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DEPARTMENTS

Cover photo courtesy of Southern California College of Optometry.

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. The ASCO website is www.opted.org **Subscriptions:** **JOE** is published quarterly and distributed at no charge to dues-paying members of ASCO. Individual subscriptions are available at $25.00 per year, $35.00 per year to foreign subscribers. Postage paid for a non-profit, tax-exempt organization at Rockville, MD. Indexed in Current Index to Journals in Education (ERIC).

EDITORIAL

"The Lecture"

This issue of *Optometric Education* features a number of excellent articles, but I would like to focus on the one by McClain and colleagues about enhancing the lecture environment. Although the style and format of the written presentation follow the classical pattern, there are cartoons and pictures as figures that make the article just a bit different from the standard fare. But, after all, the title indicates that the subject is about enhancing the very traditional format of a technique, which we have come to know and love, called "The Lecture."

The lecture is probably the most common method of classroom teaching in colleges of optometry, and students often feel they are being lectured to death. From a theoretical point of view, lecturing has its pros and cons. It is certainly an efficient use of the teacher's time, provides a structure for learning what the teacher considers important, and appeals to people with strong verbal/linguistic skills. Fortunately the majority of optometry students fall into this category.

But, on the downside, the lecture method often involves a passive transfer of information, which is useful only for short-term memory and recall, discourages curiosity and exploration, and does not address the development of higher order cognitive skills such as the synthesis of new ideas and the evaluation of information. But all is not lost since computers and other techniques can bring to the lecture an interaction between the deliverer and recipient.

The importance of McClain's article lies in its look at the downside of lecturing and how to overcome it. The recent move toward more case-based learning in health professional schools is another understandable response to the inadequacies of traditional lectures. But I believe there is still a place for lectures in a well-designed curriculum — lectures that are novel in format and enhance problem solving and decision making skills.

How much information is available on the issue of lecturing? The answer to that question is really the second reason I selected this article to highlight. There is a wealth of available literature that optometric faculty should be using. There is no need for all faculty members to have a graduate degree in education, although some people with advanced training at each institution would certainly be beneficial. Faculty can educate themselves in the science of education — an important example for our students whom we must motivate to establish a pattern of life-long learning.

One of the most important activities I perform with my students is to assure them that five years after they graduate they will have to learn some things that they were never taught in optometry school. One of the best places to start their learning is to turn to the literature and read about other peoples' experiences and ideas. I read journals like *Academic Medicine* and *Medical Teacher* as often as *Optometry and Vision Science* and *Ophthalmic and Physiological Optics*. Since the issues that optometry faces are almost identical to those encountered in other health professions, insights and techniques are available in journals in dental education, nursing, and others. There are excellent online journals like *Medical Education Online*, and many of the other journals that cover education in the health professions can be accessed electronically. If you really want to survey the field of education, the ERIC database is to education what MEDLINE is to the health professions. Why not use both?

Optometry faculty must realize that it is just as important to be knowledgeable about the *process of education* as it is to be the content expert. When faculty become more familiar with and more skillful in utilizing educational theory and technology, there will be fewer concerns from the optometric educational community about a boring and passive procedure that students often have to be dragged to kicking and screaming - a process called "The Lecture."

Lester E. Janoff, O.D., M.S.Ed, F.A.A.O.
Editor

SCHOOL NEWS

Dr. Charles F. Mullen, president of the **Illinois College of Optometry (ICO)**, was selected as the recipient of the Benjamin Franklin Society Award by the **State University of New York (SUNY) State College of Optometry**. The Benjamin Franklin Society, which was founded by a group of Columbia University faculty, is presented to a professional with a distinguished career in the optometric field. Dr. Mullen is recognized for his enormous 32-year contribution to the field in building institutions of quality education; in forming national health care policy through the U.S. Veterans Health Administration; and in strengthening the commitment to optometric care for all communities through education, research and patient care.

"It is a great honor to receive this prestigious award, especially since it comes from one of the nation's highly respected colleges of optometry," said Dr. Mullen. Dr. Mullen's tenure at ICO, which began in 1996, will conclude in October 2002 when he retires from the college.

The **UAB Vision Science Research Center** will begin the pilot phase of an extensive Black Belt rural screening and research program aimed at assessing the prevalence and progression of eye disease due to glaucoma and diabetes. The program is made possible through $325,000 in grant money from several non-profit and state agencies.

VSRC Director Kent Keyser, Ph.D., said a screening and referral system is much needed in the poorer, more rural areas of Alabama where the unemployment rate is about three times the national average, 36 to 43 percent live below the poverty level, and the illiteracy rate is at least 36 percent.

The researchers hope to achieve several objectives with the project, said **Mary Jean Sanspree, Ph.D.**, co-director of the project. "There is the screening component in which we hope to catch and prevent these diseases early. There's a research component in which we hope to identify the prevalence of these diseases, develop a database and follow the progression of the diseases. And lastly, there's an educational component, in which we hope to identify and develop appropriate educational materials for this audience," Sanspree said.

The extensive project, which Sanspree said is one of the most unique university-community partnerships in the country, involves coordination and participation from UAB's VSRC, the UAB School of Optometry, UAB School of Medicine Department of Ophthalmology, the Alabama Department of Public Health, along with local county and state health groups.

The **Illinois College of Optometry** announced that **Dr. Sandra Block** and **Dr. Dominick Maino** are collaborating with several research organizations to carry out a phase II clinical study to evaluate AMPAKINE compounds as a potential treatment for fragile X syndrome. Organizations participating in the study include the Illinois College of Optometry, FRAZA Research Foundation, Rush-Presbyterian-St. Luke's Medical Center in Chicago, University of California-Davis and the Child and Adolescent Psychiatry Department at the University of Chicago. The design of this Phase II clinical study is a randomized double-blind, placebo controlled trial lasting four weeks and involving one hundred patients. Outcome measures will include testing attention and executive function, visual/perceptual spatial and verbal/auditory memory, language and behavior. Drs. Maino and Block have been pioneers in the study of ocular, vision and visual perceptual abnormalities in the Fragile X syndrome population. The principal investigator, Elizabeth Berry-Kravis, M.D., Ph.D., is at Rush-Presbyterian-St. Luke's in the Pediatric Neurology Department.

Ferris State University's Michigan College of Optometry and Technology Transfer Center has developed *Binocular Indirect Ophthalmoscopy: Courseware for Eye Care Professionals*, a CD-ROM based training program that provides interactive instruction on the basic techniques for successful examination of the retina using BIO. The CD-Rom includes full-color photos, video and interactions. Unique interactive screens allow the user to practice interpreting the inverted lens view while it is simultaneously compared to the actual fundus anatomy. The relationship between lens power, magnification and field of view is also interactively demonstrated so that users can understand the advantages of selecting different condensing lens powers. **Dr. J. Randell Vance** acted as content developer. Dr. Vance has conducted numerous workshops on binocular indirect ophthalmolscopy, and has been a leader in the use of technology to enhance optometric instructions. For additional program information, e-mail Dr. Vance at vancej@ferris.edu or Jeffery Gabalis, multimedia development specialist, at gabalis@ferris.edu

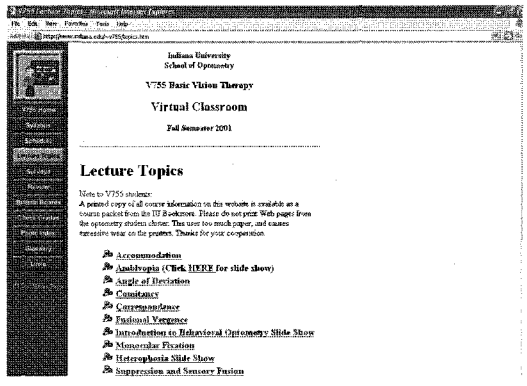
Dr. Lawrence J. DeLucas, University of Alabama at Birmingham School of Optometry was awarded an Honorary Doctor of Science degree by **Ferris State University** at its May 2002 Commencement. As a payload specialist aboard the Space Shuttle Columbia in 1992, traveling more than 5.7 million miles in 221 Earth orbits, Dr. DeLucas conducted a wide variety of experiments relating to materials processing and fluid physics. Dr. DeLucas is recognized as a world authority in the area of protein crystallography and the design of pharmaceuticals. Dr. DeLucas received his diploma from **Dr. Kevin Alexander**, dean of the **Michigan College of Optometry at Ferris State University**.

Web-Enhanced Courses for Students

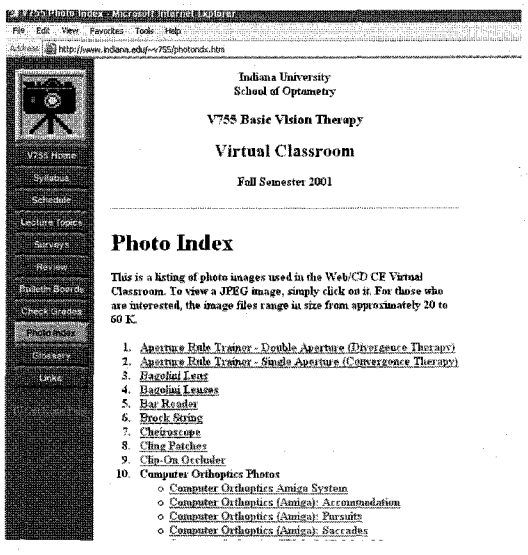
Dominick M. Maino, O.D., M.Ed., F.A.A.O.

Where's the research concerning web-enhanced courses for optometry students? Is web-enhancement a good idea in optometric education? While we haven't begun to answer these questions, a few of our non-optometric health care education brethren have. After reviewing abstracts on PubMed and paraphrasing them for you here I found that at the completion of one study researchers found:

... one of the most positive effects students experienced was competence in using the computer...[students] also [enjoyed] the use of multimedia for learning clinical procedures. [However], it was found that web [discussion] boards and email were too slow to allow group work in the virtual classroom. Real time communication programs were found to be superior for problem discussion and hypothesis formulation. [The authors] experience suggested that distance learning should be organized with a mixture of different media, allowing communication of knowledge and skills between the resources and the students, as well as cooperation between the students (Mattheos N, Nattestad A, Schittek M, Attstrom R. A virtual classroom for undergraduate periodontology: a pilot study. Eur J Dent Educ 2001 Nov;5(4):139-4



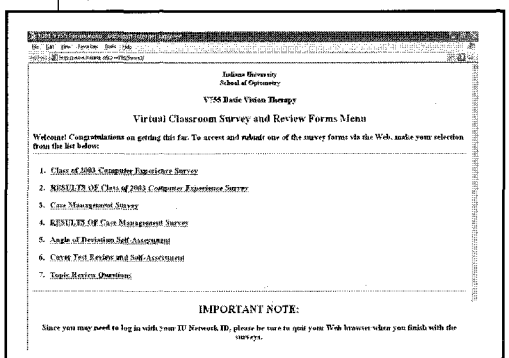
Lecture Topics Page for Basic Vision Therapy Web-enhanced course



Photographs are available of all vision therapy equipment discussed in this IU course

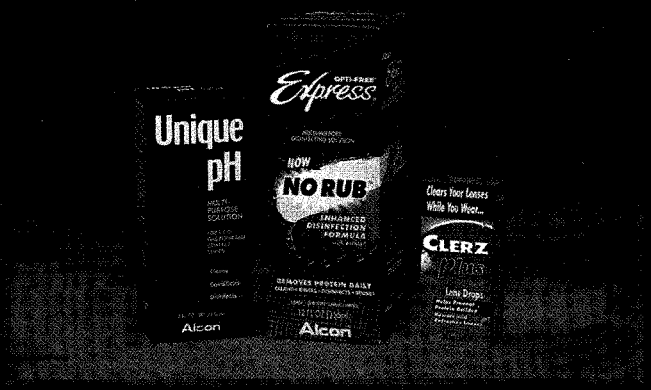
Another study developed computer-aided instructional resources via the Internet, various intranets, and desktop computers to supplement pathology education. A comprehensive set of images with text, along with interactive examination questions, were developed and placed on the web. A CD-ROM was also developed for use with individual desktop computers and intranets. It was found that web-based delivery of computer-aided instruction was an efficient way of enhancing courses for students studying pathology and that student performance was also enhanced. (Klatt EC, Dennis SE. Web-based pathology education. Arch Pathol Lab Med 1998 May;122(5):475-9)

And finally, **can you improve student's grades using Internet enhanced courses?** Lipman et al note that computer-based methods of instruction offered the possibility of helping medical students learn clinical skills and professionalism. A prospective, randomized study comparing traditional classroom course methods in clinical ethics was compared with the same course supplemented by Internet-based discussion. The results indicated that the students' understanding of ethical analysis was significantly higher for those in the course with the Internet component than it was for those in the traditional course. (Lipman AJ, Sade RM, Glotzbach AL, Lancaster CJ, Marshall MF. The incremental value of internet-based instruction as an adjunct to classroom instruction: a prospective randomized study. Acad Med 2001 Oct;76(10):1060-4)



Survey and review forms are available online for Dr. Rainey's course.

(Continued on page 131)



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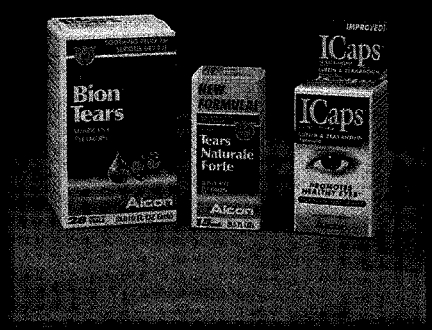

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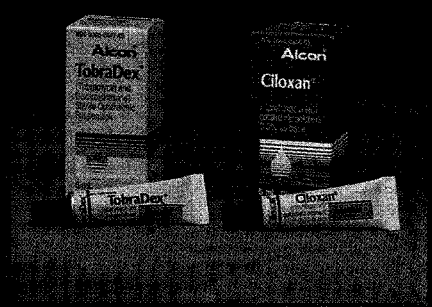

INDUSTRY NEWS

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* ASCO Corporate Contributors support national programs and activities benefiting the schools and colleges of optometry. For more information on the program, contact porourke@opted.org

CIBA Grant Will Support ASCO's "Each One, Reach One" Program

In an effort to increase the number of qualified applicants to optometry schools and colleges in the United States, CIBA Vision and Novartis Opthalmics recently awarded a grant of $25,000 to ASCO for its "Each One, Reach One" program. The program seeks to enlist optometrists to encourage interested patients to enter the field of optometry.

According to ASCO, applications to optometry schools and colleges in 2001 were down 13 percent compared to the prior year. Furthermore, over the past three years, the number of students taking the Optometry Admission Test (OAT) has dropped by 35 percent.

"The declining rate of applications to optometry schools is bound to have an adverse affect on each school's ability to be selective in the admissions process and its ability to guarantee a high caliber of graduates," said Joan Anson, Director of Career Promotion and Student Affairs at ASCO.

In response to this disturbing trend, ASCO developed the "Each One, Reach One" program to encourage O.D.s to talk to their patients about optometry as a future career. Two primary goals for the program are to increase the applicant pool to three qualified applicants for each first year position in the schools and to develop an applicant pool that reflects the national diversity of the U.S. population.

"For this program to be truly successful, it will require the cooperation and commitment of educators, practitioners, professional associations and the eye care industry. CIBA Vision and Novartis Ophthalmics are pleased to help support the future of the optometric profession," said **Dr. Sally Dillehay**, head, academic development at **CIBA Vision**, and **Dr. Carl Spear**, director, optometric services at **Novartis Ophthalmics.**

Optometrists who have contacted ASCO and expressed interest in the "Each One, Reach One" program will become members of ASCO's Career Promotion Corps. Members will receive an "Each One, Reach One" kit that was made possible by the CIBA Vision and Novartis Opthalmics grant. The kits include a bookmark, a rolodex card with ASCO contact information, 15 to 20 student brochures, a plastic stand to hold the brochures, career prescription pads, an OAT test information booklet and a copy of ASCO's admission requirements.

Optometrists interested in becoming members of the ASCO Career Promotion Corps can also register online on the ASCO web site at www.opted.org (go to Career Promotion Corps).

With worldwide headquarters in Atlanta, CIBA Vision is a global leader in research, development and manufacturing of optical and ophthalmic products and services, including contact lenses, lens care products and ophthalmic surgical products. CIBA Vision products are available in more than 70 countries. For more information, visit the CIBA Vision website at www.cibavision.com.

VISTAKON® Expands Parameters of ACUVUE® Lenses

VISTAKON®, Division of Johnson & Johnson Vision Care, Inc., announced the introduction of new Plus and High Minus powers for its ACUVUE® Brand TORIC Contact Lenses. The new ACUVUE® *TORIC* expanded parameters complete the product line and will enable practitioners to successfully fit more patients with astigmatism.

"The new Plus and High Minus powers are a significant advancement for ACUVUE® *TORIC* and underscore our commitment to helping the majority of astigmatic patients enjoy the comfort and convenience of contact lenses," said Phil Keefer, president, VISTAKON® Americas.

Like all ACUVUE Brand contact lens products, ACUVUE® Brand *TORIC* lenses are made by the patented "stabilized soft molding" process which sets the industry standard for reproducibility; pricing and shipping policies will remain the same.

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Transitions Sponsors UV Symposium

Ophthalmologists from around the world heard leading clinical research about UV and the eye at a UV Symposium supported by Transitions Optical during the XXIXth International Congress of Ophthalmology in Sydney, Australia, April 23. The presentation explored the role of UV light exposure in eye health and included the results of a recent user study on Next Generation Transitions(r), 1.50.

"The danger of UV to the eye is a global issue, requiring increased awareness in every country around the world," said Susan Stenson, M.D., F.A.C.S., clinical professor, Department of Ophthalmology, New York University, and moderator of the symposium. "With the support of Transitions Optical, we were able to share some of the leading clinical research in this area with our colleagues worldwide."

Part of the clinical research, funded by an independent grant from Transitions Optical, compared the experiences of patients wearing regular, clear lenses to their experiences wearing Next Generation Transitions lenses. Results showed that four out of five clear lens wearers preferred the comfort of Next Generation Transitions. For more information, visit transitions.com or contact Transitions Optical Customer Service at (800) 848-1506.

