]

The initial step taken in identifying the information system needs at UAB School of Optometry was to collect and review the routinely used output of the current system. The output consisted of all printouts that were generated for any reason, as long as the printout was used by an employee for a specific task. Included in this output were special reports used for administrative planning, annual reports, and COE self-studies. Examples of collected documents included:

- Daily clinic operations documents - schedules, financial daysheets, activity reports
- Month-end clinic administration reports - financial summaries, appointment fill rates
- Annually needed reports - financial summaries, patient volume
- Ad-hoc research reports - patient lists, patient counts by condition, demographics
- Mailing list data - patient address labels, data files for brochure mailouts
- Student patient experience reports

These printouts were reviewed, related to the mission of the clinics and prioritized. This process revealed that a number of routine reports being generated by our current system were not being used at all, and these were discarded. The remaining reports created the foundation for the requirements for the new system. This proved to be an efficient process and was accomplished quickly. It was found that the need for different printouts was distributed among many levels of faculty and staff. There was value in sharing the review of the printouts among all levels of employees in the clinic: there was no single individual or group that had a clear understanding of the system's full output.

Eliciting User Information

The requirements process is dependent on the needs of the users[3] so the next step was a series of meetings with the users of the system, where each major function of the current system was reviewed. This process took the form of scheduled meetings with faculty, staff and students held at convenient times. Meals were provided to create an incentive for participation. Several sessions were scheduled to maximize opportunity for attendance. For clinic staff, schedules were modified so that clinical functions could continue - half of a clinic's staff would attend one session, the other half, another. The multiple sessions also worked well for faculty participation, allowing faculty with commitments or travel schedules to attend at least one session. Six sessions

Figure 1
Information Flow

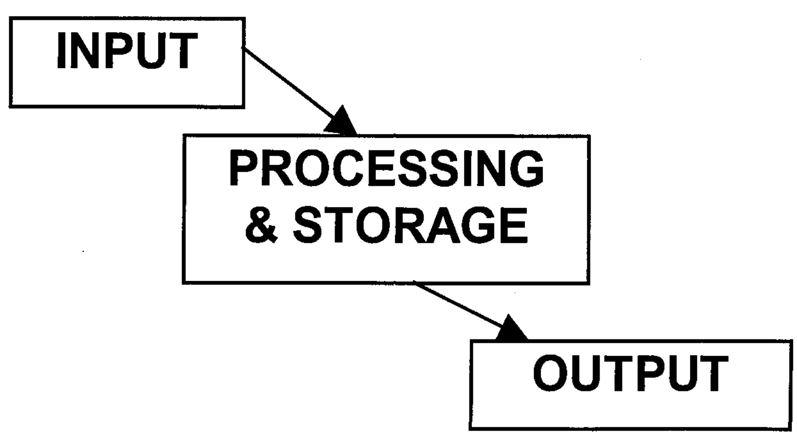
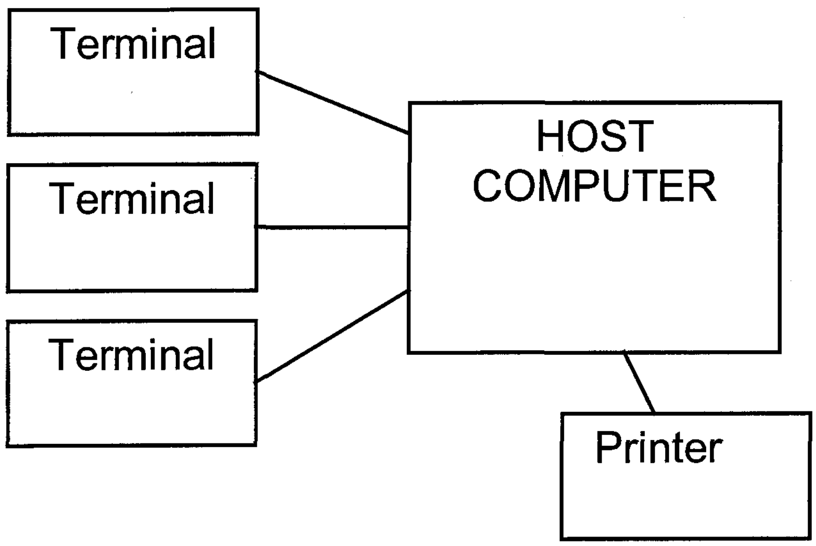


Figure 2
Centralized System



were held, in which all functions of the current system were reviewed.

Each major function of the system was reviewed with the following format:

1. What aspects of the function are essential and need to be kept?
2. What aspects of the function need fixing, or are in need of improvement?
3. What aspects of the function are disliked, or disused, and need to be eliminated?
4. What are some "blue-sky" wish list aspects or functions that are needed?

The results of these meetings were distilled into a series of changes that were incorporated into the emerging requirements document. Examples of suggestions/changes that emerged from this process:

- Be able to search for patients by date of birth, social security number and phone number
- Eliminate an unused spectacle order tracking system
- Be able to generate statements for patient accounts on-site
- Be able to tailor charges and charge coding to insurances
- Be able to search and identify patients based on all diagnoses, not just those used for insurance claims

This process took a total of six weeks and provided valuable information. Of particular value was documenting the true manner in which our current system operated as opposed to the way administrators thought it operated. In addition, it increased confidence among the faculty and staff because they had significant input into the development or selection of the new clinical information system.

