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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Optometric Education
Assessment of Critical Thinking Skills and Disposition of Optometry Students
Jimmy H. Elam, O.D., F.A.A.O.
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Cover photo courtesy of Southern College of Optometry.
In this issue's article on critical thinking, Dr. Elam addresses one of my major concerns regarding optometric education in this era of rapidly expanding responsibilities.

Ten years ago medicine recognized the need for undergraduate medical education to adapt to changing needs (1993 Report on the World Summit on Medical Education and 1993 Report on Tomorrow's Doctors from the General Medical Council of England). Among the recommendations were curricular changes that promoted curiosity, self-directed learning and the critical appraisal of evidence. In other words, physicians should be critical thinkers. Isn't that also true for optometrists? Does the optometric curriculum deal adequately with this matter?

What is critical thinking, and why is it so important? According to one expert, the goals of critical thinking are to recognize propaganda, analyze hidden assumptions in arguments, recognize deliberate deception, assess the credibility of information, and work through problems and decisions in the best way. Critical thinking is usually regarded as necessary, although not sufficient in itself, for effective problem solving. There is no question, then, that critical thinking is an important component of clinical problem solving, and that is my concern. Are we teaching clinical problem solving well, and by what mechanism do we measure whether learning has taken place?

Can critical thinking be taught? Most experts would answer in the affirmative since thinking is a skill and therefore teachable. Also, the experts indicate that critical thinking is not merely a by-product of acquiring knowledge. I'm sure we have all seen examples of that — a brilliant individual with tremendous knowledge in a narrow field who has little ability to apply it. Critical thinking has to be actively promoted. The characteristics attributed to critical thinkers are flexibility, persistence, a willingness to plan, self-correct, be aware of their own thought processes, and be consensus seeking.

As Dr. Elam points out in his article, the current OAT (Optometry Admission Testing Program) does not specifically measure critical thinking. The test assesses critical thinking in questions that are of sufficient taxonomic level. Those questions where the student simply recalls a value from memory do not involve critical thinking to any significant extent. But we were encouraged to learn that as a result of a critical thinking task force appointed by ASCO, of which Dr. Elam was a member, the OAT is currently being revised to raise the taxonomic level of many portions of the exam. According to task force co-chair Dr. Kent Daum, the OAT contains elements of critical thinking in about 75% of the questions, and he indicates that the revision underway should increase that amount. The OAT task force did not recommend a test that measures only critical thinking because no instrument is currently available with sufficient accuracy and reliability.

Why all this concern about critical thinking? I believe critical thinking constitutes a basis for good clinical practice. Undergraduate optometric education must foster sound clinical judgment — often in the face of considerable uncertainty — in the student clinician. This is especially true as we move into the field of disease management. Defining a disease, diagnosing a disease, assessing the potential outcomes of various interventions and then deciding on the most effective clinical management plan are key features in effective decision-making. This is not to say that these factors aren't important in managing refractive errors or binocular problems, but we have had more time and experience in creating effective approaches for the treatment of these refractive and binocular problems.

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Dr. Arol Augsburger has been named president of the Illinois College of Optometry (www.ico.edu) by its Board of Trustees. He succeeds Dr. Charles F. Mullen, who served six years as president of the institution. Dr. Augsburger brings over 30 years experience in academic, clinical and organizational management in optometry to his position at ICO. Prior to his appointment, he served as interim provost at the University of Alabama at Birmingham (UAB). Previously, he had served as dean of UAB's School of Optometry. His teaching experience includes service at both the University of Alabama at Birmingham and The Ohio State University (TOSU). Following his graduation from The Ohio State University's College of Optometry, he provided over 20 years of clinical care through the TOSU clinics.

Dr. Augsburger served as president of ASCO from 1999 - 2000 and served four years on its Executive Committee. He held several board offices and served as president of the National Board of Examiners in Optometry (NBEO). He was named a fellow of the American Academy of Optometry (NBEO). He was named a fellow of the American Academy of Optometry (NBEO). He was named a fellow of the American Academy of Optometry (NBEO). He was named a fellow of the American Academy of Optometry (NBEO).

"Joining the nation's oldest and largest institution of higher learning dedicated solely to the teaching of optometrists is indeed an honor," said Dr. Augsburger. "ICO's excellent optometric curriculum, outstanding clinical program and first class facilities are at the forefront of contemporary optometry."

Dr. Augsburger received his bachelor's, master's and optometry degrees from The Ohio State University. Dr. Augsburger assumes the presidency on October 1.

Dr. Larry Davis was appointed dean of the University of Missouri at St. Louis School of Optometry, effective July 15. Dr. Davis, associate professor, has been a member of the faculty since 1993. His previous administrative assignments include acting dean, a role Dr. Davis assumed during the illness of the late Dean Jack Bennett, and subsequently, interim dean.

Under Dr. Davis' leadership, the faculty, staff and administration completed a comprehensive self-study, which included the development of a new strategic and outcomes assessment plan. The school underwent a successful accreditation site visit in November 2001 that resulted in an unconditional accreditation from The Accreditation Council on Optometric Education.

Before coming to the UM-St. Louis, Dr. Davis was an assistant professor of ophthalmology and director of the Contact Lens Service in the Department of Ophthalmology. He received his O.D. degree from Indiana University and completed a residency in cornea and contact lenses at the University of Missouri - St. Louis. He is a Diplomate of the Cornea and Contact Lens Section of the American Academy of Optometry and principal investigator for one of 15 participating clinics in the Collaborative Longitudinal Evaluation of Keratoconus (CLEK) study.

Two University of Alabama at Birmingham School of Optometry (UAB) faculty members will be inducted into the National Optometry Hall of Fame in October during the 2002 East-West Eye Conference in Cleveland. Dr. Lawrence Delucas, a professor of optometry and director of the Center for Biophysical Sciences and Engineering, was optometry's first astronaut. He made various contributions to the field of crystallography as a payload specialist on one of NASA's space shuttles. Dr. Melvin D. Shipp is a leading teacher of vision concerns in both optometry and public health. He has served as an administrator, educator and researcher at UAB and as treasurer of the American Public Health Association.

The Southern California College of Optometry reports the following promotions: Dr. Morris Berman to vice president and dean; academic affairs, Dr. Ken Brookman to assistant dean, academic affairs, Dr. Eric Borsting to professor; Dr. Elizabeth Hoppe to professor, Dr. John Lee to assistant professor and Dr. Susan Shin to assistant professor.

The Southern College of Optometry reports on the addition of five new faculty members. Dr. Russell W. Hart is an assistant professor teaching optics classes and providing clinical instruction. Dr. Hart was in private practice in Kansas for eight years. Dr. Ingrid Lorenzana, assistant professor in The Eye Center, was in private practice for five years and was assistant professor at Illinois College of Optometry. Dr. Eric Nosel, instructor, was previously a resident in SCO's pediatric/vision therapy service. Dr. Makedsha Sink, instructor, completed a residency at the Memphis VA Medical Center. Dr. Jim Williamson, assistant professor, was center director at Omni Eye Services - Memphis.
Can we actually teach our students to think in a critical fashion? I know that when we are acting as clinical educators we often use a multitude of methods to get our clinicians to think in a way that will lead them to an appropriate diagnosis and treatment plan. During my discussions with students, I usually use a "Socratic method" so that my students "see the light" when determining the best patient care plan for the data collected that day.

Are there other teaching methodologies available that will turn on the clinicians' "I see the light" mechanism? Yes, there are. Look no further than the Internet for assistance. Just go to the Critical Thinking Consortium at http://www.critical-thinking.org/ to access various resources. These resources include: how to design a course using critical thinking, how to get students to think in a critical fashion, and other materials (posters) to emphasize the importance of critical thinking.

Critical Thinking on the Web (http://www.philosophy.unimelb.edu.au/reason/critical/) also offers a host of resources, essays and web links to tantalize the teacher teaching thinking skills. You will find information on critical reading and writing, magazines dedicated to critical thinking, and information in the areas of health and medicine.

The Institute for Critical thinking (http://www.chss.montclair.edu/ict/homepage.html) presents topics on critical thinking theory and using critical thinking across disciplines.


Critical thinking in health care. A problem-based learning approach to assist students in developing critical thinking skills in health care from the University of Florida. http://www.hp.ufl.edu/courses/hsc4608l/

What is the state of information technology in higher education and how can the Internet help you answer that question? The first item on your agenda would be to read the article by Claudia Perry in this issue of Optometric Education and then visit:

Educause (http://www.educause.edu/) where you can find information about conferences, seminars, and best practices.

Other web resources include:


Critical thinking in dentistry Two courses designed to help students reinforce and incorporate the basic medical sciences in the care of their patients.

http://sdm.uchc.edu/predoctoral/curriculum/criticalthinking.shtml

Optometric Education

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Editorial
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In my editorial in the summer 2002 issue of Optometric Education, I discussed "the lecture," and you may remember that one of the downsides of the lecture method is that it does not usually address the development of higher order cognitive skills. In the Elam article, one of the findings was that third year students showed no significant difference in their critical thinking skills when compared to first year students. Courses in the curriculum that encourage critical thinking are certainly called for. Problem Based Learning (PBL) provides the conditions that are believed to support student learning, especially in the area of clinical decision making. Many experts believe that Problem Based Learning promotes critical thinking1. Although it is unlikely that a totally PBL curriculum is the ultimate answer (although some medical schools have gone that route), certainly the infusion of more PBL-type courses in institutions where they are absent might produce better critical thinkers.

In conclusion let me underscore Dr. Elam's call for incorporating critical thinking into the optometric curriculum and urge you to heed his general suggestions to enhance student critical thinking in the optometric curriculum.

References:

IN REMEMBRANCE

George W. Mertz, O.D., F.A.A.O.
July 2, 1946 – September 14, 2002

ASCO mourns the untimely death of Dr. George Mertz, friend and dedicated supporter of optometric education. As director of academic affairs at Vistakon, a Division of Johnson & Johnson Vision Care, Inc., he was unwavering in his support of ASCO’s mission, and was instrumental in the funding of its career promotion efforts, its Critical Issues Seminars and the Georgetown Summit Series on Optometric Education.

Dr. Mertz received his Doctor of Optometry degree from the University of California at Berkeley in 1975. He was involved in clinical research and professional education programs in the contact lens industry for over 25 years. Prior to coming to Vistakon, he held executive management positions at several contact lens manufacturing companies. In 1980, he worked at the Cornea and Contact Lens Research Unit, University of New South Wales, in Sydney, Australia, where he was involved in landmark research on the ocular physiological response to extended wear soft contact lenses.

