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Articles

Student Performance and Perceptions Following Incorporation of Eyesi Indirect Simulators into the Optometric Curriculum

Heather A. Anderson OD, PhD, FAAO, Amber Gaume Giannoni OD, FAAO, and David A. Berntsen OD, PhD, FAAO | Optometric Education: Volume 42 Number 2 (Winter-Spring 2017)

Abstract

Background: This study evaluates simulation for training binocular indirect ophthalmoscopy (BIO) skills.

Methods: Students completed portions of Eyesi Indirect (VRmagic) courseware in fall 2014 prior to completing a BIO skills assessment for which performance was compared for three years prior (2011-2013) and during incorporation (2014) of simulation technology. **Results:** Scores did not differ across 2011-2013 ($p = 0.153$), but did differ when comparisons included 2014 ($p = 0.032$). The number of perfect scores in 2014 was greater than in years prior ($p = 0.001$). **Conclusion:** Incorporation of simulation technology had a positive impact on student preparedness to perform BIO on patients.

Key Words: binocular indirect ophthalmoscopy, simulation, optometric education, virtual reality, fundus examination

Background

Virtual reality patient simulators are an appealing tool in education programs for medical professionals. Simulators provide an opportunity for increased training in risk-free environments, which may result in better patient outcomes as trainees transition from the laboratory to actual clinical care. With respect to surgical simulators utilized in ophthalmological training, virtual patient simulators have been well-accepted by trainees,¹ have been demonstrated to provide improvements in surgical outcomes in the operating room,²⁻⁴ and have even been validated for the assessment of clinical competencies for surgical certification.⁵



Image 1. A University of Houston College of Optometry student using the Eyesi Indirect simulator (VRmagic, Mannheim, Germany). Pictured are the touchscreen user interface, headband-mounted stereo display, handheld fundus lens and model patient face. Note that the student examiner views the patient images through the stereo display, while the touchscreen user interface simultaneously displays views for the on-looker instructor.

[Click to enlarge](#)

In addition to ophthalmological surgical simulators, non-surgical, retinal diagnostic simulators are now available in a virtual reality platform to train eyecare practitioners.⁶ The Eyesi Indirect and Eyesi Direct systems (VRmagic, Mannheim, Germany) utilize augmented virtual reality, which incorporates virtual views of the patient face and fundus blended with actual views of the surrounding environment, such as the examiner's hand, to create a realistic examiner experience for binocular indirect ophthalmoscopy (BIO) and direct ophthalmoscopy (DO). The system hardware includes a touchscreen user interface and either a headband-mounted stereo display with two handheld fundus lenses (Eyesi Indirect) or a handheld direct ophthalmoscope display (Eyesi Direct). A model patient face interacts with the examination equipment to render fundus images (**Image 1**). Both the indirect and direct ophthalmoscope platforms include a software curriculum that trains the mechanics of retinal examination, recognition of normal anatomic findings, and understanding of an extensive library of pathological findings rendered from fundus photographs of actual clinical patients. In addition to disease detection and recognition, the software aids in the development of the diagnostic process by incorporating common diagnostic tests, such as visual fields and OCT scans, and furthers the understanding of patient management through a variety of clinical questions that are built into each case scenario.

In the fall semester of 2014, the University of Houston College of Optometry (UHCO) became the first optometric institution in the United States to equip a clinical skills simulation lab for the training of both retinal examination and diagnosis with the Eyesi Indirect and Direct simulators. While the potential for improvements in student preparedness through simulation training is evident from previous studies of surgical simulators, published reports of the translation of student clinician skills from simulated to live patients for retinal diagnostic techniques are limited.⁷

This study seeks to provide a retrospective report of student performance on a pre-clinic, live-patient BIO skills assessment in the years prior to and during the implementation of the clinical skills simulation lab. In addition, anonymous feedback from surveys of faculty and current and incoming students is summarized to detail perceptions of the effect of implementing a clinical skills simulation lab in the UHCO curriculum on student performance.

Methods

This study was approved by the Committee for the Protection of Human Subjects at the University of Houston and was classified as exempt from informed consent due to the educational nature of the research. For this retrospective analysis, data were compiled from the UHCO second-year students' BIO skills assessments (described below) for fall semesters 2011, 2012 and 2013 (pre-implementation of simulation technology) and compared to second-year students' scores during fall semester 2014 (post-implementation of simulation technology). Student training methods for BIO examination at UHCO are described below for both pre- and post-implementation of simulation technology.

Traditional BIO instruction

Historically, students at UHCO are first introduced to BIO examination in the spring of their first year during the Clinic Practicum II Lab. Model eyes are utilized to develop an understanding of the mechanics of obtaining views and documenting abnormalities. In addition, students complete one lab session during which they examine classmates with dilated pupils as a cursory introduction to performing BIO on a live

patient. All evaluations of BIO examination skills are conducted on model eyes during the first year.

In the fall semester of the second year, students receive BIO training in the Clinic Practicum III Lab, which consists of five instructor-led lab sessions during which students practice examining dilated classmates for up to one hour at a time. In addition, students may attend weekly two-hour 'open-lab' sessions throughout the semester to practice any basic clinical skills they desire, including BIO on classmates with dilated pupils. These extra sessions are not instructor-led; thus, documentation regarding who attended or how many hours were devoted to BIO during these open-lab sessions is not available.

Incorporation of simulation training

In the summer of 2014, five Eyesi Indirect and five Eyesi Direct platforms were installed at UHCO as part of the new clinical skills simulation lab (simlab) for retinal examination and diagnosis. The Eyesi platforms include a sequential courseware designed to educate students in: 1) obtaining fundus views and documenting findings (geometric shapes), 2) recognizing normal anatomical structures in the retina, 3) recognizing and managing common retinal pathologies, and 4) recognizing and managing pathology from advanced clinical cases. For the purposes of this study, only the students' basic understanding of obtaining systematic views of the retina with BIO after completion of Eyesi Indirect Tier A (device handling and documentation) is assessed. This study does not investigate the clinical training benefits of the Eyesi Direct platform or the pathology portions of the software on either platform.

At the beginning of the 2014 fall semester, all enrolled second-year optometry students ($n = 100$) were assigned individual simlab accounts and received two hours of hands-on training from representatives of VRmagic to orient them to the proper use of the equipment. Students were then required to complete and earn passing scores on all cases in Tier A: Examination Skills of the software (version 1.4). At the time of assignment, Tier A consisted of nine subsections: A1 Device Handling (easy), A2 Device Handling (medium), A3 Device Handling (difficult), A4 Device Handling (small pupil), A5 Retina Screening, A6 Retina Documentation (easy), A7 Retina Documentation (medium), A8 Retina Documentation (difficult), A9 Retina Documentation (small pupil). For all subsections, the task included examination of the virtual patient's fundus with the user having to 'detect' geometric shapes by obtaining a stable view with a virtual cross-hair positioned on top of the shape, or view, remember, and document observed geometric shapes by placing the appropriate shape with proper size, orientation and location on a touchscreen fundus map. The difficulty of cases increased with the inclusion of more shapes of smaller size and more peripheral retinal location. On subsection A5: Retina Screening, users were scored based on whether a thorough evaluation of the entire fundus was completed. Criteria for passing each case were set by the manufacturer. In total, 57 unique cases were included in the assignment.

Each student user's performance scores, date of completion and time spent per case were stored locally on the simulator in use and then synchronized across all simulators each time the student logged out of the software via a web-based cloud system created by the manufacturer. The creation of the web-based cloud system allowed students to continue completion of their assignment on any available simulator throughout the semester. The data presented in this manuscript were extracted from the instructor web portal, which allows access to all synchronized data. A network cable failure early in the fall semester resulted in the loss of some data regarding time spent by users, which is acknowledged in the results, but student completion status was not lost (i.e., students did not have to repeat completed assignments).

Students were given the simulation assignment the first week of class in August 2014 as part of the course requirements for their Clinic Practicum III Lab and were required to complete the assignment by Dec. 4, 2014. Simlab access was restricted to students who were enrolled in the associated course and was available 24 hours a day, 7 days a week via swipe card. A student representative was assigned by the coursemaster to create an online scheduler for the weekday hours between 9 a.m. and 6 p.m., with

each student being assigned three separate 1.5-hour blocks of time in the simlab over the course of the semester. However, all students had the option to come in on their own time on evenings or weekends to finish the assignment sooner. Although the assignment was not due until December, students were strongly encouraged to complete it earlier with the expectation that it would likely assist in their preparation for the clinical skills exams administered in November. In addition to the new simulation assignment, in the fall of 2014, second-year students completed the same traditional BIO laboratory instruction that had been given in previous years and had the same opportunities for open-lab practice sessions as in past years.

BIO skills assessment

Student BIO skills were evaluated in a skills assessment administered in the Clinic Practicum III Lab during the weeks of November 17 and December 1. The timing of test administration and the content of the exam were the same as previously administered in the fall semesters of 2011, 2012 and 2013. The live patient exam was graded by one of the four instructors assigned to each lab section (four lab sections total with some overlap in instructors). The assessment had well-defined criteria (**Appendix 1**) and was scored as a percentage of points earned out of 26 total points. While there were numerous instructors participating in grading over the years, it should be noted that one of the authors of this manuscript (AG) was the coursemaster for the lab and graded approximately 25% of the student class each year, and a second author of this manuscript (DB) was an instructor in one lab section and graded approximately 6% of the student class each year.

We hypothesized that test scores would not differ in the years prior to implementation of the simlab, but would improve with the addition of simulation training in 2014. Given that test scores were not normally distributed (all years were skewed towards high performance), we used the non-parametric Kruskal-Wallis test (the non-parametric equivalent of a one-way ANOVA) to compare test scores first for the years prior to implementation of simulation (2011-2013), and then for all years, including the year of simlab implementation (2011-2014). The percentage of perfect scores for each year was compared using chi-squared tests.

Assessment of perceptions: second-year student survey

On Nov. 7, 2014, an online survey link was sent to the second-year student class by the Clinic Practicum III Lab coursemaster, soliciting anonymous feedback regarding the new simlab. In the text of the e-mail, students were asked to complete the survey if they had finished at least half of the simulation assignment as of the date the survey was distributed. The survey consisted of three questions with five response options (strongly agree, agree, neutral, disagree, strongly disagree):

1. Working through the BIO simlab curriculum has increased my understanding of how to systematically examine the retina and document my findings
2. The opportunity to use the simlab has been an overall positive experience and a benefit to my optometric education
3. Working through the BIO simlab curriculum has improved my ability to obtain BIO retinal views on actual student patients

Second-year clinic faculty survey

At the end of February 2015 (two months after the transition of second-year students to patient care in the University Eye Institute at UHCO), faculty who were clinical attending doctors in second-year clinic and had been for at least the past three years were sent an invitation by the Clinic Practicum III Lab coursemaster to complete an anonymous online survey to provide feedback about student performance and preparedness for second-year clinic. No mention was made in the survey invitation about the recent

incorporation of simulation technology and/or its evaluation. Faculty responded to a series of questions, including two questions relevant to simulation technology:

1. When thinking about your current OPT II students in the FPS (Family Practice Service) clinic, how do their BIO skills compare to prior OPT II students you've had AT THIS POINT IN THE SEMESTER? (better, the same, worse)
2. When thinking about your current OPT II students in the FPS (Family Practice Service), how comfortable are they in performing BIO on patients compared to prior OPT II students you've had AT THIS POINT IN THE SEMESTER? (more comfortable, the same, less comfortable)

Incoming student survey

In February 2015, students who had already accepted admission to UHCO as part of the class of 2019 were invited to complete an online survey about their decision to attend UHCO. The survey was distributed via e-mail by a staff member in the Office of Optometry Relations. Students responded to a series of questions, including two questions relevant to simulation technology:

1. What factors played into your decision to attend UHCO? (select as many as are applicable: UHCO's facilities, UHCO's Vision Source Surgery Center, Procedures Lab with video slit lamps, Clinical Skills Simulation Lab, College Location, Faculty Expertise, Interview Day Experience, or Other)
2. How much did the clinical skills simulation lab influence your decision? (a lot, some, a little, none)

Responses to the three surveys were summarized by percentages of respondents in order to obtain information regarding perceptions of the simlab. No formal analysis was conducted on survey data.