Functional Versus Platform Requirements

The above steps allowed us to create a comprehensive list of functional requirements for the new system. In addition to these requirements, we included a specific set of platform (hardware and software system) requirements. These pertained to specific details about the hardware and software we desired for the new system. The requirements that were added as platform requirements were based on philosophical decisions about the information system. These decisions included strategies on standardized versus custom software and client-server versus centralized architecture.

Standardized Versus Custom Software

The original UAB School of Optometry clinical information system was developed exclusively with custom programmed software. This was done due to two factors influencing decisions at that time: (1) it guaranteed the functions desired by our individual clinics, and (2) there were no commercially available optometry software solutions on the market. Over the years, attempting to update and modify this custom-written software led to many difficulties. We learned that custom-programmed software has limited value: it is difficult to internally maintain over the useful life of an information system. We chose to base our new system on industry-standard, commercially available software components. These were added to our requirements:

- All databases must incorporate some non-proprietary form or industry standard database such as Oracle, Sybase, or SQL-Server formats.
- All functions outlined as our requirements are to be provided in the basic product offering and will be supported as such by the software company. They will not be considered "custom-written" enhancements.
- All forms of specialized information (data files, images, sounds, etc.) must be stored and retrieved using current non-proprietary standardized file formats.

Client-Server Versus Centralized Systems

Our original information system was a centralized system where all terminals connected physically to a minicomputer (Figure 2). As the School of Optometry has in place an extensive PC network that connects to campus resources, this connectivity advantage was used to support the new clinic information system. A system that uses network connectivity is termed a "client-server" structure and has additional advantages in distributing the computing workload over a number of machines (Figure 3). Client-server structures also offer increased flexibility and accommodation of growth.[4] We felt it important to use the advantages of the "client-server" structure in our new computer system and included it as a requirement.

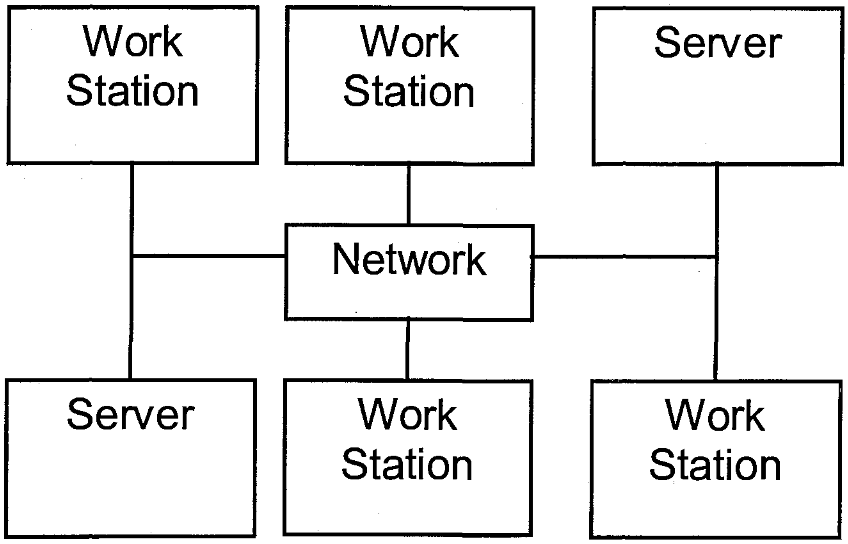
Creating the Request for Proposal Document

The functional and platform requirements were combined and edited into a single document.

Functional and Platform Requirements

The functional and platform requirements that emerged included the following:

Figure 3
Client-Server System



- Hardware - description of the current network (physical installation and protocols), servers, and workstations standards.
- Software - description of software tools used on standard workstations.
- Databases - specification of database standards and acceptable industry standard formats (i.e. Sybase, Oracle, etc.)
- Operational - description of who will support and maintain the new system, including network administration, applications maintenance, system modifications, new employee training, software security, backups, and disaster recovery.
- Functions - a detailed list of needed functionality, divided into major systems. This included a patient information system (demographics and insurance), appointment scheduling and visit tracking, a financial system (charges, fees, patient and insurance accounts receivable, claims submission and tracking), administrative reporting and decision support, photography tracking, and optical materials inventory.

Added to this information were important additional sections, the environment description, procedures for responding to the request, and timelines.

Description of the Environment

Information was included that allowed the prospective vendors to understand our operation. The following information was included:

- The mission of the clinics
- Annual patient volume
- Departmental organization
- Patient care flow - how patients are seen in the clinics
- Description of the physical facility
- Description of the current clinical information system
- Description of the computing environment at the University outside the clinical areas

This information was written to allow individuals with no background in optometry or vision care to understand the operations of the facility.

Procedures for Responding

Once vendors learned that the school was considering a major system purchase, many were eager to contact high-ranking individuals within the UAB School of Optometry to begin a direct sales effort. As this would undermine a measured consideration of all options, it was emphatically discouraged. As part of the request for proposal document, specific instructions were included for the vendors to follow in replying to the proposal. A specific methodology was prescribed for their response:

1. Return a letter of intent that they plan to respond to the RFP (request for proposal).
2. Provide a written response in a form that shows how their product meets each of our requirements.
3. Provide an initial cost estimate for the installation of their product.

