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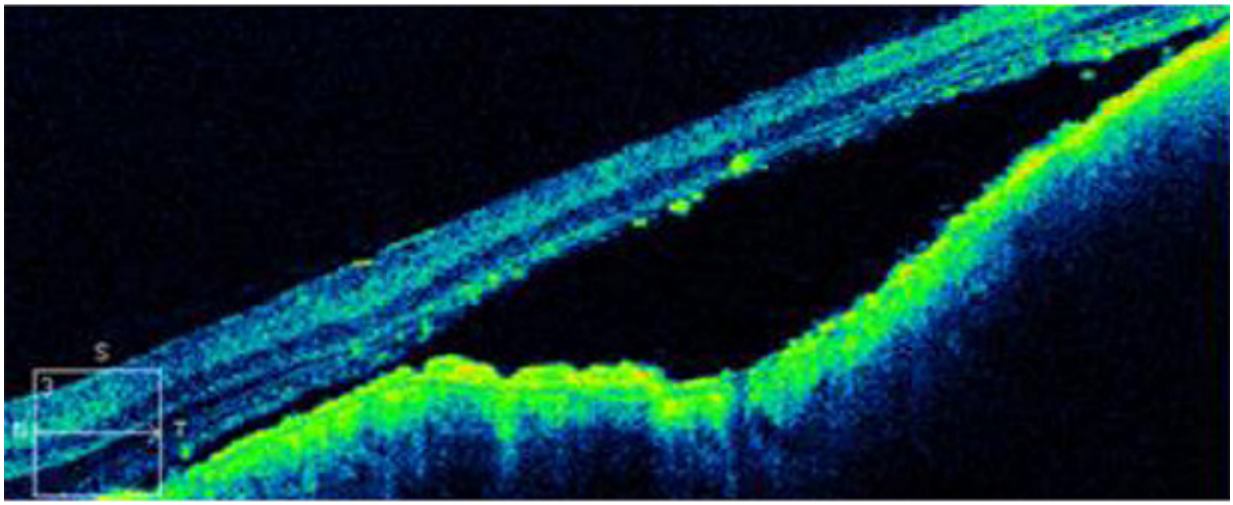

Vitamin B12 Deficiency Optic Neuropathy: a Teaching Case Report

Influence of Participation in an Elective Course in Enhancing Perceived Critical Thinking, Independent Learning and Residency Decision-Making

Normotensive Glaucoma Follow-Up with Incidental Finding of Choroidal Neovascular Membrane: a Teaching Case Report

Choroidal Melanoma and Disclosing Bad News: a Teaching Case Report

Communicating Educational Objectives in an Optometry Course

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ALSO INSIDE

Optometric Education: Volume 42 Number 3 (Summer 2017)

Table of Contents

Articles

Articles

Influence of Participation in an Elective Course in Enhancing Perceived Critical Thinking, Independent Learning and Residency Decision-Making

Gayathri Srinivasan OD, MS, FAAO, Diane Russo OD, FAAO, and Stacy Ayn Lyons OD, FAAO |
Optometric Education: Volume 42 Number 3 (Summer 2017)

Abstract

Purpose: *This study evaluated the perceived effectiveness of the Special Populations Experience Course (SPEC) elective in enhancing critical thinking and independent learning skills and its influence on residency decision-making.* ***Methods:*** *68 participants from graduating classes 2013-2016 who completed the SPEC elective were contacted by e-mail using an online survey developed by the authors.* ***Results:*** *49 participants responded to the survey. Of the participants, 29 (59.2%) reported that the SPEC elective was very beneficial in cultivating independent learning and critical thinking skills; 27.6% reported that SPEC was the primary reason for pursuing a residency; and 55.2% cited other reasons for pursuing a residency.* ***Conclusion:*** *The majority of participants reported that the elective was beneficial in enhancing critical thinking and independent learning skills and also influenced their choice of specialty for residencies.*