He was a kind and gentle man and he is missed by many.
Vistakon Launches Consumer Marketing Campaign

As part of a comprehensive consumer marketing campaign, VISTAKON, Division of Johnson & Johnson Vision Care, Inc., is executing a series of new programs and partnerships to enhance the growth of the contact lens category and highlight brand awareness for the market leader — ACUVUE® Brand Contact Lenses. The expansive outreach combines celebrity sponsorships, color contact lenses TV ads, and participation in multi-cultural events nationwide to target the youth, entertainment and Hispanic markets. These tactics will assist Eye Care Professionals (ECPs) in expanding the vast potential of patients interested in contact lenses in their practice.

Launched in January 2001, the ACUVUE® Eye Health Advisor (AEHA) Program reinforces the VISTAKON commitment to partner with eye care professionals to elevate the need for eye exams and the value of their practices. AEHA provides literature, posters, and multimedia presentations that help eye care professionals educate patients in several areas including: diagnosing and treating vision disorders, ensuring patients satisfaction with their vision correction choices and encouraging patients to schedule annual eye exams. Consumers are also being educated through the exhibit, "The Science of Sight Experience" sponsored by ACUVUE®. The “Science of Sight Experience” is an interactive exhibit that is traveling to malls across America spreading the educational message about the importance of regular eye care.

Research Explores Vision-Related Quality of Life

Clinical research exploring whether a person’s overall visual experience can be enhanced by more than visual acuity was recently published in the July issue of the CLAO Journal as “Evaluation of Vision-Related Quality of Life for Patients Wearing Photochromic Lenses.” The research, funded by an independent grant from Transitions Optical, compares the experiences of patients wearing regular, clear lenses to their experiences wearing Next Generation Transitions® Lenses. Results showed that patients experienced a significant improvement in visual comfort and satisfaction with Transitions Lenses outdoors, and had equivalent experiences with both types of lenses indoors.

"While other instruments have measured general quality of life, no previous instrument has focused purely on vision-related issues involving daily activities in both indoor and outdoor environments and demonstrated the scientifically meaningful nature of differences measured," said Christopher J. Baldy, Ph.D., A.B.O.C, research associate for Transitions Optical, and part of the instrument development team. “With this tool, we can confirm clinically what many have believed intuitively for years - that the visual comfort provided by a lens that adjusts to varying light conditions can enhance a patient’s overall vision-related quality of life.” For questions related to the research, email researchinfo@transitions.com.

Paragon Receives Approval For Corneal Refractive Therapy

Paragon Vision Sciences received FDA approval for Paragon CRT, its Corneal Refractive Therapy contact lens, for overnight contact lens corneal reshaping for the temporary reduction of myopia. This is the first approval for this overnight indication. Paragon has spent years of research and development to establish the safety and efficacy of contact lens corneal reshaping in overnight use. The study involved 11 investigational sites and 205 patients. It was designed for overnight lens wear only and patient follow-up was for nine months. Patients in the study achieved the following visual results based on binocular vision: 93.3% with 20/32 or better and 67.4% with 20/20 or better. In the FDA study lifestyle questionnaire,
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91.7% of patients rated their post-treatment unaided daytime vision as good to excellent while rating their vision good to excellent at 91.5% with their previous vision correction modality. There were no serious adverse events reported in the study. The approved indications cover individuals with up to -6.00 diopters of myopia with or without astigmatism up to -1.75 diopters. The approval also mandates that eye care practitioners be trained and certified specifically in the fitting and prescribing of Paragon CRT.

“Eye care professionals are now able to offer an exciting option to consumers who desire freedom from contact lenses and spectacles during their waking hours, but who do not elect surgery. Paragon CRT is the safe, effective and convenient non-surgical vision correction option consumers have been seeking,” according to Joe Sicari, Paragon president and CEO.

Sola Announces Reorganization Of Sales and Marketing

SOLA International has announced changes to its sales and marketing organizations, with the goals of increasing demand for AO and SOLA products and improving service to all customers. The Marketing organization, based in Petaluma, California, will be divided into three groups: brand marketing, customer and lab marketing and marketing services. The North American Sales organization will be divided into three groups: the wholesale labs group, sales to managed care, wholesale labs in the Northeast and Canada and the chain retail group.

For more information, contact Jeff Hopkins at (707) 763-9911, ext. 6176.

Survey Shows Santen's Betimol® Lowers IOP

A national survey of 2,037 Americans sponsored by Santen incorporated found that only 27% have heard of ocular hypertension, a generally symptom-less condition that can be a precursor to glaucoma.

Only 7% of those who were aware of ocular hypertension know that it has no symptoms. Additionally, only 29% of the group at increased risk for ocular hypertension - those aged 40 and older - are aware of the condition or the need for regular screening.

“Beta-adrenergic antagonists are appropriate in the treatment of ocular hypertension in many patients with the condition,” stated Dr. Kuldev Singh, director of the Glaucoma Service at Stanford University School of Medicine. “I have found BETIMOL® is often an excellent choice in such patients who require IOP lowering. Besides being better studied than generic preparations, BETIMOL is generally well priced, especially in comparison with other branded topical beta-blockers.”

The survey was conducted by CARAVAN® ORC INTERNATIONAL for Santen, Incorporated, the U.S. subsidiary of Santen Pharmaceutical Co., Ltd. A pharmaceutical company founded in Osaka, Japan, in 1890, Santen specializes in treatments for eye and rheumatic diseases, offering both prescription and OTC products. Among prescription ophthalmic pharmaceuticals, Santen holds the top share within the Japanese market and is one of the leading ophthalmic companies worldwide. For more information, contact Ed Stevens at (858) 587-5670.

Marchon Announces New Senior Vice President

Marchon Eyewear, Inc., announced the appointment of Mr. Thomas Zettler to the newly created position of Senior Vice President, Managing Director of Marchon Europe, B.V. Mr. Zettler has extensive experience in consumer goods sales and marketing. Previously with AMER Group PLC, where he spent 11 years, Mr. Zettler held the position of Vice President of Global Sales and Marketing for Atomic Ski Products.

Marchon Eyewear, Inc., headquartered in New York, is the world’s largest, privately owned manufacturer and distributor of fashion, sport, and technologically advanced eyewear and sunwear with branches in all major international markets. Marchon has an impressive collection range of house brands and world-famous licensed brand names including Calvin Klein, CK Calvin Klein, Donna Karan, DKYN, Nautica, Nike, Disney and Fendi.

Zeiss Announces Slotkin As Director of Sales

Carl Zeiss Sports Optics, a division of Carl Zeiss, Germany, announced the advancement of Robert Slotkin to director of sales for North America. Slotkin will lead the birding, photo, government and optical sales division after a successful run during his 15 years at the Humphrey Division of Carl Zeiss Ophthalmic Systems.

Headquartered in Oberkochen, Germany, Carl Zeiss is a world-renowned manufacturer of optics. Zeiss pioneered the development of binoculars in 1894 and continued to build on its strength as an innovator by introducing the world’s first roof prism binocular in 1897 and inventing anti-reflection coating in 1935. The North American headquarters for the distribution of Zeiss sports optics is located in Chester, Virginia. For more information, contact Jason Clayborook at (804) 530-5842.

FDA Clears Labeling Claims for Alcon Contact Lens Solution

Opti-Free® Express® multi-purpose disinfecting solution earned two new labeling claims from the U.S. Food and Drug Administration. First, Alcon will add the words, “Lasting Comfort,” to its labeling, and second, users will be instructed that they no longer have to rinse their lenses after soaking for at least six hours.

“Opti-Free® Express® contains Tetronic 1304, which has been proven to attract moisture to the hydrophobic as well as hydrophilic sites on the lens surface,” said Dr. Ralph Stone, vice president, consumer products, R & D. "Tetronic 1304 remains on the lens for 24 hours, allowing it to stay comfortable longer."
Assessment of Critical Thinking Skills and Disposition of Optometry Students


Abstract
This study investigates the critical thinking attributes of optometry students for the first time. Critical thinking scores of students at different academic levels at one optometry school were compared. Associations between student demographics and critical thinking and between critical thinking and Optometry Admission Test (OAT) scores were investigated. No significant main effect was found for academic level or gender on critical thinking skills and disposition. Third year students had non-statistically significant lower critical thinking disposition scores than first year students. Critical thinking was not correlated with OAT scores. Suggestions for ways to enhance critical thinking in the optometric curriculum are given.

Key Words: Professional education, curriculum, critical thinking, cognition, Optometry Admission Test

Introduction
It has been suggested that optometry school curricula should promote as early as possible student-thinking attributes that emulate the qualities and characteristics of a clinician. Those attributes include critical thinking. Professionals use critical thinking to exercise sound, unbiased judgment in interpreting and analyzing information, to determine the nature of problems, to identify and evaluate alternative courses of action, to make decisions, and to monitor problem solving.

During the last decades of the twentieth-century an interest in the critical thinking abilities of college students emerged. Interest in college student critical thinking abilities came from several sources: (1) In the mid-1990’s Congress made improving college graduates’ critical thinking abilities a national objective in the Goals 2000: Educate America Act; (2) In 1997 an optometry school in the southeastern United States adopted a five-year institutional strategic plan that included critical thinking as an educational goal, and (3) In 1997 an optometry school in the southeastern United States adopted a five-year institutional strategic plan that included critical thinking as an educational goal, and (4) In 1999 the Association of Schools and Colleges of Optometry (ASCO) assembled a task force to examine the critical thinking content of the Optometry Admission Test (OAT). This study represents the first assessment of critical thinking attributes of optometry students in the United States. The purpose of the study was to ascertain if a difference existed in critical thinking skills and disposition between academic class levels and gender of optometry students at one optometry school. First year and third year students served as subjects. The following research questions were addressed:

1. Is there a difference in critical thinking skills and critical thinking disposition between optometry students at different academic levels?
2. Is there a difference in critical thinking skills and critical thinking disposition by gender of optometry students?
3. Is there an interaction between student academic level and gender affecting critical thinking skills and critical thinking disposition?
4. Are there associations between critical thinking skills and dispositions with selected student characteristics?
5. Are there differences between subjects in selected characteristics?
6. Are there any correlations between critical thinking skills and dispositions scores and scores on the Optometry Admission Test?
7. Is there a correlation between total critical thinking skills and total critical thinking disposition scores?

For the purpose of this study, the following definition of critical thinking was established:

Critical thinking is the process of purposeful, self-regulatory judgment. This process gives reasoned consideration to evidence, context, conceptualizations, methods, and criteria.

Optometry schools and colleges may use results from the study in different ways: (1) Comparing student group critical thinking abilities, (2) Expanding the profile of a successful optometry student, (3) Developing programs to integrate critical thinking, and (4) Advising students with academic problems. Results may also be used in revision of the OAT.

Methods

Study Design
This is an ex post facto study with a cross-sectional, between-subjects, and 2 X 2 factorial configuration.

