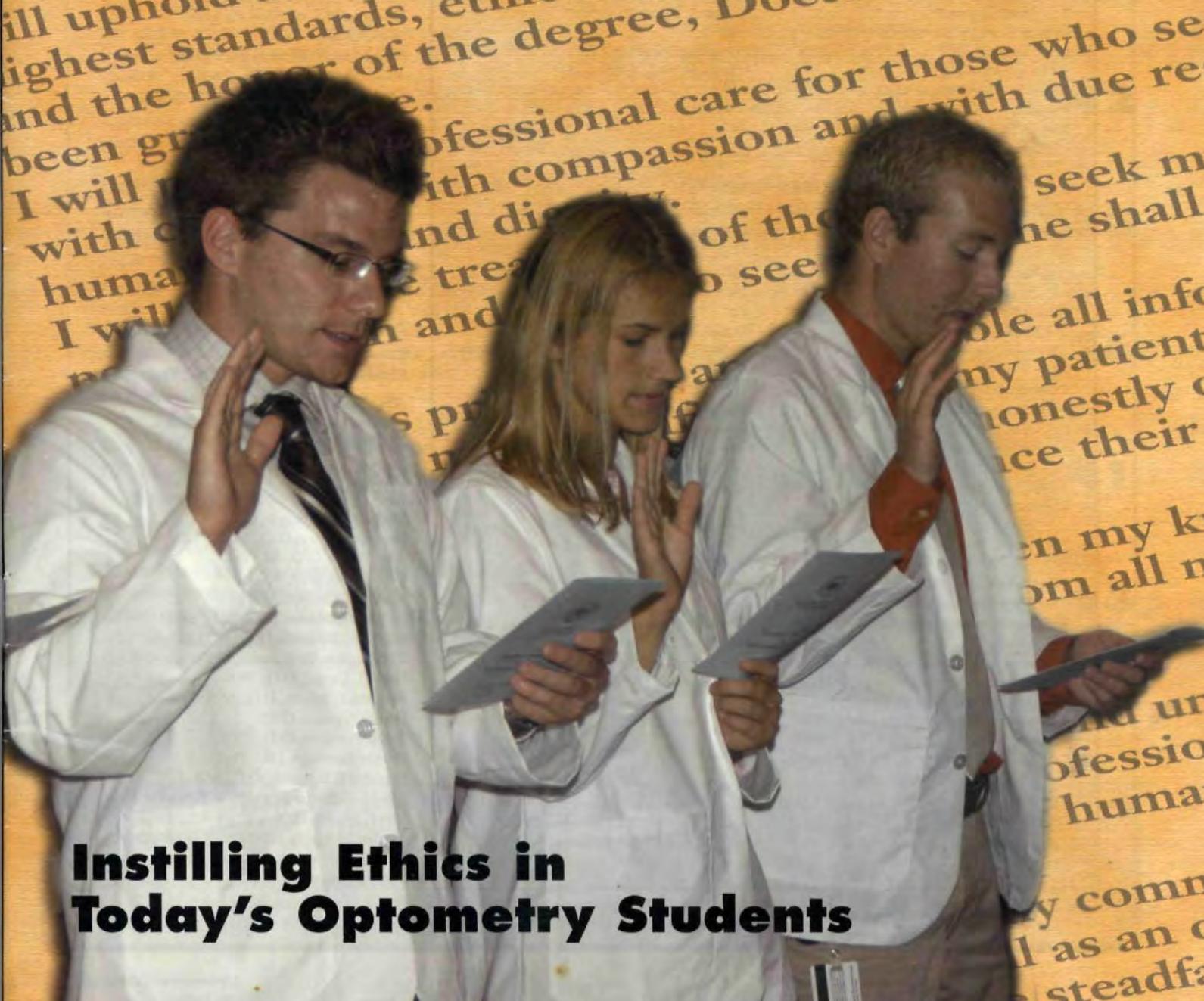


# OPTOMETRIC EDUCATION

Volume 32, Number 2

Winter 2007



**Instilling Ethics in  
Today's Optometry Students**

# Association of Schools and Colleges of Optometry

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

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# EDITORIAL

## Developing and Implementing an Educational Research Agenda

Elizabeth Hoppe, O.D., M.P.H., Dr. P.H., F.A.A.O.

**T**he new year often brings a sense of renewal, and may encourage a renewed sense of commitment to our careers in optometric education. For many of you, it may be a time to reinvigorate your commitment to educational research, a key area of professional and personal development. As a first step, it is critical to align your agenda for educational research within the context of your institution's mission. Prior to pursuing your research path, work to ensure that your institution both *values* and *rewards* educational research.

From an administrative perspective, educational research is *valued* by the institution when grant money is brought in to support it. The institution particularly values external grant funding that comes with support for indirect expenses. Unfortunately, many of the funding sources for educational research may allow for limited, or no, indirect costs in grant awards. The same is often true for personnel costs.

Government funding for educational research has dramatically decreased in recent years. In 2000 the Fund for the Improvement of Post Secondary Education (FIPSE) had appropriations of \$27,665,000 compared with 2005 in which \$11,869,000 was appropriated.<sup>1</sup> In fact, in 2005, FIPSE did not fund any projects and cancelled the grant competition. The year 2006 saw an increase to \$17,100,000<sup>2</sup> and it is

expected that funding in 2007 will be frozen at last year's levels.<sup>3</sup>

Many educational researchers have turned to private foundations to fill the funding gap. An internet search can identify possible funding sources quickly, but the real likelihood of attaining funds is uncertain. As mentioned previously, many private foundations may not include support for indirect costs and may not allow for personnel costs. Educational researchers may find that they need to seek funding for another project, such as one oriented towards patient care, access, or diversity, and then gain the opportunity for educational research as an "add-on" component or as one of the outcome measures designed to assess the benefits of the funded program.

Private foundations may be more likely to fund cross-disciplinary or collaborative research designed to improve communications between different health care professions. Educational researchers may also have better success by forming partnerships with community-based non-profits. "Town and gown" projects may have more appeal to funders, and by working with a community organization you may be eligible to apply for other types of grants. Once again, the educational research component may be an "extra" added on to the overall project plan.

Educational researchers may also find an alternative funding source

through professional associations. I have been the recipient of small grants from the American Public Health Association and the Association of Schools and Colleges of Optometry. Check with your state professional associations and even professional associations from other disciplines to see if funding might be available.

Another way an institution can gain value from educational research is when the research results in a specific benefit to the program. For example, an educational research project may result in improved retention rates, which in turn can enhance an institution's reputation and ultimately may also result in more revenue from tuition dollars. Educational research may result in better board scores and improved licensure rates, which in turn may result in a higher caliber applicant pool and better student satisfaction.

Institutions also value educational research that can be used in the context of reaccreditation. Both professional and regional accrediting bodies have become much more sophisticated in their assessment of educational outcomes. Research that can be used in the preparation of self-study materials, and that documents educational outcomes or program responsiveness to changes, is very valuable to institutions.

As you structure your own educational research agenda, you may want to clearly delineate the potential benefits to your institution to

underscore *why* administrative support makes sense, and why the institution *should* value your research. Even when your primary research question relates more to validation of an educational theory or when your research is designed to provide a descriptive rather than predictive model, identifying ways in which your institution can benefit makes sense. Take the opportunity to add secondary questions, or to identify ways in which the results of your research can translate into educational practice.

From a faculty perspective, reward comes in the form of merit recognition, promotion, and tenure. Each of these may or may not come with a financial reward, but all come with prestige and acknowledgement of a job well done. Make sure that the time you spend pursuing educational research is recognized by your institution as a worthwhile endeavor. In some cases, educational research will already be recognized by the institution. Check the faculty handbook and the policies and procedures manuals for merit, promotion and tenure. Make sure that educational research is included, and, if it is not, work within your faculty governance structure and through the appropriate committees to see that it is included.

Guidance is available to provide examples of types of educational research and suggestions on how educational research can be documented. Useful information can be found from many professional associations such as the American Educational Research Association, the American Council on Education, the Association of American Universities, and the American Association of University Professors. A literature search can also provide excellent examples of ways in which other institutions have grappled with key issues on how to recognize and reward educational research.

In an era of reduced funding, educational researchers will have to structure their agendas to maximize the benefits from each project. Defining a specific research focus and sticking with it for 3 to 5 years has benefits both for your research agenda, and for your academic career. Concentrating your work in one area makes each subsequent

review of the literature easier and faster, because you are now updating your knowledge base rather than creating it from scratch. A specific focus also helps a faculty member develop a reputation for expertise and makes it easier to demonstrate professional impact.

When you have a research concentration it also makes it easier for you to cite yourself and your previous work. Many institutions are now assessing the number and frequency of citations to evaluate research productivity. Journal impact factors may also play into rating the value of research. Citing yourself can only help!

Busy faculty often find that their research agendas are the first thing to suffer when they are balancing heavy teaching loads and/or long hours in clinical education. While there really is no substitute for the time you may need to put in above and beyond your allotted work-week, there are ways in which you can maximize the benefit from the long hours of work.

As you plan your educational research study, determine in advance which presentations and publications will result. You should set a goal of producing a minimum of three publications for each project. Professional presentations or posters (which may be listed as peer-reviewed published abstracts on your curriculum vitae) come first chronologically, but the real value comes when these are turned into manuscripts. The gold-standard for scholarly activity remains the peer-reviewed publication. Alternatives such as publication on line, or in e-journals have probably not caught up yet, but that may be changing soon.

Busy faculty definitely benefit from collaborating with each other, but may overlook another potential source of support, their students. Faculty who participate in graduate study programs, or have themselves worked in a research lab while pursuing doctoral studies, already know that student assistants can provide a very valuable source of labor. Faculty engaged in educational research may find that serving as a research advisor or a faculty mentor for student projects can be very stimulating for their research agen-

das. Providing students with ideas, research designs, and advice may result in collaborative publications, while also providing valuable experience for the students.

Alternatively, check with your institution to see if you can hire work-study students for research support. Students can be extremely helpful for inputting data or administering surveys or other measurement instruments.

So, now you are ready — where do you start? One of the best ways to start is by reading journal articles of a type similar to one you want to publish. Read articles that address a similar topic. Read articles that employ a similar methodology. Read articles from other health professions to learn what is happening in another field. And, don't forget to read *Optometric Education!* Take inspiration wherever you find it, but the most important thing is to get into action and jump in to your own educational research agenda!

1. Funding Status - Fund for the Improvement of Post Secondary Education, <http://www.ed.gov/programs/fipsecomp/funding.html>; accessed on January 18, 2007.
2. Awards - Fund for the Improvement of Post Secondary Education, <http://www.ed.gov/programs/fipsecomp/awards.html>; accessed on January 18, 2007.
3. The Chronicle of Higher Education, January 5, 2007.

*This editorial is modified from a presentation at the Health Professions Educational Research Symposium at Nova Southeastern University.*

## Optometry Students

CREATIVE THINKERS IDENTIFY THE MOST IMPORTANT ISSUES FACING OPTOMETRY STUDENTS TODAY AND DISCUSS HOW THOSE ISSUES WILL CHANGE OVER THE NEXT 20 YEARS.....

**O**ne issue of significance is student debt and how it will impact graduates on their mode of practice. The good news is that almost all optometry graduates are practicing and paying off their student debt which for many now exceeds \$100,000. However, for students with significant debt, how much does it impact their choice of practice modality? How many graduates who wish to own and operate their own practice choose to do that with over \$100,000 in student loans?

*The most important issue facing our optometry students today is learning 'how to learn' - to best integrate all of the knowledge and skills they will need as entry-level optometrists and beyond.*

*What will change over the next 20 years (and sooner) is the method of delivery of optometric education. Today's technologically savvy, multimedia-raised, multi-tasking millennials have already forced changes in the lecture format from carousel slides to powerpoint to videos. As millennial professors replace retiring baby boomers in the classroom and clinic, they will teach in their own preferred learning and teaching styles. One can only imagine the changes the post-millennial generation will demand of their millennial teachers and preceptors. Educators, get ready - change is coming!*

*Barbara McGinley, M. A., Director of Student Services, New England College of Optometry*

Another trend impacting current and future graduates is the saturation of optometrists in major U.S. cities. Are graduates interested or willing to practice in smaller towns even if there are great opportunities there? Although many students enter optometry school from small towns, most schools are in large cities. After living in a metropolitan area for four years, how many students want to live in a small town? I believe there are wonderful practice opportunities in some of the smaller towns across the country. With a collaborative discussion among the optometry schools, AOA and AOSA, future graduates might have better insight before making their practice decisions.