Results

Simulation completion times

TABLE 1
Student Completion Times for Tiers A1-A9
of the Eyesi Indirect Courseware

of Students	Minimum Completion Time	Maximum Completion
22	0:16:35	1:07:59
39	0:12:59	1:59:11
62	0:33:35	3:38:53
78	0:56:56	3:07:51
81	0:58:10	1:29:52
86	0:11:55	1:42:37
92	0:30:05	3:32:31
96	0:46:00	8:12:19
97	0:15:13	3:24:58

is the number of students for whom data were available (see 2 minutes:seconds)

Table 1: [Click to enlarge](#)

Student completion times for the components of Tier A in the Eyesi Indirect courseware are summarized in **Table 1**. Although all 100 students completed the entire simulation assignment, network connectivity issues early in the deployment of the technology resulted in loss of storage of completion time data for some students. Therefore, total completion times for all individual students are unavailable. Based on the median completion times for each tier from the available data, the total median completion time for Tiers A1-A9 was approximately 8.5 hours. However, completion times varied widely across students, as can be seen in the minimum and maximum columns in **Table 1**.

Student performance

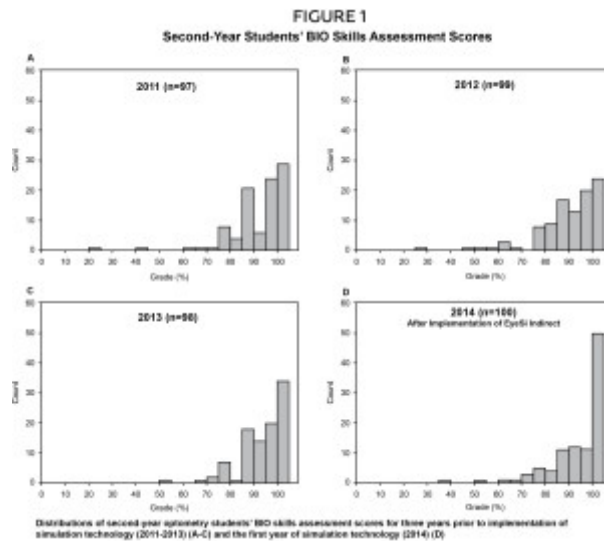
Figure 1: [Click to enlarge](#)

TABLE 2
BIO Skills Assessment Perfect Scores
Before and During Simlab Implementation

	Median	% of Students Earning a Perfect Score
2011	96	30
2012	95	24
2013	96	35
2014	98	50

Means and percentages of students earning a perfect score on assessment for the years prior to (2011-2013) and during (2014) of the simlab

Table 2: [Click to enlarge](#)

Inspection of student completion dates for the simulation assignment demonstrated that 88% of the class in fall 2014 completed the entire assignment (Tiers A1-A9) by the time of their BIO skills assessment. The remaining 12% had completed, on average, 78% of the assignment by the time of their skills assessment (completion ranged from Tier A5 to A8 for these 12 students). Class performance on the fall semester second-year BIO skills assessment was not normally distributed and consistently skewed towards high performance (**Table 1, Figure 1**), creating a potential ceiling effect for detection of improvements in test scores following the introduction of simulation technology. Even in light of this constraint, the distribution of test scores when comparing years 2011-2014 were significantly different (Kruskal-Wallis, $p = 0.032$) vs. a comparison of years 2011-2013 (before simlab implementation), which did not significantly differ (Kruskal-Wallis, $p = 0.153$), supporting our hypothesis that performance was stable for the years prior to simulation, but improved with the addition of simulation training in 2014. Additionally, the number of perfect scores (100%) earned in the year 2014 was significantly greater than in the three years prior (χ^2 , $p = 0.001$), whereas no difference in the number of perfect scores was observed across the three years prior to simulation technology (χ^2 , $p = 0.274$) (**Table 2**).

Student perceptions

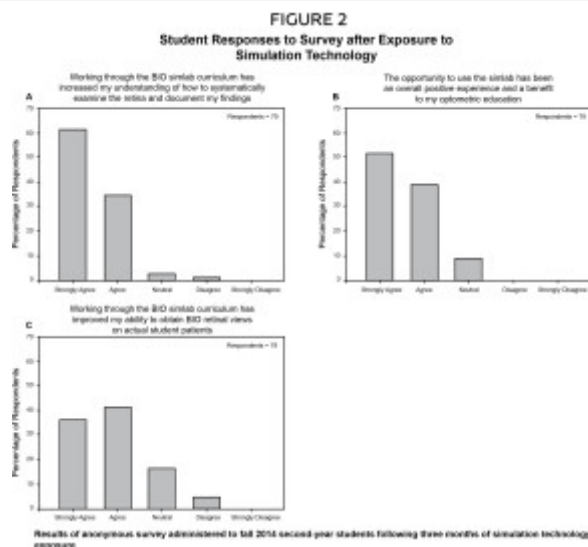


Figure 2: [Click to enlarge](#)

Student responses to an anonymous web-based survey distributed to the 100 second-year students during the fall 2014 semester are shown in **Figure 2**. Students were asked to complete the survey if they had finished at least half of the simulation assignment as of the date the survey was distributed (Nov. 7, 2014). Web portal information indicates that 93 students had completed at least Tiers A1-A5 by that date, and thus if only those students responded, the response rate for the survey was 88%. Of those responding, more than 90% agreed or strongly agreed that the simlab curriculum had increased their understanding of performing BIO (**Figure 2A**) and that it was a positive overall experience (**Figure 2B**). More than three-fourths of the respondents agreed or strongly agreed that the simlab curriculum had improved their ability to obtain views on student patients (**Figure 2C**).

Faculty perceptions

Sixteen faculty responded to the survey about student performance in the second-year clinic during spring 2015. Of the 16 respondents, 71% felt students were better prepared on basic BIO examination skills when first entering clinic in 2015 than in past years. Also, 100% felt that students were more comfortable performing BIO on patients in 2015 than in past years.

Incoming student perceptions

Sixty-one students responded to the survey of incoming students regarding their decision to attend UHCO. When asked to select as many factors as applicable that influenced their decision to choose UHCO, 80% of respondents indicated that the clinical skills simulation lab was a factor. Regarding the magnitude of the influence of the simlab on their decision to attend UHCO, 22% rated its influence as a lot, 51% some, 20% a little, and 4% none.

Discussion

This study provides evidence that incorporation of simulation training with the Eyesi Indirect positively influenced the performance of students in the second-year class on their lab BIO skills assessment, as indicated by improved test scores. The study also indicates that incorporation of the simulation training positively influenced their performance in the clinic when seeing patients for the first time, as reported anonymously by second-year clinical faculty. The creation of a clinical skills simulation lab was also viewed positively by students currently utilizing the lab as well as by incoming students who had yet to utilize the technology.

BIO is often a challenging technique to master mechanically, as well as mentally, due to the need to

comprehend the image reversal created by the fundus lens. That being said, BIO is a technique that was previously being taught with high success at UHCO, as evidenced by the test scores in **Figure 1**. Despite a potential ceiling effect of already strong scores limiting the room for improvement, students in fall 2014 still performed statistically better than students in preceding years. The authors acknowledge that having a second year of test scores from 2015 to demonstrate a continued stronger performance with incorporation of simulation would be compelling; however, these data are unavailable due to changes in both the timing of simulation assignments in the curriculum and resultant changes to the BIO skills assessment, as follows. In the spring of 2014, due to a desire to reduce the simlab load for future second-year students, the first-year students were assigned portions of Tier A to complete during March and April (A1, A2, A6, A7). This change in curriculum meant that students entered the second-year curriculum with greater exposure to BIO than the second-year students reported in this study. Early in the fall semester of 2015, the Clinic Practicum III coursemaster recognized that the new second-year students were much better prepared for BIO examination than in years past, and deemed the traditional BIO skills assessment (reported in this study) as 'too easy'. As a result, the assessment was altered to include full views in nine peripheral locations to better challenge and further assess students' ability to perform BIO, leaving us unable to compare performance between fall 2014 and 2015.

Incorporation of simulation technology in the fall of 2014 resulted in a median simulation usage time of 8.5 hours, which was in addition to the traditional instructor-led practice time of approximately 5 hours. With a class of 100 students, that increase would represent an additional 850 hours of participation from dilated patients if it were conducted on classmates rather than the simulators. Not only did the incorporation of simulation technology offer more practice time for students without the concern of fatiguing their classmates, it redirected the emphasis of BIO education away from a set number of hours of instruction per student to a set endpoint of competency, irrespective of the time it took to reach that goal. By standardizing the endpoint and requiring all students to pass and complete Tier A of the simulation courseware, students were able to work at their own pace instead of achieving the best outcome they could with a fixed set of hours. This shift in educational strategy may be attested to by the fact that more students in the fall of 2014 attained perfect scores on their skills assessment.

While this study offers encouraging findings in support of simulation technology, it is not without its limitations. First, because this study was a retrospective evaluation across years rather than a randomized study of simulation versus non-simulation training, the training experiences of students could have varied from year to year. This possibility is limited, however, given that the same instructor served as coursemaster across all four years tested. In addition, student performance on the BIO skills assessment did not differ significantly across 2011-2013, suggesting that student instruction was likely uniform for the years prior to implementation of simulation.

A second limitation is the fact that two authors of this paper served as instructors scoring the BIO skills assessments each year. The potential for bias toward an improvement with simulation training exists given that the authors led the initiative to implement the simlab. However, the grading criteria of the BIO skills assessment were well-defined with binary outcomes rather than a subjective scoring scale (**Appendix 1**), and the majority of the skills assessments were scored by instructors who had no connection to the simlab, which would limit the potential for bias.

Lastly, the results of this study are limited to a discussion of the potential benefits of completion of Tier A in the Eyesi Indirect courseware. Tier A is designed to train basic examination skills (obtaining views and documenting findings) and does not address the anatomical structures of the retina or pathological findings. Further studies are needed to evaluate the potential training benefits of completion of the other portions of the courseware and its impact on clinical performance or standardized license examinations.

Conclusions

The incorporation of simulation technology into the BIO training curriculum at the University of Houston College of Optometry had a positive impact on the preparedness of second-year students to systematically obtain views of the retina of live patients in both the classroom and the clinic.