Key Words: *electives, critical thinking, optometric residency*

Introduction

The Association of Schools and Colleges of Optometry defines optometrists as “independent primary health care professionals for the eye.”[1] The scope of optometry has expanded over the past three decades. In an increasingly digital world with an aging population, optometrists should be prepared to adequately provide eye care to a wide variety of patients across all ages. Sound didactic knowledge and robust clinical experience are essential in training qualified doctors of optometry. Most schools of optometry offer direct patient care/clerkship experience in the second half of the second year or early in the third year of the degree program.[2] Depending on the robustness and diversity of clinical sites, students gain exposure to general optometry and various optometric specialties (e.g., contact lenses, pediatrics, ocular disease, low vision). Even though early exposure to optometric specialties provides a better foundation for clinic readiness, didactic coursework in most specialty topics is often not offered until the third year of optometry school, and clinical exposure in these areas may not happen concurrently. Elective courses offer the opportunity for students to gain in-depth understanding of optometric specialties.

Elective courses designed to expand knowledge in optometric specialties are currently offered to third-year students in 12 optometry schools in the United States.[3] At the New England College of Optometry (NECO), third-year students are required to complete 2.75 credit hours of elective courses in the third-

year of optometry school. While most of the elective courses offer only a didactic component covering advanced topics in various optometric specialties, the Special Populations Experience Course (SPEC) at NECO offers weekly clinical patient care placements (4-8 hours per week) in specialty clinics (advanced contact lenses, pediatrics, vision therapy, low vision, and individuals with disabilities) in addition to didactic content.

Goals of the SPEC elective are:

- To provide earlier exposure through a combined clinical and didactic experience in the following areas of optometry: advanced contact lenses, pediatrics, low vision, vision therapy, and individuals with disabilities
- To enhance critical thinking skills through literature search for journal club discussions and case report submission
- To enhance independent learning through self-study for clinical case presentation and mentor discussions
- To enable students to make a more informed residency decision through early clinical exposure, and potentially increase the number of students pursuing a post-graduate residency year

Currently, the SPEC elective is offered during the summer, fall and spring terms of the third year. Enrollment in the elective is application-based, and because it contains additional didactic and clinical workload, students are required to be in good academic standing (cumulative grade point average minimum of 3.0). The application process includes a brief written statement outlining the student's interest in a particular specialty and ranking of specialties (most to least desired). An accepted student is paired with a faculty mentor with clinical and didactic expertise in the student's choice of specialty. The students work with the mentor in clinic weekly and participate in weekly discussions with the mentor to advance their training/knowledge in the field. In addition, students are assigned to eight hours per week of primary care clinic as part of their regular third-year assignment. The didactic component of the elective requires each student to do at least one case presentation and one journal article review and to write a case report. The final grade is pass/fail. Each mentor works with a student or two per term and is compensated separately on a term basis for the mentorship provided. Historically, 10-15% of the class population has enrolled in the elective in the third year.

A recent survey found that approximately 65% of all elective courses offered in other optometry schools cover topics in specialty patient care.[3] However, it is unclear whether early exposure to optometric specialties prepares students for clinic readiness in fourth year or if it is beneficial in the residency decision-making process.

The purpose of this study was to evaluate the SPEC elective's effectiveness in meeting its goals, specifically:

1. Did students perceive that this elective enhanced their critical thinking and independent learning skills compared to their primary care assignment?
2. Did early clinical exposure to optometric specialties influence their residency decision-making process?
3. Did this elective influence the choice of specialty in the residency decision-making process?

Methods

A web-based survey **(Appendix A)** was designed by the authors and sent through Google Forms to the students who completed the SPEC (classes 2013-2016) after the residency matching results were released for the class of 2016. The Institutional Review Board at NECO approved the study. Participants were given 10 days to complete the survey, the results of which were analyzed using Google Sheets and

Microsoft Excel.