Joe Hauser  
Vice President for Student Services  
Southern College of Optometry

**Quantitative data (e.g. OAT, GPA) reveal that typical optometry students today have excellent academic preparation. In spite of this, an increasing number of students are having difficulty keeping up with the demands of the optometric curriculum. In some cases, apparently minor extenuating circumstances are sufficient to precipitate an academic collapse. Currently there is no way to predict which students will encounter difficulty. Can at-risk students be identified and the underlying problems rectified? Does the solution lie in improving time management, learning better study skills, enhancing critical thinking, or a composite approach?**

Lewis Reich, O.D., Ph.D., F.A.A.O.  
Assistant Dean for Student Affairs  
College of Optometry, Nova Southeastern University

## The most important issues facing students today are:

- o increasing costs of education
- o changes in the national board exams
- o uncertainty of beginning a practice

Lanny Shulman, O.D., Ph.D.  
Assistant Dean, Student Affairs  
and Admissions  
University of Houston, College of  
Optometry

### Two UH students that Dr. Shulman consulted with added:

**For me, the biggest issue is learning all the "business" aspects of optometry. How to file for insurance, how to manage staff, how to best run an office, etc.**

Marcia Moore, Conroe, Texas -- Class of 2008

**The issues you mentioned are definitely the most pressing concerns I have. Specifically, since our class is going to be the first group to be tested using the new [National Board] format, I feel we are disadvantaged somewhat since we do not have old material to study from, nor can we ask our mentors for advice.**

**Residency placement may be a concern for some students. With the class sizes and general competitiveness of students increasing over the years, will those interested in residency be able to attain the residency position of choice, or even one at all?**

Michael Chu, Calgary, Alberta, Canada -- Class of 2010

OPTOMETRY STUDENTS TODAY ARE FACING SOME OF THE SAME ISSUES THAT STUDENTS HAVE FACED OVER THE LAST 20 OR 30 YEARS — THE RELATIVELY HIGH COST OF EDUCATION, THE IMPACT OF STUDENT DEBT ON THEIR FUTURE AND HOW THEY WILL BE WELCOMED INTO THE PROFESSION UPON GRADUATION. • STUDENTS TODAY KNOW THAT EDUCATION IS EXPENSIVE, ESPECIALLY AT THE PROFESSIONAL LEVEL WHERE SO MUCH OF THE PROGRAM IS DEPENDENT UPON SMALL GROUP AND EVEN INDIVIDUAL ONE-ON-ONE TEACHING ENCOUNTERS. • THEY ALSO UNDERSTAND THAT PREVIOUS GENERATIONS OF OPTOMETRISTS HAVE BEEN VERY SUCCESSFUL AND HAVE REPAID THEIR STUDENT DEBTS. •

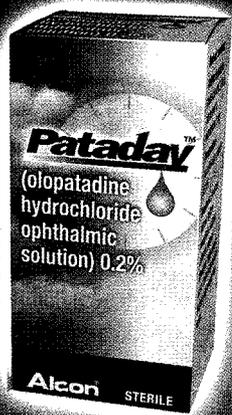
A NEWER CONCERN TO THE STUDENTS TODAY IS HOW THEY WILL SPEND THEIR FUTURE. • WILL THEY ACTUALLY BE ABLE TO HAVE A CAREER AS AN INDEPENDENT OPTOMETRIST OR WILL THEIR ONLY OPPORTUNITY BE A JOB IN AN AIR-CONDITIONED BOX IN A SUPER STORE FOR EIGHT HOURS A DAY PERFORMING 15 MINUTE EXAMS IN ORDER TO SELL THREE PAIRS OF LOW QUALITY GLASSES FOR \$99? • THEY ARE CONCERNED ABOUT WHAT THE PROFESSION OF OPTOMETRY, BOTH ON THE NATIONAL AND STATE ORGANIZATIONAL LEVELS AS WELL AS INDIVIDUAL PRACTITIONERS, IS DOING TO PROVIDE NEW GRADUATES WITH OPPORTUNITIES FOR A CAREER AND NOT JUST A JOB. • AS FAR AS THE FUTURE, THE COST OF EDUCATION AND STUDENT DEBT WILL PROBABLY STILL BE CONCERNS BUT THE BIGGER CONCERN WILL BE WHETHER OPTOMETRY HAS GONE THE WAY OF PHARMACY AND BEEN RELEGATED TO DISPENSING SERVICE IN A STORE AND NO LONGER A PRIVATE INDEPENDENT PRACTICE.

LORRAINE VOORHEES, O.D., M.S.  
VICE PRESIDENT OF STUDENT AFFAIRS  
SOUTHERN CALIFORNIA COLLEGE OF OPTOMETRY

## Think Tank . . .

- The cost of optometric education will only continue to increase, constituting an ever-more-challenging debt load for our graduates.
- Keeping pace with the ever-expanding scope of practice and the introduction into the optometry curriculum of invasive procedures including injections and minor surgical procedures will pose an ongoing challenge to optometry students, particularly those who were initially attracted to the field because it was non-invasive.

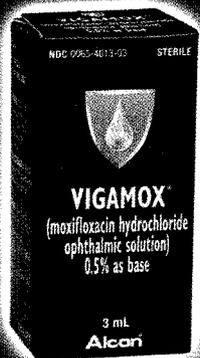
Sally Haltom, M.A. • Director of Student Affairs • College of Optometry • Ohio State University



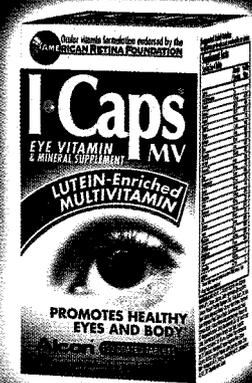
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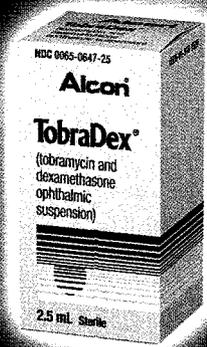


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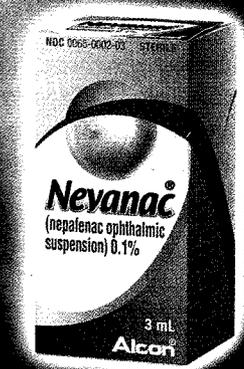


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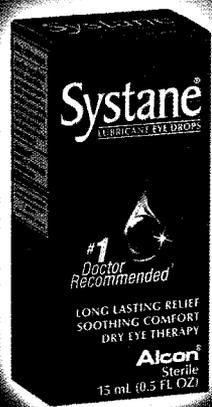
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**CIBA Vision, a Novartis Company**

CIBA Vision has established a new Customer Development Group to meet the evolving needs of an increasing and diverse global customer base, including eye care professionals (ECPs), retailers and distributors. Karen Gough, previously president, Americas Region, has been appointed as Chief Customer Officer (CCO) to lead the new customer Development Group at CIBA Vision. The Customer Development Team will build and implement

strategies and programs with a focus on professional and practice development for ECPs, e-Commerce development and making it easier and more efficient for customers to do business with CIBA Vision.

"We see ECPs, students, retailers and distributors as our critical partners in ensuring the continued eye health of contact lens wearers around the world," said Michael Kehoe, CEO of CIBA Vision. "To that end, we intend to increase our partnership with customers, so that we can work together to continually increase the standard of care that we offer consumers. That will be the charter of our customer Development Group working with our associates around the world."

Dr. Richard Weisbarth joins the team as vice president, global head of professional development and partnerships. At CIBA Vision, he served in several different positions in clinical research and professional services, most recently as vice president, North America Professional Services.

**HOYA Vision Care**

HOYA Vision Care is offering 3rd and 4th year students a \$1000 grant program and an opportunity to qualify for a \$6000 Scholarship. To be considered, students will submit a patient case study involving HOYA products. There will be one winner at each school and each winner will receive \$1000. The winning case studies will then be reviewed by HOYA's ECP Advisory Panel and an overall winner chosen. This student will receive an additional \$6,000 scholarship.

Judging will be based on originality, application of technology involved, product knowledge and overall analysis and composition. The written case study report must be submitted to the faculty judge, designated at each school, by **April 1, 2007**. The grant winners from each school will be announced on June 1, 2007. The 19 winners will be invited to the AOA meeting in Boston June 27 - July 1, 2007. Hoya will pick up their airfare and hotel room for the meeting. The scholarship winner will

probably be announced during the reception for the opening of the Exhibit Hall. The grant and scholarship winners will receive their awards at the meeting.

The one winner from each school policy assumes at least one submission from each school. All grants and the scholarship will be awarded. Please submit a winner and a runner-up. The runner up names will be put into a drawing for any unclaimed grants. If for some reason HOYA does not receive a qualified submission from a school, HOYA reserves the right to award the grant to a qualified student from one of the other schools via the runner-up pool. HOYA Vision Care North America is sponsoring the program for the 17 Optometry Schools in the United States and Puerto Rico. HOYA Vision Care Canada is sponsoring the program for the two optometry schools in Canada.

**Volk Optical**

Volk continues to provide the best quality and value in patented double aspheric optics. Building on the quality and popularity of the recently launched Digital Series slit lamp lenses are two new Binocular Indirect Ophthalmoscopy (BIO) lenses that deliver the highest resolution imaging with the Binocular Indirect headset. With advanced glass technologies and designs, these 'Clear' (higher resolution) lenses use high index glass, and deliver superior image quality and clarity compared to traditional BIO lenses across the diagnostic spectrum, with wide field and high magnification views.

The two new lenses are named the Digital ClearField, for mid and far peripheral retinal viewing and the Digital ClearMag for detailed optic disc and posterior pole examination. The superior imaging and comprehensive views they deliver help to reduce overall examination time. Remember to personalize your own lenses with color ring options and

(Continued on page 54)



# My Best Day in Optometric Education — Inspiration Often Comes from the Most Unexpected Places

Renée Mika, O.D., F.A.A.O.



I spent three years in private practice before completing a post-doctoral fellowship and joining a university faculty. When invited to write this article, I immediately thought of my worst day, my first day in the academy. I had only prepared thirty succinct powerpoint slides for a two-hour lecture. Not even close . . . My thoughts turned dark, to the obsessive and compulsive character of Melvin Udall\*, stalking me and molesting my students by uttering...

**"What if this is as good as it gets?"**

That was a painful lesson — those thirty skimpy slides — that has fueled fanatical preparation for every lecture since. Fortunately,

having survived my worst day, I have had many far better days. My best days, however, are not defined by formal accomplishments that add to the vitae or put plaques on the wall. They have little to do with developing community-based clinics, fellowships, research, grants, or publications.

These fortunate outcomes define some *good* days. However, my *best* days seem to originate from the most unexpected places and events.

One such episode involved a student who came dangerously close to failing a clinic while under my supervision. He had wasted an entire semester seeming to hate me, apparently. I wasn't sure why, and maybe he didn't know either. To make matters worse, this occurred during my first year of teaching, before I learned to take some student evaluations with the proverbial grain of salt.

In a lovely touch of irony - or maybe it was Melvin Udall interfering again - this student and I were assigned to another clinic together, *again*, the following semester. I was not very hopeful. We did not have a good track record, he and I. But to my surprise, he began the semester performing reasonably well. Within a couple of weeks, however, he had dismissed an important clinic assignment. I confronted him immediately. Afterwards, I followed up with a letter summarizing a number of specific concerns and included suggestions of how he might remediate his sub-par performance. While he never acknowl-

edged receiving my letter, I was aware his performance changed and noticeably improved over the remainder of the semester.

A year later and a week before graduation, he came knocking at my office door. After some uncomfortable small talk, he quietly (very quietly) thanked me for holding him accountable, and for not ignoring and dismissing him. I was dumbfounded. This whole event had crystallized into a critical learning moment for me, an inspiration that continues to motivate me to become a better teacher.

I define my best days as the daily routine of building relationships with students, colleagues, and patients. Often unrecognized or rewarded, they are the very private moments we probably talk about the least. But they are experiences shared by all educators, simply because we care about people.

If Melvin Udall walked past my classroom door today, I would assure him that the worst days can only get better, and that inspiration often comes from the most unexpected places. He should take a seat, pay attention, and stop annoying the rest of us.

\*Played by Jack Nicholson in the 1997 classic, *As Good As it Gets*.

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# Using Reflective Journal Writing in Optometric Clinical Education

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## Abstract

To become competent clinicians, students must learn to self-evaluate and to acquire life-long learning skills. Journal writing has been reported in the health education literature as a tool that helps students acquire these skills. First year students at the New England College of Optometry were required to write journals reflecting on their screening experiences after each screening assignment. This report will present the authors' experiences with student journal writing along with excerpts from the students' journals, the students' perceptions of journal writing and the preceptors' perceptions about how journal writing enhanced student learning.