Disclosure

The authors of this manuscript have no conflicts of interest related to the Eyesi Indirect simulator.

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APPENDIX A

BIO SKILLS ASSESSMENT		
Name: _____	Lab Day: M T W Th	
Grader: _____		
SET-UP: 1. Adjusted BIO and properly prepared the patient?..... • Must be supine with adequate room to obtain ALL necessary views for a FULL BIO exam. 2. Explained the purpose of the test?.....	Y N Y N	CLEAN LENS? YES NO
MID-PERIPHERAL VIEW #1: FACULTY CHOICE: 3. Stood in correct place to obtain requested view?..... 4. Directed patient's gaze correctly?..... 5. Obtained a clear/stable (3 sec) MID-PERIPHERAL view? (i.e. optic nerve or macula not visible) (2 POINTS) 6. Filled condensing lens (<80% full)? (2 POINTS) 7. Demonstrated appropriate hand placement on face and adequately controlled pt's lids/eyelashes (if applicable)?... 8. Correctly identified mid-peripheral landmark (or correctly indicated which landmark should be expected)?.....	Y N Y N Y N Y N Y N Y N	
MID-PERIPHERAL VIEW #2: FACULTY CHOICE: 9. Stood in correct place to obtain requested view?..... 10. Directed patient's gaze correctly?..... 11. Obtained a clear/stable (3 sec) MID-PERIPHERAL view? (i.e. optic nerve or macula not visible) (2 POINTS) 12. Filled condensing lens (<80% full)? (2 POINTS) 13. Demonstrated appropriate hand placement on face and adequately controlled pt's lids/eyelashes (if applicable)?... 14. Correctly identified mid-peripheral landmark (or correctly indicated which landmark should be expected)?.....	Y N Y N Y N Y N Y N Y N	
POSTERIOR POLE VIEW: FACULTY CHOICE: 15. Directed patient's gaze correctly?..... 16. Obtained a clear/stable view (3 sec)? (i.e. ONH and macula must both be fully visible) (2 POINTS) 17. Filled condensing lens (>90% full)? (2 POINTS) 18. Demonstrated appropriate hand placement on face and adequately controlled pt's lids/eyelashes (if applicable)?	Y N Y N Y N Y N	
POSTERIOR POLE VIEW: FACULTY CHOICE: 19. Gave proper patient instructions throughout procedure? 20. Performance points: 0 Below Expected 1 Expected	Y N	

Appendix A: [Click to enlarge](#)

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Dr. Berntsen is an Associate Professor at the University of Houston College of Optometry and Co-Coursemaster of the Clinic Practicum I & II Laboratory Sequence.

The SIFD and the Three-Legged Stool

Sarah Martin, OD, Fraser Horn, OD, FAAO, David A. Damari, OD, FCOVD, FAAO, and Tiffenie Harris, OD, FAAO | *Optometric Education: Volume 42 Number 2 (Winter-Spring 2017)*

Abstract

Background: The Summer Institute for Faculty Development (SIFD) is a biennial workshop, hosted by the Association of Schools and Colleges of Optometry, focused on providing optometric educators the knowledge and tools necessary for a successful career in academia. **Methods:** A survey was sent to 170 SIFD participants to evaluate the efficacy of the program. **Results:** The survey response rate was 44.7%. One or more short-term goals were met by 93% and one or more long-term goals were met by 82% of the surveyed participants. In addition, 59% of survey respondents developed new career goals, which led to significant career achievements. **Conclusion:** The SIFD has made a positive impact on enhancing careers in optometric academia.

Key Words: Summer Institute for Faculty Development, faculty development, promotion and tenure, career in optometry academia, optometry teaching, optometry scholarship, optometry service

Background

The Summer Institute for Faculty Development (SIFD) is a biennial workshop hosted by the Association of Schools and Colleges of Optometry (ASCO).¹ It is designed to assist faculty members' transition into the academic culture by increasing their awareness and understanding of the tools and resources available to them. In 2006 the SIFD, aka the Institute, was established as a collaboration including all of the schools and colleges of optometry. It consists of workshops, small group sessions, lectures, panel discussions and mentoring. The Institute's goals as published on the ASCO website¹ are:

- to provide participants with an opportunity to gain the knowledge and skills necessary to enhance their success in an optometric academic environment as career-long, productive faculty members
- to increase retention of faculty in the schools and colleges of optometry

The program is designed for full-time faculty members with more than two years but less than 10 years of academic experience.¹ The Institute is a way to orient and prepare junior faculty for the process of promotion and development, including tenure when applicable. Faculty development and promotion is evaluated at each respective institution by the contributions made locally, nationally and internationally in teaching, scholarship and service. This is often referred to as the "three-legged stool" of optometric academia. In order for the stool to be balanced and not tip over, there must be relatively equal weight distribution to all three legs. This metaphor represents the need for relatively equal contributions in teaching, scholarship and service for a successful career in academia. The Institute dedicates time to discussing resources and tools available to the faculty members and brainstorming ways to enhance their careers by achieving balance in these three areas.

Six SIFD programs have taken place between 2006 and 2015. The Institute began as an annual workshop in 2006 and evolved into a biennial event starting in 2007. To evaluate the outcomes of the program, a survey was sent to those who participated between 2006 and 2013.³ The purpose of this study is to determine whether the Institute's goals were achieved, based on the survey findings.

Specifically, do faculty members feel they gained the necessary skills to be a productive faculty member? Secondly, what is the retention rate of SIFD participants in optometric academia based on their mode of practice at the time of the survey?

Methods

The survey (**Appendix A**) was designed to specifically evaluate the Institute's goals and was sent to all 183 participants from five workshops between 2006 and 2013. The survey consisted of 16 questions with text box areas available for added comments. Each participant was sent the survey on Aug. 25, 2015. Those who had not yet responded were sent a reminder e-mail on Sept. 15, 2015. Participants' contact information was updated in October 2015 as was made available by public record. All participants for whom a different e-mail address was found were sent the survey again on Dec. 15, 2015, and a reminder e-mail on Jan. 4, 2016. The survey was not anonymous; however, the individual respondents and the data are not linked in this study. Utilizing a survey as the method of evaluation presents limitations in assessing the entire population. The survey may attract the participants with the strongest opinion, whether positive or negative. For the purpose of this study, our assumption is that those who responded represent the entire population.^{1,2}

The survey evaluates whether the faculty members gained the skills and knowledge necessary to be successful in academia through responses related to:

- accomplishment of short- and long-term goals
- evaluation of mentor relationships
- resources planned to be utilized in career advancement
- new career goals developed at the Institute
- knowledge of new potential barriers to career advancement
- the overall perceived effect of the program on the academic career

In order to evaluate participants' current mode of practice, additional research was conducted. Each participant's National Provider Identifier number was obtained⁴ and confirmed via phone calls and Internet Google searches during October 2015. Each school and college of optometry website was reviewed to confirm the faculty positions.⁵⁻²⁷ The current mode of practice of all SIFD participants is reported regardless of their participation in the survey.

Results

TABLE 1
SIFD Participants' Survey Responses

2007	2009	2011
33	34	35
29	33	35
12	9	17
36.4%	26.5%	48.6%
involvement		

Table 1. [Click to enlarge](#)

The survey reached 170 of the 183 SIFD participants, and 76 responded, resulting in a response rate of 44.7%. We were unable to obtain accurate contact information for 13 participants. Prior to participating in the SIFD, 34% of participants had been working in academia greater than two but less than 10 years, within the Institute's recruiting goal. Those outside the Institute's recruiting goal represent 66% of the respondents (**Figure 1**). The distribution of feedback received is shown in **Table 1**. Annual response rates ranged from 26% to 52%.

TABLE 2
Participation Year and Long-Term Goals Accomplished

2006	2007	2009	2010
1	3	1	4
2	1	3	6
7	7	3	1
3	1	2	1
13	12	9	1

reassignment

Table 2. [Click to enlarge](#)

This study showed that participants were able to gain the skills and tools needed to be successful. Among SIFD participants, 93% reported meeting one or more of their short-term goals, and 82% reported meeting one or more of their long-term goals, as depicted in **Figure 2**. There was no significant association between SIFD year of participation and number of long-term goals accomplished (Chi-Squared = 15.2, $p = 0.2$, **Table 2**). Several National Institutes of Health grants for research were funded for multi-centered studies that initiated from the goal development workshop.

The mentoring program was reported as an extremely valuable resource for providing tools and skills as demonstrated in **Figure 3**. Respondents commented on the benefits of maintaining relationships with their mentors. Other resources strongly valued were the connections made with faculty at other institutions, curriculum vitae (CV) evaluation, and test-writing skills. More than half of the participants (59%) developed new career goals as a result of their experience.

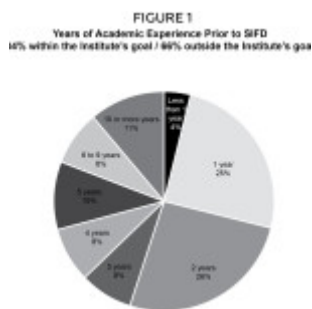
Figure 1. [Click to enlarge](#)

Figure 4 shows the respondents acknowledged barriers to career advancement. The most frequently mentioned barriers were too much time devoted to other duties and changed priorities. Participants commented on the challenges of work-life balance and time management. Five respondents felt as if their promotion and advancement were hindered without a PhD. A majority of respondents stated the need for additional mentorship at their respective institutions. The challenges identified at the institution level reportedly led several respondents to gain a better understanding of future expectations.

This study showed that 86% of the 170 SIFD participants surveyed were working in optometric education for a total of six to 10 years at the time of the survey (**Figure 5**). The modes of practice of these 170 SIFD participants were included regardless of their participation in the survey.

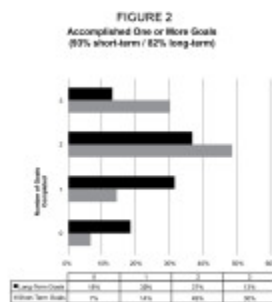


Figure 2. [Click to enlarge](#)

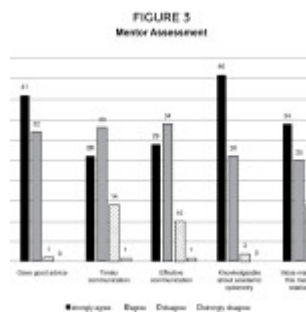


Figure 3. [Click to enlarge](#)

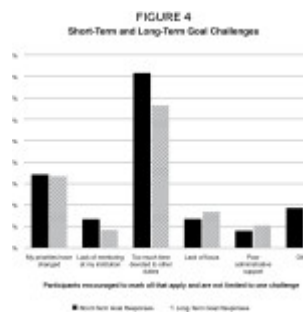


Figure 4. [Click to enlarge](#)



Figure 5. [Click to enlarge](#)

Discussion

The SIFD set out with an intention to enhance faculty development throughout the colleges and schools of optometry. This study found multiple aspects of the Institute that support the goal of gaining the knowledge and skills needed to be successful in a career in optometric academia.¹ The information gathered in the following areas was used to assess the Institute's goals:

- accomplishment of short- and long-term goals
- evaluation of mentor relationships
- resources planned to be utilized in career advancement
- new career goals developed at the Institute
- knowledge of new potential barriers to career advancement
- overall perceived effect of the program on the academic career

During the SIFD workshops, each participant develops three or more short-term and long-term goals. Time is dedicated to developing these goals in the areas of teaching, scholarship and service. Having a balanced career that addresses all three of these factors is crucial for successful promotion and growth as a faculty member. The results of the survey demonstrate that 93% of participants achieved one or more of their short-term goals, while 82% achieved one or more of their long-term goals (**Figure 2**). There was no statistically significant relationship between long-term goals accomplished and year of SIFD participation.