Optometry school academic class
level, with first year and third year academic classes, as categories, and gender are factors. Dependent variables include critical thinking skills total scores and critical thinking disposition total scores and their respective sub-test scores. Students' demographic information, including age, grade point average, socioeconomic status, work history, and college attendance history, are obtained to characterize subjects and answer study questions.

**Instrumentation**

Three instruments were administered to subjects: (1) The Student Demographic Questionnaire (SDQ), developed by the investigator, (2) The California Critical Thinking Skills Test (CCTST) and (3) The California Critical Thinking Disposition Inventory (CCTDI), both standardized cognitive psychological tests.

The SDQ contains demographic questions about gender, age, race, undergraduate grade point average, undergraduate major, years of college, marital status, socioeconomic status, and work experiences (Appendix A). The investigator analyzed responses to the SDQ.

The CCTST measures six critical thinking skills scores, an overall total score and five sub-scales. The five sub-scales are (1) analysis, (2) evaluation, (3) inference, (4) deductive reasoning, and (5) inductive reasoning. The test publisher scored responses on the CCTST.

The CCTDI is designed to measure the attitudes, expectations, and beliefs associated with an individual's disposition toward critical thinking. Among the attributes the CCTDI measures are (1) truth-seeking, (2) open-mindedness, (3) analyticity, (4) systematricity, (5) self-confidence, (6) inquisitiveness, and (7) maturity. The test publisher scored responses on the CCTDI.

The OAT is designed to measure general academic ability and comprehension of scientific information. The OAT consists of four subtests: (1) natural sciences, which include biology, general chemistry, and organic chemistry; (2) reading comprehension; (3) physics; and (4) quantitative reasoning. OAT scores of the subjects were obtained from the optometry school for use in the study.

**Subjects**

All subjects attended an optometry college in the southeastern United States at the time of the study. A total of 189 subjects participated (Table 1). Approval from The University of Memphis Institutional Review Board was obtained for the collection of data from human subjects. Subjects were grouped according to academic class level and gender. One academic level was composed of newly admitted first year students and the second was composed of students finishing their third year.

The first group was included in order to obtain baseline levels of student critical thinking skills and disposition before any course-work had been completed in optometry school. The inclusion of the second group provided an opportunity to measure the critical thinking skills and disposition of students who had completed most of their on-campus courses while in optometry school. The basis for measuring critical thinking attributes at the end of the third year was to reduce confounding influences from off-campus clinical learning experiences and to enhance assessment of the effect of the on-campus curriculum on student critical thinking skills and disposition. The fourth year class was not chosen because those students are customarily divided into two segments, with one segment participating in on-campus clinical rotations at the Eye Institute for two quarters. The second segment participates in off-campus clinical rotations during those quarters. For the remaining two academic quarters the two segments are reversed, with on-campus students going off-campus.

**Procedure**

Test instruments were administered to the first year class during the beginning of the fall 1998 academic quarter and to third year students during the spring 1999 academic quarter. Subjects were given sufficient time to complete their SDC before the administration of the two critical thinking measuring instruments. All but two of the 122 students in the first year class participated in the study (n = 120, 98%). Since the SDQ and CCTST were given on one day and the CCTDI on another day to the first year students, different numbers of first year students took the two critical thinking measuring instruments. There were 114 (93%) first year students who took the CCTST and 119 (97.5%) who took the CCTDI. The statistical program only used data from subjects that had taken both critical thinking measuring instruments for multivariate analysis. Of 118 students in the third year, 58% (n = 69) participated in the study. Third year subjects were administered the SDQ, CCTST and CCTDI during one testing session, although they did not all attend the same testing session.

**Data Analysis**

SPSS 9.0 was used for statistical analysis. Research questions 1-3 are investigated by use of a general linear model (GLM) multivariate analysis of variance procedure (MANOVA). The procedure considers the effects of factors on several dependent variables at once. An analysis of variance procedure (ANOVA) was used to investigate differences in means of CT skills and critical thinking disposition between academic class levels and gender. Another ANOVA was similarly performed to investigate differences in means of critical thinking dispositions between academic class levels and gender. Different statistical measures of association were used to investigate research questions 4-7. Pearson's product-moment correlation, chi-square, eta coefficient, and Mann-Whitney U tests were performed.

**Results**

**Critical Thinking Skills**

The CCTST overall total mean was 17.85 and the standard deviation was
Gender: a = Computed  
Class * Effect between academic classes (Table 2).  
No measures of critical thinking skills were found to have statistically significant difference between means for gender. Only one measure of critical thinking disposition showed a significant difference between genders of optometry students. Open-mindedness had a significant difference between genders (F [1, 179] = 4.41, p = .037), with females being more open-minded. This statistically significant difference should be interpreted cautiously since the multivariate test is not significant.

Critical Thinking Disposition  
The CCTDI total mean for the combined classes was 307.57 with a standard deviation of 27.20. CCTDI total mean for the first year class was 311.95 with a standard deviation of 28.53. CCTDI total mean for the third year class was 300.35 with a standard deviation of 23.28.

Research Questions  
Research question 1 asks if there is a difference in critical thinking skills and critical thinking disposition between optometry students at different academic levels. GLM MANOVA indicates academic class level had no statistically significant main effect on critical thinking skills and disposition (F [12, 168] = 1.648, p = .08). No statistically significant differences between means were found for total critical thinking skills test scores and individual critical thinking skills sub-scores between academic classes (Table 2).

Some measures of critical thinking disposition were found to have statistically significant difference between means for academic classes. Statistically significant differences were found between means for the total disposition and three of seven disposition scales; total disposition (F [1, 179] = 7.62, p = .006), open-mindedness (F [1, 179] = 4.99, p = .02), systematics (F [1, 179] = 7.21, p = .008), and analyticity (F [1, 179] = 8.72, p = .004). The third year subjects had lower critical thinking disposition scores than the first year subjects. However, these statistically significant differences should be interpreted cautiously since the multivariate test is not significant.

Research question 2 asks if there is a difference in critical thinking skills and disposition by gender of optometry students. No significant overall main effect from gender was found for critical thinking skills and disposition (Table 2). No measures of critical thinking skills were found to have statistically significant difference between means for gender. Only one measure of critical thinking disposition showed a significant difference between genders of optometry students. Open-mindedness had a significant difference between genders (F [1, 179] = 4.41, p = .037), with females being more open-minded. This statistically significant difference should be interpreted cautiously since the multivariate test is not significant.

Research question 3 asks if there is an interaction between optometry student academic class level and gender affecting critical thinking skills and disposition. No significant class-gender interaction main effect was found for critical thinking skills and disposition (Table 2). No individual measures of class-gender interaction with critical thinking skills or critical thinking disposition displayed significance.

Research question 4 asks if there are any associations of measured student characteristics with critical thinking skills and critical thinking disposition. Results from the SDQ were analyzed for an association with CCTST total scores and CCTDI total scores. The statistical procedures conducted for question four depended on the scale of the respective SDQ question. Since CCTST and CCTDI variables are interval levels of measurement, if a SDQ variable was also an interval variable, a Pearson's product-moment correlation was performed. For instance, if a SDQ variable was nominal or ordinal, a chi-square and an eta coefficient were performed. None of the demographic information from any of the 18 questions of the SDQ showed a significant association with total critical thinking scores or total critical thinking disposition scores.

Research question 5 asks if there are differences in the measured demographic characteristics between first year and third year optometry student subject groups. Results from the SDQ were compared between the two academic class groups. Student characteristics measured by the SDQ were found to have a non-normal distribution except for undergraduate GPA. The statistical procedure conducted depended on the scale of the SDQ response, as in research question four. One variable, academic class level, was always nominal. If an SDQ variable was also nominal, such as gender, statistical association was investigated with a chi square test for significance and an eta test for measure of strength of association. If an SDQ response was interval or ratio, such as age, the non-parametric Mann-Whitney U test was performed. Two SDQ questions were found to have significant differences between the two academic classes. A significant difference was found for age (Mann-Whitney U = 1793, p < .0005) and years in college (Mann-Whitney U = 213.5, p < .0005). No other demographic information was found to have a significant difference between the two academic classes.

Research question 6 asks if there are any correlations between scores on the OAT with total critical thinking skills scores and total critical thinking disposition scores. Pearson correlation coefficients were calculated for critical thinking skills and critical thinking disposition.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Multivariate Test of CCTST and CCTDI by Class and Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect</td>
<td>Test</td>
</tr>
<tr>
<td>Class</td>
<td>Pillai's Trace</td>
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<tr>
<td>Gender</td>
<td>Pillai's Trace</td>
</tr>
<tr>
<td>Class * Gender</td>
<td>Pillai's Trace</td>
</tr>
</tbody>
</table>

α = Computed using an alpha value of .05
thinking skills total scores and critical thinking disposition total scores from the combined academic classes with OAT scores from the combined academic classes. Total critical thinking skills scores were significantly correlated with seven of eight OAT scores. Positive correlations were found for all of the associations. Significant correlations were found between total critical thinking skills scores and Quantitative Reasoning ($r = .26, p < .001$); Reading Comprehension ($r = .34, p < .001$); Biology ($r = .17, p = .016$); General Chemistry ($r = .19, p = .007$); Physics ($r = .26, p < .001$); Total Science ($r = .22, p = .002$) and; Academic Average ($r = .37, p < .001$). The Organic Chemistry OAT score was not significantly correlated with total critical thinking skills scores ($r = .02, p = .73$).

Research question 7 asks if there is a correlation between total critical thinking skills and total critical thinking disposition scores. The Pearson product-moment correlation procedure found no correlation found between the two scores ($r = .035, p = .63$).

### Discussion

When compared to beginning first year students, who had not completed any of the curriculum, results from Research Question 1 suggests third year students had not significantly changed their overall critical thinking skills. Some measures of their critical thinking disposition were less than those of the first year students. However, no significant main effect for academic class level on critical thinking skills and critical thinking disposition was found for subjects. A numeric increase for all critical thinking skills sub-scores from the first year group to the third year group of subjects was found. However, no individual univariate tests for critical thinking total skills or sub-scores were significant. As with the omnibus multivariate test, no significant change in critical thinking skills was observed.

Third year students displayed less of a propensity to engage in critical thinking than first year students. All of the critical thinking disposition scale scores decreased from the first year group to the third year group. Four of eight univariate scores for critical thinking disposition were significant for differences between academic class levels. However, as stated, the omnibus multivariate tests revealed no main effect significant difference for critical thinking disposition between first year and third year groups.