**Key words:** reflective journal writing, lifelong learning, active learning, self-evaluation, critical thinking, clinical teaching methods, professional development

Dr. Carlson is professor of optometry at New England College of Optometry. Drs. Chu, Denial and Lyons are associate professors of optometry at New England College of Optometry. This paper was presented as a poster at the Annual Meeting of the American Academy of Optometry in 2002.

## Introduction

The dedication to life-long learning and the ability to accurately self-evaluate are valuable skills for a clinician to ensure a career of providing the highest level of patient care. Optometry students must acquire these skills to become competent clinicians. Journal writing has been reported in the health education literature<sup>1-7</sup> as a tool that helps students develop these skills.

In its guide to alternative modes of teaching and learning, the University of Western Australia defines the student journal as "... a learning exercise in which students express in writing their understanding of, reflections on, response to or analysis of an event, experience or concept."<sup>8</sup> Callister reports that the process of writing journals helps students to develop their critical thinking.<sup>2</sup> Westberg and Jason write that "Reflection and self-assessment are fundamental to initiating appropriate self-directed learning and change. They deserve to be considered basic elements of professional development."<sup>1</sup> Journal writing is used at the University of Arkansas School of Medicine to encourage students to develop the ability to self-reflect, to analyze their knowledge and their ability to apply it to patient

care.<sup>3</sup> Niemi reports that journal writing helps medical students in their early preclinical years to deepen their learning, develop self-evaluation skills and establish their professional identity.<sup>4</sup> In a study done at the Australian Catholic University, Davies found that journal writing reduced anxiety in the clinical learning setting, increased student confidence, helped students accept responsibility for their own learning needs and placed the patient at the center of the clinical encounter.<sup>9</sup>

In 2000 - 2001, two of the authors (Carlson and Chu) ran a pilot program of journal writing with their second and third year clinical students. Because of the positive reactions from both the students and the preceptors in the pilot program, journal writing was introduced as a part of the first year clinical program for all students at the New England College of Optometry (NECO) in September of 2001.

This report will present the authors' experiences with the logistics of first year student journal writing and preceptor review of journals; the students' feedback on using journals as a learning tool; and the preceptors' perceptions about how journal writing enhanced student learning.

## Guidelines for Writing Screening Journals

The first year students at NECO participate in vision screenings of pre-school children within the first month of their matriculation at the College. For their first few screenings, they assist preceptors and fourth year students at screenings. When the students have successfully passed the midterm written examination and a proficiency examination in Principles and Practice of Optometry, they are granted privileges to perform all of the screening tests on their own under the supervision of the preceptor.

For the past five years, all of the first year students at NECO were required to write journals after each of their screening assignments. Journals were due to preceptors within seven days of each screening. Students were instructed to write their journals as soon as possible after each screening. As recommended by several authors<sup>2,3,4,15</sup> students were given specific instructions on how to write journal entries reflecting on their clinical experiences and summarizing their thoughts and feelings.

The students were told that the journals were an important tool for their learning and that their preceptors would read their journals, comment upon them and return the journals to them. Preceptors were told that they were expected to write comments and return the journals to their students within seven days of receiving them. Both students and preceptor accepted this assignment without complaints.

Students were given the following suggestions for the content of their journals:

- Describe the screening (date, place, type of screening, patient demographics)
- Summarize your impressions of your experiences (What went well? What surprised you? What did you learn? How did you feel about your ability to care for the patients? What do you need to work on to improve?)
- Did you encounter any difficulties with communication? Did the patients understand your questions/instructions?
- Were you able to put the patients at ease?
- Did you encounter an interesting patient? A difficult or uncooperative patient? How did you or the preceptor handle it? Did it work?
- What did you learn during this screening? What goals will you set for yourself for your next screening and/or for next term?
- What questions do you have for your preceptor now that you have had time to reflect on your screening experience?

To expedite the process of students writing and preceptors reviewing and returning journals, students were instructed to send their journals via the College's email system as a Microsoft Word attachment. Preceptors were told to use the "Track Changes" feature of Microsoft Word to write their comments on each journal and to then return that document to the student. Students were told that their journals should be written in text form with 1-inch margins on the top, bottom, left and right and should be 300 to 1000 words, using 12-point type, double-spaced. Students were also instructed to keep their returned journals in a notebook with their other important clinical information (e.g., clinical schedules, privileging letters, patient logs, etc.) At the end of each term, students were told to review their journals and use them to write a summary of

their clinical progress for the term along with their goals for the next term.

## How Journals Help Students

A list of some of the ways journals are helpful to students is included in Table 1.

**Table 1**  
**How Journal Writing Helps Students**

Fosters active participation in learning
Establishes a pattern of self-reflection
Provides feedback from preceptors on the students' strengths and weaknesses
Helps student to develop accurate self-evaluation and self-correction
Allows students an opportunity to ask their preceptors questions
Provides a risk-free environment for learning

It is critical for optometry students to make the transition from being a passive student in a lecture hall to being an active participant in their own learning as a clinical student. Students must learn to self-evaluate, self-correct and continue to learn throughout their careers as their profession changes. When students spend time thinking about the work they have done and then documenting it in a written journal, they are able to connect abstract concepts to the critical thinking that is so necessary in clinical care. Students need the reflective thinking experience about their clinical encounters to promote self-awareness.<sup>10</sup>

The journaling process also helps students to share their clinical experiences with each other.<sup>11</sup> The openness of journal writing fosters conversation among students. It helps to focus students about the important issues in caring for patients and they begin to want to talk about their experiences with others.

Below are some excerpts from student journals illustrating their active participation in learning:

"The biggest thing that I learned was the importance of being observant. While practicing on our fellow students, it can be too easy to not observe well because we are confident that they know how to be 'good patients' and do the tests

correctly. But when working with three-year-old children, it is a whole different ballgame."

"I have realized that I have a problem with disciplining the children. Looking back, I see that my skills are progressing, and each time I go on a screening I become aware of another aspect where I can use some improvement. I am becoming more confident in my techniques. Now that I have pinpointed a problem, I hope to be firm in disciplining the children if they do not behave in the future."

Early in the educational process, clinical teachers must teach, encourage and reinforce skills needed to self-reflect and accurately self-assess. Journaling helps to establish the skill and pattern of self-reflection.<sup>12</sup> The nurturing of these skills will help students to develop an internal mechanism, which will aid in their training and development of future life-long learning.

Below are some excerpts from student journals illustrating self-reflection:

"Additionally, I have come to the point of realization that I am no longer a technician but must start to think like a doctor."

"Perhaps the one overriding feeling that I came out of the screening with was one of responsibility. Lab practice cannot compare to performing an actual vision screening. I was immediately hit by the fact that this may be the given child's sole vision screening and if I am to miss a problem, it may be a while longer before the problem is noted, with the problem negatively impacting the child in the interim."

"I believe that there are still several areas that I would like to grow in. I would still like to refine and master better skills in ophthalmoscopy and retinoscopy. Although I feel it has continually gotten better, I would still like to improve on my flow, gaining in efficiency as well as accuracy."

"I feel more confident in myself. But, I realize that one can never be 100% confident as a doctor. The key is being confident enough in your ability so that you are able to acknowledge your capacities, as well as your limitations."

Journaling offers the student an opportunity for dialogue with his/her

preceptor in a risk-free situation. Both the student and the preceptor are removed from the actual time when the student was working with patients and both have had time to reflect on what was done and what it means. When students write about their concerns, their misconceptions and/or their mistakes, they give themselves another opportunity to learn aside from the actual screening itself. Preceptors and students become partners in the students' learning through the journal writing and review and the students begin the process of self-evaluation and correction.<sup>12</sup>

Below are some excerpts from students' journals with the comments made by their preceptors:

"During the screening, I had my moments of forgetfulness and clumsiness. My forgetfulness included forgetting to occlude the child's eye for the Lea Card test and not placing the Polaroid glasses on the child for the Random Dot E test.

*Preceptor's comment:* "Give yourself a break! This was the first time you tried these tests on 3-year olds. It will get better with more experience and with review and practice. Be sure to review techniques the night before a screening so that you know all the details."

"In cover test, which was my weakness, I have gotten much better in correcting the tropia or phoria and also in estimating the deviation. I have become more efficient in doing the test quickly and accurately."

*Preceptor's comment:* "Good job in identifying the progress you've made. Actually seeing a child with a large alternating esotropia like you did at this screening really helps to solidify your understanding."

"We were attending to 6th graders who were very well behaved and were the ideal patients to practice on."

*Preceptor's comment:* "We go to screenings to provide a service to patients, not to practice on them. If you need to practice, go to the PreClinic. Your patients would not like to think of themselves as opportunities for your practice - they expect that you know what you are doing. If you don't, then you have no right to participate at the screening."

"I misnamed a phoria a tropia, and visa versa. Figuring out if a tropia is alternating or constant is another learning issue of mine. I think that

a good way to overcome the problem is to have a mental checklist. If I can think of what each eye is doing and when, I believe I will be more successful in correctly labeling the problem."

*Preceptor's comment:* "Now is a good time for you to review your class notes and to re-read the section on cover test in *Clinical Procedures for Ocular Examination*. It should make more sense now that you have seen some patients with phorias and tropias than it did before. If you are still having difficulty, let me know and I will try to help you sort out the issues."

"Based on a couple of the children not immediately understanding what I requested of them, I realized just how basic and explicit the instructions need to be."

*Preceptor's comment:* "Three-year-old children just do not respond like your fellow optometry students, do they? You and your classmates can help each other out in lab by pretending to be a real patient who knows nothing rather than by trying to help each other get through the lab."

"The movement on cover test that I noticed was likely due to the child getting tired of fixating on the target and shifting his gaze a bit. This also accentuates the importance of performing the test accurately, but as quickly as possible, so as not to lose the attention of the child."

*Preceptor's comment:* "There is nothing like a three-year old to point out the obvious to an optometry student. Practice so that your skills are as automatic as possible and then you can spend your energy on communicating with the patient during the screening rather than having to remember what to do next."

The screening of young children can be a demanding experience and the screening setting is often not ideal. Often there are many children to be screened in a short period of time. Students often concentrate on communication, data collection and data analysis at screenings and rarely have time for the many questions that arise. Journaling gives the students the opportunity to reflect on the day and ask preceptors questions that they did not ask or even think about during the actual screening.<sup>13</sup>

Below are some examples of ques-

tions that students asked in their journals along with the preceptors' answers:

"I wonder about the follow-up for most of the children at our screenings."

*Preceptor's comment:* "It is part of my job to communicate with the school nurses about follow up care - how quickly it needs to be done, where the nearest neighborhood health center is located and how to make an appointment. The follow-up calls that I make after a screening also help. I will try to keep you informed about the specific children you have seen who were referred for further testing."

"I had no idea that a four-year old could have such an unusual refractive error. One of the kids I saw was +5.50 in one eye and +0.50 in the other eye. Where can I read more about anisometropia and amblyopia?"

*Preceptor's comment:* "The AOA Optometric Clinical Practice Guidelines on Hyperopia and on Amblyopia are a good start. There is also an excellent chapter on anisometropia by Douglas Penisten in *Refractive Care of Ametropia* by Kenneth E. Brookman. There are many case examples in the chapter. Let me know if you have more questions."

"When a kid is being uncooperative, what is the main test that we want to have done to know that he/she is not having any condition that would lead to amblyopia? I'm guessing it is retinoscopy to see if there is any refractive error or differences between the two eyes."

*Preceptor's comments:* "Retinoscopy is one key finding. The other would be cover test or Hirschberg test or the Bruckner test to look for strabismus. All of these tests have the advantage of being objective tests that require little cooperation and response from the patient. But, as you have seen, you have to work quickly."

In informal discussions most students reported that they initially were not sure about what to write but that their preceptors assured them that they would not be graded on the grammar or style and that they should follow the guidelines given at the beginning of the term. Students reported that the preceptors' comments were very helpful to them and that they were able to be more open with their preceptors when

they saw that the feedback on their journals was helpful to their learning. These observations are consistent with the literature on journal writing. Callister reports that students found that their journal entries became more open and reactive when they found that the feedback from their preceptors was helpful to their learning.<sup>2</sup> Fonty and Cahill surveyed their students asking them to compare journal writing to just writing care plans for patients and to describe how their journal writing had influenced their critical thinking about patient care throughout the semester. Students preferred journal writing rather than writing care plans specifically because of the thought process that journal writing required. Students in this study reported that journal writing helped them to improve their overall care of patients because of the changes in their thinking that occurred.<sup>5</sup> Davies found that students who had engaged in journal writing were more likely to put patients at the center of the clinical encounter than those who had not written journals.<sup>9</sup> Walker reported that students are more apt to write about their true concerns when they have developed trust in their preceptors.<sup>15</sup>

## How Journals Help Preceptors

The ways that journals can be helpful to preceptors as well as to students are listed in Table 2.