In addition, specific rules were laid out for the vendors for contact with the organization during the RFP period. Only certain individuals within the UAB School of Optometry organization were eligible for contact by the vendors for questions about the needs. These individuals were the chief of staff and the administrative director of the clinics. Vendors were instructed that bypassing these individuals and contacting individuals higher in the UAB School of Optometry organization would result in their bid not being considered. While this was in actuality a hollow threat (we wanted to obtain as many bidders as possible), it managed to keep vendors from working to directly contact top level executives within the UAB School of Optometry organization.

Timetables and Deadlines

A frequently asked question from prospective vendors concerned the timetable of a final decision. This question was used by vendors to prioritize our request for a bid, and allowed them to determine if the UAB School of Optometry was "serious" about a purchase decision for a new system. To clarify our intent, and to insure attention to our RFP from vendors, we included these timeline events:

1. Deadline for the vendor to reply with a letter that they intend to do a bid on the new system.
2. Deadline for the completed written RFP response and bid to be delivered.
3. Estimated timeline for a decision to be made by the UAB School of Optometry to award the contract for the new system.
4. Estimated timeline for training and implementation of the new system.

Organization of the RFP Document

The final RFP document was organized into the following form:

1. A cover letter inviting responses to the RFP document.
2. Timetables and deadlines.
3. Procedures for responding to the RFP.
4. Description of the environment.

5. Functional and platform requirements.

Distribution of the RFP

A listing of known vendors of ambulatory health care information systems was constructed by reviewing trade publications such as *Healthcare Data Management, Healthcare Informatics, and MD Computing*. Several of these periodicals published annual listings of vendors that included descriptions of product offerings as well as contact addresses. In addition, vendors were added from vision care management publications including *Optometric Management, Review of Optometry, Ophthalmology Today, 20/20, and Ophthalmology Management.* One hundred and fifty-five potential vendors were identified.

The RFP document was bound with a professional appearance and mailed to each vendor on the list.

Results

Fifty-six (56) replies were received as a result of the RFP. Sixteen (16) were letters stating intent to respond with a bid. Twelve (12) written responses were received by the deadline. Each of the twelve responses was reviewed to insure that they satisfactorily met the requirements. Of these, only six (6) were found to do so.

Each of the six vendors made presentations at the UAB School of Optometry. The vendors were required to commit to performing no fewer than three (3) demonstration sessions on two (2) different days to allow staff and faculty various opportunities to attend. All clinical leaders attended the demonstrations, as well as the majority of the staff. Interested faculty attended as well.

After all demonstrations, the faculty and clinic staffs were asked to rank the systems they preferred based on the presentations. The two top ranked vendors were selected.

Both top-ranked vendors were engaged into contract negotiation. Vendors provided their first "boilerplate" contract that was then analyzed and revised. Most of the changes to the contracts involved arrangements for training, total dollars, data ownership rights, and contract period length. A satisfactory contract was developed with one of the vendors and the contract was awarded.

Training on the new system began in June of 1998. Installation of hardware and software was completed between July and September of 1998. The new system became operational on October 1, 1998.

The new system has replaced all aspects of the prior system, and has brought new and higher levels of functionality to the faculty and staff of the UAB School of Optometry. In addition to scheduling and financial functions, UAB School of Optometry now enjoys a complete clinical information system with electronic records, on-line medication formularies, health maintenance alerts and reminders, and Internet medical records access from home or office.

Timeline of Clinical System Replacement Process

October 1996 - Initiation of project
March 1997 - Distribution of RFP
June 1997 - Beginning of vendor demonstrations
November 1997 - Conclusion of vendor demonstrations
December 1997 - Contract negotiation with top two vendors begins
March 1998 - Contract Award
May 1998 - Training begins
September 1998 - New system installed and tested
October 1998 - New system implemented

Implementation

Implementation Planning

An essential aspect of the new computer system implementation was the planning sessions held immediately after the contract award in April of 1998. The vendor provided an implementation team directed by an implementation manager who oversaw the process. The sessions involved the vendor implementation team and UAB School of Optometry clinic leadership. They laid out timelines and responsible individuals for the important phases of the implementation, which were:

1. Site preparation (installation and testing of hardware - servers and workstations)
2. Installation and testing of software on the UAB School of Optometry hardware
3. Creation of training materials for UAB School of Optometry
4. Training of UAB School of Optometry doctors and clinical staff
5. Pilot implementation in a single clinic module
6. Modifications to address problems found in the pilot implementation
7. Implementation in all clinics.

Training

Training occurred once the new computer system was installed and tested on UAB School of Optometry hardware. A training room of eight workstations was used. Two four-hour training sessions were held with refreshments served. The clinic leadership (clinical service directors) was trained first, followed by clinic support staff, followed by clinical faculty. The entire training process took four weeks to train all individuals.

Staff Acceptance

Staff acceptance and enthusiasm was cyclical. Initial excitement about a new system gave way to rising frustrations during the first few weeks. Using the new, unfamiliar system "in real life," i.e., with actual patients standing in front of them, caused pressures in some clinics. Frustration was also caused by the fact that the new system "did things differently" than the previous system. These frustrations are common to implementations of new information systems[2] and were anticipated. To ameliorate this effect, the vendor provided trainers on-site at UAB School of Optometry to work side-by-side with UAB School of Optometry doctors and support staff during the first weeks of actual use.