The significant achievements that were reported as a result of goals developed from the Institute are a strong indicator of the success and benefit of the program. Several participants had goals from various areas, including but not limited to:

- leadership responsibilities that include more administrative roles in their institution
- becoming a fellow and diplomate in the American Academy of Optometry
- further education such as obtaining a master's degree in public health or a PhD
- writing a textbook

Those who had not met their short- or long-term goals indicated their time was dedicated to other assigned duties. Participants mentioned they faced many obstacles in striving to accomplish their career goals. However, time limitations stood out as the main factor for the participants. Implementing added focus on time management at future SIFD programs may be beneficial based on the findings of this study. While this study did not prove that accomplishing short- and long-term goals was directly related to retention, lack of time was the main reported obstacle to success in this area. **Figure 4** details the challenges in reaching goals as reported by participants.

The feedback obtained throughout this research positively pointed toward the importance of the connections that were made during the SIFD. The networking opportunity ? the connection of junior faculty members with mentors from all of the optometry programs involved ? was mentioned as a vital aspect of the program. **Figure 3** shows the majority of participants agreed or strongly agreed with the mentors' ability to:

- provide good advice
- have timely communication
- have effective communication
- demonstrate their knowledge of academic optometry
- be a valuable relationship to maintain

The administrators of the workshops act as mentors to the participants. This mentorship is created to facilitate the relationship between the faculty members at different institutions. Small groups are created with representatives from a variety of programs. This provides the opportunity to discuss goals, tenure and promotion, and more specific questions related to the individual and group. A participant reported that this provided the courage necessary for creating mentors at his/her own institution. Those who were no longer in contact with their mentors reported a benefit from networking with faculty at other Institutes as well.

The participants reported that the SIFD provided tools and strategies for addressing potential barriers to career advancement. One individual reported feeling lost at his/her institution due to a lack of communication related to expectations and development. The SIFD was able to clarify for the participant what is expected of faculty working in optometric education so that he/she could focus on balancing the three-legged stool of teaching, scholarship and service in order to have a complete CV for career advancement. Understanding the balance of the three-legged stool in optometric academia is necessary for a successful career in academia. Each leg of the stool needs to be addressed so the stool can remain upright, i.e., so the faculty member can be successful.

Specific resources from the Institute that have been utilized in career development are test-writing skills and techniques, outcome assessments, and creation of timelines for accomplishments. For example, multiple participants noted that focusing on a timeline to achieve goals and promotion allowed them to explore new areas of academia and find ways to incorporate them into their careers. The public-speaking suggestions and demonstration given were also a valued resource for developing career skills in teaching. Furthermore, the assistance provided in reviewing and strengthening a professional CV was repeatedly mentioned as a beneficial resource.

The overall perceived effect of the program on the academic career was extremely positive. An underlying passion was apparent in all aspects of the research. "I truly don't think I would be where I am today without this program" was expressed by a participant. This comment, along with many other strong words of support, demonstrated that participants felt the SIFD program was an important part of their career development. The mentorship and connections that were made were identified as the greatest resources participants utilized in assisting them in being a productive faculty member. The SIFD motivated and rekindled their love of teaching and provided ways of being a more effective teacher. It helped establish a perspective on the role of faculty in the larger scheme of academia and optometric education.

Ideas for re-evaluating some SIFD practices also emerged from the study. For example, the majority of participants in the Institute were outside the recruiting goal (to attract participants with more than two but less than 10 years of faculty experience). The majority had between one and two years of experience (**Figure 1**). However, the survey results indicated the participants outside of the recruiting goal valued the program and found it beneficial. This information can be used to assess and possibly adjust the

recruiting goal for future SIFD programs.

Several survey respondents suggested a need for consistent follow-up after the program as a way to increase the number of goals achieved and address any new barriers to career development. It was also suggested that participants be regularly updated on currently available resources and tools. The follow-up and updates could come from mentors, SIFD leaders, and/or the home institution. One of the participants reported that taking the survey was a reminder of the goals set and information obtained at the Institute and as such that it indirectly acted as follow-up. The authors suggest creating additional networking and mentorship opportunities by connecting SIFD “graduates” with new participants.

The survey was conducted between September 2015 and January 2016. In May 2016, ASCO launched an online community called ASCOConnect. The SIFD participants have a private community with a discussion forum and an area for posting comments and providing links to files of interest. This forum provides an opportunity for participants to continue collaborating, networking and sharing tools for navigating the culture of optometric academia. The key is to engage participants to maximize the benefits of this online community.

This study also asked the SIFD participants about their opinion of optometry as a profession and academic optometry as a mode of practice. Only 4% reported they would not recommend optometry as a career due to a concern with the debt to income ratio. There was resounding support for recommending a career in optometric academia. “Seeing the growth of students and the impact that you can have on their career is rewarding,” one participant reported. A career in academia was described as fulfilling, rewarding and autonomous with a wide variety of opportunity. It was felt that this career provides the opportunity for “lifelong learning” in a balanced and stable environment.

The retention of faculty members in optometric academia is extremely high in the SIFD participant population, based on their current mode of practice at the time of the survey. **Figure 5** shows the current mode of practice of all participants regardless of their participation in the survey. (The mode of practice of five participants was unable to be identified. They are included in the category labeled “other.”) **Figure 5** shows that 86% are still in academia even if they changed institutions. Those who are no longer in academia have moved on to different areas of optometry, such as private practice and industry. Further research needs to be done to compare the retention rate of non-SIFD participants with the retention rate of SIFD participants to determine whether this is a significant relationship.

Conclusion

This study indicates that the SIFD is a successful program that has reached the goal of providing knowledge and tools for being a productive career-long optometric faculty member while demonstrating retention of SIFD participants in academia based on their mode of practice at the time of the survey. To evaluate whether the Institute increases faculty retention, a follow-up retrospective cohort study to determine statistical significance is needed.

Benefits of this study include the ability to provide quantitative information to help individual schools and colleges of optometry make future decisions regarding their participation in the SIFD. Also, ASCO can use this research to show achievement of the program’s published goals and objectives based on measurable, successful outcomes.

By utilizing the feedback of the participants, organizers of the Institute can make adjustments, advancements or changes to the program that they deem appropriate. The authors suggest consideration of the suggestion for additional program follow-up as it was mentioned throughout the survey feedback. The new online community, ASCOConnect, will provide participants an opportunity for additional follow-up and continued collaboration and networking. Future assessments of the Institute will

include this online community resource and are projected to provide a significant benefit to the participants. Re-evaluation of the recruitment goal is recommended as the participants outside of the recruiting goal reported a significant benefit from the experience.

The ability to evaluate participant feedback from multiple schools and colleges of optometry is a significant strength of this study. The weakness of this study was the inability to reach all participants, which resulted in a response rate of 44.7%. There also may be a bias in the research as the study did not reach all participants who are no longer in academia for their feedback.

This study shows a significant positive impact made by the Summer Institute for Faculty Development on enhancing careers in optometric academia. The SIFD is able to help participants understand the need for balancing their professional three-legged stool, which includes teaching, scholarship and service, in order to have a successful career in academia. "The opportunity to be around some really great teachers inspired me to create my own legacy," was one powerful response from a participant. It exemplifies the strong perceived benefit and passion felt for the program. Based on the results of this study, the authors recommend the continued delivery of this program. The next opportunity for participation in the Summer Institute for Faculty Development will be in July 2017. It is the authors' opinion that all optometric faculty would benefit from this program with a specific additional enhancement to those who are new to optometric academia.

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APPENDIX A

2015-2016 SIFD Outcomes Survey

* 1. How many years of academic experience did you have when you participated in the SIFD?

* 2. In which SIFD did you participate?

- ☐ 2006
☐ 2007
☐ 2009
☐ 2011
☐ 2013

* 3. Are you still in academia?

- ☐ Yes
☐ No

* 4. If yes, how many cumulative years of academic experience do you have?

- ☐ <3
☐ 3-5
☐ 6-10
☐ 11-15
☐ >15

* 5. Of your short term goals, how many did you achieve?

- ☐ 0
☐ 1
☐ 2
☐ 3

6. If you didn't achieve one or more of them, can you explain why? (Choose all that apply)

- ☐ My priorities have changed
☐ Lack of mentoring at my institution
☐ Too much time devoted to other duties as assigned
☐ Lack of focus on my part
☐ Poor support for chosen goals by administration
☐ Other (please specify)

* 7. Of your long-term goals, how many have you already achieved?

- ☐ 0
☐ 1
☐ 2
☐ 3

8. If you didn't achieve one or more of them, can you explain why? (Choose all that apply)

- ☐ My priorities have changed
☐ Lack of mentoring at my institution
☐ Too much time devoted to other duties as assigned
☐ Lack of focus on my part
☐ Poor support for chosen goals by administration
☐ Other (please specify)

* 9. Would you recommend optometry as a career?

- ☐ Yes
☐ No

Why? Or Why Not?

10. Please describe how your participation in the SIFD program has specifically affected your career.

11. Please rate your level of agreement with the following aspects of your assigned mentor:

	Strongly Agree	Agree	Disagree	Strongly Disagree
given good advice				
communications are timely				
communications are effective				
knowledgeable about academic optometry				
I could value mentoring relationship				

12. Are there any new career goals you have developed for yourself as a result of your experience at the Summer Institute?

13. What resources will you plan to use that will help you advance your career as a result of participating in SIFD?

14. What barriers to advancement do you see that you didn't know about before your participation in SIFD?

* 15. Would you recommend a career in academic optometry to an optometrist, research scientist, resident, or current student?

- ☐ Yes
☐ No

Why? Or Why Not?

16. Please describe how you believe your participation in the SIFD program will affect the future of your career.

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Dr. Damari is Co-Chair of the SIFD and Dean of the Michigan College of Optometry at Ferris State University. He is a fellow of the American Academy of Optometry and the President-Elect of the Association of Schools and Colleges of Optometry. He graduated from SUNY College of Optometry and completed the college's residency in Vision Therapy.

Dr. Harris is Co-Chair of the SIFD and an Associate Professor at Western University of Health Sciences College of Optometry. She is a fellow of the American Academy of Optometry, has served on the Academy's admissions committee, and has lectured numerous times at Academy meetings. Dr. Harris has also served on the Association of Schools and Colleges of Optometry's Clinical Affairs Committee and Diversity Task Force. She graduated from Indiana University School of Optometry.