Results from Research Question 2 support the notion there is no gender difference in critical thinking attributes. One major use of MANOVA is to investigate relationships between independent variables. Results from Research Question 3 suggest neither academic class level nor gender status had an influence on the other variable. Results from Research Question 4 suggest no associations were found between student characteristics and critical thinking skills and disposition. This may be a result of the homogeneous composition of the student population. For instance, most subjects were biology majors, there was a limited range of undergraduate grade point averages (GPA), and few subjects had done anything but go to school for almost their entire life. Admission to optometry school is rigorous and competitive. Students who best match the admissions criteria are admitted to the program. This reduces the variance of student characteristics, such as GPAs and OAT scores.

Only two measured student characteristics, according to results from Research Question 5, were found to have significant differences between the two academic class levels. They were subject age and years of college attended. There was approximately a two-year difference between the mean ages of the two groups. This is expected since there is a two-chronological year difference between first and third years.

Total critical thinking skills and most of the OAT subscores have a positive low-to-moderate correlations, according to results from Research Question 6. Only the organic chemistry OAT subtest did not show a significant correlation. General chemistry, however, did have a significant correlation with total CT skills. This may be an indication of a difference in how questions on the two chemistry subtests were written. General chemistry questions could have required more thinking by students while the organic chemistry subtest may have relied more on rote memory for correct answers. Lack of correlations between total critical thinking disposition and the OAT is probably a reflection of the nature and purpose of the two tests. The CCTDI is intended to be a measure of the disposition toward critical thinking, while the OAT is designed to measure general academic ability and the comprehension of scientific information. They are currently measuring two different educational constructs. It is not possible to accurately predict critical thinking skills from OAT scores. However, an OAT task force recently suggested that the OAT be rewritten to include an increased measure of student critical thinking.

Lack of a correlation between total critical thinking skills and total critical thinking disposition scores could stem from two possible sources. The first is that there truly was no correlation between the scores. The second source could be the result of the homogenous nature of the student population and the low amount of differences found between academic classes in Research Question 5.

Results of this study suggest that an increase in the critical thinking skills and disposition of optometry students may not have occurred because the explicit critical thinking promotion in the curriculum was limited or nonexistent. Previous research supports the results of this study. Facione et al. found no improvement over time in critical thinking skills of college students who had received no critical thinking instruction. College students who had received critical thinking instruction had a significant improvement in their critical thinking skills. He suggests that an increase in critical thinking is not automatically the result of going to college. The current study reveals some evidence of a decrease in disposition of third year students compared with first year students. This may be the result of an emphasis of other types of pedagogy in the curriculum and a low amount of critical thinking pedagogy that the third year students may have experienced.

Several comments may be made about incorporating critical thinking into the optometric curriculum. For instance: (1) Overall critical thinking skill levels may be assessed for succeeding years to learn if there are gains in student critical thinking abilities, (2) overall critical thinking skill levels could be compared for different student groups with the general student population, different minority groups' overall critical thinking skills could be compared with those of the general student population to appraise if curricular changes may be indicated to improve critical thinking, and (3) critical thinking subtest scores could be used on an individual student basis to detect whether specific critical thinking skills are deficient in order to initiate counseling or remediation of skills.
The following are general suggestions for ways to enhance student critical thinking in the optometric curriculum: (1) assess student critical thinking abilities at the beginning of their educational program and reassess periodically; (2) establish a specially designated critical thinking indoctrination course during a student's first academic term; (3) employ critical thinking pedagogy in some courses during a student's first academic term; (4) continue critical thinking pedagogy throughout a student's academic program; (5) integrate critical thinking pedagogy into existing courses; (6) systematically monitor critical thinking pedagogy; (7) encourage and support faculty member initiatives to teach critically; and (8) encourage and support a critical thinking environment by exercising faculty member and administrator role modeling; and (9) encourage and support a critical thinking environment by expecting student critical thinking at all academic levels.

Acknowledgment

This study was performed to satisfy dissertation requirements for a Doctor of Education degree in Higher and Adult Education from The University of Memphis.

References

Appendix A

Student Demographic Questionnaire

1. Gender: M / F
2. Age:
3. Race: White / African-American / Asian / Native-American / Other
4. Undergraduate cumulative grade point average (GPA):
5. Undergraduate major:
6. Graduate major (if previously attended graduate or professional school):
7. Total number of years of college to date:
8. Marital Status: S / M / D
9. Number of Children:
10. Do your children currently live with you? Y / N / NA
11. Which job category does your father’s occupation best fall into?
   a. Unemployed
   b. Blue collar
   c. White collar/Professional
   d. Top level executive
12. What is the highest educational level attained by your father?
   a. Elementary (K-8)
   b. Secondary (9-12)
   c. Post-secondary (college freshman-senior level)
   d. Graduate (beyond college senior level)
13. Which job category does your mother’s occupation best fall into?
   a. Unemployed
   b. Blue collar
   c. White collar/Professional
   d. Top level executive
14. What is the highest educational level attained by your mother?
   a. Elementary (K-8)
   b. Secondary (9-12)
   c. Post-secondary (college freshman-senior level)
   d. Graduate (beyond college senior level)
15. Which of the following best describes your parent’s annual income level?
   a. Poverty income level
   b. Low-middle income level
   c. High-middle income level
   d. High income level
16. Have you uninterruptedly attended college full-time (not considering summers) since high school to date? Y / N
17. Number of years employed full-time since high school (not summers between college):
18. Primary job category employed in full-time (not summers between college), if any, since high school:
   a. Blue collar
   b. K-12 teacher
   c. College teacher
   d. Health (nurse, technician)
   e. Health (doctoral level)
   f. Engineer
   g. Business, white collar (Corporate)
   h. Business, white collar (Self-employed)
   i. Data processing
   j. Homemaker
   k. Other

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The State of Information Technology in Higher Education — How Does Optometry Compare?

Claudia A. Perry, Ph.D., F.A.A.O.

Abstract

The trend toward widespread dependence on computing in modern life has profound implications for the future of the educational enterprise. The availability of data on the state of information technology (IT) is essential to guide the planning process within optometric education, as it is for higher education as a whole. This paper reports on the findings of a survey coordinated by the ASCO Informatics SIG, and adapted with permission from the Campus Computing Survey authored by Kenneth C. Green. Responses are compared to similar data collected in the 1999 Green study to ascertain the relative position of IT in optometric education vis-à-vis higher education at that point in time, and the perceived need for continued data collection. Results are placed within the context of recent developments in IT affecting the status of higher education in general. Resources likely to be of use in tracking relevant issues also are included.

Key words: Information technology, academic computing, optometric education

Introduction and Background

Computers in American Society

The remarkable spread of computing throughout all aspects of American life has progressed at a rate that would have seemed nearly inconceivable only a decade ago. Since 1984, "the country has experienced more than a five-fold increase in the proportion of households with computers," to 51 percent, or 54 million households, according to a U.S. Census Bureau survey in August 2000. Further, Internet use has now become so common as to make computer availability and Internet access nearly synonymous. While only 18 percent of households had Internet access in 1997, four out of five home computer users (44 million households) reported the ability to go online in the 2000 survey. The additional finding that 9 in 10 school age children had access to a computer either at home or in school suggests that computer use will become even more widespread in the near future.

Computers in Higher Education

Not surprisingly, this shift in computer access has had a substantial impact on the expectations of students in higher education. One measure is the reception given the widely publicized — though controversial — surveys of "Most Wired Colleges." Although the surveys have been criticized for their methodologies and purported ambiguity, featured colleges often publicize their rankings as a means of distinguishing themselves in a competitive marketplace.

Though not as widely reported in the popular press, another effort to address the perceived information needs of prospective students is the EDUCAUSE Guide to Evaluating Information Technology on Campus. Widely disseminated both online and as a printed pamphlet, this consumer guide identifies the types of questions prospective students and their parents should ask when considering colleges. Topics range from such issues as technology fees, required computer purchases, or the existence of hardware and software standards, to the availability of electronic library reserves, and faculty use of technology in instruction. The guide also properly notes that career choice and choice of majors have an impact on a student's need for specialized equipment and resources.

Computers in Optometric Education

The trend toward widespread dependence on computing throughout the workplace, in daily life, and in education has profound implications for planning, budgeting and structuring the very nature of the educational enterprise. This is no less true for optometric educators than for decision-makers throughout higher education. On a purely practical level, perceptions of the role and adequacy of computing resources can play a role in an institution's ability to attract and retain high quality students and faculty. Faced with declining or at best stable applicant pools in recent years, awareness of institutional technological readiness can be one more public relations tool to "sell" the optometric program to prospective students and their parents.

Dr. Perry is an associate professor at the Graduate School of Library and Information Studies at Queens College. City University of New York. Previously, she was assistant dean for Educational Information Services at the SUNY State College of Optometry. Dr. Perry is past co-chair of ASCO's Informatics SIG.
Indeed, educational programs in a variety of the health professions have emphasized the importance of information technology skills and infrastructure in preparing graduates to deal with the demands of future practice. Newly minted doctors of optometry must be as well prepared to deal with this rapidly changing world of information technology as their counterparts in medicine, nursing and pharmacy.

In recognition of these developments, the Association of Schools and Colleges of Optometry (ASCO) approved the founding of the Informatics Special Interest Group (SIG) in 1997 to address the range of issues relating to the optimal use of information technology in optometric education. Among the first questions raised by the SIG were the following: 1) What is the status of computing and information technology (IT) in the schools and colleges of optometry? 2) How does the status of IT in optometric education compare with that of higher education in general, and 3) Is there an ongoing program of data collection relating to IT issues necessary and useful for planning within optometric education?

This paper will report on the findings of the resulting survey, distributed in the fall of 1999 to the Informatics SIG representatives of participating institutions. The survey was designed to collect baseline data on the technology infrastructure in the schools and colleges of optometry, as well as information on related problems, plans, and expectations. The survey instrument was adapted with permission from Campus Computing 1998: The National Survey of Information Technology in Higher Education, by Kenneth C. Green, and was distributed in October 1999. The results will be compared to similar data collected in the 1999 Green study to ascertain the relative position of IT in optometric education vis-à-vis higher education at that point in time, and the perceived need for continued data collection.

In addition, the paper attempts to place the general trends affecting the role of IT in optometric education in the context of developments affecting higher education as a whole. Lastly, the article identifies relevant organizations and resources that should aid key decision-makers in tracking important developments affecting the future and status of computing and information technology on campus.

Methodology

The Campus Computing Survey, coordinated by Kenneth C. Greene, is the largest continuing study of the use of information technology in American higher education. Begun in 1990, the annual survey focuses primarily on issues relating to academic computing and solicits detailed input from a cross-section of institutions of higher learning across the United States. Adapting selected questions from this highly cited publication series provided a means to assess the status of IT in optometric education using a well-tested and well-accepted survey instrument.

In addition, if facilitated the comparison of the state of IT in optometric education at a particular point in time with that of higher education in general.