During initial use, the staff played an essential role in identifying shortcomings in the new system. The vendor implementation team addressed and corrected these problems, which aided staff acceptance. As staff discovered new features that made job tasks easier, acceptance improved. When questioned today, staff members state they would not like to return to the previous system, but they usually have suggestions about the new one. This is an expected[2] effect and feeds an ongoing system improvement process.

Conclusions

A retrospective look at the overall process reveals several important issues.

On the negative, closer investigation into exactly how certain essential functions of the new system operated would have been beneficial. In some cases, the vendor demonstration did not fully communicate minor complexities found upon installation and use of the new system. In addition, for some doctors and support staff, a single training session was not enough. We found value in having "refresher" sessions led either by vendor trainers or by our own personnel.

On the positive, soliciting user input as an early step in the process produced many benefits. Upon implementation, the incorporation of desired features that users requested speeded acceptance. Selection of a clinical ambulatory medical system rather than a strictly optometry or vision care system also provided benefits. The UAB School of Optometry clinic operates more like a multi-practitioner multi-specialty practice rather than a private office, and the new system aligns well with this need. Lastly, broadly distributing our RFP to many vendors created new opportunities that would not have appeared from a more focused distribution. Both finalists in the selection process were unknown at the start of the project.

The approach taken by the UAB School of Optometry for replacing the clinical information system has produced a system that will meet clinic operational, financial, educational, and research goals. The formalized requirements process undertaken included the broadest base of information from clinical staff and faculty. The RFP process enabled consideration of product offerings that we were previously unaware of, with functionality that we originally did not conceive. The requirements process and RFP system for information system selection should be considered at other schools and colleges of optometry as they update and improve their clinical information systems.

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Industry News
(Continued from page 9)

Nichols, O.D. (TOSU); fourth place — Jennie Kageyama, O.D. (SCCO).

Marchon Offers Course On Fitting Rimless Eyewear

To assist dispensers in servicing their growing number of rimless and semi-rimless customers with both confidence and skill, Marchon's Department of Education offers ABO Course Number 105, "Preparing, Fitting and Adjusting 3-piece, Screw-Type Rimless Eyewear."ABO has approved this lesson for two hours of continuing education credit.

The course is available in hard copy format from Marchon sales representatives, or can be downloaded directly from the Marchon Web site at www.marchon.com. Contact your school's Marchon sales representative or visit the Marchon Web site for information on the complete range of CEC and ABO approved courses available through Marchon's Department of Education and Research.

New Corning Publication on Glare Control Lenses

A series of research articles and case histories written by low vision practitioners about the applications, performance and patient benefits of Corning® GlareControl™ Lenses is the subject of a new publication from Corning Medical Optics. The Corning Low Vision Study Series offers insight into how eyecare specialists have found photochromic, blue-light filtering GlareControl lenses helpful in providing symptomatic relief of various eye conditions.

Since GlareControl Lenses were introduced in 1981, numerous doctors have authored articles and papers concerning their personal experiences and patient observations with these lenses. The Low Vision Study Series is the first time those studies have been compiled into a single reference for low vision practitioners.

"We want to make practitioners aware of the wealth of practical, clinically-relevant information that's available on how GlareControl lenses can partially alleviate the symptoms of glare associated with macular degeneration, cataracts, retinitis pigmentosa, glaucoma, diabetic retinopathy and other conditions," said John Van Zanten, marketing manager, Optical Products, Corning Incorporated. For a free copy, contact Corning Medical Optics at (800) 742-5273.

Paragon Expands Web Site

Paragon Vision Sciences, a U.S.-based global leader in the development and production of innovative oxygen permeable contact lens materials and specialty vision products, recently enhanced its Web site to include clinical, product and case study information in several languages. The Paragon Vision Sciences Web Site can now be accessed in English, German, French, Spanish and Italian languages.

"As a global company committed to expanding the marketplace for oxygen permeable contact lenses, Paragon Vision Sciences believes the Internet is an excellent medium for providing easy access to information and education," explained David Moreira, vice president of worldwide marketing. "By offering information in a multilingual format, we anticipate our Web site reaching an even larger professional and public audience."

The Paragon Vision Sciences Web site is currently accessible at http://www.paragonvision.com/ Information on Paragon Vision Sciences or Paragon Products may be obtained by contacting Paragon Vision Sciences at (480) 892-7602; fax (480) 926-7369.

Zeiss Offers New Online Service

Carl Zeiss Optical, Inc., announced the launch of a new Internet service known as the Zeiss Certified Vision Expert Locator. The Expert Locator is a convenient referral tool geared toward the consumer who is searching the Internet for the optimum solution to his/her individual optical requirements. By logging onto www.zeiss.com, the consumer will be able to locate his/her nearest Zeiss Certified Vision Expert by typing in the appropriate street address, city, state or zip code.

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. Contact: 1-800-3802984.

Color Microfiche: Applications to Biomedical Optometric Education

Joan Tanabe Wing, O.D.
Connie Chronister, O.D., F.A.A.O.
Stephen G. Whittaker, Ph.D.
Gilda C. Crozier, O.D.