Paragon Announces Alliance With Humphrey Division, Carl Zeiss

Paragon Vision Sciences and Humphrey Division, Carl Zeiss Ophthalmic Systems, Inc., have entered into a marketing alliance to promote Paragon CRT(tm) Paragon's new product for overnight contact lens corneal reshaping (pending FDA approval), and the Humphrey(r) ATLAS(tm) Topography System. This alliance will take advantage of the synergies between the two companies and their products.

Paragon CRT is the first and only product to receive recommendation for approval for overnight contact lens corneal reshaping from the FDA Ophthalmic Devices Panel, a public advisory committee of the Food and Drug Administration.

"As we approach the launch of Paragon CRT, we are thrilled to join forces with Humphrey, the premier company in corneal topography as well as leader in ophthalmic diagnostic equipment," declared Joe Sicari, president and CEO of Paragon Vision Sciences.

For more information on Paragon CRT and other Paragon products, contact 1-800-528-8279 or their web page: www.paragonvision.com

Zeiss Focuses on Customer Technical Support

Carl Zeiss Optical, Inc., announced an expansion of personnel responsibilities to support Zeiss partner labs. Roger Reynolds, presently sales manager/Systems Technology Group, and responsible for sales for the coating and lens processing equipment, will now take on the responsibility as the distributor support manager for the states east of the Mississippi. Mr. Reynolds reports to Tom Butler, vice president, technology.

Scott Jones, Zeiss retail sales representative, will also be distributor support manager for the states west of the Mississippi while coordinating selected retail key accounts in Texas. Mr. Jones reports to Roland Sitzler, vice president, sales.

Headquartered in Oberkochen, Germany, Carl Zeiss is a leading international group of companies operating in the optical and optoelectronic industry. Further information on spectacle lenses by Carl Zeiss is available under www.zeisslenses.com

Santen's Quixin Improves Efficacy in Endophthalmitis Prevention

In the article, "Which Fluoroquinolone Do You Use to Prophylax Your Cataract Patients?" Dr. Eric Donnenfeld discusses new data that show Quixin (levofloxacin) improves efficacy in endophthalmitis prevention. Endophthalmitis is a big concern for ophthalmic surgeons because of the severe sight-threatening nature of this dreaded complication of cataract surgery. According to the literature, the incidence of endophthalmitis is between 1:1000 and 1:5000, but a number of abstracts presented over the past several years have shown that its incidence may be increasing.

The Endophthalmitis Vitrectomy Study found that 70% of endophthalmitis cases were caused by coagulase-negative gram-positive micrococci. A new study from Dr. Christopher Ta and colleagues at Stanford University compared 21 different antibiotics in their ability to cover coagulase negative Staph. Among the four fluoroquinolones tested, Quixin had the highest susceptibility (91%). More information about Quixin is available at 1-800-611-2011 or www.santen.com

VISTAKON® Launches New ACUVUE® Packaging

VISTAKON®, Division of Johnson & Johnson Vision Care, Inc., unveiled a smaller, more convenient container for ACUVUE® Brand *BIFOCAL* Contact Lenses as part of its "Innovation Platform." One of the major benefits of this innovative design, which has been successfully incorporated into ACUVUE® Brand *TORIC* and ACUVUE® 2 Brand Contact Lenses, is the 43% reduced box size with improved closure that saves both practitioners and patients significant storage space. Inside the box, the primary blister packaging has a new foil seal, and a larger bowl that makes it easier to remove the contact lens.

Enhancing the Lecture Environment Through Use of Computer-Oriented Activity Periods[a]

Anita McClain, Ed.D.
Robert L. Yolton, PhD., O.D., F.A.A.O
Graham Erickson, O.D., F.A.A.O
Bruce Eaton, B.A., B.A.
Lee M. Colaw, M.S., M.S.B.A.

Abstract

Learning should be a dynamic process that involves motivation, attention, and activity, but traditional classroom lectures often do not emphasize these factors. This can cause students to enter an "audit mode" during which their brains scan for terms such as "exam," "break," and "lunch" while rejecting other information. Students are especially likely to enter audit mode if they are given pre-printed lecture notes and can pass exams by simply reviewing those notes.

It is proposed that lecture presentations be limited to no more than 20 minutes in duration separated by four-minute activity periods. Suggested activities include consolidating material just presented into short essays, predicting relationships between variables about to be discussed, writing letters to patients or their parents describing the disease just discussed, creating commercials for products or concepts, and writing questions for the professor. It is hypothesized that shorter lecture blocks and the insertion of activity periods will facilitate learning by reducing the probability that students will enter an audit mode. As an additional benefit, well-chosen activities can make the process of optometric education more enjoyable for both students and faculty members.

Key Words: *education, learning, active learning, optometry, attention*

Introduction

Learning can encompass activities ranging from memorizing anatomical terms to mastering the motor skills required to operate a phoropter. It can also involve training the brain to think logically and solve complex problems. Many general references describe the process of learning,[1-4] but the focus of this paper is on the lecture-based learning environment and how to maximize student attention during lecture presentations.

Getting Information into the Brain for Processing

Most classroom learning involves information obtained through the senses: chiefly vision and hearing. However, visual and auditory information does not flow directly into memory because the brain would be overwhelmed by the massive input. Instead, it passes through an elaborate set of filters that remove material perceived to be irrelevant.[5]

Filters remove information, but they also allow information to break through if it is sufficiently novel or important. If someone kicks your chair or if there is a sudden gust of cold air, you become aware of these events because they are determined to be events worthy of conscious concern. Similarly, lecture material deemed to be important passes through the students' filters to be further analyzed and possibly retained.

Attention

One of the main factors controlling the brain's filters is attention.[5] Psychologically, attention is defined as the process of making ready to receive information, or the focusing of consciousness on some internal or external stimulus. Things that are attended to pass through the filters and can be analyzed, compared to previous information, and remembered/learned.[5]

Control of the attention filters is an important first step in the learning process. Over the centuries, various methods have been employed for compelling attention during learning. A common method involves fear of physical or psychological pain. Although knuckle rapping and spanking are still used in some schools, psychological fear can be much more effective. Fear of failure on tests is a strong motivator, but some optometry students extend this to a fear of any grade lower than "A" and become quite neurotic as a result. Fear of humiliation also works as a motivator as is frequently demonstrated during grand rounds when the doctor in charge threatens to embarrass his or her interns if they cannot recall some bit of information.

Using fear to focus attention can work, but it often produces unwanted side effects. Students quickly come to dislike the learning environment and eventually try to avoid it. For professional students, this can be deadly because the rapid evolution of knowledge requires that doctors must be students for their entire professional careers. It is sad to hear students at graduation say that they look forward to never having to study or take tests again. The education system has failed to instill in these students an enjoyment of learning and they view the prospect of becoming life-long learners as a burden rather than a joy.

Dr. McClain is a professor at the Pacific University School of Education. Dr. Yolton is professor and Dr. Erickson is associate professor at the Pacific University College of Optometry. Mr. Eaton is a computer specialist and Mr.. Colaw is chief information officer at Pacific University Information Services.

Extraction of Meaning

Assuming that students are motivated and their attention filters are open, the next step in learning involves extraction of meaning from information passed through the filters. This involves comparing the pattern of brain neuronal activity produced by incoming information to previously stored patterns of activity.

For example, if a formula for the change in vergence of light is written on the board, the brain determines that it is a formula because the neural activity matches activity previously associated with formulas. But, it also determines that some of the variables are novel. With sufficient motivation, this formula will be remembered as a modification of a previously learned neural activity pattern.

Long-term Memory

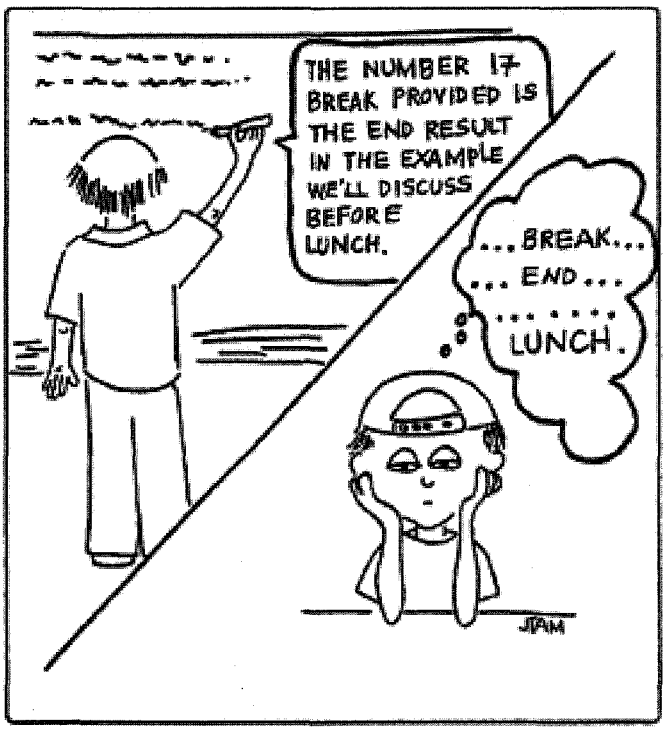
The means by which the brain stores information in long-term memory remains largely a mystery. Often the analogy of a closet or storeroom is used in which items are hung on hooks with nametags. Some nametags are larger than others and some hooks are placed closer to the front where they can be found more easily. Attaching mental/emotional importance to the hooks/nametags also makes the information easier to retrieve as does cross-referencing the nametags by using the material in multiple contexts.

The "Audit Mode"

Students must be motivated and actively attending in order to learn. Fatigue, lack of interest in the material being presented, lack of understanding, and other factors can shift students from an attentive learning state to one in which they are simply auditing the incoming information stream. They monitor the professor's words for terms like "quiz," "break," "lunch," "boards," and "patient," but everything else is just filtered out. (Figure 1)

The sleep mode in most computers provides a very good analogy for the brain's audit mode. In sleep mode, major information processing functions are shut down, but the computer is alive and can be awakened by pressing a key. For students, the mention of a quiz can bring them back from audit mode.

Figure 1
Words breaking through the attention filter of a student in audit mode.[b]



The Lecture Learning Environment

Even the best students eventually drop into an audit mode when they have been passively exposed to a lecture for too long. The time required to shift into an audit mode during a lecture depends on the skill of the lecturer, the material being presented, the time of day, the emotional state of the students, and many other factors. Professors themselves sometimes facilitate their students' transition into audit mode. They give out preprinted class notes that the students will color red and green and blue the night before the next exam, and they ask students to simply recognize facts on multiple-choice tests rather than actually understand concepts.

Today's video-generation students seem to have shorter attention spans than did their parents, but eventually everyone loses attention in a passive lecture environment. Why don't professors see this happening and wake their students up with activities? Some do, but most do not. There are several reasons for this. Most professors consider the material they are presenting to be really exciting and do not understand why students can not share their excitement.

Beyond this, most good lecturers are on an adrenaline high during their presentations, and this distorts their perception of time. For the lecturer, the hour passes very quickly, whereas it often slows to a crawl for students. Professors do not feel the need for activity breaks when they are lecturing and cannot understand why students start yawning and entering the audit mode about 20 minutes into the lecture.

In addition, many professors still cling to the concept that they must say every single fact to their students or else they will not learn the material and will not be able to pass detail-oriented, multiple-choice exams (e.g., National Board Part One). This often requires going as fast as possible through massive amounts of detailed material and filling the lecture hour completely. These professors seem to be in a race with the clock and do not have time to worry about whether their students are actually learning anything meaningful.

So what can a professor who has become aware of this problem do with a lecture class of 80 or 100 students? Karl Smith from the University

of Minnesota believes that the average adult attention span in a passive environment is about 12 to 15 minutes[6,c] and has suggested that brief activity periods should be inserted during lecture periods to restore attention and bring students back from audit mode.

The activities described below, and others,[7-13] can be used to effectively restore student interest during extended lecture periods. Many can be accomplished during three to four-minute periods inserted between 15 to 20 minute lecture blocks. They can be done with paper and pencil, but they can be accomplished much more efficiently if all students have computer and network access at their desks.[d] Using the network, students can submit responses directly to the instructor who can then select one or two for very brief viewing prior to resuming the lecture. As a variation, all responses can be collected and sent to the class as study aids.

Key points to remember when using these techniques are that activities must be varied, their purpose must be understood and accepted by students, and the time allotted to them must be strictly limited. A timer with a bell or other noise-making device can be used to signal the end of an exercise. If extra time is never allowed, students will learn to work quickly and not waste time during the activity period. Faculty members must also be careful to limit the amount of time allocated to discussing student responses to no more than 1 or 2 minutes.

Suggested Activities

Consolidation

Most lecturers stop occasionally and ask students if they understood the material just presented. But this can be a useless exercise because in a classroom environment most students will indicate understanding whether the concepts were clear to them or not.

Often students content themselves with just taking notes during the lecture and planning to figure them out later. This "IOU" process typically results in cramming and reliance on short-term memory to pass tests.

To encourage students to increase their understanding and partially consolidate material in memory during the lecture period, several techniques can be used. Students can be given a maximum of four minutes to write and electronically submit a short summary of the main points just presented and to describe how they relate to similar topics presented in other classes.

Students can also be asked to write four examination questions (and answers) that would be passed by someone who knew the material just presented. Or they can be asked to develop an illustrative case example that would help explain the concept.

With computers, students can write out their responses and quickly submit them electronically to the professor. When lecture begins again, one or two responses can be selected at random and displayed. This keeps students interested and honest.

Table 1
Discussion Web Example

PRO/AGREE	Statement of Problem	CON/DISAGREE
1.	Driver's Licenses should be taken away from all patients over 70 years of age with acuities of 20/30 or worse in the better eye.	1.
2..		2.
3.		3.
4.		4.

Anticipation/Prediction

This is the opposite of consolidation. Pause for 4 minutes during the lecture and ask students to think in a structured way about the topic to be presented next. If it involves how a drug works or how a disease attacks the body, students can be asked to make written predictions about what will happen.

If the topic involves the derivation of an optics formula, ask students to anticipate what factors will be involved. If the formula involves how much a light ray is bent as it strikes a curved glass surface, ask students to list what factors determine the degree of bending, to specify how each factor will affect the light, and to specify which factors are most important.

As a variation on this theme, students can be asked to anticipate or predict by voting on which of several possible relationships between variables is correct. (They would also need to justify their votes.) With a computer system, votes can be cumulated and prizes can be awarded to the students with the best voting records (if the professor chooses to use this type of motivation). In many ways, this process is like betting on an athletic contest; for many it increases involvement and interest.

Each of the students' responses could be submitted electronically and one or two can be presented to the class to give the next lecture segment a good starting point.

Discussion Webs

In this exercise, a table with three columns is provided to students, or they can construct it themselves. The first column is labeled "Pro/Agree," a statement is written in the second column, and the third column is labeled "Con/Disagree." Students are asked to consider the statement and then write both pro and con sentences about it.

This technique works well with ethical issues such as whether older people should be allowed to drive automobiles. It could be incorporated into a public health class discussion about accident frequencies, reaction time increases in the elderly, etc.

Semantic Translation

Send a sentence, paragraph, or short section from a textbook (e.g., Adler's *Physiology of the Eye*[14]) to the students' computers and ask them to interpret it in their own words. This exercise teaches reading comprehension, concept interpretation, and writing skills.

As a variation, a set of relatively complex polysyllabic terms that they have previously encountered, such as "polyethylene" and "uveitis," could be sent to the students' computers. They would then be asked to interpret words not previously encountered. For example, understanding that "poly" means many and "itis" means inflammation would help students to understand that "polyarteritis" means

inflammation of many arteries. Of course it would be quicker to simply give students the definition, but the semantic translation exercise will help them develop skills necessary to interpret new words.

Memory Structure Builders

Although the laptop computer is an ideal memory aid, students must carry enough information in their heads to deal with simple problems. Memory structure building exercises such as chaining and creation of mnemonics and acronyms can help with this.

In chaining exercises, students are given the first (or first and last) terms of a sequence and must fill in the intervening terms from memory in the correct order. For example they could be given "inner limiting membrane" and "choroid." They would then have to list, in order, the layers in the back of the eye. This could also be done with the progression of synapses in the visual pathway, blood flow from the heart to the eye, etc.

Students could be asked to create a mnemonic phrase to help them remember relationships and facts. Well known mnemonics include, "'i' before 'e' except after 'c'," "the Principal at school is your 'pal,' the scientific principle is not," and "On Old Olympus Towering Top....." for the cranial nerves.

An acronym is a word with letters that stand for a set of terms or relationships. A familiar acronym is "COWS" that is used to help remember the direction of caloric nystagmus. Let students make up their own acronyms and see how creative they can be.

Letter and Report Generation

Give students 4 minutes to compose and electronically submit a letter to a patient explaining the condition just discussed or a letter (or e-mail) referring the patient to a colleague. The letter would have to be complete and grammatically correct but not wordy.

Alternatively, ask students to create and submit a chart entry in SOAP format that would be typical for a patient with the condition being discussed. Stress completeness, brevity, and clarity.

Create and Solve a Problem

This technique could work well in formula-oriented courses. Students would be asked to create their own numerical, patient-oriented problem involving the concept just presented, and then solve it. As a variation, one or more students could be asked to generate problems for the class to solve. These can be distributed electronically before, during, or after class.

Questions for the Professor

At the beginning of class, at a break, or at the end of class have students submit questions to the professor describing what they did not understand from the readings, the lecture, or even from a related course. Submitting questions when they are fresh can be helpful and will demonstrate that students who would not ordinarily raise their hands during class have good questions. As a variation, students could be asked to submit questions electronically at any time during the lecture, but it is probably best to pause for a few minutes to let them compose their thoughts and questions.

This exercise can be painful but useful for both the professor and students. Professors who use it should be prepared to be depressed by the confused questions students ask about what seemed to be a crystal-clear lecture presentation.

Give a Quiz

This is the old standby, but a four-minute, computer delivered, pop quiz on the material just presented can be an effective way for students and faculty members to determine the depth of understanding that is taking place during a lecture. Quizzes can be graded or not, but they will certainly wake up the class. Again, professors should prepare to be depressed by the degree of comprehension or lack thereof that takes place during a lecture.