The Green survey is a detailed instrument encompassing more than 60 multi-part questions, many with 10 to 25 sub-components. Questions range from the specifics of budget allocation, campus computer ownership, staffing and product standards, to perceptions of the importance of a range of technology-related issues. In 1998 and 1999, respectively, it was administered to representative samples of 1,623 and 1,392 two- and four-year U.S. colleges and universities.

Questionnaires were mailed to the chief academic computing officer, or the chief academic officer if no chief academic computing officer could be identified. Usable returns numbered 571 and 530, for a response rate of 35.2% in 1998 and 38.1% in 1999. There are slight differences in the questions included in the survey from year to year, based on changes in the external environment, but the overall emphasis is quite consistent.

Given the relatively small numbers of schools and colleges of optometry nationwide, a much higher response rate than that achieved in the Green survey was a top priority for the SIG for its own survey in order to obtain representative data. Reducing the length of the adapted instrument was deemed essential to achieve this objective. In addition, the varied nature and structure of the schools and colleges created difficulties in wording questions so that reasonably comparable data could be collected both from free-standing schools and those that are part of larger university systems. A preliminary survey was drafted by the author, then a SIG co-chair, based on the 1998 Green questionnaire (This was the most recent survey instrument available at the time.) Evolving drafts were reviewed and pre-tested by selected faculty, administrators and technology staff at the SUNY College of Optometry, as well as by members of the SIG leadership at the time (past-chair Dr. William Dell, co-chair Dr. Mark Sawamura, and ASCO liaison Ms. Carol Brubaker). Comments and suggestions for improvement were incorporated into a revised questionnaire. The instrument was mailed to the designated Informatics SIG contact at participating optometric institutions in October 1999. Institutional representatives were asked to consult with other campus contacts if they were unable to respond to some of the questions. A preliminary report was presented at the December 1999 Informatics SIG breakfast, and additional responses were received in subsequent months.

Survey Response Rate and Review

By the spring of 2000, responses had been received from 15 of 16 institutions with a designated Informatics SIG representative for an impressive 93.75% response rate. [Note: Despite ongoing efforts to encourage participation in the Informatics SIG, full representation from all 17 schools has not yet been achieved as of this writing. Further information on the SIG may be obtained at http://www.ferris.edu/mco/informatics/]. The cover memo had noted that if selected data were unavailable, surveys with a few missing responses were preferred over no survey at all. Consequently, the number of responses varied from question to question.

An overview of the survey results was presented to participants at the ASCO Critical Issues Seminar on Distance and Distributed Learning in March 2000 in Santa Fe, New Mexico. The attending deans and presidents requested the opportunity to review and update the initial survey responses in order to double-check the accuracy and interpretation of collected data. Copies of previously submitted questionnaires were therefore mailed to all 17 deans and presidents in April 2000 along with a cover letter requesting permission to publish the revised results and suggestions for possible changes. This resulted in selected changes for some responses.

A particular area of concern was the presentation of data relating to
ratios between numbers of technology support staff and those of faculty, staff and administrators. Survey responses were inconsistent in terms of the reporting of faculty/staff numbers, with some indicating FTE, and others total numbers. Further, in many instances it was difficult to ascertain an accurate count of technology staff supporting the needs of the optometry program. For example, a portion of a staff member’s time might assist a particular department, while others supported the program as a whole. In those programs in a larger university setting, a centralized technology office often provides the majority of support. There also may exist wide variations in use of technology by part-time and full-time faculty-staff. Consequently, it appeared best to omit these problematic data from the overall analysis. Other than this, the deans and presidents had no objection to the publication of the survey results.

Results

This overview is designed to highlight major themes and perceived issues reported by the survey respondents. Where appropriate, results from the survey of optometry schools will be compared to national trends reported by Green in the 1999 National Survey.11

Essential Planning Issues

Paralleling trends across higher education, respondents at optometry schools emphasized concerns about the integration of technology into instruction, and the adequacy of user support and staffing at their institutions. As shown in Table 1, the integration of technology into instruction was the most highly ranked of 21 items in the campus computing/information technology environment potentially affecting IT policy and planning over the next two to three years. It also was the top choice as the single most important issue and the single most important goal for reporting optometry institutions. However, the high priority assigned to related issues such as technology staffing, the provision of adequate user support, and the need to develop budget models to fund technology suggest that addressing this challenge will not be easy. The limited range of responses indicates a fair degree of consensus regarding the importance of these technology issues in optometric education. The full listing of campus ratings of the perceived importance of various IT resources and issues in the overall campus computing information technology environment and in IT Policy over the next two to three years is reported in Appendix A.

Faculty/Student Preparedness

A situation complicating the goal of achieving a better integration of technology into instruction is the state of readiness of the institution in terms of infrastructure and the skill levels of personnel. Optometry respondents rated academic faculty as better equipped to use technology as a resource both in instruction and in scholarship than their clinical counterparts (see Table 2), and comparable to perceived overall faculty preparedness in the 1999 Green study.11,12 The disparity between assessments of the two categories of optometric educators may reflect the greater flexibility of academic as compared to clinical schedules, the relative mix of full- and part-time faculty in the basic sciences as opposed to the clinical sciences, and the time available to different categories of faculty to develop their technology skills.

Perceptions of how well our institutions are preparing professional students for the computer/IT skills they will need over the next decade were just below the mid-point (3.85) on a scale of 1-7. The mean response for optometry student preparedness in fall 1999 was markedly lower than comparable 1999 figures in the Green survey (3.6 on a 5 point scale).11,12 This could mean that incoming students in future years may enter optometry school better prepared to use technology than the current group of students, but still suggests the need for improvement in preparing optometry students for the techn-
nology challenges they are likely to encounter as practitioners over the next decade. Further, one would anticipate the need to raise clinical faculty expertise in order for them to be able to model desired behaviors and teach required skills.

Facilities and Resources
Optometry schools and colleges fare well in many aspects of their facilities. At the time of the survey, ten of 15 institutions reported the availability of a secure campus intranet, with several more under development. A majority of institutions had access to dual slide projection, LCD projection, video, and instructor network connections in all classrooms. Only two institutions reported network connections to every seat in all or selected lecture halls.

As noted in Table 3, ASCO respondents held somewhat higher perceptions of the adequacy of a number of elements in the technology infrastructure at the schools and colleges than did their counterparts in the Green survey, with mean responses ranging between 5.40 and 6.20 on a 7 point scale. A striking exception to this trend was the low ranking of adequacy of user support, with a mean of 3.31. This also is much lower than the 4.8 rating of user support services reported in the Green study.

Although the current analysis is unable to provide hard figures on technical staffing ratios at the schools and colleges, clearly the issue of user support is closely related to staffing concerns in higher education in general. Green notes that “user support ratios on college campuses are well below those found in organizations and corporations of similar size and technological complexity” with mean responses ranging between 5.40 and 6.20 on a 7 point scale. A striking exception to this trend was the low ranking of adequacy of user support, with a mean of 3.31. This also is much lower than the 4.8 rating of user support services reported in the Green study.

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Despite the apparent availability of technology in the instructional setting, there was nonetheless widespread variability in the degree to which technology was reportedly used at the time of the survey, as shown in Table 4. The top four most widely used IT resources in either the ASCO survey or the Green survey are bolded. The disparity between the response for “Computer-based classrooms or labs” and that for “Presentation handouts” may reflect confusion about the first item that could be clarified in a subsequent version of the survey instrument. The nearly universal availability of LCD projection and Internet connectivity in optometry school lecture halls makes possible the response receiving the highest average proportion of use, presentation handouts (presumably accompanied by a projected computer presentation such as Powerpoint).

While over a quarter of all optometry instructional sessions were estimated to make use of electronic mail, this is substantially lower than the 53.4 percent reported in Green’s 1999 survey. This may be due to the nature of the full-time, lockstep curriculum characteristic of optometric education, and its relatively small class sizes. Optometry students may have an easier time meeting with their instructors face-to-face than do typical students in higher education.

### Table 3
Perceived Adequacy of Technology Infrastructure (Scale of 1-7)

<table>
<thead>
<tr>
<th></th>
<th>ASCO Survey (n=15) 1999 data</th>
<th>Green Survey (n=530) All Campuses 1999 data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic mail</td>
<td>6.2 (1-7)</td>
<td>n/a</td>
</tr>
<tr>
<td>Computer networks/</td>
<td>5.8 (3-7)</td>
<td>5.7</td>
</tr>
<tr>
<td>data communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online reference sources in the campus library</td>
<td>5.6 (2-7)</td>
<td>5.3</td>
</tr>
<tr>
<td>Lecture Hall projection capabilities</td>
<td>5.5 (2-7)</td>
<td>n/a</td>
</tr>
<tr>
<td>Telecommunication/</td>
<td>5.4 (3-7)</td>
<td>5.2</td>
</tr>
<tr>
<td>phone system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequacy of user support (numbers)</td>
<td>3.1 (1-6)</td>
<td>4.8</td>
</tr>
</tbody>
</table>

*Mean ratings using scale from 1="Poor" to 7="Excellent"
reducing the need to depend on electronic mail for instructional communication needs. Institutions participating in the Green survey also reported a much higher proportion of use of outside Internet resources, perhaps reflecting the relatively limited availability of Web resources pertinent to the optometric curriculum as compared to more general educational programs.

Web-based Services

Like their counterparts in higher education, the schools and colleges are using the Web to offer a wide range of services to their constituents. Green reports even greater use of the Web to provide campus services in his 2000 and 2001 survey summaries. By extension, one would expect much greater use of the Web to provide key campus services at the schools and colleges at this point in time. Such efforts reflect a desire to meet student expectations for greater convenience in the provision of routine services, and to improve individual and organizational efficiency. The schools and colleges fared particularly well in this area, with responses close to ten or more percentage points higher than those in the Green survey in seven categories (see Table 5). In contrast, responses in the Green survey were ten points higher than optometric education in only four categories.

Technology Fees and PC Ownership Requirements

Given widespread concern in higher education regarding technology budget issues and infrastructure, the issue of technology fees as a means of offsetting funding needs has received heightened interest in recent years. The 1999 data indicate that 46.9% of survey respondents in the Green survey charge a required technology fee to students, as compared to 13.3% of optometric institutions. Optometry schools have been understandably reluctant to charge additional student fees given their already steep tuition rates, and in light of the troublingly high debt burdens of their students and recent graduates. Nonetheless, an additional 20% of optometry respondents indicated that a technology fee was under consideration at their institutions.

Despite the high profile given schools such as Wake Forest University, which have issued laptops to all incoming students as part of their overall tuition costs, a surprisingly low 2.7% of respondents in the Green survey indicated that PC ownership was required of all students. An additional 30.5% recommend the purchase of a PC, very close to the 26.7% of responding optometric institutions. Ongoing data collection at SUNY and other optometry schools suggests that regardless of recommendations or requirements, a steadily increasing proportion of optometry students are likely to have access to a computer at home. Whether this will reduce the need for computer access on campus, throughout a typical student’s tightly scheduled day, is a question open to further investigation.