Results

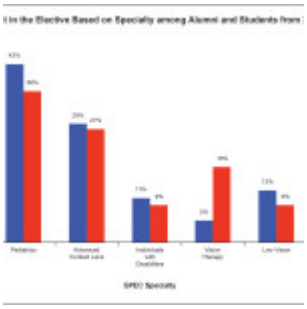

Figure 1.
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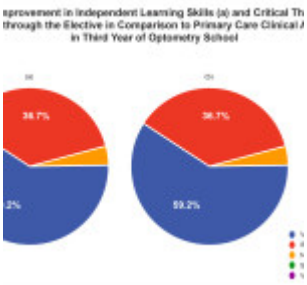

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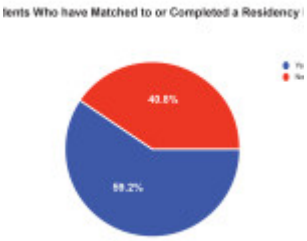

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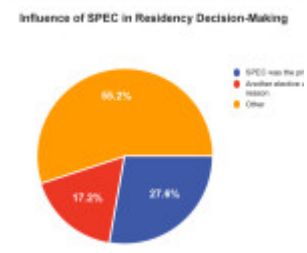

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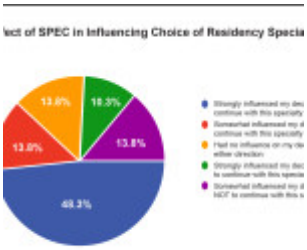

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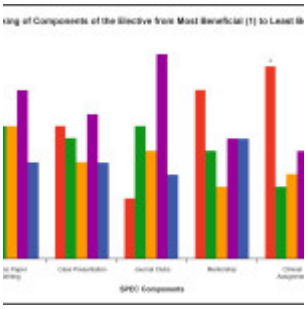

Figure 6.
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The survey was sent to 11 fourth-year students and 57 alumni (n=68). The response rates for fourth-year students and alumni were 100% (n=11) and 66.66% (n=38) respectively. **Figure 1** shows the number of students and alumni enrolled in each specialty offered in the elective.

Perception of improvement in skills

Survey respondents were asked how beneficial the elective was in improving their independent learning skills **(Figure 2a)** and critical thinking skills **(Figure 2b)** when compared with their primary care assignment in their third year. 59.2% (n=29) responded that the elective was very beneficial, and 36.7% (n=18) responded that the elective was somewhat beneficial. A small percentage (4.1%, n=2, data not shown) of respondents found that the elective was neither beneficial nor unbeneficial in improving critical thinking and independent learning skills. None of the respondents reported that the elective was not beneficial in improvement of either of those skills.

Influence in residency decision-making

59.2% of respondents (n=29; alumni = 21, fourth-year students = 8) either completed a residency or had been accepted to a residency program. **(Figure 3)** 36.7% of respondents (n=18) did not apply to any residency program. 4.08% (n=2) applied to residency program(s) but did not match (data not shown).

27.6% (n=8) responded that the elective was the primary reason for applying to residencies, while 55.2% (n=16) cited another elective as the primary reason. **(Figure 4)** Of the 29 respondents who had either completed a residency or had been accepted to a residency, 48.3% (n=14) felt that the elective strongly influenced their decision to continue with the same specialty as the elective experience. 13.8% (n=4) responded that the elective had both somewhat influenced and not influenced their decision-making. 10.3% (n=7) of participants noted that the elective influenced their decision to not continue with the same specialty as the elective. **(Figure 5)** Other common reasons for applying for residencies were “other faculty mentorship” and “fourth-year rotations.”