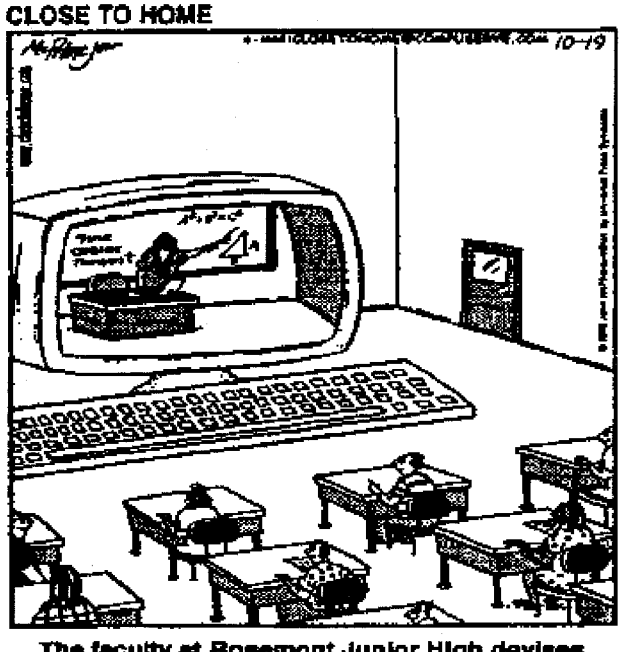
To simulate the real world in which access to information via computers is becoming ubiquitous, make quizzes and exams open-computer. However, be warned that it will take a few experiences with open-computer exams before students figure out that they are not "no-brainers" and develop appropriate preparation strategies.

Video

There is little doubt that students live in a video world. Most have probably accumulated more hours watching television than they have spent studying for all their classes. The movement, sound, and color of video has an almost magical ability to captivate,[15] so capitalize on this by showing short video clips in class. (Figure 2)

Videos are easy to make with a digital camera and editing software such as iMovie2[e], or clips from commercial

Figure 2
The ultimate video learning experience.



The faculty at Rosemont Junior High devises a brilliant method for holding students' attention.

videos can be used. Clips can be downloaded to the students' computers and/or shown on projection equipment. As a variation, students can be asked to make their own video clips illustrating key lecture points for use in next year's class.

Images and Patients

Commonly, faculty members teaching disease courses flash the image of a sick cornea or retina on the screen and ask students to make a diagnosis. Often this causes great consternation because the students don't have a clue about what disease is being shown. The instructor, however, comes to their rescue by providing the diagnosis.

The problem is that seldom in clinical practice is a diagnosis based only on an image. Instead, diagnoses are based on a matrix of information including personal and family histories, symptoms, ancillary test results, pictures or appearances, etc.

As an exercise, students can be given all but one piece of the information matrix for a particular disease and asked to supply the piece that is missing. For example, the diagnosis, history, and symptoms for retinitis pigmentosa could be supplied, but students would need to fill in the results of ancillary tests such as the electro-retinography and dark adaptometry.

As a variation, students could be asked to make up and e-mail their own matrices with missing information pieces to classmates as challenge exercises.

Compare and Contrast Terms

Compare and contrast helps students to develop vocabulary and understand concepts. Two or more terms are selected, e.g., myopia and astigmatism, and students are asked to list their similarities and differences. As a variation, a single term, e.g., myopia, could be selected and students could be asked to list synonyms and antonyms.

Semantic Feature Map

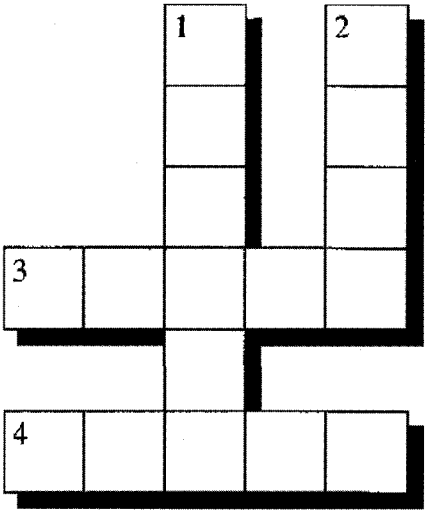
Semantic mapping is another good technique for vocabulary and concept development. A table is constructed and sent to each student's computer. In the left column, nouns or descriptive terms are listed. The next several columns are headed by category names. Students are asked to determine the correct category for each term. Justifications would have to be provided for their choices.

Table 2 shows two simple Semantic Feature maps.

Crossword Puzzles

There are several programs available on the Internet that help to design puzzles, e.g., the Crossword Express.[f] Puzzles that incorporate material from lectures or readings can be used in many ways. For example, the puzzle can be designed before class and transmitted to students electronically during an activity period, or students can build simple puzzles. Expect them to flounder the first few times they try a puzzle, but the skill builds quickly. Puzzles can help students learn basic vocabulary, spelling, and concepts. (Figure 3)

Figure 3
Simple crossword puzzle example.



Across
3. Colorful receivers
4. Flap and zap

Down
1. Makes cornea happy
2. Nighttime guides

Table 2
Semantic Feature Map Examples. Students would be asked to select the proper category for each term and justify their choices.

Terms	Monocular	Binocular	Either or Both
Acuity			XXX
Stereopsis		XXX	

Terms	Myopia	Hyperopia	Astigmatism
Single focus ahead of retina	XXX		
Multiple line foci			XXX
Single focus behind retina		XXX	

Use Humor to Regain Attention

Humor can be a bit tricky to use but it can also be very effective. Initially, some faculty members will protest that jokes are not professional, and some students will protest that they have no ability to create or tell jokes. To counter these feelings, students can be assured that creating humor is like remembering dreams. Most people claim that they cannot remember dreams but with practice and encouragement they come to be quite good at it. Humor is the same; practice and encouragement work wonders.

Using each of the humor strategies described below, students can be asked to submit their work electronically and one or two submissions can be selected randomly for viewing by the class at the end of a four-minute activity session.

(1) Story Completion

Using the story completion technique, a scenario is provided on the students' computers and they complete the dialogue. For example, "Three first year optometry students

go into a bar. Their names are Myopia, Hyperopia, and Astigmatism. Astigmatism doesn't drink so she cannot see the *point* of going into the bar. Myopia ....." Students then complete the story using relevant material to help them remember the ametropias.

Or, "Three blood cells (substitute drug molecules or whatever) are swimming home carrying the groceries when they encounter a CLOT! (or a cut, bacteria, hemorrhage, etc.)."

Or, "Three eyeballs go for a walk in the woods. Their names are Dexter, Sinister, and Pineal. Pineal's job is to keep every one *awake*." Students could complete the story with some kind of "left-handed" activity by Sinister, thereby helping them to remember OD and OS.

(2) Cartoons and Picture Captions

A cartoon or picture could be presented and students would be asked to create a caption for it. Cartoons could be hand-drawn or a file of cartoons/pictures from journals, newspapers, etc. could be developed. As a variation, students could create a cartoon strip illustrating the topics being discussed; stick figures would work just fine. Cartoons can be created in groups or individually. (Figure 4)

The picture in Figure 5 appeared as part of an advertisement for a local hospital. In the full ad, the woman is wearing a stethoscope and appears to be a doctor. Could sharp-eyed students who are just learning to use an ophthalmoscope come up with a "backwards" caption for this picture?

Commercials

Students could be asked to write commercials for products, substances, diseases, or techniques. Topics could include lens types, methods for correcting anisometropia, drugs, or even blood cells. Commercials would be judged on the basis of their appeal to consumers, technical accuracy, etc. As a variation, students' ads could be submitted to outside companies with a prize for the best one.

Simulations and Games

Cries abound for placing patient care earlier and earlier in the curriculum to maintain student interest. However, it also clear that first-year students do not have the skills required for extensive patient care without intense supervision. This suggests the use of patient care simulations delivered by interactive computer programs.

There are many patient simulation programs available on the Web. A good example shows simulated eye movements that occur when various muscles and/or nerves are damaged (http://cim.ucdavis.edu/eyes/eyesim.htm). Other simulations can be used during optics laboratories to demonstrate the effects of lenses and prisms, the ametropias, and accommodation.

Figure 4
Sample cartoons for which students could write captions.[b]

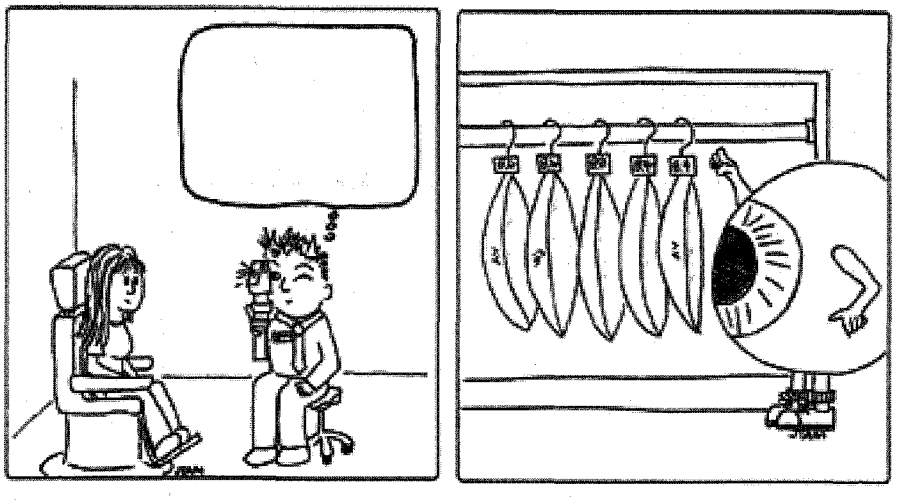


Figure 5. Example of a newspaper ad for which students could write a caption.

At Pacific, two simulation programs have been created. One called "The Optometry Game," credits students with patient fees and then deducts expenses for acquiring test data. The object of the game is to write an acceptable spectacle lens prescription while retaining as much of the patient's fee as possible.[16]

A second simulation, "The Disease Game," also asks students to spend patient fees to buy information. In this simulation, the object is to make a correct disease diagnosis and then to prescribe appropriate therapy.

Surfing and Video Games

At Pacific, all students have Ethernet connections in the classroom. Being innovative, they have discovered that e-mail and video games work during lectures to relieve boredom. Lecturers have reported that they can track the movement of messages or game playing turns around the classroom by noting the sequence of smiling, laptop-focused students.

When this phenomenon was first detected, there was a cry from some faculty members who wanted to ban Internet access during lectures and punish any students caught playing games or surfing the Web during their lectures. These faculty members failed to recognize that it is their lecture format that is failing to hold the students' attention rather than some inherent student attention deficit.

Rather than punish those students who use the Internet during lectures, a better way to deal with the problem

might be to organize an optometrically-oriented game tournament that can be played during four-minute breaks. In exchange for this officially sanctioned opportunity, students would agree to forgo games and e-mail during lectures. In addition, it must be kept in mind that if lectures are interesting and active enough, there should be no time or desire to play games or surf anyway.

Treasure Hunt on the Web

In practice, doctors will become increasingly reliant on the Web for information regarding diagnoses and state-of-the-art treatments. In a four-minute exercise, students can be asked to go on a WebQuest[17] to find as many URLs as possible that contain scientific information about a particular condition. Or they can be asked to verify (or demonstrate the fallacy of) statements about a particular condition by using commercial sites and/or Medline. In this exercise, students would develop Web access skills and discover that almost everything is on the Web somewhere.

As variations, students can be asked to assume that they are new in town and are using the Web to find an optometrist to care for their child whose eye turns out. Or a game of Scavenger Hunt on the Web can be arranged in which individuals or groups compete to find a set of facts relating to the topic being presented.

Play the Patient

In clinical practice many optometrists have patients who have made a hobby out of finding out about their particular disease. To simulate a patient's information search process, students can be "diagnosed" with the disease about to be discussed and asked to determine what they can quickly find about it on the Web. Next, they could be asked to evaluate the quality of information they found. What makes information credible, e.g., a site sponsor whose name is well known, a paper written by a doctor, etc.? Is the Web more credible than professors or textbooks? Why or why not? Yes, this activity will use up time during which professors could be reading lists of diseases with signs and symptoms, but it might be more beneficial to students in the long run.

Summary

If the techniques presented above seem interesting, and if you have recognized that your students sometimes enter the audit mode despite your best efforts, perhaps you might be considering trying some of the techniques in class. But you have reservations.[18] Perhaps you are saying to yourself, "The way I have been teaching has worked well for many years, I have my lectures all worked out and timed down to the last minute, and besides there are no clinical trials to prove that any of this stuff works. Why should I change?" Or, "I can't ask my students to write a commercial or create a joke. What about my reputation? These are grade school games and I would feel foolish using them. And how would I explain them to the Academic Dean or the promotion/tenure committee? "Or, "what would happen if my class was fun and students really wanted to attend it?" And the ultimate threat, "Having fun takes too long, and if I don't say every single fact to my students they might not pass Boards, and the reputation of my school will go down, and I will be out of a job, and...."

Perhaps, but you might also optimize the learning environment for your students and participate in the creation of a new generation of optometrists who consider learning to be enjoyable and who are good at thinking and constructing new ways of understanding - rather than just memorizing. Is the risk worth it? Who knows? You have to decide. Just be sure that your students understand what you are trying to do and that they agree with your pedagogical adventures - otherwise forget it and let them regress back into a comfortable, passive, audit mode.

Footnotes

a. The ideas and methods presented in this paper are partially derived from the authors' nearly 100 years of combined teaching experience. Skeptical readers will ask for clinical trial-based proof that the proposed methods work before trying them in their classrooms, but this level of proof is not readily available. Therefore, the proposed methods will need to be accepted as reasonable or rejected as unneeded or unworkable largely based on face validity. Feedback would be welcomed from educators who try the proposed methods in their classrooms.
b. Drawn by Jennifer Tam, Pacific University College of Optometry, Class of 2004.
c. Personal Communication, Karl Smith, Forest Grove OR. 2000.
d. Faculty members interested in obtaining more information on how to utilize computers in the classroom and other educational environments should consider subscribing to Syllabus magazine by visiting their Web site at www.syllabus.com. The subscription is free and there are multiple articles in each issue focusing on computer use.
e. Imovie2 is available from www.Apple.com.
f. A free demonstration version of Crossword Express is available as shareware in Mac and PC versions from http://www.adam.com.au/johnstev. A full version is also available for a nominal fee. Another cross-platform puzzle maker is available for download at http://puzzlemaker.com.

References

(Note: Many of the references cited are global in nature because the authors feel that the area of teaching innovation itself is global in nature and is limited only by the imaginations of teachers and the understanding of students.)

1. Tama C, McClain A. Guiding Reading and Writing in the Content Areas: Practical Strategies. 2nd ed. Dubuque, IA: Kendall/Hunt. 2001.
2. The Brain and Reading. Alexandria, VA: Association for Supervision and Curriculum Development. (Video series) 1999.
3. Marzano R, Pickering D, Pollock J. Classroom instruction that works: Research-based strategies for increasing student achievement. Alexandria, VA: Association for Supervision and Curriculum Development. 2001.
4. Zemelman S, Daniels H, Hyde A. Best practice: New standards for teaching and learning in America's schools. 2nd ed, Portsmouth, NH: Heinemann. 1998.
5. Coren S, Ward LM, Enns JT. Sensation and Perception. 4th ed. Fort Worth: Harcourt Brace College Publishers. 1994:512-47.
6. Smith KA. Going deeper: formal small-group learning in large classes. In: Cooper J, ed., Strategies for energizing large classes: from small groups to learning communities (New Directions for Teaching and Learning, 81). San Francisco: Jossey-Bass. 2000:25-46.
7. Vacca R, Vacca J. Content area reading: Literacy and learning across the curriculum. (6th ed), New York: Longman. 1999.
8. Miholic B. An inventory to pique students' metacognitive awareness of reading strategies. J Reading. 1994; 38(2):84-6.
9. Blachowicz C, Fisher P. Teaching vocabulary in all classrooms. Columbus, OH: Merrill. 1996.
10. Buzan T. Use both sides of your brain. New York: Dutton. 1983.
11. Hyerle D. Visual tools for constructing knowledge. Alexandria, VA: Association for Supervision and Curriculum Development. 1996.
12. Kurth R. Building a conceptual base for vocabulary. Reading Psych 1980; (1):115-20.
13. Schwartz R, Raphael T. Concept of definitions: A key to improving students' vocabulary. The Reading Teacher, 1985; 39:198-205.
14. Moses RA, Hart WM. Adler's physiology of the eye, 8th ed. St. Louis: Mosby. 1987.
15. Kubey R, Csikskszentmihalyi M. Television addiction is no mere metaphor. Sci Amer. 2002; 286(2):74-80.
16. LeRoy A, Zeitner D, Smith D, Yolton RL. The Optometry Game: enhancing test selection and lens prescribing skills by use of computer simulations. J Am Optom Assoc. 1993; 65:221-9.
17. http://webquest.sdsu.edu/webquest.html
18. Sprague D, Dede C. Constructivism in the classroom; if I teach this way, am I doing my job? Learning and Leading with Technology. 1999; 27:6-17.

Diversity Within the Profession

Part 1: Trends and Challenges

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Abstract

In the past 30 years, the historically white male optometric profession has become more diversified in terms of gender and ethnicity while maintaining its white male power structure. There has been limited study of the experiences of visible and invisible minorities or of their impact on the profession. An examination of minority experiences in the membership of optometry and other historically white, male-dominated professions reveals intolerance in the form of harassment and discrimination and inequalities in the patterns of practice, power and economics.