Competency-based Assessment of Refractive Error Measurement in a Mozambique Optometry School

Kajal Shah PhD, Kovin Naidoo, PhD, OD, Luigi Bilotto, OD, and James Loughman, PhD | Optometric Education: Volume 42 Number 2 (Winter-Spring 2017)

Abstract

Background: The aims of this study were to develop a process for assessing refractive error management competence among the first two cohorts of students in a new optometry program at Unilúrio in Mozambique and to understand the effectiveness of implementing the process in the context of a low resource environment. **Methods:** The assessment methods were developed using information from a literature review and a focus group discussion and implemented on 15 students. **Results:** The exams consisted of direct observation of two patients, short-answer questions and a structured oral examination. **Conclusion:** The use of existing checklists and rating skills helped to identify areas of competence deficits. Areas for further development of the assessment process include increasing assessor training and guidelines for patient standardization.

Key Words: competency assessment, refraction, optometry students, Mozambique

Introduction

The Mozambique Eyecare Project is a higher education partnership between the Dublin Institute of Technology (DIT), the Brien Holden Vision Institute (BHVI), the University of Ulster and Universidade Lúrio (UniLúrio), Nampula, for the development, implementation and evaluation of a model of optometry training at Unilúrio in Mozambique. The four-year optometry program was based on a curriculum developed by BHVI with competencies drawn from the global competency-based model of the World Council of Optometry (WCO) and the Association of Regulatory Boards of Optometry (ARBO). The model allows for objective comparisons of scope of practice between countries. The global competency-based model provides a vertical career ladder for individuals seeking to expand their scope of clinical practice and includes four categories of clinical care. Each category requires a set of competencies that includes the previous category: optical technology, visual function, ocular diagnostic and ocular therapeutic.¹ The minimum required for individuals to call themselves an optometrist is demonstrating competence in dispensing, refracting, prescribing and the detection of disease/abnormality.¹ In Mozambique the exact scope of practice of optometry is not defined, but the curriculum enables at least the ocular diagnostic category to be met.

Competencies are seen as a framework for entry-level abilities in the profession of optometry in most countries. Students have to show by some means of assessment (a specific examination or some form of continuing assessment program) that they are competent in the areas listed.² The definition of competence provided by the General Optical Council (GOC) in the United Kingdom (UK) is: "Competence has been defined as the ability to perform the responsibilities required of professionals to the standards necessary for safe and effective practice. A competency will be a combination of the specification and application of a knowledge or skill within the occupation, to the appropriate standard."³

Literature on methods of assessing clinical competency has existed in medicine for many years;

however, little published research exists for optometry.⁴⁻⁷ In the UK, the GOC describes the required competencies in detail, but it does not specify the method of assessment. This is left to the respective training institutions and professional organizations responsible for assessment and certification.⁴

An ideal assessment tool would have to be reliable and valid.⁸ Reliability is a measure of the reproducibility or consistency of a test, and is affected by many factors such as examiner judgments (inter-rater, examiner experience), inter-case (student) reliability, inconsistency of patient performance, and reliability of rating scales.⁶ Validity refers to the ability of the assessment to measure what it is supposed to measure. No valid assessment methods that measure all facets of clinical competence have been designed.⁶ Other factors, including the feasibility of running and resourcing the examination, are also important in a developing country context.⁸

Miller's pyramid conceptualizes the essential facets of assessment of clinical competence.⁷ The base represents the knowledge components of competence: 'knows' (basic facts), 'knows how' (applied knowledge), 'shows how' and 'does'. The base levels are assessed with written tests of clinical knowledge such as multiple-choice questions, short-answer questions, essays and oral examinations. They are still popular in the training of optometry students in the UK and Europe and in the entry-level examinations to the profession in the United States (US).^{9,10} Direct observation of students in clinics, the use of standardized patients (SP) and objective structured clinical examinations (OSCE) are commonly used to test the 'shows how' component.¹⁰⁻¹² The final assessment of pre-registration optometry students in the UK is in the form of an OSCE, wherein students rotate through a series of stations to demonstrate clinical skills applied in a range of contexts.¹¹ However, little literature exists on assessment of exit-level competencies from the optometry program, which is the context in Mozambique, as opposed to entry level into the profession, even though assessment strategies can be similar.

Uncorrected refractive error has been identified as a major cause of visual impairment in Mozambique.¹³ The only providers of refraction services within the national health system in Mozambique are ophthalmic technicians. However, previous assessment of their refraction skills showed they needed upskilling to make them competent at refraction.¹⁴ We did not set out to assess dispensing and contact lens fitting, which are all part of the competency skill set of an optometrist.¹ There were various reasons for this. For dispensing, the spectacle supply system at the university had not been established when the students graduated; therefore, their exposure to dispensing was restricted. Once the students have graduated and started working within the national health system, their access to contact lenses is limited apart from in the larger central and provincial hospitals. Hence, refractive error measurement was deemed the most important responsibility at present of the Mozambican optometrist. For this paper, refractive error management includes the clinical judgement related to the patient's age, symptoms, accuracy of the subjective or objective refractive result, binocular vision status and disease.¹⁵ Moreover, there is little or no supervision of students once they've graduated. In the absence of alternative refractive care provision, emphasis had to be placed on ensuring they were competent in their refraction routine.

The aim of this study was two-fold: 1) to report on the development of a process for assessing refractive error management competence that is practical to implement and keeps staffing and resourcing costs at sustainable levels within the context of limited academic resources, and 2) to understand the effectiveness of implementation of the process in the context of a low resource environment, in terms of its reliability and validity.

Competence Assessment Development and Implementation

This article describes two components: 1) the development of the competency assessment methods and process, and 2) the implementation of the assessment process. The evaluative elements of this work were conducted according to the tenets of the Declaration of Helsinki and approved by the research

ethics committee at the Dublin Institute of Technology.

Assessment Development: Methods

Information was gathered from a literature review of assessment methods in medicine^{6-8,16,17} and high-stakes optometry exams,^{9-11,18} the latter being the only literature available for optometry.

A focus group discussion was conducted with two lecturers from Unilúrio responsible for the clinics of the first cohort of students, and three of the program developers on the basis of their clinical and academic expertise. They were asked to read and sign a consent form by the investigator acting as the facilitator of the focus group. The members of the group, two each from South Africa and Colombia and one from Canada, had an average of 16 years of clinical experience and an average of nine years teaching experience in international undergraduate optometry education, particularly in curriculum design, teaching and developing and conducting assessments.

The investigator informed the participants about the objective of the focus group. The primary intention was to develop the assessment methods for evaluating competencies of the optometry students, concentrating on refraction, before they graduated. Qualitative data based on grounded theory was captured on assessment methods and their evaluation, which would be feasible given the challenges that existed for a new program in a low academic resource context.¹⁹ The participants were asked how best to evaluate the optometry students' refraction competencies as the standard necessary for entry into the profession in Mozambique. The discussion was recorded by the investigator, read, coded, categorized and analyzed thematically. In order to improve the credibility of the data, member checking was used.²⁰ This involved the data being presented to the focus group members to confirm the credibility of the themes and whether the overall account was realistic and accurate.

Assessment Development: Results

The key themes extracted from the focus group, which informed the development of the assessment methods included: 1) exclusion of OSCEs, 2) practice assessment by direct observation, 3) theory exams, and 4) qualitative observations of the competency assessment process.

Exclusion of OSCEs

The existing literature on different assessment procedures suitable for use in medicine^{6-8,16,17} and optometry^{9-11,18} was discussed. The two most commonly cited methods of assessment of clinical competencies, identified from the literature review, are the direct observation of students performing these clinical skills and objective structured clinical examinations (OSCEs). However, there is little published literature on the use of OSCEs in Africa. In a review of the economic feasibility of OSCEs in undergraduate medical studies, only 17 of the 1,075 publications were from Africa.²¹ A study comparing six assessment methods for their ability to assess medical students' performance and their ease of adoption with regard to cost, suitability and safety in South Africa revealed OSCEs to be the most costly.²² Hence, OSCEs and the use of standardized patients were ruled out due to lack of academic resources and examiners.

Recommendations were made on the most suitable methods for competency assessment in Mozambique, taking into account that integrating disease and binocular status with the refractive result is necessary for prescribing a refractive correction.¹⁵ The competencies would be assessed as follows.

Practical assessment by direct observation

This had to be constructed to maximize validity and reliability against the time and cost of running and resourcing the exams. Students undertook an eye examination of two real patients, a presbyope and a

pre-presbyope, under observation of two examiners for each patient. Clinical performance was assessed for communication, history and symptoms, vision and visual acuity (with pinhole if necessary), pupil distance, assessment of pupil responses, cover test, ocular motility, near point of convergence, externals, retinoscopy, best sphere, cross cylindrical refraction, binocular balance and near vision, final prescription, ophthalmoscopy, advice, recording, management and time-keeping. **(Appendix A)**

The WCO global competency model would be used as the framework for the assessment, with the assessment method mapped to the elements of competencies and performance criteria and the level of difficulty expected to be mastered by the student specified, to enhance content validity.

TABLE 1
Results of Practical Clinical Competency Assessment

Technique / (weighting %)	Mean mark (SD) / total mark		p value	Total number of students demonstrating competency (n=15)	Number of students demonstrating competency	
	Cohort A	Cohort B			Cohort A (n=8)	Cohort B (n=7)
Communication / (4%)	4 (0) / 4	3.8 (0.6) / 4	0.58	15 (100%)	8 (100%)	6 (100%)
History and symptoms / (10%)	5.2 (1.5) / 10	7.5 (2.0) / 10	0.49	14 (93%)	8 (88%)	6 (100%)
Visual/visual acuity with aid Rx / (15%)	4.7 (0.7) / 5	4.8 (0.4) / 5	0.90	15 (100%)	9 (100%)	6 (100%)
Pupillary distance / (2%)	1.3 (1) / 2	2 (0) / 2	0.07	11 (73%)	5 (60%)	6 (100%)
Pupil responses / (2%)	1.8 (0.5) / 2	1.8 (0.6) / 2	0.84	13 (87%)	8 (88%)	5 (83%)
Cover test / (2%)	1.6 (0.6) / 2	1.8 (0.6) / 2	0.22	10 (67%)	6 (87%)	4 (87%)
Ocular motility / (2%)	1.8 (0.6) / 2	2 (0) / 2	0.24	14 (93%)	8 (88%)	6 (100%)
Near point of convergence / (2%)	1.2 (1) / 2	1.7 (0.6) / 2	0.14	9 (60%)	4 (44%)	5 (83%)
External exam / (5%)	4.2 (0.6) / 6	3 (2) / 6	0.18	10 (67%)	7 (78%)	3 (50%)
Retinoscopy / (10%)	6.8 (2) / 10	5.5 (3.6) / 10	0.30	8 (60%)	6 (87%)	3 (50%)
Sphere / (10%)	4.9 (2.6) / 10	5.8 (2.6) / 10	0.33	6 (40%)	3 (33%)	3 (50%)
Cross-cylinder / (10%)	2.6 (2.4) / 10	3.9 (2.6) / 10	0.17	4 (27%)	1 (11%)	3 (50%)
Binocular balance and near visual acuity / (4%)	1.2 (0.6) / 4	2.3 (1.3) / 4	0.02*	4 (27%)	1 (11%)	3 (50%)
Final prescription and auxiliary tests / (4%)	2.6 (1.6) / 4	2.4 (1.6) / 4	0.52	7 (27%)	4 (44%)	3 (50%)
Advice to patient / (4%)	2.4 (1) / 4	2.1 (1.6) / 4	0.88	5 (33%)	2 (22%)	3 (50%)
Ophthalmoscopy / (10%)	5.8 (2) / 10	4.7 (3.3) / 10	0.45	8 (60%)	3 (33%)	3 (50%)
Recording / (4%)	2.8 (0.6) / 4	2.2 (1.2) / 4	0.12	11 (73%)	7 (78%)	4 (87%)
Management and time keeping / (10%)	4.9 (2.6) / 10	4.4 (3) / 10	0.68	4 (27%)	1 (11%)	3 (50%)
Total score / (100%)	62.6 (13.8)	61.7 (20.8)		4 (27%)	1 (11%)	3 (50%)

*Mann-Whitney U test
SD = standard deviation

Table 1: [Click to enlarge](#)

Direct ophthalmoscopy and an external exam using a slit lamp were also included because the presence/absence of pathology would indicate the level of best-corrected visual acuity and help in the management of the patient. A pass-fail cut-off score of 75%, as stipulated by the university and backed by literature, was maintained by the participants of the focus group discussion.¹⁰ The skills were weighted according to their importance for safe, effective clinical practice based on the literature and clinical assessment experience of the focus group participants.¹⁰ The weightings and number of checklist items for every skill are reflected in the results in **Table 1** with 100% being the overall score.