Components of the elective that affected clinic readiness for fourth year

Many respondents reported that the clinical assignment, mentorship and case presentations were the

most beneficial in helping them to become clinic ready for their fourth-year rotations. Activities such as journal clubs and topic paper writing were not perceived as beneficial in preparing for clinic readiness. However, a comparison of ranking across all components yielded no significant difference of rankings among SPEC components [?2 (4) = 2.7265, p=0.6046]. **(Figure 6)**

Discussion

At NECO, SPEC is the only elective that offers clinical patient care assignment in different optometric specialties to third-year optometry students in addition to a didactic component. The goal is to introduce clinical patient care in optometric specialties early during a student's education through mentor pairing and weekly clinical assignments to facilitate informed residency decision-making. To our knowledge, this is the first study to evaluate the influence of an elective program in the optometric residency decision-making process. In addition, this study evaluated the perceived improvement in critical thinking and independent learning skills after participating in the elective.

Past studies have shown that good critical thinking skills are linked to good professional judgment.[4,5,6] Denial[4] showed that entering fourth-year optometry students who scored low on a critical thinking skills test demonstrated the lowest clinical ability. Independent learning is a lifelong necessity for optometrists. In addition, in the era of evidence-based medicine it is even more important for optometry students to learn the art of independent learning, which involves identifying reliable sources of information and seeking the most up-to-date information for providing quality patient care. In this study, more than half the respondents reported that the elective improved their critical thinking and independent learning skills compared with their primary care clinical assignment. This could be due to a combination of additional clinical assignment, participation in and preparation for case presentations and journal clubs (didactic elective activities) and one-on-one mentoring, which may not be required components of primary care regular clinical assignments for third-year students.

A desire to improve skills and develop confidence has been reported to be one of the important factors in deciding whether to pursue an optometric residency.[7] Optometry students first hear about residency programs in their first year but decide to pursue residencies in their fourth year.[8] It can be argued that early exposure to optometric specialties may benefit students' residency decision-making process. A web-based cross-sectional survey evaluated the factors that influenced fourth-year medical students' career choice in internal medicine and found that educational experience in internal medicine as a student was a significant factor in the choice compared with students whose career choice was not internal medicine.[9] Another study showed that clinical experience during clerkships combined with "role-modeling effect" from clinical teaching faculty greatly influenced student specialty choices in medical schools for residency.[10] In the current study, among respondents who applied for residency, 48.3% reported that SPEC influenced them to pursue residency training in the same specialty. It is important to note that clinical exposure in optometric specialties combined with mentorship is an important hallmark of this elective. However, only 27.6% of the respondents reported SPEC as the primary reason for deciding to apply for a residency. For a small group of respondents (10.3%), the elective influenced their decision not to continue with the specialty. This can be very useful when deciding to apply, given that 17.1% of optometry residency applicants begin searching for programs at least one year before the start of residency programs, in their third year.[11]

There are limitations to this study. We are reporting the perceived (subjective) improvement in participant skills. Conducting an assessment of skills prior to and after completion of the elective to objectively assess the impact of participation would have been helpful. Furthermore, because the elective is fairly new (class of 2013), the sample size was small. Nevertheless, the results of the study enabled an understanding of how SPEC benefitted the participants with regard to difficult choices such as residency decision-making.

Conclusion

The SPEC elective experience benefitted participants in deciding choice of residency in their third-year of optometry school. In addition, the SPEC elective was perceived by third-year optometry students to be effective in improving independent and critical thinking skills compared with the primary care assignment. Additional research is needed to assess what factors/experience influence the choice of optometric residency, which in turn could help optometric educators develop creative learning experiences.

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Appendix A.

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Communicating Educational Objectives in an Optometry Course

Lawrence R. Stark, B.App.Sc. (Optom.)(Hons), PhD | Optometric Education: Volume 42 Number 3 (Summer 2017)

Abstract

This study investigates how to communicate written course objectives effectively within an optometry course. An action research approach was used to study how students use and interpret behavioral objectives, and how they use course materials. Students use objectives in a wide variety of ways, some of which are consistent with past studies and with the cognitive mediation paradigm. Objectives and self-tutorials made learning easier and more efficient and provided appropriate expectations of examination questions.