Key words: *diversity, professional socialization, sexism, racism, homophobia*

When the first law defining the practice of optometry was proclaimed in 1901, optometrists were white men.[1-6] By the end of the century, demographic homogeneity within the profession had given way to a substantially more heterogeneous state. The changes occurring within the optometric profession are echoed to varying degrees in other healthcare professions such as medicine, dentistry, pharmacy and veterinary medicine.[7-12]

Cohen[13] reasoned that intra-professional diversity can achieve: 1) just and equitable access to a rewarding career, 2) improved access to healthcare, 3) culturally competent care, 4) a comprehensive health research agenda, and 5) better management of an ever more complex healthcare system. In an ideal profession, the unifying qualities of its members are certain agreed-upon, shared abilities and ideals while diversity of age, sex, sexual orientation, ethnicity, attractiveness and socio-economic background are accepted individual characteristics. Like all professions, optometry has the opportunity to examine its gatekeeping procedures, academic structures and professional organizations for indications of if, and how, cultural diversity is accepted. In addition, optometry can reflect on what programs, if any, address the tensions created by a profession whose members are less like-minded than in the past. This paper is the first of two papers that examine the literature on diversity within health care professions, including optometry. Part 1 focuses on the trends in and challenges to diversity while Part 2 describes the programs geared either toward increasing diversity or facilitating acceptance of diversity.

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Trends in Diversity

Gender

In the past 30 years, the representation of women in North American optometry schools has grown significantly (see Table 1). In three decades, the proportion of the student body who are women has risen from 3%[14] to 54%.[15] By 1990, women began to outnumber men applying to North American optometry schools.[16] The shift in enrolment has been filtering into private practice such that by 1994 over one-third of practicing optometrists in Canada were women.[17]

The increasing representation of women in a historically male-dominated profession is not a phenomenon restricted to optometry,[7-11] although the extent of the feminzation varies substantially. In the late 1990s, 64% of North American pharmacy students were women compared with 38% for dentistry students (See Table 2). Since 1970, the number of male physicians has increased 79%, while the number of female physicians has grown 425%.[18]

The dramatic increase in the number of women in optometry and other historically male-dominated professions can be credited to the burgeoning civil rights and women's movements in the 1960s and subsequent federal and regional regulations and policies that began to appear (e.g., In Canada: 1982 Charter of Rights; In the U.S.: 1964 Title VII of the Civil Rights Act, 1972 Equal Employment Opportunity Act, Title IX of the 1972 Educational Amendment).

Ethnicity

Between 1980 and 1995, the majority white population in the U.S. grew by 12% while minority population growth rates were notably higher: African Americans (24%), Native American (57%), Hispanic (83%), and Asian (160%).[13] As of 1996, people of color made up 11% of the population in Canada,[19] and by 2016, the proportion is expected to reach almost 20%[20].

Table 1
Student Enrolment in ASCO Optometry Programs Since 1970

Demographic	1970[14]	1980[130]	1990[131]	2000[15]
Women	3%	25%	48%	54%
Individuals of Color	6%	10%	26%	38%

Table 2
Student Enrolment in Four Historically White, Male Professions

Demographic	Optometry[132]	Medicine[133]	Dentistry[134]	Pharmacy[135]
Women	54%	43%	38%	64%
Caucasian	63%	63%	65%	65%
Asian/Pacific Islander	24%	20%	24%	21%
Hispanic/Latino	5%	7%	5%	4%
African American	2%	8%	5%	4%
American Indian/1st Nation	1%	1%	1%	1%
Other	5%	3%	NA	5%

Since 1970, individuals of color have represented an increasing share of student enrolment in North American optometry programs (see Table 1). Caucasian students represented approximately 94% of optometry school enrolment in 1970. Three decades later, the proportion has dropped to 63%. Asian and Pacific Islander students currently make up the second largest ethnic group at 24% while each of the other ethnic groups account for 5% or less of the student body. The ethnic composition of the student body in optometry is similar to that in medicine, dentistry and pharmacy although the proportion of African American students in optometry schools is the lowest of the four professions (See Table 2).

Organizations normally track ethnicity by differentiating *Under Represented Minorities* from *Minorities.* Minorities encompass all ethnic groups other than the group with the dominant representation (e.g., Caucasians in North America). A "Representation Factor" (RF) for an ethnic group represents the proportion of the ethnic group in a given organization (e.g., the optometric profession) divided by the proportion of that group in the general population. RFs below 1.00 indicate under-representation of the ethnic group in the organization. For example, in 1993, 1.0% of North American optometry graduates were Hispanic women while this group represented 9% of the population, thus producing a RF of 0.11.[21] In 1991, ethnic minorities made up 22% of the U.S. population yet only 8% of practicing physicians, yielding an RF of 0.4.[22] An examination of RFs reveals that although ethnic diversity is occurring in numerous professions, it is not following that occurring in the population-at-large.[7, 13, 21, 23-28]

It is important to acknowledge that shifts in the constituency of the workforce result from changes both in who is entering the workforce as well as in who is leaving through retirement.[22] The U.S. Bureau of Labor Statistics projects that between 1990 and 2005, significant increases in those entering the labor market will include women (26%), Blacks (32%), Asians (74%), and Hispanics (75%) while 80% of those leaving the workforce will be non-Hispanic males.[29] In Canada, women currently constitute 45% of the total workforce.[19]

Governments and educational institutions are more inclined to direct recruitment, employment equity, affirmative action, and retention strategies to under-represented than to over-represented minority groups. Those wishing to redress under-representation in certain professions look toward the legal and social policies that create unequal social, economic and educational opportunities for various ethnic groups. These inequities provide the underpinnings of self-selection[7], which determines who applies and social selection[30], which determines who is admitted.

Sexual Orientation

It is easier for professions to monitor their behavior and attitudes around visible minorities whether it be in terms of gender or ethnicity. The *invisible* minorities are difficult or impossible to track. For example, gays, lesbians and bisexuals have entered the profession but their presence remains largely invisible, as there are no estimates of their numbers and many remain *closeted* in their academic and professional lives. At least 10% of the population are gay, lesbian or bisexual.[31-33] Without estimates for the professions, it is difficult to obtain indications of self-selection or social selection that disadvantage gays, lesbians and bisexuals.

Challenges to Diversity

The numerical gains of women and ethnic minorities in prestigious and autonomous occupations such as health professions can be viewed as evidence of the stronger position these groups hold in the labor force. Yet, examinations of equity must go beyond a demographic count to uncover differences in income, practice patterns and social status. These social patterns within healthcare professions have been examined for women more than for ethnic minorities.

The latent culture of a group (e.g., the optometric profession) is determined by the patterns of meanings, beliefs and behaviors that individual members bring to the group.[34] The mainstream latent culture of optometry has been and continues to be white, male and heterosexual despite the diversification of the student body in the past three decades.[1, 5, 35] The latent culture filters into the informal environment within the educational and professional organizations.[36] Those who share the latent culture feel a sense of belonging while the remaining members are more likely to feel alienated and marginalized.[34] The mainstream, white culture of most healthcare professions continues after graduation and poses problems, not only for some of its members, but also for culturally, committed patients with different values and beliefs.[37] Guruge and Donner[38] argue that it is important for healthcare professionals to develop an understanding that "culture and ethnicity shape people's views of health and illness, their health-seeking behavior, their use of health care services, the type of treatment they seek and their expectations of that treatment" (p. 37).

Harassment and Discrimination

Individuals who differ from the mainstream latent culture are at risk to experience some form of harassment or discrimination. Harassment involves verbal or physical conduct that creates an intimidating, hostile environment in which submission to the conduct is a condition of employment or training.[39] An example of harassment would be a professor who demands sexual favors of a student as a condition of passing a course. Discrimination adversely affects an individual through behaviors, actions, interactions and policies that treat individuals disparately or create a hostile environment.[39] Discrimination may be blatant (i.e., overt), subtle or covert,[36, 40] with the latter two forms sometimes occurring without the realization of the damaged individual or others[39]. Unlike in the case of blatant and subtle discrimination, the perpetrator of covert discrimination is not an individual but rather a group or organization.[40] The current level of awareness in society has meant that a female student is likely to recognize an experience as discrimination when her male peers are referred to by name and she and her female peers are called "sweetie" or "honey" by their instructor (overt discrimination). However, she may not recognize the scheduling of meetings at the end of the day as covert discrimination on the part of the institution unless she notices the attendance patterns of her peers with children.[36] As women usually provide a greater proportion of childcare than men, women with children will more likely miss meetings at the end of the day than their male counterparts.[36]

It is important to recognize that the impact of harassment and/or discrimination goes beyond the individual level. That is, not only does discrimination prevent a member from reaching her/his potential, it limits the ability of the wider community to reach its potential.[41] A profession can advance through clinical, economic, social and/or political developments and innovations.[41] The opportunities for a profession to advance are curtailed when significant proportions of its membership are not able to contribute at their maximum level.[41] As Ettinger[41] pointed out, if women in optometry face discrimination, then over 25% of optometrists today are not reaching their potential, thereby limiting their contribution to the profession. Wallick and Townsend[42] found that the sexual identify of LBG (Lesbian Gay and Bisexual) medical students comes into conflict with the professional socialization process in medicine, which emphasizes conformity. As a result, many LGB students conceal not only their identity but also their significant relationships, activities and accomplishments. In order for a profession to understand if and how it marginalizes some of its members, the day-to-day experiences of its members and the social structure of the profession must be examined.

There are indications that women and men in optometry experience the profession differently.[1-3, 5, 43] A case study of one optometry school's admission interview revealed differential interviewer behavior toward women and men applying to the program.[1] Accounts of harassment and discrimination among women in optometry school have not been published but women in optometric practice have characterized gender-based overt and covert discrimination as commonplace[3] and more apparent after graduation than during optometry school.[5] Intolerance has been encountered both on an individual level (e.g., from older male optometrists and/or employers) and an institutional level (e.g., conducting banking relative to the practice). The tendency of increased gender discrimination after graduation has also been reported in dentistry.[44]

As high as 54% of women in dental and medical schools have reported experiencing harassment and/or discrimination during their professional training.[36, 45-47] In a 1996 study of medical students,[45] in which harassment and discrimination were commonplace, the harassment was most often non-sexual (41%) while the discrimination was most often gender-based (29%) followed by racially-based (12%). Women and ethnic minorities were significantly more likely than men or Caucasians to report experiences of harassment and discrimination. The prevalence rates of harassment and discrimination within a profession may initially seem high in view of the documented diversification of its membership; however the rates speak to the power of the latent culture.

In general, the prevalence of reported gender-based discrimination and harassment has increased over time and it is the subtler and covert forms of discrimination that are reported more often now. Grant[36] postulated that although the greater attention paid by professions to gender imbalances has led to a decrease in the prevalence of overt discrimination, the heightened collective consciousness of the healthcare community has meant that previously unrecognized subtler forms of discrimination are now apparent. In fact, Grant[36] reported two or three times as much subtle and covert discrimination as overt discrimination. In general, professional school admission committees began to examine their policies in the late 1960s to eliminate overt discriminatory practices[48] yet some schools were slow or reluctant to respond. In the 1980s, one British medical school used computer software to downgrade applicants who were women or people of color.[49]

Gender discrimination is more prevalent in clinical rotations than in the classroom.[30, 36, 50] Grant[36] postulated that the stress of clinical rotations leads to a relaxing of egalitarian appearances and a surfacing of underlying hostilities. Discrimination, particularly of an overt nature, is more likely in male-dominated clinical rotations (e.g., surgery and urology).[36] In medical training, the source of gender discrimination toward women is most likely to be faculty and hospital physicians, less likely to be nurses and other non-physician staff, and least likely to be classmates and patients.[36] Grant did not find the age of the perpetrator was a strong indicator of discrimination. If any trend has been evident in medicine and dentistry, then younger male practitioners (e.g., residents) have been more likely than established male practitioners to discriminate against their female counterparts.[36, 44, 51]

Medical peer groups have been described as tight and influential to students[52]; therefore men can be a source of support or strain to women (and visa versa).[36] An awareness of gender discrimination toward women in medical school has been greater among female than male students. Male students tend to be more aware of the overt discrimination than the subtler forms and more likely than women to attribute some responsibility for the discrimination to women (e.g., the female student must have flirted with the male resident for him to comment about her body). In one study of medical students, a small proportion of male students (8%) perceived greater discrimination towards men than women. The term *reverse discrimination* is part of an emotionally

laden language used to describe perceived or actual disadvantaging of the dominant group by those concerned about the legitimacy of employment equity or affirmative action programs.[53] Other examples of this type of discourse include *apartheid in reverse, creeping totalitarianism,* and *anti-democratic political correctness.*

Lewin and Rice[54] outline numerous tangible and intangible systemic sources of discrimination experienced by ethnic minorities seeking to become healthcare professionals. Minority students face barriers to accessing quality education, teachers who expect too little of them (because of cultural stereotypes), anti-intellectual peer pressure, and a wide cultural gap between school and home. Many healthcare educational institutions have failed to recognize that under-represented minorities have likely faced a lack of mentors, encouragement in their academic pursuits or family financial assistance before entering the program.[54] Once admitted, the under-represented minority student is unlikely to encounter mentors and role models on faculty or a curriculum that honors the importance of culture, ethnic status and socio-economic disadvantage on the healthcare delivery system.[21, 55-58] Finally, the minority student's perception of an unfriendly environment makes the student hesitant to seek help from the institution.[54]

George[25] has expressed concern about admission practices regarding Asian applicants among medical schools. The RF for Asian Americans in U.S. medical schools is approximately 6.0.[25] George[25] postulated that some medical school admission committee members equate over-represented with "too many" and thus are more inclined to choose "well-connected applicants" (p. 227) or under-represented applicants over qualified Asian Americans. The admission-based RF, which reflects the number of students admitted divided by the number of applicants, declined from 0.96 to 0.88 for Asian Americans in medical school between 1989 and 1996.[25] The drop in the admission-based RF for Asian Americans in medical schools suggests either a drop in applicant quality among Asian Americans or biased social selection (i.e., admission committee members are hesitating to admit Asian Americans). Under-represented admission-based RFs highlight the need to look at admission policies for unintended biased social selection. These types of studies are lacking currently.

The homophobia and heterosexism experienced by sexual minorities pervades their lives and their experiences with the health care system.[59-61] This negativity is deeply rooted in the religious, legal, political, medical and psychological institutions of society.[59, 62] In the past two centuries, homosexuality has been viewed as a moral weakness, a crime and/or a disease.[63-65] Half the states in the U.S. still outlaw same-sex relationships or aspects of them.[59] The view of homosexuality as an illness began in the 19th century when psychiatrists began labelling it as a disease requiring treatment. Homosexuality remained listed as a mental illness in the American Psychiatric Association's Diagnostic and Statistical Manual (DSM) until 1973, and it is still listed as an illness in the international code book of disorders (ICD-9).[59]

Lesbian, gay and bisexual (LGB) patients are likely to experience intolerant and substandard healthcare because of their sexual orientation (e.g., ostracism, mistreatment of partners, breached confidence, derogatory remarks).[66-70] In one study, 67% of 711 lesbian, gay and bisexual physicians and medical students knew of patients who had received substandard care because of their sexual orientation and 88% had heard their colleagues malign their lesbian and gay patients.[70] Exposure to the views of homosexuality as a sin, a crime and a disease has shaped the attitudes of many currently practicing healthcare providers.[59, 67, 71] Discomfort in working with sexual minority patients can be attributed to a lack of knowledge about and exposure to sexual minorities and/or a disapproval of them.[69] Negative attitudes have been found to occur most likely in male students whose religious beliefs are conservative and whose parents hold negative attitudes toward sexual minorities.[68]

Homophobic and heterosexist attitudes among healthcare providers are evident not only in the treatment of patients but in their behavior toward their colleagues. Sexual minority healthcare providers have experienced intolerance as applicants,[61, 70, 72] as students,[61, 72, 73] and as practitioners.[61, 70, 72] LGB physicians are likely to encounter intolerance if they pursue certain residencies and unlikely to receive referrals from some colleagues.[61, 72] The level of intolerance is greatest in the specialities of obstetrics and gynecology, pediatrics, and psychiatry.[61, 72]

The likelihood of self-disclosure in a professional program depends on the existence of and accessibility to community or school support groups.[74] The integration of issues pertaining to sexual orientation throughout the curriculum of professional programs is unlikely. Typically, less than 4 hours of a four-year medical school curriculum address issues pertaining to sexual orientation.[75] The topics addressed are often restricted to gay men and AIDS[76] with only an hour devoted to lesbians and bisexual women.[75]

Practice Pattern Equality

Optometry, like all professions, is a dynamic entity, which is constantly changing in its nature and breadth. Ascertaining the causes of these changes is difficult at best. When faced with change, it is understandable that at least some of that change will be attributed to shifts in the constituency of the group. Women are changing the profession but the nature of the change is unclear due to their brief time in the profession and the small energy devoted towards studying the changes to date. There are few if any differences in academic or clinical performance between women and men enrolled in optometry programs.[77-80] Yet there appear to be gender differences in practice patterns and status that must be carefully examined. The increased representation of women in optometry has coincided with an increase in commercialized optometry.[2] Women have been assumed to be responsible for this shift within the profession without substantive evidence to support the assumption.[2, 81] Because women-dominated professions such as nursing and teaching have been associated with lower status and income, there is concern that the feminization of male-dominated professions such as optometry will lead to a devaluation of these professions.[2] Troeger[5] found that the majority of women in optometry were self-employed although 80% of them began their optometric career in a salaried position. Proportionally more women than men hold salaried positions in optometry although it should be noted that working for Health Maintenance Organizations (HMOs), ophthalmologists or commercial organizations are the least common career options among women.[2,5] The assump-

tion that women are responsible for the trend toward corporate optometry not only ignores aspects of practice patterns but it ignores the male-dominated power structure of corporations. The hiring practices of these corporations deserve study before the commercialization movement among healthcare professions can be understood.