**Table 2**  
**How Journal Writing by Students Helps Preceptors**

Helps preceptors learn about students' understanding of concepts applied to patient care
Presents teachable moments that may not come up during patient care
Demonstrates the students' attitudes about their clinical experiences

Journals provide the faculty with insights about their students that they would not experience through supervising students at screenings. Screenings are often a very chaotic experience for everyone involved and taking care of the patients takes precedence over teaching the students at that moment. When the preceptors read what the students thought about their clinical experiences, they have additional opportunities to teach.<sup>12-14</sup>

Journals help preceptors learn about their students' attitudes towards patient care and learning, about the students' ability to communicate with patients, peers and preceptors and about how students are able to apply classroom learning to patient care.

Below are excerpts from students' journals with their preceptors' comments:

"My last patient even failed her screening, as she was unable to read the visual acuity chart with her left eye. In addition, she had unequal pupils on the Brückner test, indicating a potential strabismus."

*Preceptor's comment:* "You must mean unequal reflexes on the Brückner test; this can be due to unequal refractive error as well as due to strabismus."

"Upon performing retinoscopy, I found -2.50 D OU. After I checked this once more, I held up my retinoscopy rack with the -2.50 over the child's eyes and he exclaimed, 'I can see!!!' and proceeded to read the 20/20 line without mistakes. It was the best part of the day for me, knowing that I had made a difference."

*Preceptor's comment:* "What a wonderful experience this was for you! I talked to the school nurse about this child and she will follow up with the parents to be sure that the child has a complete exam so he can have the prescription filled."

Journals offer the preceptor teachable moments even after the clinical encounter has been completed. Sometimes when a student has had a chance to think over the screening experience his/her understanding is incomplete and the preceptor can help the student to further his understanding.

Below are some excerpts from journals to illustrate this:

"Most importantly, in these kind of cases where there is a possibility of kids to develop amblyopia, it is necessary that their parents are told about the seriousness of the problem. We also learned that kids that do not wear glasses and they really should be wearing them, can lead to underdevelopment of the visual cortex for one eye and thus, those children might have a serious visual problem in the future."

*Preceptor's comment:* "You have defined refractive amblyopia here.

It can be present in one or both eyes. You should do some reading to gain a better understanding of amblyopia. I suggest the *AOA Clinical Guideline on Amblyopia* as a good place to start."

"I feel that my communication skills have improved in dealing with the children and building a rapport with them and I also feel that I have become more confident in performing the tests now that I have had exposure to more than one screening."

*Preceptor's comment:* "Even though there weren't any significant optometric findings at this screening, you were able to point out some key areas of communication in establishing a doctor-patient relationship."

Students' attitudes, both positive and negative, are often revealed in their journal writing as illustrated in the journal excerpts below:

"As a whole it was a valuable experience. I saw how my preparation in lab will only take me so far, and that practical experience is what will make me into a proficient optometrist."

*Preceptor's comments:* "Good observation."

"I learned another invaluable secret to working with little boys: talk about video games! As soon as I mentioned X-box, his face lit up. All of a sudden he was transformed into a talkative, friendly kid with tons of advice for me on what games to buy and why."

*Preceptor's comment:* "That's great! The most important aspect of the encounter, though, was the empathy that you displayed and that you took steps to make the patient comfortable. In the long run, it probably assisted the whole process of obtaining valid data."

"The chief idea I will take away from this experience is [that] I would not practice in a pediatric or underprivileged setting. I agree it is good to give back to the community, but I honestly do not feel on a day-to-day basis it would be rewarding enough for me."

*Preceptor comment:* "It is early in your education to have made this decision. Over the next four years, you will see a lot of underprivileged patients. I hope you can become more comfortable in these situa-

tions and begin to feel some of the rewards from giving back to the community. Let me know if you would like to discuss this further."

"I had the privilege of meeting children who spoke Russian, Armenian, French, Romanian, Spanish, and much more. Screening children from various backgrounds not only helped me appreciate the diversity of Boston but also expanded my clinical experience to patients of other backgrounds."

*Preceptor's comment:* "You will see lots of patients from different backgrounds over the next four years. I am happy to hear your positive attitude towards that. It will serve you well as a clinician."

"I truly learned the most during these screenings. I learned how practicing on each other during first year doesn't really prepare you for the real world of patients, who have anomalies, can't fixate, don't understand tests, etc."

*Preceptor's comment:* "This is an excellent lesson to have learned early in your career. It will help you to remember that your focus must always be on the individual patient."

"I cannot for the life of me figure out why a screening device would need to check binocular acuity anyway, but such is life."

*Preceptor's comment:* "Then why didn't you ask? There is a reason for the design of such an instrument, but you took such a negative view of what you were doing, you couldn't see that this may have been an opportunity to learn something. You are the one who lost."

Preceptors can gain insights into their students' understanding of basic concepts from reading their journals. There is not always time for this to occur during clinical practice since the focus must be on the patient during the clinical encounter. Below are some journal excerpts to illustrate this:

"For one child, I obtained a -2.00 sph on retinoscopy and 20/50 on VA. I expected to observe -1.00 sph; this could be due to the fact that the child was squinting while I was testing his VA."

*Preceptor comment:* "Excellent observation on the relationship between VA and refractive error. You always need to be thinking about this

when prescribing. Your patient may have been accommodating during retinoscopy and that would make you find more minus than is needed."

"Over the last three months I have become much better at doing the testing and now I can concentrate more on the individual patient. Now that the tests are more automatic, I find that I am really enjoying the experience of getting to know the patient and figuring out the best way to get the patient to cooperate."

*Preceptor comment:* "From the nature of your journal, I can tell that you took some time to reflect on the experience and I can see how you are setting your own clinical goals."

Preceptors were trained in how to respond to journal writing at the annual preceptors' meeting at the beginning of the academic year. Preceptors were shown some journals from the pilot program along with the comments that had been written by the previous preceptors. At the end of the academic year, preceptors met to review all of the journals their students had written along with the students' summary for the year and their goals for the next year. Preceptors reported that they were able to learn more about their students through reading their journals than they would have through patient care alone. They also found that the students thought more critically about their patient care experiences when they reconstructed the day through their journal writing. Preceptors found that once the students developed trust in the journaling process and in their preceptors, they were able to open up and share their feelings, both positive and negative, about their experiences. The negative feelings in particular were helpful for program revision and for improving communication between faculty and students. Since most preceptors worked with about four students per week, they found that reading four journals per week was a fairly easy task.

## Conclusions

Journal writing is a valuable tool for students because it fosters active participation in their learning. The active process of journal writing also helps to establish a pattern of self-reflection, which can lead to a pattern of life-long learning. Feedback from preceptors on the students' strengths and weaknesses

helps them to appreciate the value of constructive criticism and to develop accurate self-evaluation and self-correction. Preceptors reported that the journals helped them to learn more about the individual students than they would have learned during patient care. The journals presented the preceptors with additional teachable moments that did not come up during the screenings, demonstrated the students' attitudes (both positive and negative) about their early clinical experiences, and allowed the preceptors to gain insight into the students' understanding of basic concepts. Reviewing all of the journals at the end of the year showed the students' growth as clinicians to both the preceptors and to the students.

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# Instilling Ethics and Professionalism in Today's Optometry Students

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to diagnose and treat patients but also requires a major shift in how students think about **themselves**, how they no longer view themselves as students responsible for learning information for a midterm or final exam but as doctors-in-training seeking to apply that knowledge to a patient. Most students find following the path of this process of change (attending lectures and labs, then increased clinical responsibilities, then culminating in entry-level competencies) forces them to think differently about their roles and behaviors. Students and optometric educators must define behaviors and attitudes that are considered ethical and professional. With this understanding, how do we effectively instill ethics and professionalism in our students?

Several key issues are raised when discussing ethics and professionalism. For example:

- How do we define ethics and professionalism?
- Who are today's optometry students? What characteristics do they display? How do these descriptions differ from those of their faculty and staff?
- What methods or programs can we develop to create an awareness and understanding of ethics and professionalism?

## How Do We Define Ethics and Professionalism?

The New England College of Optometry Student Handbook 2005-2006 provides examples of academic misconduct, professional misconduct, and unprofessional conduct.

Academic misconduct is defined as the misrepresentation of one's own academic achievement and includes but is not limited to cheating on examinations and plagiarism. Professional misconduct includes but is not limited to deliberate acts of disrespectful behavior toward faculty, staff, students or patients; failure to abide by standard clinical policies and procedures; theft of examination or examination answers; forgery, alteration or knowing misuse of patient records; and/or theft or destruction of College/Clinic property and/or property belonging to members of the College's community. Unprofessional conduct includes much of the above and adds organizing or participating in harassment or hazing as well as other conduct unbecoming a student at the College.

## Introduction

**I** will uphold and honorably promote by example and action the highest standard, ethics and ideals of my chosen profession and the honor of the degree, Doctor of Optometry, which has been granted me.<sup>1</sup>

Every optometry school graduate is familiar with this powerful and meaningful statement. As part of the Optometric Oath taken upon completion of the Doctor of Optometry degree, it signifies that in addition to providing excellent care to their patients, doctors of optometry continuously incorporate ethics and professionalism into their practices.

As optometric educators and role models, we hold our students to that same highest standard of ethics and ideals in their day-to-day lives, substituting their present college and clinic environments for their future practices. We believe that students whose behaviors demonstrate these characteristics during their education **now** will act ethically and professionally **later** throughout their careers.<sup>2,3</sup> Throughout their optometric education, students must undergo a process of change to transform from college senior to student clinician and then to doctor. This process requires not only the acquisition of knowledge and skills necessary

## Abstract

**Purpose:** To survey first year students' perceptions of ethical and unethical behavior as a first step in designing an effective ethics and professionalism program.

**Methods:** An anonymous survey covering academic, clinical, and professional misconduct was handed out at the end of first year optometry student Orientation following a presentation of Student Handbook rules and regulations covering those topics.

**Results:** The only area of concern was academic misconduct.

**Conclusions:** Students' perceptions, attitudes, and practices of ethical and professional behavior may differ from those of optometric educators who design programs. Input from students is necessary to produce relevant programs.

**Key words:** ethics training, academic dishonesty, unprofessional conduct

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**Table 1**  
**Generational Characteristics**

Society and Culture	Boomer Childhood c. 1945-1965	Xer Childhood c. 1965-1985	Millennial Childhood c. 1985-today
Child Nurture	Relaxing	Underprotective	Tightening
Family Stability	High, starting to fall	Falling	Low, starting to rise
Family Policy Priority	Needs of community	Needs of adults	Needs of children
School emphasis	Excellence	Liberation	Standards
Crime and Drugs	Low, starting to rise	Rising	High, starting to fall
Popular Culture	Homogenizing	Confrontational	Fragmenting
Gender-role Gap	Wide	Narrowing	Narrow
Racial Goal	Integration	Assertion	Diversity
Immigration	Low	Rising	High
Income Equality	Rising	Peaking	Falling
Fiscal Tilt	To working-age adults	To retirees	To kids
Public Generosity to Poor	Rising	Peaking	Falling

Adapted From *Millennials Rising: The Next Great Generation*<sup>12</sup>

dents to change their perceptions and practices of academic dishonesty once they continue on to graduate programs. Despite Codes of Ethics signed by students and lists of taboo items which must not be brought into exam rooms such as cell phones, which could be used to text message answers; hats, jackets, or water bottles with labels which could conceal notes; and assigned seats without neighbors on either sides, cheating persists, and often with great reluctance by students to identify cheaters to administrators."

Other examples of ethical and professional lapses in judgment such as plagiarism, theft of personal items, missing of mandatory sessions, disregard of rules and excessive absenteeism have all been noted. These actions are worrisome and cause concern about a migration of these unacceptable behaviors into clinical rotations and later clinical practice.

### Who are Today's Students?

Neil Howe and William Strauss, in their book *Millennials Rising: The Next Great Generation*, look at characteristics of Americans divided by birth years, or by generations. Using this scenario, most of the current students would be early born Millennials or late born Gen X. Our next wave of students will be Millennials, a group who will bring in characteristics differing from their predecessors. Earlier born Gen X and Boomers make up most of our faculty and staff. What do their characteristics indicate? Table 1, *Generational Characteristics*, illustrates some of the differences.<sup>12</sup> If we accept the premise that societal norms influence behavior and attitudes, we can see that generational perceptions will differ. In order to create an effective program of ethics and professionalism, we must understand that practices students consider ethical and

professional may differ from those we as educators deem acceptable.