The time allowed was 50 minutes. If the examiner considered that the examination was difficult (due to a complex refraction, low vision, pathology, patient being illiterate or unable to communicate in Portuguese), an additional 15 minutes could be allowed. Examiners were to consider the difficulty of the patient in the marking of the student.

Theory exams

To cover the background knowledge required for the competent practice of refraction, two theory exams would be set, short-answer questions and a structured oral exam. Both exams would be double-marked using checklists. The overall pass mark for this was set at 50%, as stipulated by the university, backed by literature,⁵ and agreed upon by the focus group, with each section contributing equal weight.

- i. short-answer questions (SAQ) (one hour): This consisted of six case slides. Five of the patient cases had a color photograph of an ocular condition, and one comprised a binocular vision scenario in which the patient history and clinical data were presented. The student was examined on recognition (signs and symptoms), judgment (differential diagnosis and extra tests necessary), refraction management and decision-making skills (e.g., referral, low vision appliances) for the five

cases with a photograph, and a diagnosis and treatment plan for the binocular vision case. The cases were standardized in terms of content (the elements of competencies and performance criteria assessed) and difficulty for both cohorts, taking into account the depth of coverage of a topic expected in the students' answers and the amount of time required to answer a question to the appropriate standard. Model answers were prepared ranking the importance of the different components using guidance from best practice tools in optometry, and graded using a checklist.^{10,23}

- ii. structured oral exam (half hour): This consisted of an oral exam of three case studies from the students' portfolio: one low vision, one binocular vision and one pathology patient, and the management of their refractive error. A checklist with a set of questions was used to elicit the students' knowledge and rationale in the management of the topic under examination as well as the ability to communicate this knowledge. The checklist included the competencies to be assessed and was adapted from checklists used in optometry registration exams in the UK.²³

For both theory exams, each question/case was first marked independently out of 10 by two examiners and then averaged to give a final score. Students who passed both the theory and the clinical exam were deemed competent to refract.

Qualitative observations of the competency assessment process

Qualitative observations of the competency assessment process were made by the examiners. These were used to provide information, regarding the results, to the university and the faculty. This would help identify factors affecting student performance that the quantitative assessment results would not provide. Feedback would be provided to the faculty enabling them to develop an understanding of the results from the clinical assessments of the optometry students. Faculty would have the opportunity to learn from this and improve teaching as a consequence.

Overall, the methodology should be appropriate to provide an assessment of optometry students' refraction knowledge, skills, behaviors, attitudes and values, undertaken in a clinical context of a complete eye examination. This would be a low-stakes assessment with the students' performance not affecting their overall university end-of-year result. Before the clinical assessments were carried out, all the students had a portfolio that documented their refraction competencies including retinoscopy, sphero-cylindrical refraction and binocular balance tests. The students were eligible for the final examination when they had: a) been signed off on the relevant competencies in their portfolio, and b) successfully completed multiple-choice questions in the five courses (clinical optometry, low vision, binocular vision, optometry and clinical medicine and occupational optometry) in their seventh (penultimate) semester.

Assessment Implementation: Methods

Subjects

All 15 students (nine from the first intake, cohort A in 2012, and six from the second, cohort B in 2013) who had progressed to the final semester in their fourth year were invited to participate in the study. The students read and signed a consent form for their inclusion in the study, and confidentiality of the results was maintained throughout.

Equipment

The research equipment used in the study comprised:

- visual acuity chart (3-meter phoropter chart with duochrome and cross-cylinder targets)
- streak retinoscope

- trial lens set and frames / phoropter
- cross cylinders $\pm 0.25\text{D}$ and $\pm 0.50\text{D}$
- $\pm 0.25\text{DS}$ and $\pm 0.50\text{DS}$ flippers
- torchlight
- cover stick
- slit lamp
- ophthalmoscope

Data analysis

Data were entered into an SPSS database (version 21) and analyzed for inter-rater agreement. Consistency between the students and the examiners was analyzed with Cohen's kappa statistic. Descriptive statistics were produced for the clinical competency assessments, and the difference in performance between the first and second cohort were analyzed using a Mann Whitney U test. A significance value of $p < 0.05$ was adopted throughout the analysis.

Refractive error analysis

Based on the literature of repeatability and reproducibility of refractive values, a variance of $\pm 0.75\text{D}$ sphere and cylinder was set as the limit of acceptability for retinoscopy and subjective refraction.²⁴

Examiners

The selection criteria for the external examiner were clinical and academic optometry experience, ability to communicate in Portuguese, familiarity of the health context and availability for placement in Mozambique. The researcher with 14 years clinical and public health experience in optometry and four years experience in the training and evaluation of pre-registration optometry students in the UK met the criteria to carry out the evaluations.

Four of the Unilúrio lecturers, two for each cohort, were recruited as internal optometrist examiners. Two were from Colombia and two from Spain. Two had completed their post-graduate studies, one in Spain and one in the UK. The internal examiners had an average of 10 years clinical experience and four years teaching experience.

All examiners had knowledge of the methods used and were provided training by the program developers on the use of the standardized checklists along with the performance criteria and competency standards necessary for the students to exhibit entry-level competency in refraction on graduation. Two of the internal examiners assessed the practical competency, and two assessed the theoretical exam consisting of the SAQs and the oral exam (one for each cohort), along with the external examiner.

Assessment Implementation: Results

Clinical competency assessment

TABLE 2
Results of Theory Exam

Mean mark (standard deviation)	Inter-rater Kappa
6.6 (1.8)	0.77
5.5(1.6)	0.74

Table 2: [Click to enlarge](#)

Thirty patients were examined (mean range 37.6 years; standard deviation 18.4 years; age range 7 to 72 years; 16 male [53%] and 14 female [47%]) by nine students from the first cohort and six students from the second cohort.

Fourteen patients had low refractive error (sphere within ± 0.75) and seven had best-corrected decimal visual acuity < 0.4 . Refraction results from the two graders were averaged. Inter-rater K value was > 0.6 for all skills, showing a good strength of agreement between the two raters.²⁵ The only significant inter-cohort difference was in binocular balance and near visual acuity. **Table 1** summarizes the mean marks with the standard deviation for both cohorts for every technique, the inter-cohort difference and the total number of students passing every skill.

Theory exam

Table 2 demonstrates the number of students passing the two sections of the theory exam. The inter-rater agreement for the theory exam was > 0.6 , indicating good agreement.

Qualitative observations of clinical assessment

The examiners noticed certain factors in play during the assessments. Eleven students did not carry out binocular balance tests. For both retinoscopy and subjective refraction, there was a lack of clarity with the instructions, with poor fixation targets being presented. The students did not detect a retinoscopy reflex in any of the patients with high myopia. They could not control the subjective response of patients whose response pattern was poor. They took too much time on history and symptoms, which resulted in less time for refraction and other tests. Overall, 10 students did not relate patient symptoms to management.

Discussion

The aim of this study was to evaluate the design of a competency assessment process and gain an understanding of the effectiveness of the process for assessing clinical competency in refraction. Before the clinical assessments were carried out, all the students had a portfolio and had been 'checked off' for all the refraction competencies. However, from the results of these assessments, it appeared that the portfolio served to reflect the procedure being performed and audit skills acquisition rather than check on quality or even proficiency.

Overall, only four students passed the clinical competency assessment. As this was a low-stakes assessment there could have been a lack of motivation to perform well on the part of the students. The qualitative observations identified some of the factors that led to the students failing. These were communicated to the lecturers in a feedback session. This input to the faculty, isolated in a developing country context, has enabled them to learn how to refine student training.

There are several factors that need to be considered in assessing the implications of this study: the lack of standardization of patients; the methodology of direct observation of real clinic patients; the use of SAQs and an oral exam; the increasing importance of using OSCEs; the setting of competency standards and the training and recruitment of examiners. These are all discussed below.

Seven students saw patients with severe, untreated pathology and complex refractive errors. The mix of patients being tested and the complexity of skills being assessed can result in a lack of reliability. SPs are people who are simulating real patients with defined criteria to provide students with consistent and equivalent assessment experiences.^{26,27} Overall, the high costs of training and expertise to ensure reproducibility and consistency of scenarios could not be justified in the context of student assessment in

Mozambique.⁶ The recommendation is to integrate a degree of standardization for future student assessment. A focus group discussion by the faculty to set the criteria for standardization is proposed. The criteria could include patient age, range of refractive error (if complex then every student should get a complex case), best-corrected visual acuity, past experience of optometric exam, absence or presence of pathology, and ability to communicate in Portuguese. This will facilitate the selection of patients that meet defined criteria, by faculty, for competency assessments without incurring an increase in cost and ensure that the marks on the assessment correlate well with the assessments of the students over their entire program.

The methodology of direct observation of real clinic patients is increasingly challenged on the grounds of authenticity and unreliability due to examiner and patient variance.⁶ Inter-rater reliability measures the consistency of rating of performance by different examiners.⁶ The use of two trained raters, for every practical and theoretical exam, with good inter-rater agreement (kappa greater than 0.6) helped to increase consistency.²⁵ Providing the examiners with a standardized checklist increased the reliability of direct observation, and this has been shown to be as reliable as an OSCE.²⁶ A 'Hawthorne' effect occurs when a student or practitioner behaves differently because they are being observed. This effect can have a positive impact on student performance;¹² however, the effect is inevitable with any methodology involving direct observation.¹²

Students were familiar with the test formats employed for the theory exams. SAQs were designed to assess problem-solving and data-interpretation skills when faced with common clinical management problems. The oral exam was based on the students' case records, and examined the knowledge, values and attitudes that informed the students' management of the patients. The issue of reliability and validity in this study was addressed by using two trained raters with good inter-rater agreement and checklists for both exams. The exams were mapped to the elements of competencies and performance criteria and the level of difficulty expected to be mastered by the student specified.