Future IT Issues

In addition to questions exploring the “single most important IT issue” confronting institutions of higher education over the next two to three years, both the Green survey and the ASCO survey solicited feedback on the perceived importance of a range of items likely to affect the overall campus computing/IT environment, and IT policy and planning, over the next 2-3 years. The optometry survey used a subset of the 80+ questions asked in the Green survey, in order to limit the total length of the questionnaire. This subset was supplemented by questions perceived to be of special interest to optometric education, such as the use of digital cameras and digital slide scanners. Respondents replied using a Likert scale, with 1 = “Not Important” and 7 = “Very Important.”

Figure 1 compares the responses for a number of these key items. (The full data for all 21 questions posed to optometry respondents are listed in Appendix A.) Interestingly, only one of the 21 items in the optometry survey (thin client computing) received a response below the mid-point on the seven-point scale. This may be due to

Table 4

<table>
<thead>
<tr>
<th>Estimate of the Proportion/Percentage of Instructional Sessions That Use Selected IT Resources</th>
<th>ASCO</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (Range)</td>
<td>1999 M</td>
</tr>
<tr>
<td>Computer-based classrooms or labs</td>
<td>37.50 (0-90)</td>
<td>24.7</td>
</tr>
<tr>
<td>Computer-based simulations or exercises</td>
<td>8.33 (0-20)</td>
<td>17.6</td>
</tr>
<tr>
<td>Presentation handouts (e.g. Powerpoint)</td>
<td>59.58 (25-95)</td>
<td>41.3</td>
</tr>
<tr>
<td>Electronic Mail</td>
<td>27.08 (0-100)</td>
<td>53.4</td>
</tr>
<tr>
<td>Database Searches (e.g. MEDLINE)</td>
<td>10.83 (0-30)</td>
<td>n/a</td>
</tr>
<tr>
<td>Commercial courseware/Computer-assisted instruction (CAI)</td>
<td>5.00 (0-20)</td>
<td>13.8</td>
</tr>
<tr>
<td>Self-produced CAI</td>
<td>5.83 (0-20)</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Both groups held similar views on the importance of developing course-related Web pages. Given the heavy burden of equipment optometry students are required to bring to clinical sessions, it is perhaps not surprising that notebook or laptop computers were considered less of a priority in optometric education than in the more general higher educational setting. A clear exception to this trend is the approach implemented at Pacific University College of Optometry, where all entering students in the class of 2005 were required to own laptop computers effective September 2001. It will be interesting to follow the impact of this innovation over time.

Two of the added questions in the optometry survey, relating to the future importance of digital slide scanners and digital cameras, placed between the creation of course-related Web pages and distance learning in their relative rankings, with mean responses of 5.37 and 5.33 respectively. The highly visual nature of optometric education suggests that mechanisms for capturing high quality images are likely to be an essential precursor to the more extensive use of technology-assisted instruction in the optometric curriculum.

Discussion and Conclusion

Despite selected differences, the most telling observation from analysis of the two surveys is their strong similarity in responses. For both schools and colleges of optometry and higher education, the 1999 data reflect a strong concern for: 1) how best to achieve the integration of technology into instruction, 2) how to address technology staffing and user support needs, and 3) how to fund the technology infrastructure. Like much of higher education, optometry schools appear to have developed good on-site technological infrastructure and good basic policy development to assist in planning for future growth. Use of the institutional Web site to provide essential campus services appears to have been particularly well-developed among the schools and colleges at the time of the survey.

However, like much of higher education, substantial challenges relating to information technology issues confront optometric education. In addition to those already mentioned, these include intellectual property issues; the development of faculty reward structures that encourage faculty to experiment with learning, teaching and technology; and the need for mechanisms to assist and support faculty in the effective use of IT resources.

The two most recent versions of the Green survey highlight issues both new and familiar. The 2000 survey notes continuing struggles to retain IT personnel and help them stay current in their skills, as well as continued growth in the use of technology in the classroom, and in the provision of campus services on the Web. Nonetheless, Green reports that compared to the availability of electronic services in the consumer and corporate spheres, “it’s clear that [the] campus community is perhaps two years behind in its eCommerce and eService offerings.” Such services are likely to be especially difficult to implement at smaller campuses. Other findings from the most recent Green survey include indications of declining technology budgets and the growing importance of wireless computing.

---

The table below summarizes what is on the Campus Web Page.

**Table 5: What’s on the Campus Web Page?**

<table>
<thead>
<tr>
<th>ASCO Survey (n=15)</th>
<th>Green ’99 Survey (n=530)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printable application</td>
<td>66.7%</td>
</tr>
<tr>
<td>Interactive application</td>
<td>40.0%</td>
</tr>
<tr>
<td>Application, unspecified</td>
<td>n/a</td>
</tr>
<tr>
<td>Current course catalog</td>
<td>60%</td>
</tr>
<tr>
<td>Program requirements</td>
<td>86.7%</td>
</tr>
<tr>
<td>E-commerce</td>
<td>13.3%</td>
</tr>
<tr>
<td>Library catalog</td>
<td>80.0%</td>
</tr>
<tr>
<td>ILL services</td>
<td>40.0%</td>
</tr>
<tr>
<td>Journals/Ref sources</td>
<td>80.0%</td>
</tr>
<tr>
<td>Course reserves</td>
<td>46.7%</td>
</tr>
<tr>
<td>Student transcripts</td>
<td>33.3%</td>
</tr>
<tr>
<td>Instructional software</td>
<td>53.3%</td>
</tr>
<tr>
<td>Faculty/staff directory</td>
<td>93.3%</td>
</tr>
<tr>
<td>Student directory</td>
<td>46.7%</td>
</tr>
<tr>
<td>Student handbook</td>
<td>26.7%</td>
</tr>
<tr>
<td>Alumni information/services</td>
<td>93.3%</td>
</tr>
<tr>
<td>Press releases</td>
<td>60.0%</td>
</tr>
<tr>
<td>Campus bookstore</td>
<td>26.7%</td>
</tr>
<tr>
<td>Course syllabi</td>
<td>40.0%</td>
</tr>
<tr>
<td>Other</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Note: Responses 9.8 or more percentage points higher than those in the alternate survey are bolded.
As noted in the introduction, an initial question framed by the Informatics SIG was whether an ongoing program of data collection relating to IT issues is necessary and useful for planning within optometric education. Clearly, any ongoing program of systematic data collection is both time-consuming and labor-intensive, especially in a small profession such as optometry. The present findings suggest that the status of IT in optometric education strongly parallels the larger universe of which it is a part. Where necessary, targeted data collection efforts might be employed to meet specific information requirements in the future. However, monitoring of the many other IT indicators in higher education should be sufficient to meet most of the information needs of key decision-makers in optometric education regarding computing trends.

While this paper has focused primarily on data from the long-running Campus Computing Survey, a number of nonprofit organizations have attempted to track the evolving role of computing in higher education. As noted previously, EDUCAUSE, perhaps the largest and best-known organization concerned with the role of IT in higher education, has just published its second annual current issues survey. Appendix B provides a Web bibliography of selected organizations and initiatives that should prove useful to those interested in monitoring key issues in the field. Faculty, administrators and other key decision-makers are strongly encouraged to avail themselves of these exceptional resources in order to better address the substantial challenges that information technology is likely to present to optometric education for many years to come.

Acknowledgements:

This paper would not have been possible without the valuable input and strong support of the ASCO Informatics SIG, the ASCO Board, the deans and presidents of the schools and colleges of optometry, and Carol Brubaker, ASCO staff liaison. In particular, the ASCO Board graciously approved funding for the licensing fee required to adapt the questionnaire. A special thanks is due to the following individuals for their work in coordinating data collection at their respective institutions: Arthur Afanador, Bette Anton, Linda Casser, Brenda Collins, David Corliss, Jorge Cuadros, William Dell, Michael Fendick, Suzanne Fermer, Douglas Freeman, Ronald Jones, William Long, Dominick Maino, William Rainey, Mark Sawamura, Scott Steinman, and Mark Swan. Thanks also are due to Carol Brubaker, William Dell, Michael Heiberger, Mark Sawamura, Marc Seybold, and Elaine Wells for their helpful feedback on early survey drafts. Any errors in analysis or interpretation are the sole responsibility of the author.

References

10. Green, KC. Campus computing 1998: the
Appendix A: Strategic Technology Resources and Issues in Optometric Education
Perceived importance in the overall campus computing information technology environment and in IT Policy over the next 2-3 years.

<table>
<thead>
<tr>
<th>Technology or Issue</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staffing</td>
<td>6.73</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>E-mail</td>
<td>6.73</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Integrating technology w/instruction</td>
<td>6.73</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Network security</td>
<td>6.73</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Web access</td>
<td>6.67</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>User support</td>
<td>6.53</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Internet resources for instruction</td>
<td>6.47</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>PC presentation facilities</td>
<td>6.40</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Budget mechanisms to finance technology</td>
<td>6.33</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Technology goals/plans</td>
<td>6.13</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Course Web pages</td>
<td>6.00</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Hardware/software standards</td>
<td>5.87</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Electronic calendaring</td>
<td>5.47</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Digital slide scanners</td>
<td>5.37</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Digital cameras</td>
<td>5.33</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Courseware development</td>
<td>5.13</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Wireless computing</td>
<td>4.93</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Distance learning</td>
<td>4.93</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Document management</td>
<td>4.86</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Notebook computing</td>
<td>4.73</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Thin clients</td>
<td>3.79</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix B: Useful Resources Relating to Information Technology in Higher Education

EDUCAUSE. EDUCAUSE is arguably the preeminent association concerned with the role of information technology in higher education. With a membership "comprising more than 1,800 colleges, universities, and education organizations, including over 180 corporations," it promotes the intelligent use of information technology (IT) through a variety of programs, ranging from professional development activities, conferences, electronic and print publications, strategic policy initiatives, research, and awards. Participation in the CIO listserv is highly recommended, as are the online information resources available on the EDUCAUSE website. If you consult only one source on this list, make it this one. Available at: http://www.educause.edu. Accessed 12 June 2002.


The Pew Learning and Technology Program: "The Pew Learning and Technology Program is an $8.8-million, four-year effort to place the national discussion about the impact that new technologies are having on the nation's campuses in the context of student learning and ways to achieve this learning cost-effectively." Available at: http://www.center.rpi.edu/PewHome.html. Accessed 12 June 2002.