Key Words: *behavioral objectives, course objectives, cognitive processes, cognitive mediation paradigm, formative evaluation*

Background

Educational context

The purpose of this study is to investigate how to communicate written course objectives within the course Visual Optics so students can be informed effectively about what they should learn. This course is offered in the first year of the four-year optometry program at the Southern California College of Optometry at Marshall B. Ketchum University (SCCO). Resources include a course handbook and self-tutorial exercises. The course handbook contains lecture and laboratory class notes set out in chapters. Each handbook chapter begins with an advance organizer, which is a type of introduction that aims to bridge the gap between what the students may already know and what they will learn.[1,?2] This is followed by the behavioral objectives[3,?4] listed in a nested form, which consists of a small number of general objectives, each with a subset of specific learning outcomes constructed using Mager's[3] behavioral-objective format (Gronlund,[5] ch. 2). Each self-tutorial consists of the behavioral objectives set out as headings, with relevant questions listed under each heading, and a list of answers to provide feedback to the student. My reflections on the current implementation led to a set of 10 inquiries, six of which are presented in the current paper.[6]

INQUIRIES

Inquiry 1. How do students actually use objectives?

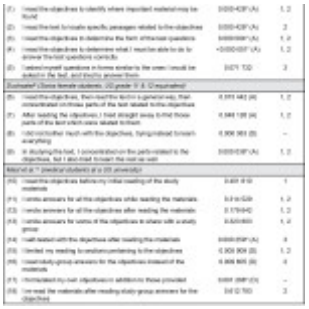

Table 1
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Despite the large volume of papers published on the topic of behavioral objectives, surprisingly few authors have considered whether students actually use the supplied objectives.[7–11] Unfortunately, the conclusions of those studies differ widely. Several authors have studied the specific strategies of those students who do make some use of supplied objectives **(Table 1)**.[9,?12,?13] Of these, only Mast et al.'s study involved a genuine educational context; that is, they studied actual student behaviors in a real educational program rather than having subjects (or students) participate in an experimental situation designed by the investigators.[13] In addition to these observational studies, Jiang and Elen[11] hypothesized a three-part cognitive mediation paradigm, in which the student (1) interprets the objective, (2) uses the objective for goal-directed learning, and (3) self-tests to the objective. In relation to the current course, it would be useful to know how students use the objectives (if at all), and whether the students' strategies match those of previous studies **(Table 1)** and the cognitive mediation paradigm.[11]

Inquiry 2. Do students have previous experience in the use of objectives?

My literature search uncovered no direct studies of the effect of prior experience with objectives on students' current use of objectives. In relation to the current course, students who have used behavioral objectives in the past might perform better with objectives than students who lack this experience.

Inquiry 3. Are there ways to present objectives to enhance learning?

The current handbook has the behavioral objectives placed near the start of each chapter. It is natural to question whether other placements could be more helpful for students. The literature indicates that interspersing objectives within the passage before each paragraph leads to significantly higher test performance than other single placement alternatives.[14,?15] In addition, Kaplan found greater learning when objectives were placed before and after a passage than when they were placed in either location alone.[16] Contrary to expectations, a larger number of objectives is not a deterrent to students' use of objectives,[13] nor does it have a significant effect on learning.[17]

Inquiry 4. Does completion of questions promote learning?

Several studies show an important effect of practice with feedback on test performance in objectives-based curricula,[11,?18–22] consistent with the self-testing component of the cognitive mediation paradigm.[11] These beneficial effects of practice, unfortunately, are reduced greatly when students are required to transfer knowledge to unfamiliar situations.[22] In relation to the current course, it would be helpful to know if completion of the self-tutorials provides appropriate opportunities for practice and feedback.

Inquiry 5. Do objectives increase the ease and efficiency of discovering what should be learned?

Rushin and Ballin calculated study efficiency as the ratio of test performance to study time, in points per hour.[23] Using these measures, undergraduate students provided with objectives were significantly more efficient than those without objectives. In Mast et al.'s study,[13] medical students stated that shortage of

time was a reason for using objectives, and that objectives improved the efficiency of their study time. In contrast, two other studies did not find a replicable effect of objectives on students' reports of knowing what they should learn.[18,?19]

Inquiry 6. Do exam questions meet students' prior expectations of learning?