### Program Development

Literature abounds with examples of programs in ethics and professionalism. Articles discuss curricular design and measurement of outcomes. Cohn et al describe a curricular element that includes development of a Code of Ethics, discussion and case examples.<sup>13</sup> Huddle suggests that professionalism cannot be taught using the usual methods of medical education but must be encouraged through faculty role modeling.<sup>14</sup> Gordon suggests that ethics and professionalism be incorporated into existing courses and feels no need for a separate ethics and professionalism class or courses.<sup>15</sup>

### Methods

At The New England College of Optometry, students were surveyed to gain information about their perceptions of ethics and professionalism. Starting with the hypothesis that student perceptions of ethical behaviors differ from faculty perceptions, a survey, shown in Table 2, was constructed which listed 21 scenarios. These included behaviors in the classroom, on College property, in clinic, within email, and interpersonally. The survey was developed by reviewing real incidents that had occurred in recent years within the college community.

All but the last dilemma — breaking confidentiality — were considered to be unacceptable. Faculty and staff indicated their perception that such incidents are unacceptable by their responses to them at the time they occurred, which have ranged from individual conversations with students; emails to the student body describing incidents and explaining why such incidents are considered inappropriate; or referral to the Student Affairs Committee, the entity empowered to suspend, dismiss or implement other sanctions if a student is found guilty of unprofessional behavior. The title *Professional Dilemmas: Acceptable or Unacceptable?* was intentionally chosen over *Professional Dilemmas: Ethical or Unethical?* in hopes of receiving responses that more adequately mirrored student beliefs and behaviors.

The survey was administered to all first year students (n=111) at the end of their fall 1½ day orientation pro-

gram. The Student Handbook was distributed, and a powerpoint presentation was delivered, highlighting rules involving excused/unexcused absences from class, lab, and clinic; descriptions of professional/unprofessional conduct; academic probation and dismissal; and the role of the Student Affairs Committee within these domains. It was stressed that misunderstanding rules and regulations could lead to disciplinary action and students were encouraged to use the Handbook as a reference tool.

At the conclusion of the lecture, the anonymous survey was handed out. Students were told not to put their names on the surveys. After they had finished, key scenarios were discussed and the reasons for their desired responses were explained. Students were then asked to turn in their surveys.

## Results

Table 2 and the graph following it, Figure 2, show examples where student perceptions and expectations did not match those of the faculty and administration. Responses to our first survey question immediately proved our hypothesis correct: Ninety-three out of 111 students believed that turning in a paper under one's own name as individual work, even though it had been done with a classmate, is acceptable. A much smaller percentage of the students, 23/111 students, expressed reluctance to stop or report cheating. Fortunately, only 10 students would not break confidentiality if a friend appeared suicidal. Results indicate that the examples of cheating behaviors were deemed by most to be unacceptable with the exception of collaboration.

## Discussion

Most of the student responses relieved some of our concerns about student behaviors. However, this survey did have limitations. Given the excitement of orientation itself, the opportunity to meet new classmates, the need to become familiar with one's surroundings on campus as well as off, it was believed that students' responses to the scenarios would not be corrupted by the handbook discussion. For example, some of the scenarios had not yet been experienced by students, especially those dealing with clinical settings or screenings, so responses could not

accurately reflect direct clinical experience. The authors expected students to be able to relate to these scenarios based on similar types of experiences or to be able to reason through the key elements of the situation to apply their existing ethical standards to the hypothetical scenarios.

Additionally, self-reports cannot be adequately verified. Because the survey was anonymous, demographic information such as age, gender, years of undergraduate education, grade point averages, types of work experience were not taken into account. Lack of demographic information also does not allow us to determine to which generational group students belong. What are the percentages of Gen X, Millennials or Boomers in this class? Again, this survey was an exercise to see what concepts needed to be stressed during the coming year, rather than a direct comparison of generational values.

Finally, although the authors believed student responses were based on their own experiences and beliefs, rather than on what had been discussed during orientation, this could not be verified. Questions regarding relevance and outcome, as perceived by both students, faculty and administrators, have been raised. Goldie et al find a disappointing lack of improvement in three years' post-training.<sup>16</sup> Spafford and Strong recognize difficulties often encountered in teaching professional ethics, and suggest ways to develop this content area within an optometric curriculum.<sup>17</sup> An award-winning essay from the Dr. William Logie Medical Ethics Essay Contest emphasizes the need to include discussion of student-specific ethical dilemmas.<sup>18</sup> Roberts et al surveyed medical students and residents and found a perceived need to focus on practical ethical professional dilemmas based in real-world scenarios.<sup>19</sup>

## Conclusions

The first class to have taken this survey has now finished its first year. There have been no reported instances of unacceptable behavior in this time. It is unknown whether this is due to an early emphasis on appropriate behaviors, with specific examples given. We will continue to monitor this class and will repeat the process with the new entering class. The lessons of hindsight show us that the survey must be modified to com-

pensate for its limitations. The survey identified two parts of academic dishonesty (collaboration on homework and reluctance to confront cheating) requiring emphasis in developing an ethics and professionalism program. These areas will continue to be addressed as homework is assigned and during exams. It is also imperative to request student input on ethics and professionalism training so that any type of program can be seen as relevant. The authors believe programs must continue throughout all years of an optometry program. For first year students, the authors recommend two administrations of the survey — one at the beginning of the year, and one at the end — with the second survey containing clinical scenarios students may have been exposed to during their first year.

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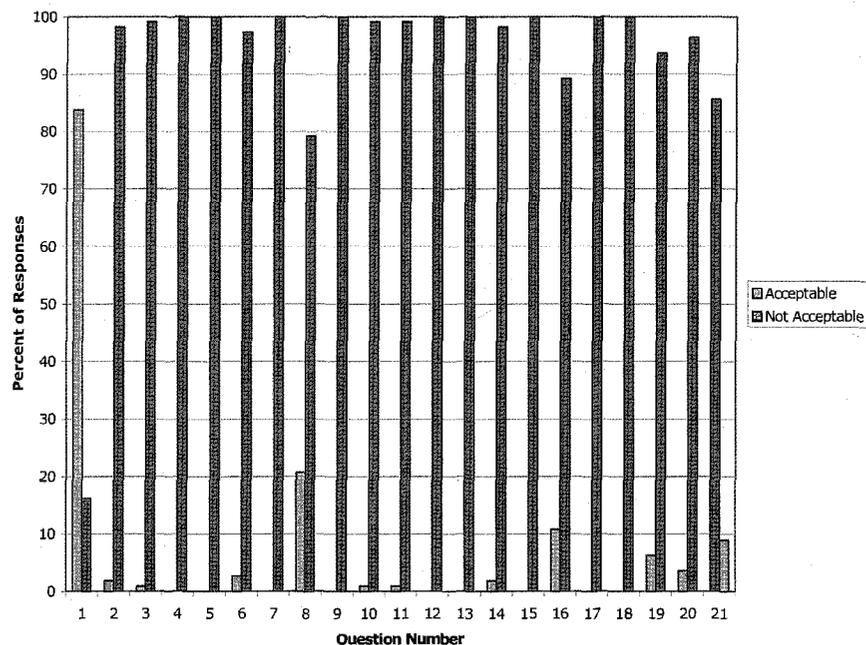
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**Table 2**  
**Survey Given to Students During First Year Orientation**  
**Professional Dilemmas: Acceptable or Not Acceptable?**

		Acceptable	Not Acceptable
1	You are given a homework assignment. You and a classmate work on the assignment together and then each of you turn in your own paper under your own name.	93	18
2	You are preparing a homework assignment. You cut and paste some relevant information from a great website.	2	109
3	You find some diagnostic equipment in a hallway. There is no one in sight and you don't know whose it is. Finders keepers, you can take it to use yourself.	1	110
4	You see the first page of one of your midterm exams on the counter in the copy room. You memorize the questions and share them with a select group of your best friends.	0	111
5	You are sitting next to a classmate who you know is on probation. It's ok for your classmate to look at your answers because it will help him do better.	0	111
6	After your patient leaves you realize that you forgot to record the results of one of the clinical tests that you performed. You are pretty sure that the results were normal, so you go back and record a normal value for the test.	3	108
7	It's OK for a classmate to look at your test answers because she'll never need most of this stuff anyway!	0	111
8	You think your friend was involved cheating. You do nothing because it is her business and not yours, you are not a tattle-tale and besides what good will it do anyway?	23	88
9	You are running out of your disposable contact lenses so the next time you attend your clinical assignment you help yourself to a pair of demo lenses.	0	111
10	You take an exam and try to memorize as many questions as possible. You then share them with the next group of students taking this exam.	1	110
11	Your clinical preceptor asks you if you performed a specific clinical test on the patient you are examining. You don't think the test results are really all that important, so you say yes, even though you didn't.	1	110
12	You are really angry at your instructor. You vent your sentiments in an e-mail and send it to the whole College.	0	111
13	Your second screening assignment is very similar to your first screening so you just change the date and the name of the site and turn it in.	0	111
14	It's OK for you to look at a classmate's exam paper just as long as you don't change your answers.	2	109
15	You are anxious to leave your clinical assignment because of the Red Sox game. You get your friend to call in and make an eye appointment with you because you know she won't keep it and you can leave early.	0	111
16	On your way to study at the library you see a reception going on. The food looks great so you help yourself.	12	99
17	You need a reference for a paper you are writing but you don't have change for the copy machine so you just cut out the pages of the journal. After all, the library has 3 issues.	0	111
18	You get a work-study job where you just can't help but notice a list of students on academic probation. Later that evening you tell your roommate the names on the list.	0	111
19	You just got a great new video game. To relax a bit you load it onto a computer in the Marco Center so you can de-stress between classes.	7	104
20	You are attending a mandatory class. You know your friends plan to come but aren't there yet so you go ahead and sign them in on the attendance sheet.	4	107
21	Your friend confides that he is prepared to commit suicide. You break confidentiality and tell an administrator.	101	10

**Figure 2**  
**Graphical Results of Survey**

**Professional Dilemmas: Acceptable or Not Acceptable?**



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**Industry News**

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free engraving. Also, when you purchase our lenses, ask for a free multi lens case to keep them together. Volk Optical is an innovator in the design and manufacture of diagnostic and therapeutic ophthalmic lenses, equipment, and accessories. The company is based in Mentor, Ohio, USA, and has representatives and distributors around the world. Stay tuned for our new product simulator, due in August. To order or obtain more information about Volk products, visit [www.volk.com](http://www.volk.com), phone Volk at 1-800-345-8655 (toll free) or 440-942-6161, or contact your Authorized Volk Distributor.

**Alcon Laboratories**

Alcon Laboratories, Inc., a subsidiary of Alcon, Inc., announced a voluntary recall of Systane(r) Free Liquid Gel lubricant eye drops. This product is distributed only in the United States, including Puerto Rico. No other formulations of Systane lubricant eye drops are included in this recall. This voluntary recall is in response to 11 consumer reports citing the presence of foreign material. Alcon has distributed over 5 million bottles of Systane Free Liquid Gel since its introduction in January 2006

After testing particles from the opened, partially used bottles that were returned to Alcon, the company identified the foreign material as mold. However, because of the characteristics of these molds, the development of an infection is considered unlikely. In fact, Alcon has received no reports of fungal infections associated with the 11 reports. Alcon took the action to voluntarily recall Systane Free Liquid Gel because eye drops that become contaminated after opening the bottle may cause eye infections. Alcon notified the U.S. Food and Drug administration of this voluntary action. "Alcon is absolutely committed to providing the highest level of quality eye care products," said Kevin Buehler, Alcon's senior vice president, United States and chief marketing officer. "We took this voluntary action even though it is unlikely that eye infections would occur as a result of this issue." For more information on Alcon, Inc., visit the company's web site at [www.alconinc.com](http://www.alconinc.com)

**The Vision Care Institute**

**Dr. Richard Clompus** was recently appointed as the new director of The Vision Care Institute of Johnson & Johnson Vision Care in Jacksonville, Florida. After leading the Institute since its inception, **Dr. Howard**

**Purcell** is now working on new projects within professional affairs at Vistakon. In addition to the director position, Dr. Clompus will also be responsible for the management of U.S. educational grants, school relationships and deployment of the Professional Development Centers. The Professional Development Center project is a special initiative that will create a customized room in each optometry school with advanced teaching and communication technologies. It will permit schools to communicate with each other as well as other teaching institutions and Vision Care Institutes throughout the world. The Vision Care Institute is a global initiative with its headquarters in Jacksonville. It has sister facilities operating in Brazil, Prague, Taiwan, and Korea. Since its launch in 2004, The Vision Care Institute in Jacksonville has hosted more than 2,000 students from all 19 schools and colleges of optometry in North America, according to **Dr. Pat Cummings**, Vistakon's vice president of professional affairs. Topics include development of patient communication skills and specialty contact lens prescribing. For further information, contact [www.thevision-careinstitute.com](http://www.thevision-careinstitute.com)

# Optometry Students: Attitudes and Expectations

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**T**oday's optometry students, the children of Baby Boomers, bring new attitudes and expectations to the profession of optometry. Many of these attitudes are generational and affect students across many professions; some are specific to optometry. During the 2005-2006 academic year, CIBA Vision sponsored Dr. Chudner, a 1997 graduate of UC Berkeley School of Optometry, to give a practice management presentation, "Trends in Optometry: the Future for the New Optometrist." Dr. Chudner has experienced many career opportunities that students may be considering.