The Teaching, Learning and Technology (TLT) Group. A subscriber supported organization that aims to "motivate and enable institutions and individuals to improve teaching and learning with technology, while helping them cope with continual change." Useful listservs, resources and programs. Available at: http://www.tltgroup.org/default.htm. Accessed 12 June 2002.

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- Generous leave and holidays
- Mobility that comes with a nationwide health care system
- Federal retirement plan similar to 401K

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Guidelines for Designing A Clinical Extern Site Orientation Manual

Jeffrey A. Myers, O.D., F.A.A.O.

Abstract
Clinical optometric education benefits greatly from the use of a wide variety of student clinical extern rotation sites. This diversity creates a need for students to know about many logistical details before they arrive at various clinical extern rotation sites. A survey of the schools and colleges of optometry in North America reveals that some, but not all, clinical extern sites prepare an orientation manual to help student externs be better prepared. Additionally, no survey respondent has any guidelines for preparing a manual. This paper presents detailed guidelines for the preparation of a clinical extern site orientation manual as well as a checklist for preparing such a manual.

Key words: Optometry, extern, orientation manual, clinical optometric education

Introduction
An exciting facet of optometric education is the use of off-campus extern rotations that has evolved greatly in the last twenty years. These opportunities for clinical practice experience outside the academic environment have long been part of professional education. Examples of other professions that include these types of rotations are medicine, education, architecture, veterinary medicine, pharmacy, nursing, and physical therapy.³ Evaluations of these extern rotations consistently demonstrate that students describe greater self-confidence, better understanding of “real-world” practice, better time management, increased relevance and reinforcement of didactic teaching as a result of an extern experience.²,⁴

While state laws limit the scope of optometric practice in a legal sense, an individual’s true scope of practice is limited by his/her education and confidence in his/her knowledge and abilities. The patient population of many campus-based clinics is limited, often skewed to a healthy, college-age population, limiting the opportunity for optometry students to gain clinical confidence. Optometry education administrators, seeing the need to expand the clinical practice experience by having optometry students manage a broad range of clinical situations, have developed numerous clinical extern rotations at all the schools and colleges of optometry.⁵

Off-campus extern rotations provide a wide variety of practice settings for students. These settings include private solo and group optometric practices, private solo and group ophthalmological practices, hospital and outpatient clinics in the Department of Veterans Affairs, Indian Health Service hospitals, laser centers, referral (co-management) centers, military hospitals and clinics, specialty optometric clinics (contact lens, vision therapy, low vision, pediatrics and vision rehabilitation), schools for the blind, rural and neighborhood health centers, low vision centers, surgical centers, HMO’s, general and specialty hospitals, and medical ambulatory clinics.³³–⁶ Often, students in their fourth professional year will spend 50% or more of their time in clinical extern rotations.⁵

The extern rotations provide optometry students an opportunity to come in contact with patients of varying ages, races, cultures, and socioeconomic situations. The wide variety of health delivery systems available in extern rotations also gives students an opportunity to sample potential professional practice situations.

Schools and colleges of optometry in the United States and Canada use a variety of types of extern rotations to achieve specific goals. Often, more than one extern rotation must be completed. Usually, one of the rotations focuses on ocular disease and may be hospital-based. Other types of rotations may focus on gaining a large volume of patient-care experience, on a particular aspect of optometric care, or focus on primary care and the business aspects of private practice. The extern rotations have a wide variety of schedules, from one to five days per week for an academic quarter. Locations vary from a few miles from the college campus, allowing easy commuting, to several thousand miles away, requiring temporary housing for the duration of the externship.

The diversity of the externship rotations creates many challenges for the optometric student extern. Among these is learning the logistical details and clinical expectations of each rotation. One option the student has is to discuss such challenges with...
the college faculty. However, the college faculty usually has not experienced the externship and cannot provide complete information.

Another option the prospective extern has is to communicate with students who have completed, or are in the process of completing, the rotation. However, the extern site director is better able than a former student to provide the prospective student with orientation information regarding performance objectives and expectations. Often, the school or college of optometry will provide general background information regarding the rotation to assist prospective externs in selecting a rotation suitable to their interests. Nevertheless, this does not address the need for site-specific logistical information.

Clearly, the best method for preparing the student for the extern experience is for the extern site director to communicate the specifics of the program. The simplest way to handle this type of communication comprehensively, including all vital pieces of information, is to do it in writing. This is where a clinical extern site orientation manual can be of great help. In my practice, my staff and I developed an extern site orientation manual for primary care externs from The Ohio State University College of Optometry who rotate through our practice. This led us to inquire about the existence of guidelines for preparing such a document. Additionally, we created a template that could be used by other extern site coordinators to produce their own manual.

**Survey Methods and Results**

In an effort to gather information on extern site orientation manuals, a survey of the clinic directors/extern coordinators of the 19 colleges and schools of optometry in the United States and Canada was conducted via electronic mail. Ultimately, representatives of fourteen schools and colleges (listed in Table 1) responded within 10 weeks to these questions:

1. Do your affiliated extern sites use an extern site orientation manual?
2. Does the college have any guidelines regarding the preparation of a manual?

The responses to Question 1 were varied. Two colleges reported that no extern sites use orientation manuals. One college reported that most sites use some type of orientation manual. The remainder of the colleges reported that a few extern sites use an orientation manual, but most do not. It is interesting to note that representatives of the colleges are unfamiliar with the manuals that do exist. This suggests extern site coordinators who use manuals should share them with their affiliated college.

The responses to Question 2 were universally “No.” No school or college of optometry in the United States or Canada that responded to the survey reported guidelines or a suggested template for the preparation of an extern site orientation manual. While there are orientation manuals from most colleges regarding general issues of externship rotations, site-specific extern orientation manual guidelines do not exist.

Since colleges of optometry and extern site directors want students to be comfortable with and knowledgeable about the extern experience, it seems logical that student externs be given specific details about the site they will be attending. Imagine traveling across several states to an extern site and not knowing how to get there, what to wear, what equipment to bring, whether you will see patients the first day, or what to plan for lunch on the first day of your rotation. Providing this information to externs before they arrive at an extern site seems to be both respectful and professional.

<table>
<thead>
<tr>
<th>College/School of Optometry</th>
<th>Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indiana University School of Optometry</td>
<td>Dr. Steven Hitzeman Chrissy Kefauver</td>
</tr>
<tr>
<td>Michigan College of Optometry at Ferris State University</td>
<td>Dr. Nancy Peterson-Klein</td>
</tr>
<tr>
<td>New England College of Optometry</td>
<td>Dr. Roger Wilson</td>
</tr>
<tr>
<td>Nova Southeastern College of Optometry</td>
<td>Dr. Kimberly Reed</td>
</tr>
<tr>
<td>Pacific University College of Optometry</td>
<td>Dr. Kenneth Oakland Martina Fredericks</td>
</tr>
<tr>
<td>Pennsylvania College of Optometry</td>
<td>Dr. Gwenn Amos</td>
</tr>
<tr>
<td>Southern California College of Optometry</td>
<td>Dr. Raymond Maeda</td>
</tr>
<tr>
<td>Southern College of Optometry</td>
<td>Dr. Richard Goodson</td>
</tr>
<tr>
<td>State University of New York College of Optometry</td>
<td>Dr. Richard Weber Dr. Diane Adamczyk</td>
</tr>
<tr>
<td>The Ohio State University College of Optometry</td>
<td>Dr. Robert Newcomb Dr. Gregory Nixon</td>
</tr>
<tr>
<td>University of Alabama-Birmingham School of Optometry</td>
<td>Dr. John Classe</td>
</tr>
<tr>
<td>University of Houston College of Optometry</td>
<td>Dr. Nick Holdeman Dr. Ralph Herring</td>
</tr>
<tr>
<td>University of Montreal College of Optometry</td>
<td>Dr. Etty Bitton</td>
</tr>
<tr>
<td>University of Waterloo School of Optometry</td>
<td>Dr. Marlee Spafford Dr. Susan Leat Dr. Jeff Hovis</td>
</tr>
</tbody>
</table>
What follows are suggestions about the topics that should be addressed to prepare your extern for the rotation. These guidelines are based on the author’s own experience as a primary care extern site director for The Ohio State University College of Optometry. A condensed version can be seen in Table 2.

**Introduction/Practice History**

The purpose in this section is to give the extern a feel for the history and flavor of the practice.
- Welcome the student to your site and state your desire for his/her success.
- Tell about the history of the practice: how long it has been established, names of doctors who have been involved in the past, who is involved now.
- Describe any subspecialty of the practice.
- Describe any previous locations that have been used.
- Describe what makes this site unique as an extern site.

**Educational Goals and Objectives**

Formally state the educational goals and objectives for the extern rotation. These should be consistent with the affiliated college’s goals for the type of experience that you are providing. As described above, extern rotations fulfill a wide variety of clinical education needs. These include emphasis on disease, primary care, and specialty practice. While the educational goals and objectives will be similar to and consistent with the affiliated college’s goals for extern rotations, state the specific educational goals and objectives of the extern rotation. Additionally, explain the process by which the student will be evaluated in meeting the educational goals and objectives. This is particularly important if it differs in any way from the college’s evaluation method.

**Facilities**

Describe the physical facilities of the site. Include the following:
- Size of space.
- Number of exam rooms and ancillary testing rooms.
- Size and location of the eyewear and contact lens dispensaries in the clinic.
- Provide a floor plan of the clinic to allow students to gain familiarity with the layout.
- Describe the geographical location of the clinic. Choices might include: imbedded in a medical center, a freestanding neighborhood clinic, a surgical center, strip mall, an interdisciplinary setting, urban, suburban, or rural location.
- Give specific directions and approximate travel times from the college campus if the student will be commuting to the clinic.

If the extern needs to make housing arrangements, describe possible housing arrangements, such as the availability of a housing stipend, or a list of local housing available for short-term lease.