As a potential solution to the concerns of reliability and validity of the other assessment methods, the OSCE has gained increasing importance in the assessment of clinical competency in medicine and optometry in the UK and US.^{10,11,28,29} Wide sampling of cases and structured assessment improve reliability, but the OSCE is expensive and labor-intensive.^{4,6} In Mozambique, due to the lack of SPs and expertise among the faculty to implement and grade OSCEs, they were not considered a feasible assessment method for a new program in a low resource environment. In addition, students were not familiar with the format of OSCEs. Direct expenses of an OSCE include the cost of training standardized patients, examiners, support staff, development of scoring tools and venue costs dependent on the number of stations. However, these costs can be reduced by the use of volunteer faculty, volunteer patients and students as raters.²¹ Further research is required on the cost of implementing the OSCE (materials, examiners and patients or patient simulators) and the reliability and validity offered compared with the other methods, specifically in a low resource environment.

In this study, the setting of competency standards was stipulated by the university, backed by a literature review and agreed upon by the focus group (75% clinical and 50% theory).^{5,10} Absolute standards that are criterion referenced are most appropriate for tests of competence.³⁰ In this case, the exams for the two cohorts were not identical as they contained different patients and cases. Hence, percentage scores did not reflect the same level of knowledge. In the long run, a more systematic, transparent approach to standard-setting and pass-fail criteria, supported by a body of published research, needs to be adopted. This involves evaluating the content and difficulty of the examination.³⁰ Standards should be consistent with the purpose of the test and based on expert judgement informed by data about examinee performance.³⁰

The examiners were all experienced and competent optometrists. The use of multiple examiners is a means that has been shown to enhance reliability.⁶ The examiners were all given explicit criteria and

training in the use of checklists, performance criteria and competency standards based on good practice.⁵ The ideal proposed for an exit assessment is a group of external assessors, accredited for suitability by a professional body of optometrists, trained at the required level with experience in competency teaching and assessment.³¹ They should all be competent in the area they are to assess and familiar with the competency standards. The selection of examiners in Mozambique will evolve over time as more students graduate, a professional body is formed and accreditation to become an assessor offered.

There are certain limitations to the study of assessment methodology. Our sample of 15 students was small but represented 100% of the final-year optometry students. The study concentrated only on refraction because the spectacle supply system at the university had not been established and access to contact lenses is limited. Intraocular pressures were not assessed as this assessment was concentrating on refraction error management competence. However, this assessment methodology could be expanded to include the additional elements in a more comprehensive "suitability to practice" exit competency assessment.

Conclusion

As optometry continues to move towards competency-based curricula, educators require appropriate tools to support the assessment of competencies. The use of existing checklists and rating skills helped to identify areas of competence deficits. Overall, the methodology of direct observation, SAQs and an oral structured exam has shown good inter-rater reliability with the use of these standardized checklists. The main recommendations are the provision of clear guidelines to faculty for the standardization of patients during exams for the assessment to be reliable and repeatable, and increasing assessor training. More data on the use of OSCEs and standard-setting to ensure case specificity and increase validity are required for this methodology to be adapted for use in optometry schools with similar academic resource limitations.

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Features

Announcement

2nd World Congress of Optometry Features Educators' Track

Desiree Ifft | Optometric Education: Volume 42 Number 2 (Winter-Spring 2017)

The 2nd World Congress of Optometry will be held in Hyderabad, India, Sept. 11-13, 2017. Focused on the theme of “Accessible, Quality Vision and Eye Health,” this year’s biennial congress offers optometrists, vision scientists, educators, researchers, students and other visual health professionals a wide-ranging program including lectures and workshops in a variety of areas such as ocular disease, binocular vision, glaucoma, low vision and contact lenses.

Courses offered at the congress will be organized around two principal tracks, a Scientific track and an Educators’ track, and will be COPE-approved. The Educators’ track includes lectures, workshops, symposia and poster presentations designed to maximize the opportunity to advance the optometric education agenda across the world and through that support the sustainable development of highly needed human resources.

The 2107 congress is a World Council of Optometry initiative in partnership with its members the Asia Pacific Council of Optometry and the India Vision Institute. Read more about the 2nd World Congress of Optometry, including [how to submit abstracts](#) for oral and poster presentations, [online](#). [Click here](#) to register.

Industry News

Editorial

Do Students Still Need to be Proficient in Gathering Data?

Aurora Denial, OD, FAAO | *Optometric Education: Volume 42 Number 2 (Winter-Spring 2017)*



Aurora Denial, OD, FAAO

Recently a student assigned to my clinical site commented that retinoscopy and keratometry were useless techniques to master. I was appalled and asked the student to explain the statement. The student said that in previous clinical experiences an autorefractor/keratometer was utilized to obtain a starting point for refraction, and that in the future most potential work environments would also use an autorefractor/keratometer. Although still appalled that a student would question the importance of mastering techniques foundational to our profession, I wondered what it might tell us about preparing our students to practice in today's world.

The Power of Technology

Over the past several decades, there have been significant advances in the sophistication and quantity of technology available to optometrists. New instruments and technology are sought after to provide better patient care, increase productivity and provide a state-of-the-art experience for patients. According to a survey conducted by *Review of Optometry* in 2014, the technologies most wanted and recently purchased by optometrists were: automated phoropter, optical coherence tomograph, electronic health records system, digital anterior and fundus cameras, tear film osmolality test, corneal topographer, pachymeter, wide-field scanning laser ophthalmoscope, and patient recall system.¹ Most of these instruments allow for data to be easily and accurately gathered by technicians. The ancillary use of technicians in optometry is not new. However, the combined use of technology and technicians frees the optometrist from spending valuable time gathering data. The practitioner can utilize chair time to refine data and talk with patients.

In a more futuristic scenario, patients may be able to gather data on their own. There are currently 50,000 medical apps that allow patients to do so.² In the novel *Cell*, written by physician and best-selling author Robin Cook, a phone app, "iDoc," is poised to replace the primary care physician.² In 2014, Cook told a symposium that a virtual doctor can gather data and "sift through billions of studies and records to make a diagnosis and offer a solution."² In optometry, we are seeing the availability of online eye

examinations.

Should Data-Gathering No Longer Be the Primary Focus?

All optometric curricula include courses in clinical methods and techniques. These courses teach skills that allow future optometrists to gather data. The courses usually reflect a significant amount of credit hours and time commitment from students. Most courses have a clinical skills exam or proficiency that insures that students are able to gather data in an accurate and efficient manner. Currently, this is important because students have to pass the entry-level competency exams administered by the National Board of Examiners in Optometry (NBEO) to qualify for licensure. However, if academic curricula changed, would the NBEO follow? Additionally, the argument could be made that certain populations and environments will always demand the need for proficiency in specific data-gathering techniques.

Is data-gathering by the optometrist foundational to our profession and needed to accurately and reliably assess the data? How proficient do students have to be in data-gathering when technology and instrumentation that allow for efficient data collection may be readily available? Do they still need to be proficient in using the binocular indirect ophthalmoscope when they can obtain a wide-field scanning laser ophthalmoscope image? Do students still need to be proficient in retinoscopy? In 2011, ASCO reported that the schools and colleges of optometry “shall ensure that before graduation each student will have demonstrated all the skills required for the diagnosis, triage, management and/or treatment of common visual conditions.”³ Can this goal be met by focusing on the analysis of data along with the diagnosis and management of conditions and leave the data-gathering to instruments, technicians and technology? Most first- and second-year optometry program courses focus on technique and data-gathering, but do we need to change the culture of learning in optometry school and shift our focus away from data-gathering?

I often tell my students, “Throughout your careers you will be in awe of new instrumentation, medications and technology, but in the end your mind and ability to think will be the best skill you can bring to your patients.” My message reflects the perception of an optometrist who relies on thinking skills, such as analyzing data, interpreting information, forming conclusions and implementing plans, rather than an optometrist who focuses on data-gathering. I have to ask myself: Why was I initially distraught by the student who discounted retinoscopy as an essential technique? As educators, should we reflect and consider that we are subconsciously hanging on to the role of the optometrist of the past instead of looking into the future?

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opted@redhead | Optometric Education: Volume 42 Number 2 (Winter-Spring 2017)

Industry News

Leadership Change at the Vision Impact Institute



VISION IMPACT INSTITUTE™
Giving Vision a Voice

Kristan Gross was recently promoted to the role of Global Executive Director of the [Vision Impact Institute](#) (VII), a non-profit organization that receives support from the Vision for Life Fund of Essilor. Gross had recently served as the organization's Director of Global Content and Communications. The VII is dedicated to raising awareness about the importance of healthy vision, including the socio-economic impact of uncorrected refractive error and the quality-of-life benefits of vision correction.

Gross replaced Maureen Cavanagh, who served as President of the VII for two years and was expected to transition to a different role with Essilor of America. For more information about the Institute, including its unique database of research, [visit its website](#).

New Scleral CL Designed for Normal Corneas

BAUSCH + LOMB
See better. Live better.

The Specialty Vision Products division of Bausch + Lomb introduced the Zen RC Scleral Contact Lens, which is designed to aid eyecare professionals as they fit patients who need a scleral lens but have a normal cornea. Zen RC provides a smaller diameter for easier insertion and removal by the patient as well as a reduced nominal center thickness.

Fitting the Zen RC scleral lens within the standard parameters should be adequate for most patients, but it can be customized to nearly any parameter. Toric peripheral curves, customized center thickness, flexure controlling profiles and front toric prescriptions can also be ordered when necessary. [Visit Bausch + Lomb's website](#) for more information.

Company Provides Multiple Resources for Optometry Practices



The role of optometrists in patient care continues to expand. In recognition of this trend, Allergan has been working closely with ODs nationwide to provide programs and resources aimed at helping them diversify their practices. One of many programs, Allergan Optometry Jumpstart provides students and recent graduates with tools and information to help them get off to a strong start. Currently, 9,120 new ODs and students are registered in the program, including 91% of the class of 2016.



Among the resources available from Optometry Jumpstart are product samples for patients who need them, a dedicated Allergan sales representative, savings programs to help manage costs for eligible patients, and patient education materials. Visit AllerganODJumpstart.com to become part of the program.

Contact Lens Designed for Digital Device Users



Now available from CooperVision is a new contact lens, Biofinity Energys with Digital Zone Optics, which was created specifically for digital device users. The new lens combines unique optical properties, an advanced silicone hydrogel material and a smooth, naturally wettable surface designed to provide long-lasting comfort. It's designed to help the eyes better adapt so wearers can seamlessly and continuously shift focus between digital devices and offline activities. According to company research, after one week of wear, eight out of 10 digital device users agreed that Biofinity Energys lenses made their eyes feel less tired.

For more information, visit the CooperVision website or FightEyeFatigue.com.

Get Help with Digital Marketing



VISION CARE, INC.

Johnson & Johnson Vision Care Inc. has created an all-new Digital Guide to help eyecare professionals develop or optimize a digital marketing strategy to encourage new patient visits, stay engaged with current patients, and keep patients informed of new contact lens options.

The actionable and interactive guide includes topics such as targeting, websites and social media as well as tips for reaching patients where they are online, simple updates for optimizing a practice website, and effective ways for leveraging social media to reach different patient groups.

Download the guide for free from www.AcuvueProfessional.com. Download other free and customizable assets, such as digital banner ads and social media posts, from www.MyAcuvueResourceCenter.com.