ABSTRACT

A color microfiche was developed and introduced into an ocular histology and embryology course. This form of media contained original images produced by photographing a glass slide collection of ocular tissue sections and converting these images into a microfiche format. Use of this teaching method was initiated to enhance access to ocular histology images, to replace slides and to expand the relatively small amount of atlas material available for study. Objective and subjective evaluations of the use of this teaching material were made. The objective evaluation compared test performance of the one group using the microfiche in addition to existing course materials, and another group using only the traditional materials. There was no difference in the average examination score between the two groups. We believe that there was no adverse effect on learning with the use of the microfiche. Subjective data from a questionnaire (n = 151) indicate that a majority of students (85%) agreed that the color microfiche enhanced their ability to learn, with the biggest advantages being availability (49%) and the opportunity for independent study (40%). The authors support use of color microfiche because it allows students to prepare for the laboratory in advance, thus utilizing class time for discussions with the instructors, and it provides an opportunity to integrate material and to learn at a higher level.

Key words: *Color microfiche, education, ocular histology*

Introduction

To remain effective, educators must continually address the need for better ways to teach. However, in introducing a new method in a course, one must also be able to justify its use. Ideally, one can support a new teaching method as being valid if it can be shown to either increase comprehension and retention of material or improve the efficiency of learning.[1] However, it can be difficult to substantiate any such beneficial effects.

Microfiche is one such method to be considered for use in the classroom. But there is only limited information on the use of microfiche as an educational tool, with just a few medical education publications cited since the 1970s,[2,3,4] and only one article noted on the use of microfiche in optometric education.[5] Its authors, Fry and Augsburger, have cited the microfiche as providing inexpensive, high quality images and an accessible reference resource. However, research studies evaluating the effectiveness of microfiche as a teaching method are not readily available.

In contrast to the microfiche, a multitude of research studies have examined the use of computer-assisted instruction and some have addressed the difficulties in assessing the educational merit of new teaching methods.[6,7] The issues involved in assessing teaching methods can be applied to the evaluation of microfiche. We encountered similar problems in our assessment of the use of microfiche and will discuss them later.

We provide a descriptive report of our experience in introducing color microfiche into an optometric curriculum. We will discuss our rationale for using the microfiche and describe some of our observations regarding its use.

The color microfiche was developed for use in a course entitled Ocular Biology, which involves the study of the anatomy, histology, embryology and physiology of the eye and adnexa. The course material is presented during two academic quarters, each quarter having both a lecture and laboratory section. The laboratory component of the course relies heavily on the use of visual images of histological specimens to illustrate the concepts of anatomy, histology and embryology presented in lecture. The traditionally most important method of visual image study has been the microscopic examination of glass histology slides. This has been augmented over the years by a laboratory manual containing original drawings of ocular tissue sections[8] and a number of alternative modes of image presentation such as histology atlases[9-12], 35 mm color slides, videotapes and eye models. Unfortunately, 35 mm slides and videotapes are labor intensive techniques, which are difficult and expensive to make individually available to large numbers of students. They require the use of expensive viewing equipment, some of which is becoming rapidly obsolete. Histology atlases also present significant limitations to the ocular biology student because the best ones are currently out of print and those that are available are not well suited to ocular studies. Our customized laboratory manual is a good supplement but has some limitations because it contains only black and white line drawings of the specimens viewed through the microscope.

Thus our use of these diverse instructional resources has evolved from an attempt to compensate for the lack of an atlas on ocular histology. In contemplating the use of color microfiche as a further adjunct, the instructors questioned the need for introducing yet another teaching method. However, the quality of the repro-

Figure 1
Color microfiche and handheld viewer.

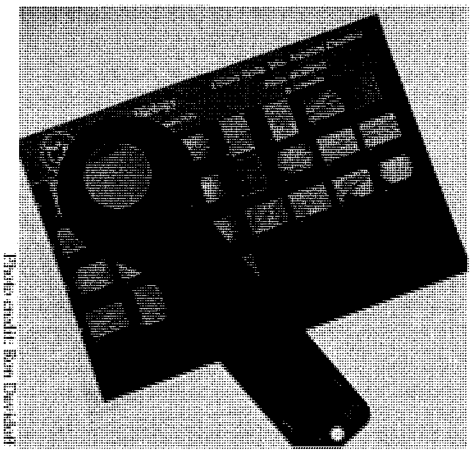

Photo credit: Ron Davidoff

duced image with color microfiche generated interest and enthusiasm among the course instructors. Microfiche offered the opportunity for nearly ubiquitous availability of all the lab images to all students both in class and in their home study. In addition, students would have equal access to images representing optimum tissue specimens. However, the wide availability of the images to the students generated a particular concern that it may adversely affect the students' attitude toward learning. We considered carefully whether the easy accessibility to the images would create a passive attitude, that the students would be less engaged in learning since they no longer had to actively scan glass slides during the laboratory session to study the material. To encourage active viewing of the microfiche, we continued the previous course format of having a quiz at the end of each laboratory session.

Materials and Methods

The color microfiche was created by assembling representative samples taken from the extensive photographic collection of ocular tissue sections used in the course. Color slides representing the histology and embryology of the cornea, sclera, anterior chamber, iris, lens and ciliary body were used in the preparation of the microfiche. The slide images represented original material and none have been previously copyrighted. These images were incorporated into a microfiche measuring approximately 6.75 x 4 inches and used with a hand-held viewer (Figure 1). The microfiche can contain up to forty 35-mm color slide images, while still retaining excellent image quality (Figures 2 and 3).