The presentation was given at nine schools (UAB, UCB, UH, IU, Nova, PUCO, SCCO, SCO, SUNY) with 460 students participating via interactive keypads. Participants were 38% male and 62% female. Sixty-seven percent were 3rd year students and 33% were 4th year. We were interested in learning: 1.) when and why did students decide upon optometry; and 2.) what are their plans upon graduation. We found many of the results interesting and would like to share these with you. Some may be worthy of follow-up with a formal survey and/or study.

Most students (61%) decide on the profession of optometry while in college and, for 66% it is their first choice. Only 15% have relatives in optometry. A few students (9%)

come to optometry from another career.

Although the majority of students are Caucasian and a significant number are Asian, almost half (48%) are fluent in another language. Sixteen percent are fluent in Spanish. Please note that we did not have the opportunity to survey students at Inter-American University in Puerto Rico. Increasing the number of students fluent in Spanish will help meet the needs of America's fastest-growing demographic group.



*Residency programs are seen as a way to increase knowledge and experience in a specific area of optometry (53%), more than a way to increase learning potential (28%). Twenty-three percent of students plan on residency training.*

Students enjoy learning about ocular disease and pathology, but recognize that it is not the most important skill they can offer an employer (15%). Contact lenses are a close second in interest level and are seen as an important skill to offer employers (22%). (The number one choice was ability to work evenings/weekends at 27%). Students were almost unanimous in saying that they select contact lenses from personal experience fitting them (91%),

not from results of clinical studies (4%). Students are eager for additional contact lens experience, but limited in the time they can spend outside class to attend workshops.

Residency programs are seen as a way to increase knowledge and experience in a specific area of optometry (53%), more than a way to increase earning potential (28%). Twenty-three percent of students plan on residency training. Only nine percent were planning on completing a residency in order to go into teaching or research. In fact, ten percent admitted that it was a way to spend one more year in school!

Lifestyle considerations following graduation are very important to both female and male students. Eighty-two percent of females and 47% of males plan to practice part-time at some point during their career prior to cutting back during the retirement phase.

Related lifestyle questions included asking students if they would be the primary earner in their household and where they planned to practice. Again, female responses were different from male. Only 39% of female students expect to be the primary earner, while 69% of males do. Females were also more likely to want to practice in a specific location (36% vs. 28%). Males were more likely to "go anywhere" for the right practice opportunity (30% vs. 21%). Interestingly, both males and females felt that the best opportunities were in small town/rural areas (48% & 43%). Another concern is the need to practice in more than one state during one's career. Fifty-seven percent of females and 50% of males predict that they will practice in more than one state.

*Dr. Chudner completed a residency at Bascom Palmer Eye Institute, has practiced in both commercial and medical settings and now owns a private practice employing another optometrist. Dr. Nylander is manager, academic development, at CIBA Vision, a Novartis company.*

When asked about plans immediately following graduation, many responded, "don't know yet" (22% male, 37% female). Males were more likely to be purchasing a practice or share in a practice (19% male, 5% female). Employment in a private practice was a top choice for 22% of males and 18% of females. Only 4% plan to be employed by a commercial practice.

Finally, students were asked about male versus female opportunities in optometry. Overall, 66% felt that males and females did not have the same career advancement opportunities, and 55% said that males and females do not have the same career earnings potential. Females felt the differences more strongly than males, with 71% vs. 58% seeing different career opportunities and 56% vs. 52% estimating a difference in earnings.

In conclusion, we feel that students are aware of the excellent opportunities in optometry, and many have chosen it for the flexible options the profession offers

A significant number of students plan to be the secondary earner in their family which may mean following a spouse's move to another state. This could adversely impact their interest and ability to buy into a practice. Student perceptions that females do not have the same career and earning potential as males should also be addressed. Students may recognize that working part-time affects both choices. Another interpretation is that students feel females have fewer career advancement opportunities.

Now that a majority of optometry students are female, and female optometrists should equal male optometrists in 2017, optometry needs to recognize these changes

and make part-time optometrists feel as welcome and valued as their full-time colleagues. This is especially important for optometric organizations that depend upon time-consuming volunteer effort that currently is difficult to participate in for many optometrists with multiple obligations. Student organizations have many eager volunteers who are the potential leaders of the new generation of optometrists. We can all work together to keep optometry a leading choice for upcoming students.

## **Guest Lecturer Program in Contact Lenses**

A grant from CIBA Vision, a Novartis Company, will provide funding to a number of the schools and colleges of optometry to bring lecturers in contact lenses to their campuses in 2007. This program implements one of the priorities of current ASCO President Dr. Hector Santiago - the sharing of educational resources.

### **Purpose of Program**

- encourage sharing of faculty expertise in contact lenses among the schools of optometry
- develop opportunities for talented younger faculty to visit other schools

### **Application Process**

- Applications from interested schools will be accepted by ASCO beginning February 1, 2007. Application forms are available from Pat O'Rourke (porourke@opted.org).
- Funding will cover travel expenses and a \$1,000 honorarium for the invited contact lens guest lecturer.
- Schools may select the guest lecturer. Priority should be given to faculty with two-six years teaching experience.

# Using the Original Judd-Lievens C/D Ratio Grading Card (JLC) to Improve Interobserver Reliability

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## Abstract

**Purpose:** To determine if the use of the Judd-Lievens grading card (JLC) provided improved interobserver reliability in grading C/D ratios when compared to observer's typical method of choice.

**Methods:** Thirty-three stereopairs of optic nerve head slides were viewed by 12 experienced optometrists and 12 fourth year optometric interns on two separate occasions. The first evaluation was completed while utilizing individual clinical technique. The second evaluation was completed three months later utilizing the JLC grading card and method.

**Results:** The weighted kappa statistic ( $K_w$ ) is a measure of interobserver agreement and its score improved for both the intern group and the doctor group with the use of the grading card. In all cases the  $K_w$  description improved from moderate to substantial agreement with the use of the JLC.

**Conclusions:** The use of the JLC improved the agreement of observers in both the optometrist and the intern group.

**Key Words:** interobserver error, cup to disc ratio, glaucoma, agreement, grading card

Dr. Lievens is an associate professor and the Chief of Primary Care at the Southern College of Optometry. Dr. Lievens was the Chief of Aerospace Optometry at the Pentagon before joining SCO. He has also been employed in private practice and at an ophthalmology referral center. He is currently enrolled in a Master's degree program in health administration. Dr. Judd is a 2003 graduate of the Southern College of Optometry. He recently separated from the U.S. Army after serving time in Iraq. Dr. Judd is now employed at the Florida Eye Health medical practice.

gested that previous studies of observer error have been biased by lack of criteria for cup determination.<sup>7</sup> For example, some practitioners have considered the central disc pallor to be equivalent to the optic cup (maximum color contrast criterion).<sup>7</sup> With the natural course of practical eye care moving in the direction of more group practice and less solo-practitioner practice, the variability in method of ratio determination has created an obstacle to efficient and uniform management of GLC.

The result of varying methods of C/D ratio assessment is that individual clinicians develop a consistent and internal system.<sup>7</sup> Because clinicians' internal systems vary, interexaminer variability is the result.<sup>7</sup> In essence, observers are more likely to agree with themselves than with others.<sup>8,9</sup> In a large study assessing the agreement between ophthalmologists and optometrists in the assessment of the vertical C/D ratios, intraobserver agreement was found to be substantial: weighted kappa ( $K_w$ )= 0.69 while interobserver agreement was only fair:  $K_w$ =0.40.<sup>10</sup>

Interobserver error is of concern. Even with experts, the vertical C/D measure has been proposed to lack clinical usefulness (with differences of 0.2 disc diameters (DD) or more between individual observers being commonplace).<sup>8</sup> Tielsch and associates demonstrated that 17%-19% of C/D estimates made by two different glaucoma specialists (fellowship trained) differed by 0.2 DD.<sup>5</sup> Considering that a change of 0.2 DD or more is considered by most to qualify as definite change, this difference is critical.<sup>8</sup> It would be intuitively plausible to predict that experience and training would result in greater agreement between graders, but research into this suggestion has been equivocal.<sup>11,12</sup> Thus, optometry and ophthalmology find themselves in the situation by which patient care and management may suffer. There may be occasions when definite progression has occurred and yet was overlooked because the doctors differed by 0.2 DD or more in their individual assessments of the C/D ratio.<sup>8</sup> Conversely, a stable disc can be mismanaged by being labeled to have progressive optic nerve damage, resulting in medical/surgical management of a non-problem.<sup>8</sup>

Some research has found ophthalmology to be superior in grading

## Introduction

**G**laucoma is a complex disease. Most clinicians use the cup-to-disc ratio (C/D) and neuroretinal rim area in their decision-making to characterize optic nerve damage and provide a measure for monitoring disease progression.<sup>1</sup> C/D ratios were first described by Armaly in the early 1970's when he concluded that enlargement of the C/D ratio occurred early in the clinical course of glaucoma (GLC) and paralleled the magnitude of visual field defects.<sup>1,2</sup> Ganglion cell loss causes both localized and generalized changes in the neuroretinal rim and an increase in the size of the optic cup.<sup>3</sup> Evaluating the cupping of the optic nerve head is thus one of the most important assessments in a complete eye exam.<sup>4,5</sup> What concerns the eye care profession is the subjective variability among clinicians when judging the amount of cupping.<sup>1</sup> This is particularly important given the notion that the first morphologic changes to the disc can precede detectable visual field loss.<sup>2</sup>

Variability in C/D grading has always been of concern. Armaly held the view that the ratio's determination was inherently influenced by the examiner's reliability and the estimation method used.<sup>6</sup> It has been sug-

C/D ratios as compared to optometry. Specifically interobserver agreement in estimating C/D was significantly higher for ophthalmologists ( $K_w$  0.68) when compared to optometrists ( $K_w$  0.56) and third-year ophthalmology residents ( $K_w$  0.56).<sup>9</sup> Overall, the agreement among the three groups combined was only fair to moderate.<sup>9</sup> In a separate study, the agreement of optometry residents and residency-trained optometrists was near the aforementioned levels ( $K_w$  0.59), but was significantly better than non-residency trained optometrists ( $K_w$  0.52).