Studies of practice patterns among physicians may be useful to understanding some optometrist career choices. In medicine, the choice of self-employment versus salaried employment has been found to depend on gender, socio-economic background, practice location relative to urban centers and proximity to where the physician trained. In the United States, the self-employed physician is most likely to be a man from an upper class background who practices in a rural setting or near where he trained.[18] Ethnicity, marital status, and educational debt have not been found to be predictors of self-employment versus salaried-employment among physicians.[18]

Gender differences in practice patterns have been attributed to three main determinants: 1) the division of labor between family and work, 2) the attributes associated with successful practice, and 3) the barriers to self-employment. Women more than men face the dual role and resulting stress of being a family caregiver and a professional.[82-86] Male physicians associate success with income, self-employment and specific career goals while female physicians believe that they can be successful physicians without owning a practice or devoting energy to all aspects of the medical profession.[87-91] The predominance of *old boy* networks within professional communities has created greater workplace barriers to establishing successful self-employment among female optometrists and physicians.[5, 92, 93]

Ethnic minority physicians are significantly more likely to provide care in economically-depressed urban areas with high proportions of minority patients.[94-99] Salaried employment is more common in these areas, in part, because the factors that determine successful self-employment (obtaining supportive capital, developing a stable client base, community support and sufficient management training) can be more difficult to obtain for minority workers.[100, 101] In contrast, minority practitioners sometimes enjoy greater support within an ethnically-similar community.[18] Large-scale healthcare organizations (e.g., HMOs) and medical schools are concentrated in urban centers and thereby account for a larger proportion of salaried physicians in urban centers than rural areas.[18]

Numerous studies[94-99] provide evidence that minority physicians are far more likely to pursue primary care medicine (e.g., family medicine, pediatrics, internal medicine) while others[102, 103] dispute this difference. In order to grasp the determinants of practice patterns, a complex analysis must at the very least include the student's ethnicity, gender, debt load, professional values, expected income, and expected geographical practice location.[18, 104] Optometry has no recognized specialities by which to make a similar comparison to medicine; however it would be interesting to make a detailed study of practice patterns in optometry.

Power Equality

While the feminization of optometry is evident in applications to and enrolment in its schools, the power structure of the profession is still largely male. Table 3 shows that in North American optometry, men hold the vast proportion of fellowships as well as leadership roles in schools, associations, and licensure bodies. Three explanations have been posed to account for the lack of women in leadership roles. First, the large representation of women in optometry is so recent that women have not had a chance to move into leadership roles.[105] Second, women are much more likely than men to face the dual roles of being a professional and the primary caregiver in the family, thus leaving little time and energy for the additional load of taking on a leadership role within the profession.[5, 106-110] This type of role conflict among women has been reported in studies of physicians, dentists and veterinarians.[12] Finally, women have indicated a lower interest in the leadership roles within their profession than men have although the reasons for the disinterest have not been identified.[5]

If moving toward more of a gender balance in power within the profession is desirable, then the resolution lies in time according to the first theory and in equal sharing of family responsibilities according to the second theory. Without further study into the *disinterest* in leadership roles within the optometric profession shown by many women, it is unclear as to whether women are disinterested in being leaders per se or in being the kinds of leaders sought by the optometric profession at present. The gender differences that have been found in career goals and priorities among physicians[87-91] may have relevance to optometry; perhaps the majority of women in optometry believe that the value of their contribution to the profession does not depend on placing energy into all aspects of the profession.

Gender socialization and stereotyping guides our notions of appropriate behavior, attitudes and appearance among women and men and these processes may account for some of the apparent *disinterest* in leadership displayed by women. Fleras[19] notes that "Women continue to be perceived as passive, emotional, weak and obsessed with appearances, in contrast to men who are thought to be assertive, ambitious, competitive, and goal-oriented" (p. 108). The traits typically sought in leadership are those more associated with appropriate behavior in men. The likelihood of a woman of color attaining a position of leadership decreases further as "whiteness is associated with leadership, responsibility, education and skill" (p. 14).[111] The barriers to shifting the gender power balance include the continued socialization of women to be non-disruptive[112] and the continued lack of awareness on the part of

Table 3
Number of Men and Women Optometry Leaders in Canada & U.S.A.

Demographic	School/College Head[136]	Association Head[137]	Licensing Head[137-139]	FAAO Held[140]
Men	100%	84%	88%	82%
Women	0%	16%	12%	18%

women of gender inequalities and their own lack of power[113].

Economic Equality

In 1989, annual earnings among women were 52% that of men in medicine.[12] The gender gap in dentistry and veterinary medicine was 57% and 58%, respectively.[12] Understanding, why economic equality has not kept pace with numerical equality in health professions requires a consideration of the differences in human capital, and labor market forces as well as the number of hours worked.

Although most optometrists, physicians and dentists practice full-time, men tend to work more hours per week and more weeks per year than women.[81, 114-116] The dual role that most women face as a professional and the primary family caregiver impacts the number of hours women spend practicing their profession.[5, 12, 117] That is, although society is increasingly tolerant of women in professions, women are expected to continue providing the bulk of childcare and housework responsibilities.[19, 118-121] A more fair calculation of work hours would include both unpaid domestic work and paid work, and in such a study, women's work hours exceed that of their male counterparts.[118] When considering a woman's total work hours, it is easier to understand why seeking additional responsibilities in the work place such as a leadership position may not be desirable or possible.

According to human capital theory,[122] gender differences in income are explained, at least in part, by differences in education, training and experience. The relatively recent increase in the number of women in historically male professions means that women are under represented among older, experienced health professionals who are more likely to achieve higher incomes.[123]

Queuing theory[124] partially accounts for sex differences in income by examining how men and women are sorted into different jobs. According to queuing theory, two types of queues determine labor markets. Labor queues are based on employers' rankings of workers while job queues are based on workers' rankings of jobs. Jobs and workers are ranked according to their desirability such that the most desirable workers are able to monopolize the most desirable jobs. Evidence of queuing theory shows up in professional practice patterns with more women being in salaried positions and more men being in more prestigious and lucrative private practice.[2, 3, 114, 125-129] Gender segregation has translated into men predominating in specialities that are considered more demanding or prestigious as a result of assumptions about men and women, their interests, their abilities and the value of the work.[12, 36, 120] For example, men are socialized to be aggressive while women are socialized to be compassionate, understanding and oriented towards child rearing and community service.[12, 36] As a result, men are encouraged to pursue medical specialities like surgery where aggression is highly valued and women are encouraged to pursue pediatrics or family practice where *feminine* traits are deemed important.[12, 36, 40]

Bird[12] found that women have not attained economic parity with men in medicine, dentistry or veterinary medicine and that the greatest gap exists in the most lucrative and prestigious profession, medicine. Her study revealed that 39% ($21,000 US) of the gender gap in annual income among physicians could not be explained by differences in hours worked, human capital and labor market forces.[12] Gender discrimination likely accounts for the majority of this gap, a postulate supported by the work of Lindsey[119] who attributes 25 to 50% of the income gender gap to the discrimination of women.

Conclusions

Since its inception a century ago, optometry has become a much more diversified profession in terms of gender and ethnicity while holding onto its white male power structure. These trends are reflected in other historically white, male-dominated professions such as medicine, dentistry, pharmacy and veterinary medicine. The experiences of invisible minorities such as gays, lesbians and bisexuals and their impact on the optometric profession are unknown and relatively little is understood about the impact that gender and ethnic diversification is having on the lives of optometry students and optometrists. Indications from other professions such as medicine are that non-dominant members of the profession routinely experience discrimination and intolerance before and after graduation. Over the last 30 years, the raising of individual consciousness has helped to dramatically reduce the prevalence of blatant discrimination and increase individual awareness of the subtler yet equally damaging forms of individual and systemic discrimination that continue to occur. Inequities in the patterns of practice, power and economics within healthcare professions provide further evidence of intolerance toward non-dominant groups. Part 2 in this series provides an examination of initiatives promoting diversity within healthcare professions that may help optometry find its way in facilitating tolerance.

References

1. Spafford MM, Beal PIA. Interview expectations and experiences of women and men applying to an optometry program. Optom Vis Sci 1999;76:500-510.
2. Blackwood F. Women O.D.'s: Will they change the profession. Optom Monthly 1990;25:23-33.
3. Ettinger ER, Welsh M, Mozlin R. Attitudes about women in optometry. J Am Optom Assoc 1992;63:705-13.
4. Fisher EJ. Memorabilia of Canadian optometry: Optometry 100 course notes. Waterloo: University of Waterloo; 1995.
5. Troeger MCP. Perceptions of women optometry graduates on educational preparation, practice patterns, and role conflicts: The implications for practice management programs and continuing professional education. Texas A & M University; 1992.
6. Classe JG. Legal aspects of optometry. Boston: Butterworths; 1989.
7. Cole S. Sex discrimination and admission to medical school, 1929-1984. Am J Sociol 1986;92:549-67.
8. McAnarney ER. The impact of medical women in United States Medical Schools. In: Spieler C, editor. Women in Medicine-1976. New York: Josiah Macy, Jr. Foundation; 1977. p. 9-21.
9. Niessen LC. Women dentists: 1992 and beyond. J Dent Educ 1992;56:555-60.
10. Hornosty RW, Coulas GC. The feminization of pharmacy: Is the analysis right. Can Pharm J 1988:92-8.
11. Muzzin LJ, Brown GP, Hornosty RW. Consequences of feminization of a profession: The case of Canadian pharmacy. Women & Health 1994;21:39-56.
12. Bird CE. An analysis of gender differences in income among dentists, physicians, and veterinarians in 1987. Res Sociol Health Care 1996;13A:31-61.
13. Cohen JJ. Finishing the bridge to diversity. Acad Med 1997;72:103-109.
14. Gold AR. Optometric education in the seventies. Optom Educ 1975;1:120-123.
15. Association of Schools and Colleges of Optometry. Student profile. Retrieved May 25, 2001 from the World Wide Web: http://home.opted.org/asco/students.html.
16. Association of Schools and Colleges of Optometry. ASCO Annual Report, 1990-91. Optom Educ 1991;17:23-28.
17. Canadian Association of Optometrists. Optometry in Canada: The 1995 national survey: 1. An overview. Can J Optom 1995;57:44-7.

18. Hoff TJ. Same profession, different people: Stratification, structure, and physicians' employment choices. Sociolog Forum 1998;13:133-156.
19. Fleras A. Social problems in Canada: Conditions, constructions and challenges. 3rd Edition. Toronto: Pearson Education Canada Inc; 2001.
20. Scott B, Schwartz M, VanderPlatt M. Sociology: Making sense of the social world. Toronto: Pearson Education Canada Inc; 2000.
21. Zambrana RE. The underrepresentation of Hispanic women in the health professions. J Am Med Women Assoc 1996;51:147-152.
22. Sabatino F. Culture shock: Are US hospitals ready? Hospitals 1993;67:23-28.
23. Carlisle DM, Gardner BS, Liu H. The entry of underrepresented minority students into US medical schools: An evaluation of recent trends. Am J Pub Health 1998;88:1314-1318.
24. Conlan MF. Minorities underrepresented despite pharmacy school gains. Drug Topics 1994;138:68.
25. George A. Admission of Asian Americans to US medical schools. Acad Med 1998;73:226-227.
26. Petersdorf RG, Turner KS, Nickens HW, Ready T. Minorities in medicine: past, present, and future. J Assoc Am Med Col 1990;65:663-670.
27. Tekian A. A thematic review of the literature on underrepresented minorities and medical training, 1981-1995: Securing the foundations of the bridge to diversity. Acad Med 1997;72:S140-S146.
28. Colborn RP, Kent AP, Leon B. The changing medical student population at the University of Cape Town. S African Med J 1995;85:256-261.
29. Kutscher RE. New BLS projections: Findings and implications. Month Labor Rev 1991;114.
30. Walsh MR. Doctors wanted - no women need apply: Sexual barriers in the medical profession, 1835-1975. New-Haven: Yale University Press; 1977.
31. Kinsey A. Sexual behavior in the human female. Philadelphia: W. B. Saunders; 1953.
32. Goodman G, Lakey G, Lashof J, Thorne E. No turning back: Lesbian and gay liberation for the '80s. Philadelphia: New Society; 1983.
33. Anderson S. Substance abuse and dependency in gay men and lesbians. In: Jean K, Peterson DSW, Editors. Health care for lesbians and gay men: Confronting homophobia and heterosexism. New York: Harrington Park Press; 1996. p. 59-76.
34. Becker H, Geer B. Latent culture: A note on the theory of latent social roles. Admin Sci Quart 1960;5:304-313.
35. Bullimore MA. Women in optometry: Hitting the "glasses" ceiling. Optom Vis Sci 1997;74:589.
36. Grant L. The gender climate of medical school: Perspectives of women and men students. J Am Med Women Assoc 1988;43:109-119.
37. Boyle J, Andrews MM. Transcultural concepts in nursing. Glenview, IL: Scott Forsman/Little; 1989.
38. Guruge S, Donner G. Transcultural nursing in Canada. Can Nurse 1996;92:36-40.
39. Lenhart SA, Evans CH. Sexual harassment and gender discrimination: A primer for women physicians. J Am Med Women Assoc 1991;46:851-853.
40. Benokraitis NW, Feagin JR. Modern sexism: Blatant, subtle, and covert discrimination. 2nd Edition ed. Englewood Cliffs: Prentice-Hall; 1995.
41. Ettinger ER. Affirmative action issues within optometry. Journal of the American Optom Assoc 1992;63:611-613.
42. Wallick M, Townsend M. Gay and lesbian issues in US medical schools: Climate and curriculum. In: Sears JT, Williams WL, Editors. Overcoming heterosexism and homophobia: Strategies that work. New York: Columbia University Press; 1997. p. 299-310.
43. Ettinger ER, Bazin MB, Welsh M, Mozlin R. Attitudes about women in optometry: National symposium on women in optometry. Am J Optom Physiol Opt 1988;65:149.
44. Austin GB, Tenzer A, Harris W. Women students discrimination in dental school. J Can Dent Assoc 1980;46:566-569.
45. Mangus RS, Hawkins CE, Miller MJ. Prevalence of harassment and discrimination among 1996 medical school graduates: A survey of eight US schools. J Am Med Assoc 1998;280:851-853.
46. Rosenberg HM, Thompson NL. Attitudes toward women dental students among male dental students and male dental faculty members. J Dent Educ 1976;40:676-680.
47. Zeitler DL, Ramsey EF, Fuller JL. The dental educational environment as perceived by the female student. J Dent Educ 1977;41:271-272.
48. Lythcott GI. Minorities in medicine: Challenge for our times. Alabama J Med Sci 1981;18:188-191.
49. Smith R. Prejudice against doctors and students from ethnic minorities. Brit Med J 1987;294:328-329.
50. Grant L, Ward KB, Brown DR, al. e. Development of work and family commitments: A study with medical students. J Fam Issues 1987;8:176-198.
51. Coombs JA, Drolette ME. Discrimination: The case of the female dental student. Women Health 1977;2:12-21.
52. Coombs RH. Mastering medicine: Professional socialization in medical school. The Free Press 1978.
53. Henry F, Tator C, Mattis W, Rees T. The colour of democracy: Racism in Canadian society. Toronto: Harcourt Brace Canada; 2000.
54. Lewin ME, Rice B, editors. Balancing the scales of opportunity: Ensuring racial and ethnic diversity in the health professions. Washington: National Academy Press; 1994.
55. Baird L. The practical utility of measures of college environment. Rev Educ Res 1974;44:307-329.
56. Pfeifer J, C, Schneider B. University climate perceptions by black and white students. J Appl Psych 1974;59:660-662.
57. Johnson HC. Minority and nonminority medical students' perceptions of the medical school environment. J Med Educ 1978;53:135-136.
58. Nechas E, Foley D. Unequal treatment: What you don't know about how women are treated by the medical community. New York: Simon and Schuster; 1994.
59. Gruskin EP. Treating lesbians and bisexual women. Thousand Oaks: SAGE publications191; 1999.
60. Pierce D. Foreword: Rationing by silence and ignorance. In: Jean K, Peterson DSW, Editors. Health care for lesbians and gay men: Confronting homophobia and heterosexism. New York: Harrington Park Press; 1996. p. XIII-XV.
61. Peterson KJ, Bricker-Jenkins M. Lesbians and the health care system. In: Jean K, Peterson DSW, Editors. Health care for lesbians and gay men: Confronting homophobia and heterosexism. New York: Harrington Park Press; 1996. p. 33-48.
62. Zeidenstein L. Gynecological and childbearing needs of lesbians. J Nurse-Midwif 1990;35:10-18.
63. Herman E. Psychiatry, psychology, and homosexuality. New York: Chelsea House Publishers; 1995.
64. Silverstein C. History of treatment. In: Cabaj RP, Stein TS, Editors. A textbook of homosexuality and mental health. Washington: American Psychiatric Press; 1996.
65. Krajeski J. Homosexuality and the mental health professions: A contemporary history. In: Cabaj RP, Stein TS, Editors. A textbook of homosexuality and mental health. Washington: American Psychiatric Press; 1996.
66. Stevens PE, Hall JM. Abusive health care interactions experienced by lesbians: A case of institutional violence in the treatment of women. Response Victim Women Child 1990;13:23-27.
67. Randall CE. Lesbian phobia among BSN educators: A survey. J Nurs Educ 1989;28:302-306.
68. Eliason MJ. Correlates of prejudice in nursing students. J Nurs Educ 1998;37:27-29.
69. Eliason MJ, Raheim S. Experiences and comfort with culturally diverse groups in undergraduate pre-nursing students. J Nurs Educ 2000;39.
70. Schatz B, O'Hanlan K. Anti-gay discrimination in medicine: Results of a national survey of lesbian, gay and bisexual physicians. San Francisco: American Association of Lesbian and Gay Physicians; 1994.
71. Young EW. Nurses' attitudes toward homosexuality: Analysis of change in AIDS workshops. J Cont Educ Nurs 1988;19:9-12.
72. Ramos MM, Tellez CM, Palley TB, Umland BE, Skipper BJ. Attitudes of physicians practicing in New Mexico toward gay men and lesbians in the profession. Acad Med 1998;73:436-438.
73. University of Michigan. Multicultural audit: Final summary and report. Michigan: University of Michigan: School of Dentistry; 1995.
74. Townsend MH, Wallick MM, Cambre KM. Follow-up survey of support services for lesbian, gay, and bisexual medical students. Acad Med 1996;71:1012-1014.
75. Wallick MM, Cambre KM, Townsend MH. How the topic of homosexuality is taught at US medical schools. Acad Med 1992;67:601-603.
76. Harrison AE. Comprehensive care of lesbian and gay families. Primary Care 1996;23:31-55.
77. Katz A, Clausen L. Effects of changing student characteristics on attrition at the New England College of Optometry. J Optom Educ 1989;15:16-18.
78. Kegel-Flom P. Women optometry students: How qualified. Am J Optom Physiol Opt 1988;65:666-73.