After a prototype microfiche is produced, copies can be made in a very cost-effective manner, ranging from $1.50 to $3.00 per 40-slide microfiche.[a] The Ocular Biology microfiche[b] and viewer were packaged with the laboratory manual which included a syllabus identifying and describing each image. These materials were made available in the student bookstore for a nominal charge.

The color microfiche was made available to the students (n=155) enrolled in the second quarter Ocular Biology course. This newly introduced teaching method was a supplement to the existing course materials. The students reviewed the material for the laboratory course by studying the manual, using traditional light microscopy and viewing the videotapes and 35 mm color slides. In addition, the students studied the microfiche images, which provided several examples of the structural components presented in each lesson.

After the completion of the course, the students were given a multiple-choice examination based on the images that were representative of the laboratory course material. Test performance of this group was compared to a group from the previous year, which used the existing course materials without the microfiche. In addition, students in the first group were given a questionnaire to subjectively evaluate the new instructional method. We were particularly interested in the responses to the questionnaire. This group of students, having taken the course with and without the microfiche, served as both experimental and control subjects.

Figure 2
Close-up of color microfiche, which can contain up to 40 color slide images.

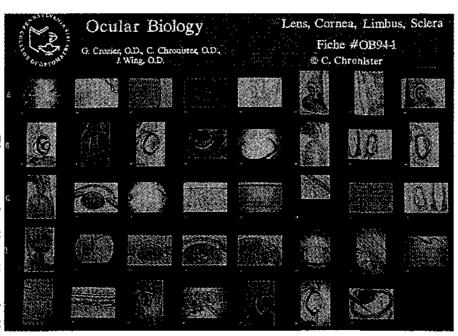

Photo credit: Ron Davidoff

Figure 3
Representative sample of a microfiche image showing a five-day chick embryo.

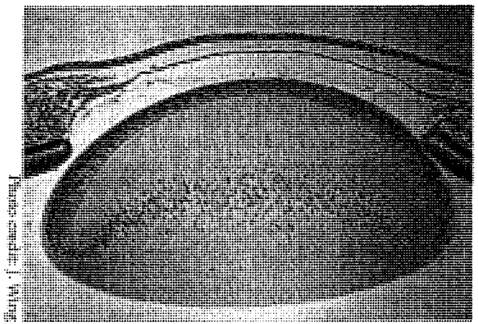

Photo credit: J. Wing

The excellent image quality clearly shows the lens with its primary fibers. The developing cornea is seen with the second wave of mesenchyme about to infiltrate the primary stroma.

Results

A total of 155 students used the microfiche in this pilot study. A "before and after" comparison was made of examination performance of these students to that of their predecessors in the previous class, which did not use this new image technology. The current class had a mean test score of 83%, compared with the class that previously used the traditional materials and had a mean score of 84%.

A subjective evaluation was also performed consisting of a questionnaire distributed to the 155 students enrolled in the course. In responding to the survey, 151 students were asked to compare their learning experience in the first quarter of the Ocular Biology course (without use of microfiche), to that of the second quarter Ocular Biology course, with microfiche. A majority of students (85%) agreed that the color microfiche enhanced their ability to learn the laboratory material. The biggest advantages of using the microfiche were the availability of image material (49%) and the opportunity for independent study (40%). The majority (88%) recommended continuing the use of microfiche in the course.

Discussion

The objective evaluation based on comparison of two classes' test performance is naturally flawed for a number of reasons. First of all, there was a comparison of test performance between two different groups of students. Each group was composed of individuals with potentially varying academic ability. Secondly, the two laboratory examinations contained different questions, although it covered the same course material and was authored by the same individual. For security reasons, it was not feasible to use the same examination for both years. The two examinations possibly contained inherent differences that could have accounted for the variance of a percentage point. Finally, another factor affecting test performance could be the sequencing of the examination. Whether the test was scheduled as the first one of the examination week, or the last, could affect performance. Nevertheless, the class correspondence of the two mean scores (83% and 84%) provides compelling evidence that use of the microfiche did not adversely affect test performance between the two groups. This is important because we had been concerned about the microfiche having possible negative effects on student attitudes toward learning.

Although effectiveness of a teaching method can be assessed on the basis of factors such as increased comprehension or shortened learning time on the part of the students,[1] there is a lack of prospective, randomized studies. Research studies, in evaluating the merit of new instructional methods in the health sciences, have contained design flaws, including some of the problems we have encountered. A commonly cited problem was an assumed causal relationship between the new teaching method and equal or increased learning.[6] Other issues include the difference between groups in the amount of time they spent on acquiring the common learning goal. Often, it is more studying rather than a superior feature of the instructional method that results in better test performance.[6] Finally, the literature reports that instructional resources can be too dissimilar to permit comparison of the factors influencing learning.

Many of these problems applied to our objective evaluation of the microfiche, which relied upon test performance between the student groups. However, as Hoffman et al. point out, improved test performance supports the use of an educational tool, but should not be considered the sole measure of instructional efficacy[13]. We believe that the microfiche offers an opportunity for learning that is not otherwise available. Consistent with our findings, it has been reported by Fry and Augsburger[5] that microfiche provides the advantage of inexpensive access to study materials. We believe that microfiche is tailored to the learning task of the Ocular Biology course, in that it allows students to view high quality images of tissue sections without the costs related to computer-assisted instruction.[6,14,15] Although intended as a supplement to the existing teaching materials, most of the students used the microfiche as an alternative to the microscope and glass slides. The subjective evaluation by the students further supported its use as providing for learning that was more available and independent.