It has been reported that 41% of surveyed eye care practitioners have no method that they consciously use to gauge C/D ratios, except experienced estimation.<sup>4</sup> With the level of agreement being far from ideal, an improvement in agreement would be beneficial. Universal methodology for C/D determination could be useful in reducing interobserver error. A greater degree of reliability when grading will facilitate more consistent decision making, record keeping, and clinical communication.<sup>11</sup> Despite the plethora of studies noting the issues regarding interobserver error in grading C/D's, there have been few if any suggestions on how best to remedy the predicament. Hollows and McGuiness produced a

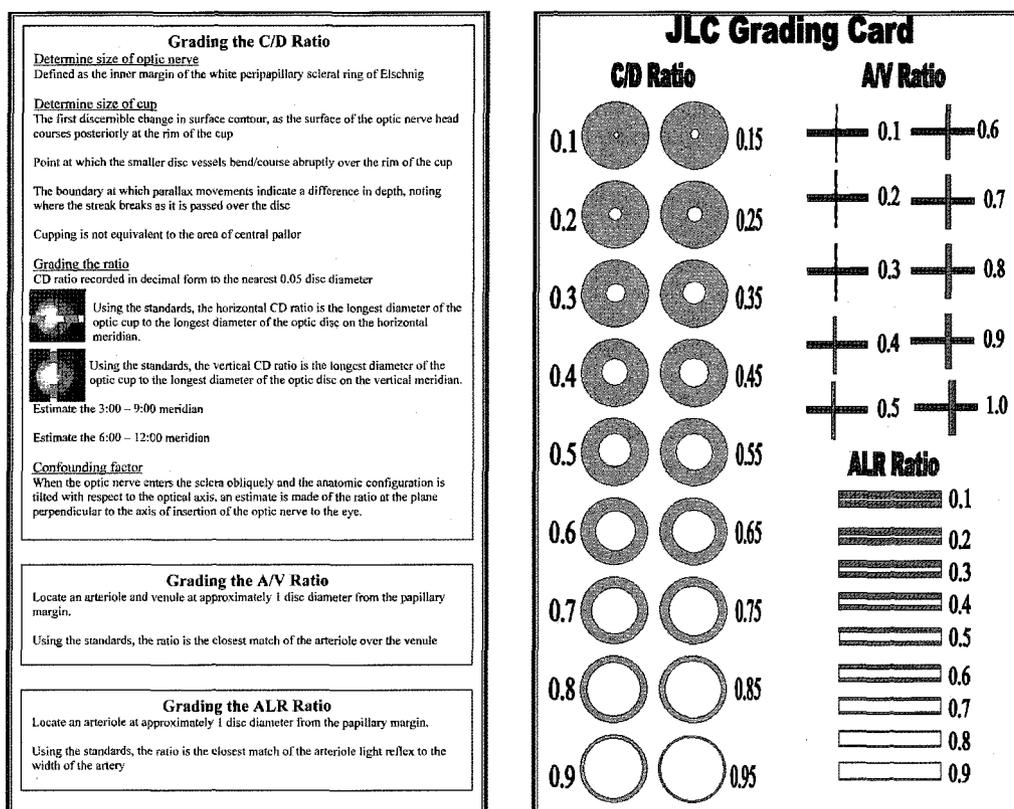
series of different sized circles to identify differing cup sizes, which were to be used with slide photos.<sup>13</sup> With the advent of digital images and optic nerve topography, a more user-friendly apparatus could be suggested. Two suggestions have been published recommending that 1) there be a reference standard using images and/or verbal descriptors and 2) that the increments between adjacent reference standard samples represent equal steps of severity.<sup>14</sup> We propose that the reliability of the C/D ratio will be improved if observers adopt a common method for estimating the ratio during their training. We aim to evaluate the interobserver agreement in grading C/D ratios with and without the use of a grading card. Should the guide improve agreement, the benefit would be to guide clinical care, co-management, and progression of patients' glaucomatous damage even when examined by multiple practitioners. This study evaluates an original design as a method of C/D ratio estimation.

## Methods

Twelve experienced optometrists (faculty of the Southern College of Optometry (SCO) and twelve optometric interns in their fourth year of

optometry school (SCO) were enrolled in this study. The fourth year interns were chosen at random without regard to academic ability or merit. Participants must have had experience grading C/D ratios on at least 100 patients and were measured to have normal stereopsis. Normal stereopsis was defined as form recognition, 20 seconds of arc, without suppression as per the RANDOT stereotest. Thirty-three stereopairs (35mm color slides) of optic nerve heads were taken by one investigator and used in this study. The photographs were selected because they were focused and represented patients with various amounts of disc cupping, with and without glaucomatous cupping. The subjects were instructed to view the stereopairs through a self-illuminated stereo viewer and grade the horizontal and vertical C/D ratio to the nearest 0.05 DD using their own subjective method of choice. It has been previously noted that when photographs (or slides) can be viewed in three dimensions, cup margin determination would more likely be made via depth cues as compared to cup-disc color differentials.<sup>4,9</sup> Whereas experts have been found to differ by as much as 0.2 disc diameters (DD) monoscop-

Figure 1



**Table 1**

C/D estimations personal method	Mean	Standard Deviation
Optometrist's Vertical C/D	0.483	0.237
Optometrist's Horizontal C/D	0.478	0.235
Intern's Vertical C/D	0.467	0.230
Intern's Horizontal C/D	0.464	0.232

*Personal C/D ratio estimation method: The mean C/D estimations for both the optometrist group and the optometric intern group are noted in Table 1 with the corresponding standard deviation.*

**Table 2**

C/D estimations with JLC method	Mean	Standard Deviation
Optometrist's Vertical C/D	0.502	0.226
Optometrist's Horizontal C/D	0.499	0.229
Intern's Vertical C/D	0.496	0.206
Intern's Horizontal C/D	0.493	0.209

*JLC C/D ratio estimation method: The mean C/D estimations for both the optometrist group and the optometric intern group are noted in Table 2 with the corresponding standard deviation.*

ically, it reduced to 0.16 DD stereoscopically.<sup>8</sup> Hence, stereo photos were selected as the means for comparison in this investigation. The following script was read to each subject:

"Using the stereoviewer provided, observe the optic nerve heads of 33 stereopairs. Using your normal clinical technique to grade C/D ratios, assign each pair a value to the horizontal (3:00-9:00) and vertical (6:00-12:00) meridians to the nearest 0.05 disc diameter. Record both the horizontal and vertical C/D ratio on the form provided next to the appropriate slide number. There will be no time limit for completing this process."

Three months later, in an effort to minimize recognition, the same set of stereopairs were again viewed and evaluated with the JLC (copyright pending). The JLC uses a computer-generated 2-dimensional color drawing of optic nerve heads. C/D ratios in the JLC are drawn with circular cups ranging in size from 0.1 to 0.95. Subjects had a recording page in which they recorded the vertical C/D ratio and horizontal C/D ratio to the nearest 0.05. The following script was read to each subject:

"Review the diagram side of the JLC for C/D ratio estimation. On the reverse side of the card, read the standardized way to grade the C/D ratio. After review of both sides of the card, use the stereoviewer provided and observe the optic nerve heads of the

33 stereopairs. Using the JLC diagram as a specific guide, assign each pair a value to the horizontal (3:00-9:00) and vertical (6:00-12:00) meridians as instructed to the nearest 0.05 disc diameters. Record both the horizontal and vertical C/D ratio on the form provided next to the appropriate slide number. There will be no time limit for completing this process."

The C/D values assigned to each stereo-pair by both the optometrists and the interns with and without the JLC were compared. Weighted kappa values were utilized in the analysis. The weighted kappa is a useful tool in evaluating observer agreement with C/D determination because it awards "partial credit" if two findings are not in exact agreement, but are similar. The mean C/D ratios from initial inspections were 0.5 with a SD = 0.22 and a range of 0.1 to 0.95.

When using the JLC, the subjects were instructed to follow the grading guidelines and diagrams (see Figure 1). The size of the optic nerve is to be assessed first by locating the inner margin of the white peripapillary scleral ring of Elschnig.<sup>3</sup> Anatomically, the physiologic cup is a central shallow depression of the optic disc formed at the point where the axons of the ganglion cells exit the globe at right angles to the retina.<sup>6</sup> The subjects were aware of the necessity to first judge the disc when using the JLC scale (and likely would have

done so in their personal method as well). If the scleral ring is small as in hyperopia, the fibers tend to be packed together and the cup tends to be smaller, whereas in myopia the scleral ring tends to be larger allowing for a larger disc and larger central depression (cup).<sup>6</sup> Second, the cup topography is determined prior to using the JLC scale. We defined the cup edge as the first discernible change in surface contour, as the surface of the optic nerve head courses posteriorly at the rim of the cup.<sup>10</sup> Additionally, this is the point at which the smaller disc vessels bend over the rim and is the boundary at which parallax movements (of a streak) suggest a depth change. It was emphasized that cupping was not equivalent to central pallor.<sup>5</sup> Finally a potential confounding factor of oblique insertion was recognized. Subjects were to visualize the C/D at the plane perpendicular to the axis of oblique insertion (and make the estimate).<sup>15</sup>

The JLC has grading instructions for accessing artery/vein (A/V) ratios and artery light (ALR) reflexes as well. They were not part of this research project.

## Results

During both phases of the study (using the doctor's and intern's own method of C/D estimation and using the JLC method), the means and standard deviations are found in Table 1 and Table 2. Both the means and standard deviations show statistically significant difference (with and without JLC use) by paired t-test ( $p = 0.0026$ ,  $p = 0.0370$  respectively). There is reduced standard deviation with use of the JLC. Clinically, the difference in the overall mean C/D ratios is very small even though statistically significant. T-test alone would be an incomplete analysis and does not evaluate agreement between observers. For this reason, kappa analysis was performed.

The weighted kappa ( $K_w$ ) statistic was used in this analysis. The kappa statistic formally tests for agreement between two methods, raters, or observers, when the observations are measured on a categorical scale. Both methods must rate, or classify, the same cases using the same categorical scale. C/D assessment was the method in this project. The "weighted version of the kappa statistic was used in this analysis because partial

TABLE 3

Kappa Values for the Comparison of Doctors' Horizontal C/D Values - No Card Used												
Doctors	1	2	3	4	5	6	7	8	9	10	11	12
1		0.55	0.56	0.37	0.67	0.73	0.71	0.72	0.77	0.57	0.81	0.68
2			0.77	0.48	0.45	0.53	0.54	0.46	0.55	0.57	0.53	0.51
3				0.38	0.44	0.56	0.54	0.51	0.51	0.57	0.53	0.54
4					0.27	0.33	0.27	0.24	0.32	0.32	0.32	0.26
5						0.64	0.67	0.76	0.74	0.51	0.59	0.74
6							0.82	0.78	0.70	0.67	0.78	0.72
7								0.79	0.75	0.61	0.72	0.75
8									0.76	0.81	0.89	0.80
9										0.56	0.56	0.69
10											0.62	0.58
11	Mean:											0.68
12	0.58											

Kappa Values for the Comparison of Doctors' Horizontal C/D Values - Card Used												
Doctors	1	2	3	4	5	6	7	8	9	10	11	12
1		0.53	0.48	0.52	0.54	0.61	0.60	0.61	0.64	0.61	0.69	0.68
2			0.66	0.68	0.38	0.48	0.48	0.46	0.56	0.68	0.49	0.68
3				0.50	0.47	0.64	0.63	0.58	0.59	0.68	0.63	0.71
4					0.35	0.38	0.36	0.35	0.43	0.57	0.41	0.55
5						0.65	0.50	0.65	0.66	0.51	0.57	0.58
6							0.72	0.72	0.69	0.67	0.71	0.70
7								0.69	0.65	0.70	0.72	0.74
8									0.70	0.61	0.67	0.68
9										0.69	0.63	0.72
10											0.65	0.78
11	Mean:											0.74
12	0.68											

Key: <0.20 =Poor <0.40 =Fair <0.60 =Moderate <0.80 =Substantial >0.8 =Almost Perfect

Weighted kappa statistics noted for all permutations of paired comparisons. The overall average of the weighed kappas is in the lower left of each chart. Chart cells are color coded to note the Landis and Koch recommended interpretations of the weighted kappa statistic. Table 3 compared optometrists in the evaluation of the horizontal C/D ratio.

TABLE 4

Kappa Values for the Comparison of Doctors' Vertical C/D Values - No Card Used												
Doctors	1	2	3	4	5	6	7	8	9	10	11	12
1		0.55	0.51	0.37	0.67	0.64	0.69	0.70	0.70	0.47	0.59	0.69
2			0.75	0.51	0.48	0.58	0.59	0.49	0.57	0.55	0.57	0.55
3				0.47	0.45	0.60	0.55	0.50	0.52	0.56	0.54	0.57
4					0.30	0.44	0.32	0.27	0.33	0.31	0.38	0.31
5						0.59	0.65	0.76	0.75	0.51	0.64	0.70
6							0.73	0.69	0.61	0.64	0.60	0.72
7								0.76	0.69	0.60	0.75	0.78
8									0.73	0.61	0.70	0.81
9										0.56	0.58	0.66
10											0.59	0.62
11	Mean:											0.72
12	0.57											

Kappa Values for the Comparison of Doctors' Vertical C/D Values -Card Used												
Doctors	1	2	3	4	5	6	7	8	9	10	11	12
1		0.62	0.57	0.54	0.55	0.62	0.62	0.64	0.60	0.61	0.73	0.71
2			0.70	0.67	0.43	0.56	0.56	0.53	0.63	0.69	0.53	0.63
3				0.53	0.49	0.78	0.72	0.65	0.68	0.74	0.65	0.74
4					0.36	0.44	0.40	0.40	0.44	0.58	0.40	0.52
5						0.55	0.47	0.60	0.61	0.50	0.58	0.53
6							0.71	0.69	0.62	0.69	0.74	0.71
7								0.64	0.60	0.72	0.75	0.73
8									0.71	0.64	0.69	0.70
9										0.67	0.65	0.71
10											0.67	0.76
11	Mean:											0.73
12	0.64											

Key: <0.20 =Poor <0.40 =Fair <0.60 =Moderate <0.80 =Substantial >0.8 =Almost Perfect

Weighted kappa statistics noted for all permutations of paired comparisons. The overall average of the weighed kappas is in the lower left of each chart. Chart cells are color coded to note the Landis and Koch recommended interpretations of the weighted kappa statistic. Table 4 compared optometrists in the evaluation of the vertical C/D ratio.