79. Trick LR, Davis SL, Wolf BB, Hirata M. A comparison of academic performance of female and male optometry students at the University of Missouri-St.Louis. J Am Optom Assoc 1988;59:89-92.
80. Trick LR, Davis SL, Zipprich A. A nationwide evaluation of the academic performance of male and female optometry students. J Am Optom Assoc 1990;61:609-12.
81. Pavlichko JL, Root LG. Will women ruin optometry? Review of Optometry 1983;120:42-48.
82. Becker GS. Human capital, effort, and the sexual division of labor. J Labor Econ 1985;3:533-558.
83. Pleck JH. The work-family role system. Social Problems 1977;24:417-427.
84. Ducker DG. The effects of two sources of role strain on women physicians. Sex Role 1980;6:549-559.
85. Ehrensing RH. Attitudes towards women physicians: A multispecialty group practice perspective. The Internist 1986;27:17-18.
86. Hertz R. More equal than others: Women and men in dual-career marriages. Berkeley: University of California Press; 1986.
87. Richardsen AM, Burke RJ. Occupational stress and job satisfaction among physicians: Sex differences. Social Sci Med 1991;33:1179-1187.
88. Weisman C, Teitlebaum M. The work-family role system and physician productivity. J Health Soc Behav 1987;28:247-257.
89. Betz M, O'Connell L. Work orientations of males and females: Exploring the gender socialization approach. Sociolog Inquiry 1988;59:318-330.
90. Clavan S, Robak N. Choosing to become a doctor: Contemporary men and women medical students. Social Sci Forum 1980;3:1-14.
91. Lemkau J, Rafferty J, Purdy R, Rudisill J. Sex role stress and job burnout among family practice physicians. J Vocation Behav 1987;31:81-90.
92. Freidson E. Professional dominance: The social structure of medical care. New York: Atherton Press; 1970.
93. Lorber J. Women physicians: Careers, status, and power. New York: Tavistock Publications; 1984.
94. Keith SN, Bell RM, Swanson AG, Williams AP. Effects of affirmative action in medical schools: A study of the class of 1975. New Eng J Med 1985;313:1519-1525.
95. Johnson DG, Lloyd SMJ, Miller RL. A second survey of graduates of a traditionally black college of medicine. Acad Med 1989;64:87-94.
96. Komaromy M, Grumbach K, Drake M. The role of Black and Hispanic physicians in providing health care for underserved populations. New Eng J Med 1996;334:305-310.
97. Moy E, Bartman BA. Physician race and care of minority and medically indigent patients. J Am Med Assoc 1995;273:1515-1520.
98. Thurmond VB, Cregler LL. Specialty choices and practice locales of black graduates from a predominantly white medical school. Acad Med 1993;68:929-930.
99. Barnhart J, Shekelee P, Lewis C. The effect of a medical school's admission and curriculum policies on increasing the number of physicians in primary care specialties. Acad Med 1996;71:293-295.
100. Boyd RL. Black and Asian self-employment in large metropolitan areas: A comparative analysis. Social Prob 1990;37:258-274.
101. Fratoe F. Sociological perspectives on minority business ownership: A synthesis of the literature with research and policy implications. Washington: The Research Division of the Minority Business Development Agency, US Department of Commerce; 1984.
102. Tekian A, Foley RP. Why do medical students from underrepresented minorities chose - or not chose - primary care careers? Acad Med 1997;72:94-95.
103. Rico M, Stagnaro-Green A. Debt and career choices of underrepresented minorities. Acad Med 1997;72:657-658.
104. Colquitt WL, Zeh MC, Killian CD, Cultice JM. Effect of debt on US medical school graduate preferences for family medicine, general internal medicine, and general pediatrics. Acad Med 1996;71:400-411.
105. Newcomb RD. Women in Optometry. Optom Vis Sci 1998;75:10.
106. Mazza K. Woman, or superwoman? Eyecare Bus 1988;3:59-61.
107. Mackowiak J, Eckel FM. Career management: Understanding the process. Am J Hosp Pharm 1985;42:297-303.
108. Shepard MD, Proctor KA. Pharmacy ownership. Am Pharm 1988;NS28:312-317.
109. Robinson LH, Edelman S, Goist K. Sex role stereotyping: Reactions of women anesthesiologists. J Am Med Women Assoc 1987;42:15-18.
110. Birch J, Bee E. Women in optometry. Optician 1986;191:24-27.
111. Das Gupta T. Racism and paid work. Toronto: Garamond Press; 1996.
112. Heilbrun C. The politics of mind: Women, tradition and the university. In: Gabriel SL, Smithson I, Editors. Gender in the classroom: Power and pedagogy. Chicago: University of Illinois Press; 1990. p. 28-40.
113. Mackie M. Constructing men and women: Gender socialization. Toronto: Holt, Rinehart and Winston of Canada Ltd; 1987.
114. Wilson A, Branch L, Niessen L. Practice patterns of male and female dentists. J Am Dent Assoc 1988;116:173-177.
115. Bobula JD. Work patterns, practice characteristics, and incomes of male and female physicians. J Med Educ 1980;55:826-833.
116. Kletke PR, Marder WD, Silberger AB. The growing proportion of female physicians: Implications for US physician supply. Am J Pub Health 1990;80:300-304.
117. Bowman M, Gross ML. Overview of research on women in medicine-issues for public policymakers. Public Health Rep 1986;5:513-521.
118. Lauer R. Social problems and the quality of life. Boston: McGraw-Hill; 1998.
119. Lindsey L. Gender roles: A sociological perspective. 2nd Edition ed. Englewood Cliffs, NJ: Prentice Hall; 1994.
120. Marger M. Social inequality: Patterns and processes. California: Mayfield Publishing Co; 1999.
121. Zukewich Ghalam N. Women in the workplace. In: Nelson ED, Robinson BW, Editors. Gender in the 1990's: Images, realities and issues. Toronto: Nelson Canada; 1995. p. 201-210.
122. Polachek SW. Occupational segregation among women: Theory, evidence and a prognosis. In: Lloyd C, al. e, editors. Women in the Labour Market. New York: Columbia University Press; 1979. p. 137-157.
123. Nakamura A. Gender differences in earnings: A comment. In: Nakhaie MR, editor. Debates on social inequality: Class, gender and ethnicity in Canada. Toronto: Harcourt Brace and Company Canada; 1999. p. 179-187.
124. Reskin BF. Bringing the men back in: Sex differentation and the devaluation of women's work. Gender Soc 1988;2:58-81.
125. Johnston E, Soroka M. A survey of optometric practice in New York State: Trends and policy considerations. J Am Optom Assoc 1990;61:836-41.
126. Mackin RC, Egan DJ, Garzia RP. Practice profile of University of Missouri - St. Louis optometry graduates. J Am Optom Assoc 1990;61:623-7.
127. Masters MM, Brey D, Jelks H, Andreas S, Kness W. Women in optometry: A profile. Optom Management 1983;19:25-33.
128. Rosner JF. Career patterns of female and male dentists. J Practice Admin 1984;11:89-94.
129. Marder W, Thran SL. Medical practice in the 1980s as measured by the AMA socioeconomic monitoring system. In: Gonzalez ML, Emmons DW, Editors. Socioeconomic Characteristics of Medical Practice 1988. Chicago: American Medical Association; 1988. p. 3-17.
130. Association of Schools and Colleges of Optometry. Annual survey of optometric education. Optom Educ 1982;8:24-29.
131. Association of Schools and Colleges of Optometry. Trends in optometric education: 1989-90 to 1992-93. Rockville; 1994.
132. Association of Schools and Colleges of Optometry. Student profile. Retrieved July 24, 2000 from the World Wide Web: http://home.opted.org/asco/students.html
133. American Association of Medical Colleges. FACTS - Applicants, matriculants and graduates. Retrieved July 25, 2000 from the World Wide Web: http://www.aamc.org/studapps/facts/famg8.htm.
134. American Dental Association. 1990 - 1999 Survey(s) of predoctoral dental educational institutions: Programs, enrollment and graduates. Chicago, Illinois; 2000.
135. American Association of Colleges of Pharmacy. Profile of Pharmacy Students Fall 1998. Fax. Alexandria, Virginia; July 26, 2000.
136. University of Waterloo School of Optometry. List of U.S. and Canadian Schools/Colleges of Optometry. Waterloo: University of Waterloo; 1999.
137. Canadian Association of Optometrists. Optometrist's Desk Reference. Ottawa: Canadian Association of Optometrists; 2001.
138. Association of Regulatory Boards of Optometry. Directory of Optometry Boards. Retrieved May 15, 2001 from the World Wide Web: http://www.arbo.org/directoryofboards.htm.
139. American Optometric Association. Affiliates' Roster Key. St. Louis, MO; 2001.
140. American Academy of Optometry. 1999-2000 Annual Report of the Academy. Rockville, Maryland; 2000.

Diversity Within the Profession

Part 2: Initiatives Promoting Diversity

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Abstract

In the past 30 years, the historically white male optometric profession has become more diversified in terms of gender and ethnicity while maintaining its white male power structure. There has been limited study of the experiences of visible and invisible minorities or of their impact on the profession. An examination of minority trends in the membership of optometry and other historically white, male-dominated professions reveals a need for more socially conscious admission practices and a call for multicultural educational models that do not treat difference as defective.

Key words: *diversity, admission practices, educational models, professional socialization*

The face of optometry has dramatically changed in the past century. Virtually all optometry students were white men in the early 20th century, yet now this group represents less than one-third of the typical optometry class.[1-7] The changes occurring within the optometric profession are echoed to varying degrees in other healthcare professions such as medicine, dentistry, pharmacy and veterinary medicine.[8-13]

Among schools of optometry, medicine, dentistry and pharmacy, the enrolment of women in optometry (54%) is second only to pharmacy and the enrolment of ethnic minorities (37%) is consistent with the other professional schools. Just 30 years ago, women and ethnic minorities comprised 3% and 6%, of the optometric student body.[14] Despite these numerical gains, intolerance towards women, ethnic minorities and sexual minorities continues to occur in the schools and in practice as evidenced by reports of harassment, discrimination and non-skill based inequities in the patterns of practice, power and economics.[1]

Like all professions, optometry can reflect on what programs, if any, address the tensions created by a profession whose members are more diverse in background and less like-minded than in the past. This paper is the second of two papers that examine the literature on diversity within health care professions, including optometry. Part 1 focuses on the trends in and challenges to diversity while Part 2 describes the programs geared either toward increasing diversity or facilitating acceptance of diversity within the profession.

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Initiatives Promoting Diversity

Affirmative Action

In the United States, *Affirmative Action* programs have been implemented in employment and educational settings with the intent to redress past and present discrimination while preventing future discrimination (The closest Canadian equivalent is *Employment Equity* legislation, which is restricted to creating fairness in the employment arena). The greatest focus of affirmative action programs has been on underrepresented ethnic minority groups. The admission of minority students to professional schools has waxed and waned in the past three decades as a function of legislative, litigious and political processes. These trends have been best documented in medical education but the underlying challenges are not unique to medicine. Efforts within medicine to increase diversity were initially triggered by legislative changes in response to the civil rights and women's movements in the 1960s. Each initiative within the profession has enjoyed some success in increasing diversity before encountering a backlash that has taken the forms of financial cutbacks, litigation, administrative and legislative actions and/or ballot initiatives (See Table 1).

Debates over the morality of affirmative action depend, in part, on defining its boundaries. Even strong critics of many affirmative action programs (e.g., Cohen[15]) agree that affirmative action is justifiable when it is designed to eliminate discriminatory practices followed by some employers and schools. Proponents of affirmative action believe that affirmative action is a reasonable way to address the significant diversity gap between professions and the society they profess to serve.[16, 17] The justification for affirmative action hinges to a certain extent on the debate of whether admission to a health care program should consider the individual's merit, society's needs or both.[16]

If admission should be strictly merit-based then consideration of ethnicity or sex seems neither equitable nor fair. If admission should be solely

Table 1
Trends & Determinants of Ethnic Enrollment in Medical Schools

Significant Trends in Ethnic Enrollment Rates		Significant Determinants
Rises	Declines	
Late 1960s to Mid 1970s		Legislative changes (regarding ethnic diversity): 1964: Title VII of the Civil Rights Act 1972: Title IX of the 1972 Educational Amendment. Organizational initiatives:[61, 62] 1968: American Association of Medical Colleges (AAMC) calls on medical schools to admit students that better reflect the diversity within the general population.
	Mid 1970s to Early 1990s	Litigation:[61, 62] Numerous reverse discrimination lawsuits. Funding cuts:[61, 62] Reduced federal and private foundation support for educational programs (placing recruitment and retention programs at risk).
Early 1990s to Mid 1990s		Organizational initiatives:[24, 63] 1991: AAMC initiates "Project 3000 by 2000 (to admit 3,000 ethnic students by the year 2000 to reflect the diversity of the population).
	Mid 1990s until the Present	Administrative & legislative actions:[17, 61] e.g., University of California 1995 elimination of gender/race-based admission preferences. Litigation:[17, 61] e.g., U.S. Supreme Court 1996 decision regarding Hopwood versus Texas. Ballot initiatives:[17, 61] e.g., State of California 1996 inclusion of the California Civil Rights Initiative in the general election ballot.

based on social needs and purposes then it must consider the inequitable distribution of opportunities, goods and resources and it must also address the under representation of certain groups in healthcare professions. Likely, admission committees live in a mixed world of these realities. Geiger[16] has questioned the validity of merit criteria used in selection. For example, he points out that MCAT scores fail to predict performance beyond the first two years of medical school. The predictive value of OAT scores has been similarly limited in optometry school.[18-21] Geiger views the selection process used by most medical schools as a stacked deck working against minority applicants because educationally disadvantaged minority applicants tend to score lower on these heavily weighted selection criteria. The use of *neutral* selection tools that attempt to treat all applicants equal does not make a fair and equitable admission process if a notable proportion of applicants have been educationally and economically disadvantaged their whole lives.[16]

Supporters of affirmative action maintain that admission committees have been careful to uphold the standard of entry while diversifying enrolment. That is, the admission committee places importance on applicant quality (e.g., GPAs, OATs) while considering applicant characteristics (e.g., ethnicity and gender). By including ethnicity in the selection process, supporters believe they are achieving compensatory justice. That is, using ethnicity to admit present day minority candidates assuages the damage created by past discriminatory practices of using ethnicity to reject minority candidates.

Criticism of affirmative action programs arises when the preferential selection of candidates is based on characteristics such as race, ethnicity or sex rather than on skills like knowledge or manual dexterity. Cohen[15] argues against the morality of such practices in part because compensatory justice is not served as promised. Compensatory justice occurs when the damaged party is compensated for her/his injury. Cohen believes that admitting a Hispanic woman based on her ethnicity does not compensate past Hispanic applicants injured by discriminatory practices. The preferential selection means that the woman is compensated for being Hispanic, which is not an injury and therefore requires no compensation. This is not to say that the Hispanic woman is free of racially based intolerance and disadvantage in society. Cohen suggests that the injured parties in preferential selection end up being the majority applicants and that this type of

"reverse discrimination" violates Section 601 of the Civil Rights Act of 1964 and the fourteenth Amendment of the U.S. Constitution.[15] Attempting to address one form of discrimination with another form is immoral according to Cohen.

Henry et al[22] warn that the immorality argument is flawed if its proponents view minority characteristics (e.g., ethnicity) and skills (e.g., knowledge) as mutually exclusive qualities. Such a view would suggest that the selection committee would have to choose either a candidate with the requisite skills or an unskilled minority candidate. Admission committees that make selection decisions based on a score derived from numerous skill factors as well as a *minority factor* are acknowledging these features are not mutually exclusive. However the weighting of the various selection factors worries opponents of affirmative action programs. They predict that the quality of graduates is at risk of declining if the admissibility formula is designed such that a high ethnicity rating can overshadow a below optimal skill such as an admission test score. McGaghie[23] estimates that a minimum GPA of 2.5 is necessary to successfully complete medical school. In some cases, applicants have been admitted with an academic score below this minimum leaving the applicant academically at risk in the program. Admitting an academically weak applicant (who scored overall high enough because of her/his ethnicity) means attrition rates increase among minorities and concerns about affirmative action grow. Even if applicant quality is not actually depleted by ethnically based preferential selection, critics argue that the perception of decline is created. Negative seeds for racial tension are created by admission decisions perceived as acts of charity rather than competence. In 1995, the Canadian provincial government of Ontario introduced a bill entitled, "An act to repeal job quotas and to restore merit-based employment practices." Even the name of the bill erroneously implied that it was normal employment practice in the province to hire unqualified minority candidates.[22]

The specific intricacies of the admission process employed by healthcare admission committees have been far from transparent. The historical defence for the secrecy has been the protection of candidate confidentiality; however the rationale for the lack of transparency has been shifting in the last decade. In a study of 15 medical schools with the largest underrepresented minority populations in the U.S., Tekian[24] found that admission committees tended to be secretive about their admission policies, particularly about those aspects pertaining to affirmative action. The litigious and legislative backlash witnessed in the 1990s against affirmative action has made admission committees hesitant to divulge their processes. This defensive posturing however has not prevented the continued backlash. In the wake of a sharp decline in minority enrollment rates since 1995, Tekian argued that admission committees must be more open about their admission procedures. Some admission committees are backing away from open affirmative action policies (even if the law has not forced them to change) and moving toward "socially conscious" criteria that indirectly translate into higher enrolment of underrepresented minorities.[24] Instead of basing selections on the ethnicity of the applicant (an openly affirmative action policy), some admission committees are positively affecting minority enrolment by adopting economically based selection criteria (e.g., candidates who have received federal aid). The logic is that many of these applicants are also members of an underrepresented minority, thus admitting economically disadvantaged candidates ultimately raises minority enrolments. One of the strategies of the socially conscious policy is that it may be less vulnerable in cases of litigation. The only way that Cohen[15] can support preferential selection policies is to attempt to redress social injustices on a broad scale. That is, all economically or educationally disadvantaged applicants, independent of ethnicity, might be compensated for the damage they have sustained. The hesitancy of admission committees to reveal their process makes it hard to know what strategies will help increase the diversity of student enrolment. Therefore, admission committees work in a vacuum not knowing what ideas other committees have tested.