Based on our experience in introducing a new teaching method into a course, we have arrived at some general conclusions. Although presented in the context of our observations in our course, similar findings have been reported in a review of instructional methods by Shatzer.[16] First of all, we have come to realize the need to present a variety of teaching methods to allow for the different learning styles of students. While the microfiche provided magnified, clear images, some students had no sense as to orientation of structures. In order to regain their perspective, students had to view a tissue section with a microscope and undergo the process of examining the entire specimen. Often both microfiche and light microscopy were needed to facilitate learning the material. Next, the new method had to be presented in the context of course objectives and expectations. Supplying the microfiche in the laboratory manual and simply providing access to information was not as effective as motivating students by having a quiz at the end of each laboratory session. Finally, we believe that the various forms of media are useful tools, but it is the skill and enthusiasm of the instructor that promotes a coherent learning experience.

Summary

In conclusion, the authors advocate the use of microfiche as a useful tool in the classroom. It stands out from the existing array of instructional resources in that it is a low-cost method that promotes an available and independent learning experience. In addition, it potentially allows the student to be better prepared for the laboratory with a higher level of understanding of the material. Instructors can utilize the allotted class time to interact with the students, allowing them to integrate the material and make correlations with clinical findings. We believe that microfiche can allow for a more interactive, less passive learning experience.

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Footnotes

a. Color Microimaging Corporation, Colorado Springs, Colorado.

b. Ocular Biology II Microfiche. Copyright 1994, C. Chronister.

Resources
(Continued from page 11)

Another serious exclusion is the lack of diagrams and photographs. For the beginner, these can be invaluable teaching tools. What does the patient see? What should I be observing? One notable exception is the description of the cover test, with a full page of the expected eye movements. Even in this area, I would have great difficulty performing this test if I didn't already know how it was done.

It would appear that this text is a compilation of manuals used by the authors in their clinical methods labs. As such, the teaching that goes along with the practice in the lab would certainly fill in many of these voids. As a reviewer, I tried to picture how I might use this book with the groups that I have taught these techniques: Optometry students, ophthalmology residents, and technicians. In each case, I believe there are better, more complete and practical texts and manuals to use.

Reviewer: Dr. Dennis Siemsen
Low Vision Service
Mayo Clinic
Rochester, Minnesota

Macular Disorders:An Illustrated Diagnostic Guide. Anthony Cavallerano, Rodney Gutner, and Leonard Oshinskie, with illustrations by Laurel Cook Lhowe. Boston: Butterworth-Heinemann, 1997, 271 pages, $95.00.

A thought comes to mind when one first sees a book like this: Do we really need another book on retinal problems? Especially on the somewhat narrow subject of macular disorders!

In optometric education, there is a tendency to concentrate on using encyclopedia-like texts, and supplement them with additional readings from key texts and journal articles. Perhaps this is done in recognition of the students' limited budgets, or because the student isn't likely to read the assignment anyway.

Optometric educators should look for books that add value to their teaching, and understanding to the student's classroom and clinical work. *Macular Disorders* is that kind of text.

Macular Disorders covers a broad range of topics and the chapters are laid out in a logical sequence. The key topics, such as anatomy and physiology, clinical findings, choroidal neovascular membranes, are well documented. Many of the less common variations on macular degenerations are arranged in a way that the students will find useful in their differential diagnoses.

The illustrations are top-notch. In retina, as in just about everything else, anatomy is a key element in understanding disease. The illustrations help the student understand the subtle differences between different disease entities.

The outline format used throughout the book works well. Students should find it easy to get right to the facts without sifting through endless pages of text. Whether studying for exams or making a quick clinical reference check, students will want this text nearby.

As good as this text is, it could be even better in a couple of ways. First, I'd like to see some histopathological cross-sections alongside the illustrations. The combination of illustration, cross-section, and clinical appearance would really reinforce the underlying disease concepts. The second key area relates to treatment. I realize that the authors describe this text as a "diagnostic guide," but a slight expansion of treatment concepts would make this text really unique. Of the 271 pages, only 26 are devoted to treatment. This is unfortunate, because low vision and nutritional therapy are the only treatments that help the patient see better. These are well within the scope of optometric practice; indeed, optometrists are the only professionals likely to administer these treatments.

Despite these minor shortcomings, this is a valuable tool for teaching. It is readable, accurate, and would be most useful in the clinic. I recommend this text for teachers students, residents, preceptors and clinicians.

Reviewer: Dr. Dennis Siemsen
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Accommodation, Nearwork and Myopia. Edith Ong and Kenneth J. Ciuffreda, Optometric Extension Program, 1997, 211 pages, $21.00.

The subject matter of this book has been of critical interest to optometrists for decades. Here it is addressed authoritatively. How much is myopia caused by nearwork through the act of accommodation? The book approaches the subject from several different perspectives starting out in the first chapter with a necessary review of the physiology of accommodation as it might influence refractive state.

The second chapter covers the manner in which accommodation and refractive grouping affects myopic progression and consists of a series of research reports. The very readable third chapter discusses whether and how near work might induce permanent myopia and touches on the nature-nurture discussion. The fourth chapter looks at near work induced transient myopia and is easily the most complex, intricate and technical chapter in the book. Considerable background knowledge is necessary to fully appreciate this chapter. Chapter five addresses the biomechanical forces (sclera and choroidal stretch, effect of IOP, etc.) and brings out the very best in these two authors: they unashamedly offer an opinion — biomechanical forces are not significant in the development of myopia.