Describe how mealtime issues are handled. Explain how much time is allowed and how it is structured. Describe any kitchen facilities that are available in the clinic or if a cafeteria is available in the medical center. If the extern may leave the site for lunch, explain about the location of nearby restaurants and/or grocery

---

**Table 2**

*Topic Checklist for Extern Site Orientation Manual*

<table>
<thead>
<tr>
<th>A. Introduction</th>
<th>Welcome, practice history, practice type</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Goals</td>
<td>Rotation goals and educational objectives</td>
</tr>
<tr>
<td>C. Facilities</td>
<td>Size, number and types of rooms, physical location, demographic style</td>
</tr>
<tr>
<td>D. Logistics</td>
<td>Directions to practice, housing, meals, optometric equipment, other needs</td>
</tr>
<tr>
<td>E. Schedule</td>
<td>Daily schedule/days of week, first day observation or patient care, non-patient care responsibilities</td>
</tr>
<tr>
<td>F. Exam protocols</td>
<td>Testing expected for each type of patient visit</td>
</tr>
<tr>
<td>G. How to prepare</td>
<td>Patient population, specialty care, reading list</td>
</tr>
<tr>
<td>H. Policies</td>
<td>Dress, attendance, other duties, evaluations, disciplinary action, emergency contact in practice</td>
</tr>
<tr>
<td>I. Patient Management Policies</td>
<td>Where and how are patients referred for additional care</td>
</tr>
<tr>
<td>J. Recordkeeping</td>
<td>Sample forms, acceptable abbreviations</td>
</tr>
<tr>
<td>K. Biographies of Doctor(s), key staff</td>
<td></td>
</tr>
<tr>
<td>L. Confidentiality statement</td>
<td></td>
</tr>
</tbody>
</table>
Figure 1
Sample of rotation schedule for Primary Care Extern Rotation
(20% time)

Appendix A
Weekly assignments

<table>
<thead>
<tr>
<th>Week</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Orientation to the facility&lt;br&gt;Meet the staff&lt;br&gt;Obtain forms, handouts, brochures, and newsletters&lt;br&gt;Preceptor observation</td>
</tr>
<tr>
<td>Week 2</td>
<td>Preceptor observation (Scribe)&lt;br&gt;Observe and discuss accounts receivable (10%)&lt;br&gt;Observe and discuss accounts payable (10%)&lt;br&gt;Discuss contact lens management (10%)</td>
</tr>
<tr>
<td>Week 3</td>
<td>Preceptor observation (75%) (Scribe)&lt;br&gt;Front desk observation (25%)</td>
</tr>
<tr>
<td>Week 4</td>
<td>Observe preliminary testing (50%)&lt;br&gt;Observe optical dispensing and selection (25%)&lt;br&gt;Observe scheduling/appointing/front desk (25%)</td>
</tr>
<tr>
<td>Week 5</td>
<td>Do preliminary testing (60%)&lt;br&gt;Observe and discuss recall (10%)&lt;br&gt;Observe and discuss accounts receivable (10%)&lt;br&gt;Observe and discuss accounts payable (10%)&lt;br&gt;Discuss contact lens management (10%)</td>
</tr>
<tr>
<td>Week 6</td>
<td>Do preliminary testing (60%)&lt;br&gt;Discuss dispensary management (10%)&lt;br&gt;Discuss and observe insurance billing (10%)&lt;br&gt;Discuss insurance reimbursement (10%)&lt;br&gt;Discuss insurance plan selection (10%)</td>
</tr>
<tr>
<td>Week 7</td>
<td>Examine patients</td>
</tr>
<tr>
<td>Week 8</td>
<td>Examine patients</td>
</tr>
<tr>
<td>Week 9</td>
<td>Examine patients</td>
</tr>
<tr>
<td>Week 10</td>
<td>Examine patients</td>
</tr>
</tbody>
</table>

If the opportunity for an 11th visit is available, the extern will examine patients. Please have each staff member sign off each week to indicate your experience with them. The preceptor will review your progress weekly.

stores. Describe any meal discounts or vouchers available.

Externs need to know if they should be prepared to see patients on their first day in the clinic, what optometric equipment is provided, and what equipment they are expected to provide.

Describe anything else that the externs should have completed or bring with them on the first day. These might include multiple forms of positive identification, evidence of physical examination, or evidence of immunizations.

Openly discuss safety and security issues. Inform the extern of areas near or routes to your office that should be avoided. Additionally, describe any history of known security issues in your office or parking area. Recommended preventive action could include removing faceplates from car stereos, having an escort to a parking area at night, protocol for seeing prisoners in a practice, or knowledge of previous difficulty with individual patients.

Schedule
- Describe the schedule for the days that the extern will be present and the number of hours the extern is expected to be on site.
- Point out multiple sites if such are used.
- Identify the minimum number of days that must be completed at the
extern site to satisfactorily complete the rotation.

- Describe whether the extern sees patients during the entire rotation, and if the student does any observation in the clinic prior to seeing patients.
- Explain if the student will interact with other staff members to learn about different office systems.
- Describe any administrative duties for which the extern is responsible, e.g., peer review, grand rounds, journal club, etc.
- Describe any enrichment opportunities that exist for the rotation, such as surgery observation, meeting with lab reps, laser surgery observation, interdisciplinary observation, etc. Describe how to schedule the opportunity and whether it will be on-site or off-site.
- Include a specific schedule if a variety of activities occur in the rotation. These might include interdisciplinary observation, interaction with the staff, administrative duties and enrichment opportunities as described above. Our Primary Care Extern rotation schedule is shown in Figure 1.

Types of Visits

Describe how patients are scheduled and the types of visits that are performed. Explain what testing is expected with each type of visit, how the clinic identifies each type of visit on the schedule, and if there is any type of visit for which the extern will not be responsible.

How to Prepare

Describe the patient population that the student will see and the prevalence of types of patients such as:

- Primary care
- Geriatric
- Pediatric
- Secondary/tertiary care
- Surgical, both pre-op and post-op
- Contact lens patients
- Vision therapy patients

Identify the areas of clinical care that the extern may want to review before arriving for the rotation. For example, if contact lens care is a part of the extern rotation, it would be useful for the extern to know the commonly prescribed brands of contact lenses used. This would allow the extern to review the available parameters and fitting guides. Likewise, if disease management is part of the rotation, it would be useful for the extern to know what the commonly prescribed medications are. If vision therapy is part of the rotation, it would be useful to inform the extern what types of problems are managed.

Consider a reading list if prior preparation and study are appropriate for your site.

General Office Policies

Policies will vary depending on the type of clinic. Some issues to consider addressing in your policies are as follows:

- Appropriate dress for the extern.
- Attendance standards for successful completion of the externship. Describe how planned and unplanned absences are handled. Explain if make-up sessions are required for absences.
- Patient flow, timing of the case presentation to the preceptor and arrangements for making the case presentation to the patient.
- Expectation of extern to perform to a high level of care.
- Expectation of extern to handle any administrative duties, covering & uncovering instruments, filing records, dispensing eyewear, teaching contact lens instruction, performing visual fields, etc. Include a general statement informing the extern that he/she will be expected to perform some non-clinical duties.
- Explain who has input into the extern evaluation process.
- Include a statement about unprofessional conduct and discipline. Describe causes of need for discipline or immediate dismissal.
- Include a statement about the completion of any requirements for the school or college with which the extern is affiliated. These might include an extern evaluation of the site, case report(s), a patient log, a report of systems in the office, etc.
- Explain any benefits available to the extern, specifically complimentary examinations and materials for externs and families.
- Include specific instructions about who the extern is to call if there is an emergency in the extern’s life. Confirm the extern’s responsibility and include the names and telephone numbers (home, pager, cell phone) that the extern would need to use.

Patient Management Policies

Describe the procedure for getting additional care for patients, and whether consults are handled within the clinic or sent to other offices. List the common practitioners consulted and their area of specialization.

Recordkeeping

Provide samples of the examination forms used in the clinic, completed properly. A list of acceptable abbreviations used in the clinic is helpful. If different forms are used for different types of visits, include each of them, again completed properly. If electronic records are used for any part of the patient record, explain when and how the extern will use them and include samples.

Biographies of Doctor(s) and Staff

Depending on the size of the clinic, include information about the doctors and staff members that the extern will meet. In a clinic with only one doctor, a biography of the doctor and all the staff may be appropriate. In a multi-doctor clinic, information about the doctors and key staff members may be appropriate. In a very large clinic, information about only the doctors who commonly interact with the extern may be most appropriate.

Information about doctors might include academic degrees earned, amount of time at this clinic, special areas of professional interest, academic appointments, community service interests, research projects, and family information. Information to include for staff might be time employed by the practice, job duties, credentials, family information, and interests outside the practice.

Confidentiality Statement

Include a statement to be signed by the extern that he or she will keep patient information and names confidential unless the patient has given the extern written permission to the contrary. Our confidentiality statement is shown as Figure 2.

Summary

As students rotate through the extern program, ask them about the accuracy of the manual, its helpfulness,
Figure 2
Sample of Confidentiality Statement

Confidentiality Statement

I understand that all patient information, both medical/optometric and financial, is privileged communication between patients and Dr. Jeffrey A. Myers, d.b.a. Winchester Vision Care.

In consideration of this, I agree to keep all such information confidential, both during and following my Primary Care Extern rotation with Dr. Myers.

NameDate

and areas that could be improved. Include the suggested changes in future revisions. Remember that this is truly a dynamic document and will continually be changing and improving.

Several students have used our extern orientation manual. When asked for their comments, each student has responded that the manual was helpful in preparing for their rotation in our office. One student’s comments in his evaluation of the extern rotation revealed that the use of an extern orientation manual sent an unintended message. He writes, “...Dr. Myers certainly is doing it [the extern rotation] for our benefit. I realized this when I was the only student given ...(a) manual for the Primary care extern (rotation)....” It is my conclusion that the orientation manual has had a positive impact in the preparation of our student externs.

Further, it is disappointing that no guidelines exist for the creation of site-specific extern orientation manuals. I encourage directors of the extern rotations at the colleges and schools of optometry to use the template presented here. The standardization of an orientation manual format would ultimately raise the quality of the extern experience. Many of the site coordinators for extern sites have little time to devote to creating such a document. However, if this template were used and site coordinators were encouraged to create an extern orientation manual, it is my belief that many would take the time to do so.

Additionally, I encourage extern site coordinators to prepare an extern orientation manual. Ultimately, it saves time through increased extern efficiency. And, as noted by the student’s comment above, it is an appreciated effort.

The important issue is to help prospective externs prepare for a rotation in each site in the best manner possible. These students are our colleagues in the family of optometry. They deserve to have the best preparation possible. By informing the extern about all of these issues prior to arrival, all parties know the expectations. This will help each extern to make the most of his or her time at each rotation site.

Footnotes

d Southern California College of Optometry. Outreach Clinical Service curriculum description. [description on-line] (Fullerton, California, accessed 8 November, 2001); available from http://www.scco.edu/ link to Course Information, Fourth Professional Year, Outreach Clinical Service.

References


Is Optometric Education Available Online?

Tables of contents from the last five years of Optometric Education may be viewed at ASCO’s website - www.opted.org.

Go to publications and choose “search archives” or “view past issues.”
illuminating articles that will help educators solve the challenge of integrating information technology into teaching and managing educational organizations and finally:

Where do you find hundreds of resources for computing in education? Just log on to Resources for Computing in Education at http://plato.acadiau.ca/sandbox/pdl/links.htm and you'll discover information for organizations, classroom instruction, faculty and many publications.

Do you have ideas on how to use technology for critical thinking? I'd love to hear them. Send all your suggestions and comments to Dominick Maino at dmaino@ico.edu.
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