Support Structures

Healthcare professional programs have employed a number of different initiatives to support internal diversity. In general, the initiatives focus on either recruitment (increasing the diversity of qualified applicants) or retention (decreasing the likelihood of attrition). Opportunities for intervention that have been targeted at members of underrepresented groups include:

- Educate children and teenagers (and parents) about healthcare career options,[25-30]
- Ensure applicants are academically and emotionally prepared for higher education through grade school, high school and college programs,[26, 28, 30-38]
- Provide 5- to 6-week summer prematriculation enrichment programs for students entering first year of a healthcare professional program,[26, 28, 38-43]
- Allow students to delay graduation through reduced load programs such as taking two years to complete the first year of the curriculum,[28, 44, 45]
- Provide tutoring for admitted students who are struggling academically,[25, 27, 28, 46, 47]
- Develop financial support systems to deal with student debt load,[26]
- Create supportive networks through counselling, mentoring and role modelling,[25, 28, 38, 41, 48, 49]
- Educate admission committee members in how to fairly evaluate minority applicants and identify those most likely to succeed in the program,[50]
- Alter existing healthcare curricula to incorporate diversity education.[51, 52]

The goal of these initiatives is to assist any student who has faced educational disadvantages, financial indebtedness, limited emotional support and cultural intolerance. The reality is that many of these students are members of a minority group. The aforementioned studies have demonstrated generally positive outcomes from these recruitment and retention programs with the exception of one study[37] that found no significant improvement in retention rates. The most frequently employed initiatives by medical schools have been prematriculation, tutoring, and counselling programs.[41]

The merits of implementing institutional initiatives that enlighten all students, staff and faculty about diversity sensitivity has been considered among some dental schools.[52, 53] The University of Michigan School of

Dentistry considers diversity sensitivity a matter of professional behavior and has established initiatives to ensure all its members increase their cultural awareness.[53] Kalkwarf[52], who has written about instructor-student dynamics in dental school, points out that without a shift in cultural awareness, an instructor may not understand that in some cultures, a student is impolite and disrespectful if s/he engages in direct eye contact, questions a teacher or asks for help without a direct invitation. An instructor might also wrongly assume a student's hesitancy to answer indicates a lack of knowledge when, in actuality, it reflects a natural systematic mental sorting of multiple languages spoken by the student. Kalkwarf[52] sees the faculty as the first target group in changing the cultural tempo of healthcare professions although staff, students and practitioners must ultimately be enlightened as well.

Most healthcare curricula that devote any time to multicultural education follow the model of "teaching the exceptional and culturally different student."[51] This model assumes the norm is appropriate and different is deficient. As the norm has tended to be the white, middle-class student, the educational program is designed to assimilate "different students" into the main white, middle-class culture. Black nursing students[54, 55] and Hispanic women in a variety of health professional schools[56] have reported two problems emanating from this mind-set: 1) they are expected to be role models for all minority students, and 2) they receive inadequate attention from their instructors in class until the topic is race-based at which point the minority students are to speak as experts for their entire ethnic community.

Sims and Baldwin[51] have reviewed four other models of multicultural education that may be more appropriate for healthcare programs to adopt in order to address longstanding issues of multicultural intolerance of care providers and patients. The *human relations* model focuses on preparing students to work together harmoniously regardless of differences in race, class, gender or disability although the model does not address the impact of poverty, institutional discrimination or powerlessness. The *single group* model promotes a single group being studied in detail one at a time in an attempt to shift students from the dominant Eurocentric male worldview. The *multicultural education* model seeks to promote the value of cultural diversity, respect for human rights, respect for alternate life choices, social justice and equal opportunity for all people, as well as equity in the distribution of power among all members.[57] As a result, no one culture dominates the curriculum. And finally, the *multicultural and social reconstructionist* model, which is an extension of the *multicultural education* model, places heavy emphasis on equal opportunity and cultural pluralism. Sims and Baldwin encourage healthcare schools to move away from the longstanding Eurocentric, male worldview that arises when knowledge is presented in a manner that reflects the language and values of the dominant culture and thereby alienates members of non-dominant groups. Pedagogical approaches that enable students to become critical thinkers who can make decisions and explore values empower professional students and ultimately the profession. The alternative models described by Sims and Baldwin would require wide sweeping changes to the curriculum, the teachers and the administration.

Many schools and institutions are at risk of making only token changes within their organization. This tokenism can take two forms: "overattentive" or "symbolic."[58] Overattentive tokenism occurs when a negligible number of minority group members are in huge demand to act as mentors, role models and counsellors for all others "like them." Symbolic tokenism results when individuals are treated equally (e.g., the same salary for the same position) but the minority members remain excluded from positions of autonomy and power within the organization. In the majority of today's educational institutions, evidence of their stated commitment to multiculturalism is limited to forms of tokenism that keep the institutions entrenched in a monocultural system that is Eurocentric and male.[22, 59] In order to transcend systemic intolerance, educational institutions must ensure that institutional norms and regulations treat cultural groups equally and informal, implicit guidelines of behavior held by the dominant group (e.g., Caucasians) do not dictate day-to-day decisions.[60]

Conclusions

Since its inception a century ago, optometry has become a much more diversified profession in terms of gender and ethnicity while holding onto its white male power structure. These trends are reflected in other historically white, male dominated professions such as medicine, dentistry, pharmacy and veterinary medicine. The optometric profession as a whole could benefit from directing its attention to socially conscious admission practices that focus on educationally and economically disadvantaged applicants, multicultural curricula that avoid treating the minority student as defective, and multifaceted studies of career patterns among optometrists.

References

1. Spafford MM, Sharma N, Nygaard VL, Kahlou C. Diversity within the profession: Part 1: Trends and challenges. Optom Educ 2002; 27: 114-121.
2. Spafford MM, Beal PIA. Interview expectations and experiences of women and men applying to an optometry program. Optom Vis Sci 1999;76:500-510.
3. Blackwood F. Women O.D.'s: Will they change the profession. Optom Monthly 1990;25:23-33.
4. Ettinger ER, Welsh M, Mozlin R. Attitudes about women in optometry. J Am Optom Assoc 1992;63:705-13.
5. Fisher EJ. Memorabilia of Canadian optometry: Optometry 100 course notes. Waterloo: University of Waterloo; 1995.
6. Troeger MCP. Perceptions of women optometry graduates on educational preparation, practice patterns, and role conflicts: The implications for practice management programs and continuing professional education: Texas A & M University; 1992.
7. Classe JG. Legal aspects of optometry. Boston: Butterworths; 1989.
8. Cole S. Sex discrimination and admission to medical school, 1929-1984. Am J Sociol 1986;92:549-67.
9. McAnarney ER. The impact of medical women in United States Medical Schools. In: Spieler C, Editor. Women in Medicine-1976. New York: Josiah Macy, Jr. Foundation; 1977. p. 9-21.
10. Niessen LC. Women dentists: 1992 and beyond. J Dent Educ 1992;56:555-60.
11. Hornosty RW, Coulas GC. The feminization of pharmacy: Is the analysis right. Can Pharm J 1988:92-8.
12. Muzzin LJ, Brown GP, Hornosty RW. Consequences of feminization of a profession: The case of Canadian pharmacy. Women & Health 1994;21:39-56.
13. Bird CE. An analysis of gender differences in income among dentists, physicians, and veterinarians in 1987. Res Sociol Health Care 1996;13A:31-61.
14. Gold AR. Optometric education in the seventies. Optom Educ 1975;1:120-123.
15. Cohen C. Affirmative action in medical school admissions. In: Basson MD, Lipson RE, Ganos DL, Editors. Troubling Problems in Medical Ethics: The Third Volume In a

Series on Ethics, Humanism, and Medicine. New York: Alan R. Liss Inc; 1981. p. 17-38.
16. Geiger HJ. Affirmative action in medical school admissions. In: Basson MD, Lipson RE, Ganos DL, Editors. Troubling Problems in Medical Ethics. New York: Alan R. Liss Inc; 1981.
17. Cohen JJ. Finishing the bridge to diversity. Acad Med 1997;72:103-109.
18. Kegel-Flom P. Predicting optometry grades from the OCAT and preoptometry grades. Am J Optom Physiol Opt 1974;51:419-424.
19. Kegel-Flom P. Personality test measures in optometry school admissions. Am J Optom Physiol Opt 1984;61:210-217.
20. Kegel-Flom P. Predicting optometry school grades from intellectual and nonintellectual admission variables. Am J Optom Physiol Opt 1985;62:901-907.
21. Bailey JE, Voorhees LI, Hanlon S. Forecasting optometry grade point average. Am J Optom Physiol Opt 1983;60:399-404.
22. Henry F, Tator C, Mattis W, Rees T. The colour of democracy: Racism in Canadian society. Toronto: Harcourt Brace Canada; 2000.
23. McGaghie WC. Perspectives on medical school admission. Acad Med 1990;65:136-139.
24. Tekian A. Minority students, affirmative action, and the admission process: A survey of 15 medical schools. Acad Med 1998;73:986-992.
25. Ettinger ER. Affirmative action issues within optometry. J Am Optom Assoc 1992;63:611-613.
26. Cohen K. The minority recruitment program at the Pennsylvania College of Optometry. J Optom Educ 1987;12:72-74.
27. Sanitago HC. The recruitment and retention of disadvantaged and underrepresented groups in optometry. J Am Optom Assoc 1992;63:815-818.
28. Payne JC, Nowacki CM, Girotti JA, Townsel J, Plagge JC, Beckham TW. Increasing the graduation rates of minority medical students. J Med Educ 1986;61:353-358.
29. Petersdorf RG. Not a choice, an obligation. Acad Med 1992;67:73-79.
30. Thurmond VB, Kirch DG. Impact of minority physicians on health care. South Med J 1998;91:1009-1013.
31. Davis JA, Davidson CP. The med-cor study: preparing high school students for health careers. J Med Educ 1982;57:27-34.
32. Thurmond VB, Mott A. Minority students' career choices and education five years after they completed a summer enrichment program. Acad Med 1990;65:478-479.
33. Bediako MR, McDermoft BA, Bleich ME, Colliver JA. Ventures in education: A pipeline to medical education for minority and economically disadvantaged students. Acad Med 1996;71:190-192.
34. Slater M, Iler E. A program to prepare minority students for careers in medicine, science, and other high-level professions. Acad Med 1991;66:220-225.
35. Carmichael JW, Bauer JD, Hunter JR, Labat DD, Sevenair JP. An assessment of a premedical program in terms of its ability to serve Black Americans. J Nat Med Assoc 1988;80:1094-1104.
36. Bergeisen L. Minority medical education program motivates future physicians. Acad Physician Scientist 1995;3-5.
37. Lehman L. More about the Sophie Davis School. Acad Med 1994;69:650.
38. Slaughter SC, Higgins EB, Lilliewood EW. South Carolina AHEC's student development and recruitment program: A model for increasing minority participation in the health profession. J S Carolina Med Assoc 1992;88:470-474.
39. Richardson BL, Saffran M. Effects of summer preview program of study skills and basic science topics on the academic performance of minority students. J Med Educ 1985;77:465-471.
40. Ugbolue A, Whitley PN, Stevens PJ. Evaluation of preentrance enrichment program for minority students admitted to medical school. J Med Educ 1987;62:8-16.
41. Shields PA. A survey and analysis of student academic support programs in medical schools, focus: underrepresented minority students. J Nat Med Assoc 1994;86:373-377.
42. Cantor JC, Bergeisen MA, Baker LC. Effect of an intensive educational program for minority college students and recent graduates on the probability of acceptance into medical school. J Am Med Assoc 1998;280:772-776.
43. Lipscomb WD, Mullan PB, Zepeda M, Price J. A retrospective analysis of a program designed to facilitate the entry of underrepresented-minority students into medical school: Program trends and outcomes. Acad Med 1993;68:S10-S12.
44. Ficklin FL, Hazelwood JD, Carter JE, Shellhamer RH. The reduced load as a remedial program to increase retention of first-year medical students. J Med Educ 1985;60:406-408.
45. Kassebaum DG, Szenas PL. The longer road to medical school graduation. Acad Med 1994;69:855-860.
46. Heath DA. Academic support services: Effectiveness of tutoring evaluated. J Optom Educ 1985;11:17-21.
47. Frierson HT. Impact of intervention program on medical students' national board part I performance. J Am Med Assoc 1984;76:1185-1190.
48. Cregler LL. A second minority mentorship program. Acad Med 1993;68:148.
49. Wallick M, Townsend M. Gay and lesbian issues in US medical schools: Climate and curriculum. In: Sears JT, Williams WL, Editors. Overcoming heterosexism and homophobia: Strategies that work. New York: Columbia University Press; 1997. p. 299-310.
50. Helm EG, Prieto DO, Sedlacek WE. Simulated minority admissions exercise at Louisiana State University School of Medicine: An evaluation. J Nat Med Assoc 1997;89:601-605.
51. Sims GP, Baldwin D. Race, class, and gender considerations in nursing education. Nursing & Health Care 1995;16:316-321.
52. Kalkwarf KL. Creating multicultural dental schools and the responsibility of leadership. J Dent Educ 1995;59:1107-1110.
53. University of Michigan. Multicultural audit: Final summary and report. Michigan: University of Michigan: School of Dentistry; 1995.
54. Jones SH. Improving retention and graduation rates for black students in nursing education: A development model. Nursing Outlook 1992;40:78-85.
55. Giger JN, Davidhizar R. I deserve that promotion. In: Minority Nurse; 1993. p. 26-31.
56. Zambrana RE. The underrepresentation of Hispanic women in the health professions. J Am Med Women Assoc 1996;51:147-152.
57. Gollnick D. Multicultural education. Viewpoints in Teaching and Learning 1980;56:1-17.
58. Benokraitis NW, Feagin JR. Modern sexism: Blatant, subtle, and covert discrimination. 2nd Edition. Englewood Cliffs: Prentice-Hall; 1995.
59. Fleras A, Elliott J. Unequal relations: An introduction to race, ethnicity and aboriginal dynamics in Canada. 3rd Edition. Scarborough: Prentice Hall Allyn and Bacon Canada; 1999.
60. Isajiw W. Understanding diversity: Ethnicity and race in the Canadian context. Toronto: Thompson Educational Publishing Inc; 1999.
61. Carlisle DM, Gardner BS, Liu H. The entry of underrepresented minority students into US medical schools: An evaluation of recent trends. Am J Pub Health 1998;88:1314-1318.
62. Petersdorf RG, Turner KS, Nickens HW, Ready T. Minorities in medicine: past, present, and future. J Assoc Am Med Col 1990;65:663-670.
63. Tekian A. A thematic review of the literature on underrepresented minorities and medical training, 1981-1995: Securing the foundations of the bridge to diversity. Acad Med 1997;72:S140-S146.

India Needs Optometrists

Anthony P. Cullen, O.D., Ph.D., F.A.A.O.

Amod S. Gogate, B.Sc. (Hons) Ophthal. Tech. (Optometry) AIIMS

It has been estimated that India has approximately 12 million blind people and an additional 45 million who are visually impaired. The number of people with undetected and uncorrected refractive and related errors remains unknown and may approach an even higher number. Many of these are in the school age population. Based on these figures it is evident that the number of primary eye care professionals required to service the population is not being met.

India has 196 Universities, 8,111 Colleges and 887 Polytechnics serving a population of one billion individuals. Approximately five million students are enrolled in regular post secondary courses. The system of education, like so many Indian institutions, reflects earlier British involvement; however other post-partition influences are increasingly apparent. For mainly political reasons, this extensive and excellent educational system has produced only 3,000 optometrists resulting in a need for approximately 97,000 more optometrists in order to reach a 1:10,000 ratio. There is one ophthalmologist per 100,000 population, which is the same ratio as in the United Kingdom. The lack of optometrists inevitably has led to ophthalmologists practicing primary eye care, frequently in close proximity to one or more of the estimated 10,000 dispensing opticians. A resulting void affects secondary and tertiary care. This problem is not unique to India. It also exists in other countries, with enormous underserved populations, where optometry has not been permitted to develop fully. If avoidable blindness is to be eliminated in India, specifically through the identification and management of refractive errors and low vision problems and the early diagnosis of blinding eye and systemic diseases, the important role that optometrists play in other countries must be recognized.

At the time of Indian independence, optometry in the United Kingdom was not a university-educated profession, nor was it a state-registered profession until 1957. There were no recognized training programs for optometrists (ophthalmic opticians) in India and those seeking formal education went to England, some not to return. In the early 1960s three major eye hospitals started two-year diploma courses in optometry, and in 1968 the prestigious All India Institute of Medical Science introduced a two-year diploma, which was soon converted into a three-year degree in Ophthalmic Techniques (Optometry).

At this critical time in the development of the profession, an argument was made to the Government, with support from representatives of the World Health Organization that India could not afford to train optometrists. Rather there should be an increase in the number of more expensively trained eye surgeons supported by technicians and assistants. Although this approach may have some merit in the reduction of the surgical backlog, this concept has not worked to the advantage of the under-served populations anywhere in the world. The result has been beneficial for some ophthalmologists with cheap controlled labor for their clinics and little competition in primary care in the private sector.

Although there are now approximately 20 institutions teaching courses that may loosely be considered optometry, they are by no means homogeneous. Their programs vary from a two-year diploma in ophthalmic techniques after Grade 10 (SNDT Polytechnic in Mumbai, a *deemed* University for women only) to four-year optometry degree courses with entry level and curricula similar to those for optometry degrees elsewhere in the world. Some of the credentials granted include:

Diploma as Ophthalmic Assistant – 2 years
Diploma in Ophthalmic Techniques (Optometry) – 3 years
Diploma in Optometric Science – 3 years
Diploma in Optometry & Refraction – 2 years
B.Sc. (Hons) Ophthalmic Techniques – 3 years
Bachelor of Optometry – 4 years
Bachelor of Clinical Optometry – 4 years
B.Sc. Applied Optometry – 1.5 years

It is evident that the holders of some of these qualifications would not meet the World Council of Optometry's (WCO) "concept of optometry"[a] statement of an optometrist. This fact, coupled with the lack of registration, explains why there is some confusion regarding the actual number of

Dr. Cullen is a professor of optometry at the University of Waterloo in Canada and co-chair of the World Council of Optometry (WCO) Education Committee. Dr. Gogate is head of the School of Optometry at Bharati Vidyapeeth Deemed University Medical College, Pune, India, and former chair of the Education Committee of the Indian Optometric Association. The WCO, the Indian Optometric Association, and several teaching institutions supported Dr. Cullen during a Senior Fellowship in India.