Chapter six looks at the effect of retinal defocus on change in refractive state. Here the reader will find the most likely cause of much myopia and the clinical connection is well made. Chapter seven closes with a summary of the clinical implications garnered from the rest of the book. Lasting only 16 pages, this final chapter covers what an optometrist needs to know about the etiology of myopia. This book needs to be read and used as a reference by any practitioner who deals with patients prone to refractive change.

Reviewer: Dr. James Saladin
Michigan College of Optometry
At Ferris State University

Manual of Ocular Fundus Examination. T. Dorion. Boston: Butterworth-Heinemann, 1998, 556 pages, $65.00.

Manual of Ocular Fundus Examination is a reference on an extensive range of ocular fundus conditions and diseases. It is an excellent guide for the clinician who wants to know, and understand, a wide gamut of retinal problems that may be encountered in clinical practice.

There are chapters covering fundus problems related to the optic nerve, macula, retinal vessels, and peripheral retina; a wide variety of etiologies such as vascular, inflammatory, degenerative, neoplastic, parasitic, injurious, metabolic, and toxic causes are covered. A detailed chapter is devoted to retinal problems associated with systemic diseases including diabetes, sarcoidosis, albinism, Behcet's disease, systemic lupus erythematosus, tuberculosis, Sturge-Weber syndrome, as well as many others.

Classic disorders like retinal detachments and glaucoma are discussed in detail, as are many less common, but potentially serious conditions that the practitioner may encounter and must know. I was particularly impressed with a section on pregnancy retinopathy (including retinopathy of normal pregnancy, retinopathy of pre-eclampsia, and retinopathy of eclampsia). This information is so important for our patients, but I have not previously seen such an efficient summary on this topic that is well detailed, yet still concise.

Good organization also permits other sections of the book to be comprehensive yet still brief. Chapter sections (including background, etiology, symptoms, clinical appearance, diagnosis, histopathology and treatment) facilitate a presentation that provides extensive and clear information in a compact format.

In *Manual of Ocular Fundus Examination*, each illustration provides exactly the view that the author would optimally want to furnish for the reader. Having the ultimate angle and view, the author was also able to label each diagram to demonstrate the distinguishing features that help establish identification and diagnosis. The color illustrations in this book are better than many real fundus photographs I have seen in other books and are clearly a strength.

A lengthy glossary at the end of *Manual of Ocular Fundus Examination* provides easily accessible and concise definitions for terms related to ocular pathology. A chapter with an overview of direct ophthalmoscopy and retinal anatomy is somewhat simplistic for the highly experienced doctor, yet it is appropriate for any comprehensive reference on retinal pathology.

This book appeals to a wide audience including practicing doctors and students who are just learning to make differential diagnoses. Doctors who are working on honing their ocular pathology skills will find this an excellent informative source and those who are current will find it to be an instructive review. In addition to appealing to optometrists, ophthalmologists, optometry students and medical students, *Manual of Ocular Fundus Examinations* would also be useful to internists, emergency room physicians, pediatricians and other professionals who should have a good grasp of retinal and ocular pathology.

Reviewer: Dr. Ellen Richter Ettinger
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State College of Optometry

Anomalies of Binocular Vision: Diagnosis and Management. Robert P. Rutstein and Kent M. Daum, Mosby, 1998, 368 pages, $59.95.

This book is written for the student or practitioner who already possesses the basics of oculomotor diagnosis and treatment. Emphasizing strabismus and conditions derived from strabismus, it is well organized with an outline at the beginning of each chapter and with the topics presented in an order that will make sense to a clinician.

A solid foundation is set in the first chapter with the development of the hierarchical nature of oculomotor diagnostics and treatment. Chapter two reviews the differential diagnosis and management of organic and functional amblyopia. Accommodative problems are covered in chapter three with a four-star rating for the authors' presentation of accommodative and convergence spasm conditions. Chapter four on anisekonia offers a good mix of theory and application with the very practical inclusion of nomograms for anisekonic lens design. Chapter five assumes that the reader already has basic clinical knowledge on suppression and anomalous correspondence and discusses them from an applied clinical perspective. Heterophoria and vergence anomalies are presented in chapter six from a statistical and case study perspective.

In chapter seven, the etiology of strabismus is reviewed by case type with each type accompanied by case reports. Chapters eight and nine go over esotropia and exotropia respectively in a way designed to please the reader who likes references, statistics and many case examples. The differential diagnosis of both esotropia and exotropia is followed by well-written instructions for treatment. Sufficient case examples are given, such that a clinician is likely to find an example very close to one he or she might encounter in practice. The diagnosis and management of incomitant deviations are presented in chapter ten in a way that is excellent for the experience but would be a challenge for the novice. A definite substrate of knowledge is assumed. Chapter eleven presents a very helpful review of the surgical and pharmaceutical management of ocular misalignment, and chapter twelve closes with the legal aspects of binocular vision practice.

This book should be read and placed on the reference shelf of any practitioner who sees the entire range of optometric patients. It is not a book for novices, nor is it a book for the very experienced in binocular vision; it is a book for the upper level optometry student and for the general practitioner.

Reviewer: Dr. James Saladin
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