Little is known as to whether objectives provide students with accurate expectations of test content. Medical students reported using objectives less when they found that the objectives were not being tested.[13] Since providing students with appropriate expectations is cited as an important reason for using behavioral objectives,[24] it was important to know if the objectives in the current course were assisting students in this respect.

Methods

A survey was designed to address the six inquiries of this study. The aims of this survey were:

1. To determine how students use objectives in the course, and whether published strategies are representative of actual uses (inquiry 1). Eighteen strategies from three papers[9,?12,?13] were presented as Likert items **(Table 1)**. Participants were also asked to contribute their own strategies in an open-ended question.
2. To document the level of previous experience with objectives (inquiry 2). Participants were asked to estimate the percentage of previous courses containing overt behavioral and non-behavioral objectives. They did this for: the optometry program to date; their undergraduate program; their time at high school; and other degree or certificate programs, if applicable. Participants were provided with definitions and examples of behavioral and non-behavioral objectives. An objective was considered behavioral if it included an observable behavior describing what the student should be able to do, and included the particular content on which the student was to act (e.g., to do something with facts, concepts, procedures or instruments).[3]
3. To determine students' attitudes to the placement of objectives within each chapter (inquiry 3). Participants' preferences for objectives placed before, within or after the text were assessed with a multiple-choice question.
4. To determine how students use the self-tutorials, and to elicit their opinions on the quality of feedback in those tutorials (inquiry 4). Participants were asked to rate their level of use of self-tutorials on a Likert scale. Two open-ended questions asked participants to describe how they used the self-tutorials, and to comment on the quality of the feedback.
5. To determine whether objectives increased the ease and efficiency of discovering what should be learned, and whether students' prior expectations of what to learn were consistent with the tests (inquiries 5 and 6). The ease and efficiency of discovering what should be learned were assessed with Likert scales. Participants were asked in open-ended questions if any objectives had hindered their study, if test content agreed with their prior expectations, and to provide examples of test questions of an unanticipated type.

The students were asked to take part in this survey after completion of the course. Two research assistants made brief recruiting presentations to the class, sent e-mail invitations to participate in the study, and personally approached students. They mailed individually addressed survey copies to students who expressed interest in the survey. Participants were allowed to take as much time as needed to complete the survey, and they returned the completed surveys by internal institutional mail at no cost. The research assistants sent reminders to participants to return completed surveys.

Where Likert scales were used, they were of the form strongly agree (SA), agree (A), neither agree nor disagree (N), disagree (D), and strongly disagree (SD). The study was designed to meet ethical considerations in educational action research.[25,?26] Informed consent was obtained from each participant.

For anonymity, the class year was not included in this report. The SCCO Institutional Review Board determined the study to be “exempt” from review.

Results

Twenty-two participants completed the survey, a response rate of 21%. The replies to all open-ended questions were coded to a smaller number of concepts using content analysis.[6]

How do students actually use objectives?

Participants used a Likert scale to rate their level of agreement with each of 18 published strategies for the use of objectives[9,?12,?13] **(Table 1)**. The binomial test was used to discover significant levels of agreement or disagreement with each strategy. Post-hoc power estimates were made.[27] For a two-tailed test with ? = 0.05, these tests had 80% power to detect a change of ± 31% away from the null hypothesis of 50% of participants agreeing and 50% disagreeing. Thus, the binomial test was well-powered to detect strong levels of participant agreement and disagreement. The Bonferroni-corrected significance level (?) of 0.002 778 (that is, 0.05/18) was also used to control for family-wise error rates.

The participating cohort reported significant levels of agreement and disagreement with various strategies, and these results are summarized in **Table 1**. Participants were then asked, “How often did you use the objectives in Visual Optics?” Nineteen of 22 used the objectives often or very often, and the remaining three used them occasionally.