Also: On Feb. 27, 2017, Johnson & Johnson announced the completion of its acquisition of Abbott Medical Optics (AMO). The acquisition includes ophthalmic products in three areas of patient care: cataract surgery, laser refractive surgery and consumer eye health. These product lines will be joined with the Acuvue Brand Contact Lenses business, and the combined organization will operate under the brand name Johnson & Johnson Vision (J&J Vision).

Vision Expo Programs for Young Professionals and Students



From free pop-up talks on the show floor to education and networking opportunities, International Vision Expo continues to offer students and young professionals the resources they need to excel in their careers. For example, members of the Young Professionals Club (YPC) and students attending Vision Expo East (March 30-April 2, 2017, New York) have access to:

- free exhibit hall registration (\$150 value)
- six hours free continuing education (YPC members)/free unlimited education (students)
- networking events and programs

Students and young professionals can also view education recommendations directly from their peers in the YPC Advisory Group. Advisory group members have suggested courses that will be valuable to students and recent graduates, from creating a memorable patient experience to building a practice with new technologies.

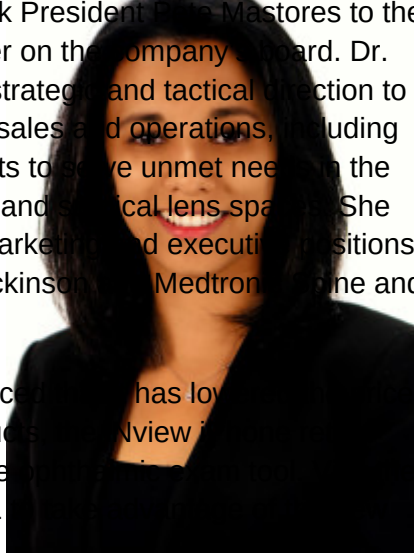
[Click here for the full list of events](#), resources and learning opportunities designed specifically for students and young professionals.

Volk Names New President



[Volk Optical](#) appointed Jyoti Gupta, PhD, to the position of President, following the move of long-time Volk President Gene Mastores to the position of Chief Commercial Officer on the company's board. Dr. Gupta is responsible for providing strategic and tactical direction to support the future growth of global sales and operations, including driving development of new products to solve unmet needs in the ophthalmic imaging and diagnostic and optical lens space. She previously held clinical research, marketing and executive positions with Unilife Corporation, Becton Dickinson and Medtronic and Biologics.

The company also recently announced that it has launched the next of two of its ophthalmic imaging products. View it on the company's website or call (440) 942-6161 for more information on pricing.



Stay abreast of the latest Volk news by following the company on Twitter @VolkOptical and Facebook or visiting its [blog](#).

Innovation Award Winners Chosen

Transitions®

Innovation Awards

Transitions Optical announced the winners of its 2016 Transitions Innovation Awards, who were recognized during Transitions Academy in Orlando, Fla., in February 2017 and included:

- Pacific Eye Care, Port Orchard, Wash ? Best in Growth Achievement
- Value Optical, Trinidad ? Best in Marketing
- Professional VisionCare, Westerville, Ohio ? Best in Patient Experience
- New Look Eyewear, Québec, Canada ? Best in Training
- Sheena Taff of Roberts & Brown Opticians, Vancouver, British Columbia, Canada ? Brand Ambassador

For more information about the company and Transitions lenses, visit Transitions.com or TransitionsPRO.com.

10-Week Student Internships Available



Walmart is accepting applications throughout the year for its Optometry Intern Program, which is designed to prepare the company's next generation of ODs for practice within Walmart and Sam's Club stores.

According to Walmart, the 10-week hands-on training program, which includes an OD mentor, is in-depth and provides experience across a range of areas from basic visual services to diagnosis, management and treatment of visual problems and ocular disease, contact lens fitting, patient education and clinical business strategies. The intern program is open to first- through fourth-year students, but the company says first- through third-year students may benefit most because the experience is geared toward entry-level clinical management. Start and end dates are flexible to accommodate the interns' school curriculum timelines.

Interested students should contact Gayathiri Pathmanapan at (479) 277-6621 or [via e-mail](#).

Device Streamlines Slit Lamp Imaging



Now available from Marco is the Ion Imaging System, an all-in-one anterior segment imaging device that combines an intra-optics beam-splitter/camera adapter with the computing and imaging power of the latest Apple technology to create a highly sophisticated “mainstream” imaging system that emphasizes image quality, simplicity and efficiency. The Ion combines all of the components (digital camera, adapter, computer, monitor, multiple cables, keyboard, mouse, etc.) of the traditional photo slit lamp into one streamlined device.

Marco says the Ion enables eye doctors to “capture, integrate and educate” with every diagnosis. It includes an app dedicated to anterior segment imaging that consists of patient demographics, pre-set photography modes for maximizing various lighting techniques for video or still images, and auto storage to the Cloud or to a local network for EMR or PACS integration. [Find more information online.](#)

Give your SVOSH Mission Trip a Boost



National Vision encourages Student Volunteer Optometric Services to Humanity (SVOSH) chapters that

are preparing for mission trips to take advantage of some assistance. The company provides \$1,000 per optometry school each year to help with the costs of going on mission trips. In addition, anyone going on a mission trip can request a glasses pack of 300 readers and 100 sunglasses that will be provided at no cost.

Learn more about this program at the [National Vision website](#) or by contacting Kristen Reynolds at (470) 448-2139 or [via e-mail](#).

Equipment Distributor Partnership Expands



Haag-Streit USA and Reliance Medical Products announced a new national authorized distributor partnership with Walman Instruments. The expansion of the working relationship grants customers additional access to Haag-Streit's ophthalmic equipment throughout all 50 states.

Walman Instruments is a single-source provider of all diagnostic instrumentation, accessories, technologies and service for the eyecare professional. Find the company online at www.walmaninstruments.com. Visit Haag-Streit USA at www.Haag-Streit-USA.com.

Educator's Podium

Using Technology to Enhance Student Learning and Clinical Teaching Outcomes

Kwang Meng Cham, PhD, BOptom, GCertUniTeach, PGCertOcTher, and Anthea Cochrane, BScOptom, PGDipAdvClinOptom, PGCertOcTher, GCertUniTeach | Optometric Education: Volume 42 Number 2 (Winter-Spring 2017)

The use of simulation and innovative technology to enhance teaching and clinical training is a common trend in higher education. Training using simulation has been reported in medical and allied health disciplines, but few publications exist in optometry. In this report, we present a teaching model implementing the 3D Eyesi Binocular Indirect Ophthalmoscope simulator (VRmagic, Germany) that has yielded positive learning and teaching outcomes.

Utilization of a BIO Simulation System

Binocular indirect ophthalmoscopy (BIO) is an essential optometric skill that students must master in order to detect sight-threatening conditions such as retinal detachment and diabetic retinopathy. It is a constant challenge for clinical educators to provide immediate, constructive and rich feedback to students performing BIO because the retina cannot be viewed simultaneously by student and educator without one-on-one supervision using a teaching mirror or utilizing imaging equipment (e.g., BIO video camera). Hence, it is difficult for students to improve their BIO skills efficiently and effectively, especially if unsupervised. In addition, students are exposed to only a couple of practice patients with a limited range of retinal conditions when learning the technique. All these factors have made student learning of BIO less enjoyable and engaging.

With a head-mounted display, a model head and two lenses, the Eyesi BIO simulator provides a realistic 3D experience and operates exactly like a real ophthalmoscope. Exact alignment of the laser light source and the lens has to be achieved before a retinal view can be obtained. A camera system tracks the position of the student's head and lens relative to the model head. The software offers training on four different tiers of complexity, which are appropriate for different year levels of our four-year Doctor of Optometry postgraduate program. The live interactive training program provides students with high-quality, comprehensive and instant feedback on their BIO technique as the examined retina is recorded and the retina currently being examined is displayed on the screen in real time. In addition, aspects of the technique such as efficiency, accuracy, thoroughness of the findings and diagnoses of a wide range of retinal pathologies can be evaluated by the computer.

We have enhanced the BIO learning experience for students using the simulator as a teaching and revision tool. In the second year of our program, after receiving the didactic lecture on how to perform BIO, all students attend standard practical classes to learn the technique. Prior to using the simulator, all second-year students need to pass an online orientation course to ensure familiarity with the technology. Then they are assigned to work in groups of three to use the BIO simulator for six two-hour self-directed sessions for the year. A final-year student is allocated to provide peer trouble-shooting advice and critique only for the first session. In the third year, students again have access to the simulator for six two-hour self-directed sessions, but on an individual basis. It is expected that by the end of the third year, students should have completed the first two tiers of the simulator training program.

Assessment of Benefits and Drawbacks

We obtained ethics approval to conduct anonymous surveys over a two-year period to assess students' perception of this technology. A total of 104 students were surveyed (response rate 46%), and 90-100% strongly agreed or agreed that the technology: (i) is a highly valued and useful learning tool, (ii) contributes to them being more confident, competent and proficient in performing BIO, and (iii) improves their stability, orientation and alignment when examining the retina on a real patient.

In our opinion, the implementation of a technology-enhanced learning environment has provided students with a deeply interactive and immersive learning experience. Our observations demonstrate that integration of the BIO simulator into our OD program has improved students' clinical examination and reasoning skills and concurrently minimized the range and variability in clinical performance. We hypothesize that well-structured self-directed BIO simulator sessions in the second and third year have allowed students to achieve technical competency earlier, which then enabled clinical educators to concentrate on the translation of the technique to a real patient in the clinical setting in later years.

Use of the BIO simulator has also led to reduction in teaching workload because the need for intensive one-on-one BIO technique introduction and refinement with clinical educators is minimized, particularly in the early stages. Increased student interaction and engagement has been achieved by working with same and different year-level peers.

Despite the positive outcomes, the BIO simulator does have drawbacks. It supplements, but still does not replace conventional practical classes. Certain aspects of the technique such as patient instructions, manipulating the patient's lids and head, and altering chair height cannot be taught and evaluated properly using this technology. How the simulator generates a final score based on its assessment criteria remains to be understood. Large class sizes require multiple simulators, and service and repairs are currently available only in Germany.

Considerations for the Future

We anticipate that improved in-situ feedback and assessment mechanisms will translate to increased proficiency and efficiency when students perform BIO on real patients in clinic in later years. Additional studies are warranted to evaluate the efficacy of the BIO simulator in improving student-perceived proficiency and confidence. Furthermore, the suitability of the BIO simulator to be used as an examination tool in clinical competency examinations remains to be explored.

Dr. Cham [ckwang@unimelb.edu.au] is a Teaching Specialist in the Department of Optometry and Vision Sciences at the University of Melbourne in Victoria, Australia. He is primarily involved in preclinical teaching in the early years of student training and has been successful with several University Learning and Teaching Initiative Grants for evaluating the use of technology to enhance formative and summative assessment and peer-assisted learning within the curriculum.

Anthea Cochrane is Senior Lecturer and Clinical Teaching Coordinator in the Department of Optometry and Vision Sciences at the University of Melbourne in Victoria, Australia. She strives to advance her teaching practices and constantly upskill her expertise in clinical teaching.

Industry News