Table 1
Addresses of Schools of Optometry in India

Name of course = Bachelor in Optometry
Institute = Elite School of Optometry, Medical Research Foundation
8 G.S.T. road, St. Thomas Mount, Chennai 600 016. INDIA.
Duration of course = 4 years (42 months)
Contact person = Dr. Srinivasan, Principal
Email = jothibalaji_j@yahoo.co.in, elite@eth.net
Web Page: http://www.sankaranethralaya.org/ elite.htm

Name of course = B.Sc. Hons. Ophthal. Tech. Course
Institute = Dr. R.P. Centre for Ophthalmic Sciences
All India Institute of Medical Sciences,
Ansari Nagar, New Delhi 110029, INDIA.
Duration = 3 years (36 months)
Contact Person = Mrs. Monica Choudhury
Email mcaiims@yahoo.com & mcaiims@rediffmailcom
Web Page: http://www.aiims.ac.in

Name of course = Bachelor of Clinical Optometry course
Institute = Bharati Vidyapeeth School of Optometry
Bharati Vidyapeeth Deemed University Medical College
Katraj Dhankwadi, Pune 411043.
Duration = 4 years (42 months)
Contact person = Amod S Gogate
Email amodgogate@vsnl.com

Name of the course = Bachelor in Optometry
Institute = Hirabai Haridas Khimji College of Optometry
Ramwadi Free Eye Hospital, Ramwadi, Kalbadevi
Mumbai, 400 002 India
Phone: (022) - 207-8556
Duration = 4 years (42 months)
Contact Person = Mrs. Prema Chande/Mr. Naval P. Baliwalla
Email: enquiry@optomeyeinstitute.com
Web Page: http://www.optomeyeinstitute.com/

Name of course = Diploma in Ophthalmic Techniques
Institute = SNDT University's PVP School of Optometry
Ophthalmic Technology Dept. Sir Vithaldas Vidyavihar,
Juhu Road, Santacrutz (West), Mumbai- 400 049.
Duration = 3 years (30 months)
Contact Person = Mrs. Kavita Mittal
Email pvpelex@vsnl.com

Name of course = Bachelor in Optometry
Institute = B&L School of Optometry,
L.V.Prasad Eye Institute,
Banjara hills, Hyderabad, INDIA.
Duration of course = 4 years (42 months)
Contact person = Mr. Vallam Srinisvas Rao
Email = vallam@operamail.com
Web Page: http://www.lvpeye.stph.net/optschool.html

Name of course = Bachelor in Applied Optometry course
Institute Jnana Prabhodhini's School of Optometry & University of Pune
School of Basic Medical Sciences, C/o Dept of Physics,
University of Pune, Ganeshkhind, Pune 411007.
x
Contact Person = Dr. P.B. Vidyasagar, Director,
Email pbv@physics.unipune.ernet.in

Name of the course = Diploma in Optometry
Institute = MEH School of Optometry,
Mumbai Muncipal Corporation's Kamathipura Eye Hospital,
Kamathipura, Mumbai.
Duration 3 years (30 months)
Contact Person = Ms. Thanuja (C.S.) Panicker
Email tanya_optom@hotmail.com

Name of Course = Diploma in Optometry
Institute = Academy of Optometry,
118/D, A.J.Ch. Bose Road, Calcutta-700 014
Duration = 2 years (?)
Contact Person = Sonjoy M. Bose
Email sonjoy_bose@hotmail.com

Name of course = B.S.Optometry
Institute = AIIOS, All India Institute of Optometrical Sciences,
14/3A, Gariahat Road, Calcutta - 700 019 INDIA
Duration of course = 4 years (40 months)
Contact person = The Principal
Email aiios@hotmail.com

Name of course = Bachelor of Optometry course
Institute = College of Optometry & Ophthalmic Sciences
Bohora Park, Gangapur road, Nashik 422022 INDIA.
Duration of course = 4 years
Contact person = Sanjay Mundada, Program Director

Name of course = Diploma in Orthoptics & Diploma in Optometry
Institute = School of Orthoptics & Optometry
Sitapur Eye Hospital, Sitapur 261 001 INDIA.
Duration of course = 2 years (20 months)
Contact person = Dr. Jain / Dr. Anup Sinha
Email = renu@vitalmail.com

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optometrists in India. Some suggest that the number may be as high as 6,000 but many of these individuals lack credentials usually associated with the designation of *optometrist*.

There is an overproduction of Bachelor's degrees in many other disciplines. As a consequence, Pune University School of Basic Health Sciences has introduced a one and a half year course leading to a B.Sc. in Applied Optometry for holders of science degrees with no specific professional or vocational applications.

The critical situation in India has been recognised at many levels and the rapid development of new degree courses and at least one multi-entry-exit point program are evidence that at last steps are under way to address the critical manpower shortage. Regrettably the entering classes tend to be small with fewer than 300 new optometrists graduating each year. The majority of these optometrists immediately find employment in government, endowed hospitals or in the private sector. Some are recruited by multinational contact lens and ophthalmic companies, and a few

Table 1 (continued)
Addresses of Schools of Optometry in India.

Name of course = Diploma in Optometry
Institute = Sarojini Devi Eye Hospital &
Institute Of Ophthalmology, Hyderbad.
Duration of course = 20 months (2 years)
Contact person = Principal, School of Optometry

Name of course = Diploma in Optometry
Institute = JPMT's School of Optometry
510 Sadashiv peth, Pune 411030 INDIA
Duration = 2 and half years (30 months)
Contact Person = Dr. Mrs. Arati Palsule

Name of course = Diploma in Optometry course
Institute = School Of Optometry,
Gandhi Eye Hospital, Aligarh, U.P. INDIA
Duration = 24 months (2 years)
Contact person = Dr. P.P. Singh, Principal

Name of course = Diploma in Optometry
Institute = Mahatma Gandhi University School of Medical Education Little Flower Hospital Campus, Angamaly - 683 572 INDIA
Duration = 3 years (30 months)
Contact person = Dr.J.K.Mukkadan

Name of course = Diploma in Optometry
Institute = School of Optometry, Janakalyan Eye Hospital Educational & Research Institute
A-1040, Indira Nagar, Lucknow, INDIA
Duration of course = 2 years (22 months)
Contact person = Dr.J.P.Gupta, Director /Chairman

Name of course = Diploma in Optometry course
Institute = Jyoti College of Paramedical science & Hospital, Near Sood Dharm Kanta, Prem Nagar, Bareilly Rajasthan 5 INDIA
Duration of course = 2 years
Contact person = Gunjan Goyal, Office co-ordinator
Email jcms_bly@hotmail.com

Name of course = Post graduate Diploma in Optometry course
Institute = Lions Aravind Institute of Community Ophthalmology
72 Kurivikaran Salai, Opp. Aravind eye hospital,
Gandhi Nagar Madurai 625 020 INDIA
Duration = 2 years (20 months)
Contact person = Course co-ordinator, Health Management courses
Web Page: http://www.arvind.org.in/

find their way into postgraduate training in Australia, Europe, Canada and USA. India should aim for an annual graduating class of 2,500 in order to begin to remedy the crucial shortage of optometrists.

Indian Optometry has been the victim of a "divide and rule" policy and hopefully the attempts of the Indian Optometry Association and others to organize an Indian Council of Optometry embracing the various factions will be successful.

Optometry is not a state registered or licensed profession in India. However, Optometry achieved a landmark decision in September 2000, when the Uttar Pradesh State Government officially notified all of its departments that the designations in government hospitals of refractionist, orthoptist, ophthalmic assistant, ophthalmic technician be changed to "Optometrist." Previously optometrists were functioning under these titles. Unfortunately other states have not yet accepted this notification.

Although the Indian Optometric Association is keen to remedy this situation there are a number of obstacles, including a splintered profession, opposition both internal and external, and lack of numbers. But Optometry is not alone; Physiotherapy, Speech Pathology and Audiology are also unregulated. Dentistry was regulated in the 1950s and Pharmacy in the mid-1980s. Conversely, in 1999, the sale of chemical fertiliser and agricultural related items has been regulated and restricted to those with a B.Sc. in Agriculture!

The recently formed Rehabilitation Council of India (RCI) is attempting to regulate 16 or 17 different health related occupations by introducing compulsory registration, by trying to standardize education and by developing codes of ethics. Informal meetings between optometry and the RCI have taken place, but the Indian Optometric Association feels that Optometry should have a separate council.

Recognition of optometry as a state regulated primary health care profession is needed to protect the public from unqualified practitioners. It would secondarily be helpful in recruiting suitably qualified candidates to the educational programs. As happened in Dentistry, it will be necessary to include those with limited formal education who are qualified by experience on the initial register(s). Upgrading courses for "opticians" have already started in some institutions.

The unmet need for optometrists in India is enormous by whichever formula is used. This has resulted in too many of the probably adequate number (10,000) of ophthalmologists spending their time practicing primary eye care. The current intake in the schools is inadequate to resolve this problem. To some extent the private institutions are producing sufficient new graduates for their own needs. We recommend that:

a. the existing Schools increase their entering "batch" as soon as resources permit, and
b. additional new Schools be developed in both state and deemed (government approved) universities with existing health care discipline programs.

In the last four years in India, five new institutions have started university

level programs in Optometry. Not all of the optometry teachers within these institutions have university qualifications. These teachers are interested in upgrading their professional education and in continuing to contribute to optometric education. In order to upgrade these educators, postgraduate optometry teachers are required. Unfortunately very few are available in India.

There is considerable interest among optometry students and recent graduates in pursuing postgraduate studies at foreign universities. This interest includes completing the requirements for practice, clinical fellowships and Master's/Doctoral degrees. A relatively large number of graduates from one of the established programs have followed this route; unfortunately too few of them have returned to assist in the development of optometric education in India.

Excellent postgraduate programs are available in India in basic science and clinical disciplines related to optometry (e.g. physics, ophthalmology, neuroscience, pathology, anatomy, pharmacology, public health). Thus far, only a few optometrists have taken advantage of these opportunities. Clinical fellowships in optometry have been introduced at some of the internationally renowned eye institutes (e.g. L.V. Prasad Eye Institute in Hyderabad) and are popular with graduates from other institutions. When a suitable cadre of educators with postgraduate credentials exists, then more specific optometry and vision science oriented postgraduate programs may be developed in the University related institutions.

Until India has enhanced its educational system to produce an adequate number of optometrists, and until the profession is licensed at the highest scope of primary care practice, the economic and societal difficulties induced by preventable and avoidable blindness will not be significantly reduced or alleviated.

Footnotes

a. According to the World Council of Optometry concept of optometry statement found in its membership brochure, "Optometry is a healthcare profession that is autonomous, educated and regulated (licenses/registered), and optometrists are the primary healthcare practitioners of the eye and visual system who provide comprehensive eye and vision care, which includes refraction and dispensing, detection/diagnosis and management of disease in the eye, and the rehabilitation of conditions of the visual system."

ASCO Meetings Calendar

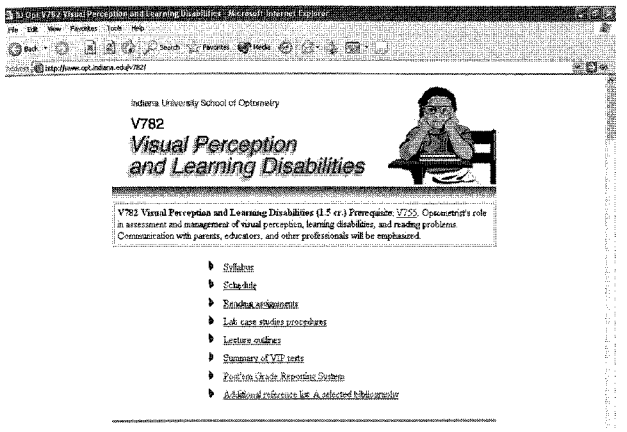
ASCO Clinic Directors & Administrators SIG
October 3-6, 2002
Portland Marriott Downtown
Portland, Oregon
Contact: Dr. Carole Timpone (PUCO)

ASCO Student Affairs Committee Meeting
January 8 and 10, 2003
University Hilton
Houston, Texas
Contact: Ms. Joan Anson (ASCO)

ASCO Student Affairs Officers Meeting and Workshop
January 9, 2003
University Hilton
Houston, Texas
Contact: Ms. Joan Anson (ASCO)

See ASCO's website — http://www.opted.org — For the most up-to-date information on ASCO meetings.

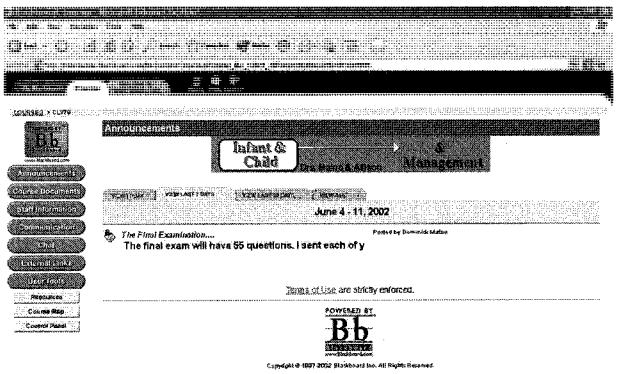
(Continued from page 102)



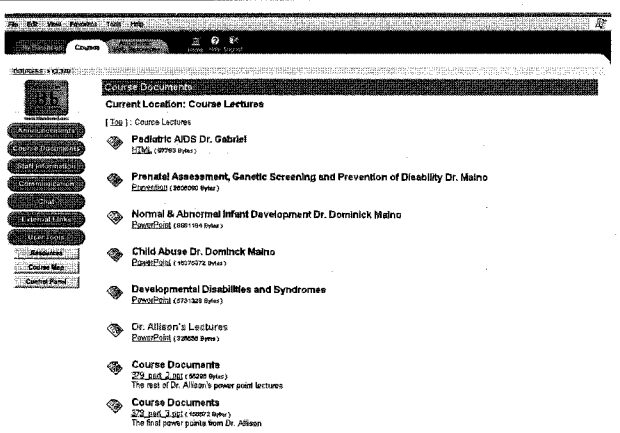
The Vision and Perception course is also web-enhanced at IU.

After searching PubMed (http://www.ncbi.nih.gov/entrez/query.fcgi), I found no articles by optometric educators concerning this topic that were published during the past year or two. A recent issue of the *Journal of Indiana Optometry* (Spring 2002) featured an article by Dr. Bill Rainey at the Indiana University School of Optometry concerning Internet enhanced optometric education. He says that using a web-enhanced course for his third year Basic Vision Therapy educational offering has had a major impact not only on the 3rd year class, but also as a readily available review for the 4th year during their clinical Pediatric/BV experiences and as part of the training given an international audience as well.

I have utilized the web to enhance the courses I have taught during the past two years (see photographs)...and yes, I am also trying to research and publish outcome measures from these courses. Are you providing web-enhanced courses for your students? If you are, let me know, so I can share your experiences with the optometric academic community in the next ASCOTech column. Contact me today at dmaino@ico.edu with your "success stories" (even your not so successful stories are welcome) when using web-enhanced optometric education.

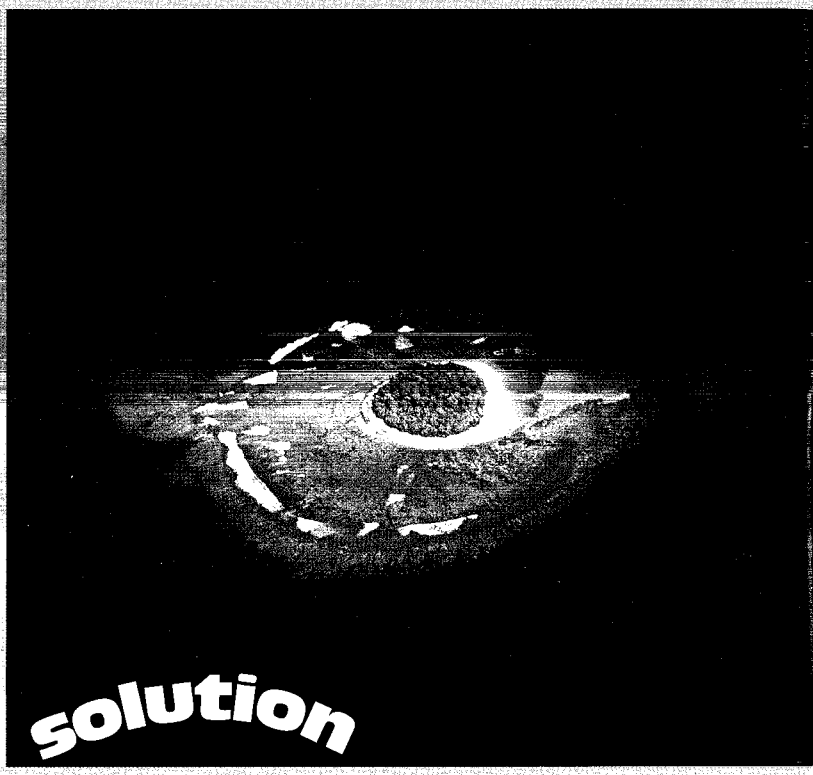


ICO's web-enhanced Infant and Child Development and Management course homepage (Drs. Maino & Allison)



All course lectures, handouts and other materials are available online for students to review prior to any lectures and laboratories for ICO's Infant and Child Development and Management course

Dr. Maino is a professor, Pediatrics/Binocular Vision Service, at the Illinois College of Optometry/Illinois Eye Institute.



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