TABLE 5

Kappa Values for the Comparison of Interns' Horizontal C/D Values – No Card Used												
Intern	21	22	23	24	25	26	27	28	29	30	31	32
21		0.68	0.53	0.54	0.61	0.59	0.69	0.64	0.58	0.70	0.71	0.62
22			0.55	0.59	0.59	0.64	0.67	0.66	0.72	0.68	0.67	0.67
23				0.47	0.58	0.59	0.58	0.56	0.58	0.62	0.64	0.48
24					0.45	0.51	0.53	0.51	0.49	0.61	0.59	0.49
25						0.53	0.50	0.52	0.58	0.63	0.60	0.49
26							0.63	0.64	0.63	0.57	0.56	0.62
27								0.82	0.54	0.67	0.73	0.63
28									0.55	0.65	0.71	0.64
29										0.60	0.57	0.64
30											0.81	0.60
31	Mean:											0.60
32	0.59											

Kappa Values for the Comparison of Interns' Horizontal C/D Values –Card Used												
Intern	21	22	23	24	25	26	27	28	29	30	31	32
21		0.58	0.61	0.64	0.73	0.53	0.73	0.68	0.72	0.69	0.67	0.67
22			0.60	0.42	0.62	0.38	0.51	0.46	0.59	0.58	0.45	0.56
23				0.53	0.61	0.57	0.57	0.49	0.63	0.64	0.44	0.60
24					0.60	0.59	0.64	0.63	0.62	0.52	0.52	0.58
25						0.49	0.70	0.63	0.71	0.69	0.61	0.68
26							0.59	0.56	0.50	0.56	0.50	0.50
27								0.70	0.68	0.63	0.68	0.74
28									0.67	0.60	0.66	0.66
29										0.63	0.56	0.7
30											0.64	0.58
31	Mean:											0.57
32	0.62											

Key: <0.20 =Poor <0.40 =Fair <0.60 =Moderate <0.80 =Substantial >0.8=Almost Perfect

Weighted kappa statistics noted for all permutations of paired comparisons. The overall average of the weighed kappas is in the lower left of each chart. Chart cells are color coded to note the Landis and Koch recommended interpretations of the weighted kappa statistic. Table 5 compared optometric interns in the evaluation of the horizontal C/D ratio.

TABLE 6

Kappa Values for the Comparison of Interns' Vertical C/D Values – No Card Used												
Intern	21	22	23	24	25	26	27	28	29	30	31	32
21		0.73	0.55	0.53	0.65	0.63	0.69	0.68	0.56	0.69	0.76	0.68
22			0.55	0.50	0.61	0.60	0.64	0.67	0.65	0.62	0.71	0.72
23				0.42	0.61	0.57	0.47	0.51	0.51	0.54	0.58	0.46
24					0.40	0.55	0.39	0.43	0.43	0.48	0.52	0.48
25						0.55	0.50	0.52	0.60	0.66	0.63	0.52
26							0.60	0.62	0.59	0.54	0.57	0.65
27								0.80	0.41	0.58	0.70	0.62
28									0.46	0.59	0.71	0.66
29										0.52	0.51	0.59
30											0.78	0.55
31	Mean:											0.60
32	0.59											

Kappa Values for the Comparison of Interns' Vertical C/D Values –Card Used												
Intern	21	22	23	24	25	26	27	28	29	30	31	32
21		0.54	0.68	0.65	0.73	0.56	0.75	0.71	0.72	0.61	0.63	0.72
22			0.55	0.39	0.61	0.38	0.46	0.45	0.57	0.55	0.44	0.56
23				0.54	0.61	0.59	0.54	0.57	0.62	0.65	0.55	0.60
24					0.60	0.56	0.59	0.62	0.60	0.61	0.48	0.62
25						0.51	0.66	0.62	0.73	0.68	0.60	0.71
26							0.54	0.56	0.49	0.57	0.50	0.53
27								0.87	0.60	0.55	0.61	0.69
28									0.63	0.55	0.64	0.72
29										0.59	0.52	0.77
30											0.61	0.80
31	Mean:											0.57
32	0.64											

Key: <0.20 =Poor <0.40 =Fair <0.60 =Moderate <0.80 =Substantial >0.8=Almost Perfect

Weighted kappa statistics noted for all permutations of paired comparisons. The overall average of the weighed kappas is in the lower left of each chart. Chart cells are color coded to note the Landis and Koch recommended interpretations of the weighted kappa statistic. Table 6 compared optometric interns in the evaluation of the vertical C/D ratio.

credit can be awarded for closer ratio grades (ex. more credit when observer-A grades 0.2 and observer-B grades 0.3, than when observer-C grades 0.2 and observer-D grades 0.9). We interpreted the  $K_w$  proposed by Landis and Koch and duplicated frequently in previous C/D agreement research, as follows:  $K_w < 0.20$  as poor,  $K_w < 0.40$  as fair,  $K_w < 0.60$  as moderate,  $K_w < 0.80$  as substantial,  $K_w > 0.8$  as almost perfect.<sup>1,5,8,10,12</sup> The focus on kappa as the primary measure of agreement has been proposed because of the inherent ordinal categorical values of C/D ratios.<sup>5</sup> Values beyond the second decimal place are unlikely to provide further accuracy to the measurement. Tables 3-6 demonstrate the  $K_w$  in this study. The tables are color coded for quality of agreement. In the intern and doctor comparison, without the JLC, both the horizontal C/D agreements and the vertical C/D agreements are moderate. With the JLC, the agreement improves to substantial (over 0.6). When the entire group of interns and doctors is examined as a single large group the same is true (agreement for horizontal and vertical improves from moderate to substantial). So, for every comparison made in this study, interobserver agreement is better established with the use of the JLC. Using the Landis and Koch criteria, the agreement becomes "substantial" when using the JLC. A final t-test revealed that the differences in  $K_w$  for the intern group and the doctor group, with and without use of the JLC, is statistically significant ( $p=0.0239$ ).

## Discussion

Assessment of the optic disc is an essential part of glaucoma screening and management. Thinning of the neuroretinal rim of the optic nerve has long been accepted as a verifiable progression indicator or diagnostic factor for glaucoma. The challenge clinically is that this measure has been shown to have very little clinical reproducibility by different practitioners and even less reproducibility by practitioners of limited background and experience. Some studies have shown that this variability is noted in as many as 20% of cases varying up to 0.2 disc diameters.<sup>8</sup> The solution to this variability is to construct a standard way by which to grade this measure. Albeit, there is newer digital and laser technology

that has been developed to more objectively assess this measure, but for the purposes of this study we relied solely on subjective measures of the C/D ratio. As noted, consistent overestimation of the C/D may result in needless over-referral/over-management, while consistent underestimation may allow pathology to go undetected.<sup>6</sup> Reliable assessment of the C/D is essential for the diagnosis and monitoring of GLC.<sup>16</sup>

The most important characteristic of any grading system is its reliability; the ability of the grader and system to give similar results time after time.<sup>14</sup> With optometrists and ophthalmologists co-managing glaucoma patients, a single patient is likely seen by more than one practitioner. Interobserver agreement needs to improve so glaucomatous loss can be accurately recognized.

The C/D ratio has been shown to have questionable reproducibility by different practitioners and even less by practitioners of limited experience. The grading card improved the agreement of observers in both the optometrist and the intern group. It should be considered a valued instrument in the training of new examiners. Of additional note is that ophthalmologists' interobserver agreement has been previously noted as "substantial," with optometrists as "moderate." While many authors have commented upon the procedures to more reliably define the cup and disc borders (used in this study), few have commented on the mental processes required to determine the C/D in ratio form.<sup>4</sup>

The JLC process aims at standardizing the mental process. The use of the card places both optometrists and interns in the substantial agreement category with regards to  $K_w$ . The agreement is improved and statistically different comparing usage before and after the JLC method. With the standard deviation decreasing among observers as well, there is an argument to employ the JLC method in optometric education.

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The funduscopy grading card (JLC) can be obtained from Richmond Products: [www.richmondproducts.com](http://www.richmondproducts.com) 505-275-2406.

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## E-Portfolios: Using Electrons for Learning

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The portfolio has long been an excellent tool to showcase the work of our students. More often used in the liberal arts curriculum, a portfolio could contain samples of a student's best art work or highlight the development of writing samples throughout an academic term. More recently, the digital age has given birth to the *electronic* portfolio, which has revitalized this great educational resource.

An electronic portfolio, also known as an e-portfolio or digital portfolio, is a collection of electronic media, usually online. Users can gather together Word documents, PDF files, web resources, scanned images, and anything else electronic. In *The Learning Portfolio*, author John Zubizarreta describes e-portfolios as flexible, evidence-based processes that combine reflection and documentation.<sup>1</sup>

Three main types of e-portfolios include developmental, reflective, and representational.<sup>2</sup> Developmental e-portfolios document tasks the student has completed over a period of time and may be directly tied to learner outcomes or rubrics. Reflective e-portfolios include personal reflection on the content and how it relates to the student's development. Representational e-portfolios contain selective content to highlight the student's achievement of a particular goal.

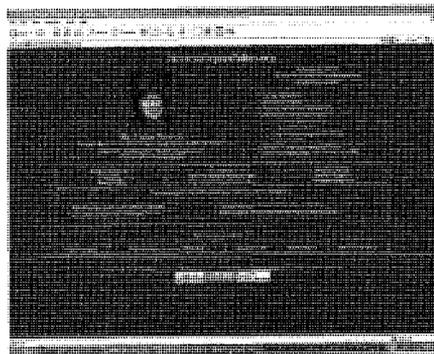
What are some uses of e-portfolios in optometric education? Perhaps a student could be assigned to research a topic for a didactic course and put together a collection of citations, pictures, and web resources demonstrating what she learned. Maybe a student could chronicle his experiences while on externship. Perhaps some portions of the curriculum could be presented in an independent-study format in which an e-portfolio would assess the student's

growth over time. The options are practically countless.

How do you institute e-portfolios into your learning scheme? On her website<sup>3</sup>, Helen C. Barrett, Ph.D. suggests development using the following stages:

### Stage 1: Defining the Portfolio Goals and Context

- Determine the audience and purpose for the portfolio.
- Determine the standards that will be used.
- Determine the hardware and software available/required.
- Determine the required technical skills of the portfolio developer.



- Determine the appropriate level to begin electronic portfolio development.

### Stage 2: The Working Portfolio

- Identify your portfolio artifacts (examples of your work in electronic form).
- Collect and save these examples in appropriate folders on your disk or server.
- Add individualized style and flair to the portfolio through the use of graphics.
- Use appropriate multimedia.

### Stage 3: The Reflective Portfolio

- Write reflective statements on achieving each goal for your portfolio.
- Select the examples that best represent achievement of your goals.

- Write statements for each example telling us why it was selected, its meaning and value in the portfolio.
- From your written reflections and feedback you receive, you can then set learning goals for the future.

### Stage 4: The Connected Portfolio

- You will need to organize your digital examples, create hypermedia links between goals, student work samples, and assessment.

### Stage 5: The Presentation Portfolio

- You may wish to present your E-Portfolios on disc, CD, DVD, or over the Internet or college Intranet.

E-portfolios may be just what you need to immerse your students in the learning process and to help them maintain active learning involving all aspects of their optometric education. If you currently use e-portfolios in your teaching, we would love to hear about it. Feel free to send us an email at [dmaino@ico.edu](mailto:dmaino@ico.edu) or [ggoodfel@ico.edu](mailto:ggoodfel@ico.edu).

### Reference List

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2. Mendoza-Calderon MA, Ramirez-Buentello J. Facilitating reflection through eportfolio at tecnologico de monterrey. In: Jafari A, editor. Handbook of research on eportfolios. Hershey: 2006. p. 484-93.
3. Barret HC. Electronic portfolios and digital storytelling for lifelong and life wide learning 2006 November 8 [cited 2006 Dec 1]; Available from: URL: <http://electronicportfolios.org>

Additional references and papers concerning E-Portfolios can be found at <http://www.lanacs.ac.uk/postgrad/ramirez/m/e-portfolio/eport2.htm>

Stanford Medical School E-Portfolio Information  
[http://lane.stanford.edu/services/about/edtech/files/2005-10\\_iamse\\_tobin\\_eportfolios.pdf](http://lane.stanford.edu/services/about/edtech/files/2005-10_iamse_tobin_eportfolios.pdf)

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\*Dk/t = 117 @ -3.00D. Other factors may impact eye health.  
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