Twenty-one participants described how they used objectives in the course. Twelve participants provided reasonably detailed linear accounts of the steps they usually followed, eight provided possibly incomplete narratives that did not contain multiple steps, and one described a non-linear approach in which the objectives and self-tutorial were used to create a personal study guide.

In the group of 12 participants who described linear processes, only four described the three parts of the cognitive mediation paradigm in order.[11] For example, here is participant 4’s response (with the three steps annotated): “I would read the objectives [Step 1, interpretation of objectives], then read all of the material (text) and highlight the information pertaining to the objectives [Step 2, goal-directed learning]. After I would read group study notes & questions that quizzed me on my study/reading [Step 3, self-test to the objective].” A diversity of linear, stepped approaches was found with the remaining eight participants.

The responses of all 21 participants were then read to identify the presence or absence of parts of the cognitive mediation paradigm,[11] regardless of order. Ten participants described activities consistent with interpretation of the objectives, 12 described goal-directed learning, and 11 reported self-testing to the objectives.

TABLE 2
ınts’ Prior Experience with Course Obje

	Percentage of Courses (mea	
	Behavioral Objectives	Non-B Object
	56.8 (25.2)	51
	43.9 (29.7)	58
	36.1 (33.3)	57
	55.0 (n.a.)	45

non-behavioral objectives, please consult th

Table 2
Click to enlarge

Responses were read to identify other characteristics of students' uses of objectives. First, with regard to when the objectives were used, five participants commenced their descriptions as they were approaching a test. Second, some participants gave explicit reasons for their use of objectives. These reasons were classified as orientating oneself to the topic (two participants), goal-directed learning (one), self-testing (three), reinforcement (one), and test preparation (two). Finally, the relationships between the participants and other students in the class were assessed. Most participants (19 of 21) did not mention anyone else present with them. Only one participant related how he or she used the objectives to quiz classmates during group study, and another noted that the instructor covered the objectives during the lecture.

Do students have previous experience in the use of objectives?

Participants generally had extensive experience with behavioral and non-behavioral course objectives **(Table 2)**.

What are students' attitudes to the placement of objectives within each chapter?

Twenty-two participants completed this question and, of these, two expressed split preferences, which were distributed to the respective categories as half-scores. Fifteen preferred objectives placed only at the start of the chapter. 'Two and a half' participants each preferred objectives placed at the end of the chapter or within the chapter. Two participants preferred objectives placed at multiple locations.

How do students use self-tutorials and what are their opinions on the quality of feedback?

When participants were asked whether they completed the self-tutorials, the Likert scale responses (SA, A, N, D, SD) were (14, 5, 2, 1, 0). Twenty-one participants described how they used the self-tutorials. Six read or studied the self-tutorials, one read the self-tutorials to provide a focus for studying, 10 answered the questions, two checked their answers against the text, five used the self-tutorials in self-testing, one memorized the questions and answers, four shared answers, and two read others' answers.

Three participants emphasized that they strived to produce detailed answers and even extra annotations so that the product would be a comprehensive study tool. Four participants used the self-tutorials as study guides or as the basis for creating study guides, or outlines and flashcards. These approaches are interesting for their creativity. Participant 3 did not create a study guide but noted, "the self-tutorials were the bulk of my studying for the course."

When participants were asked whether the answers in the self-tutorials provided an appropriate amount of feedback, the Likert scale responses (SA, A, N, D, SD) were (10, 9, 1, 2, 0). Participants were then asked to comment on the quality of feedback, and 21 answered the question. All but one participant did try to make use of supplied feedback. The most common comment was that the feedback in the self-tutorial answers was helpful or good (10 participants). Other positive comments were that feedback was extremely helpful (one), just right (one), without extraneous details (one), sufficient (one), and especially helpful for questions not directly answered by a fact located in the text (one). Negative comments were that the answers were sometimes too brief (two) and did not explain how the answer was obtained (two), that many of the answers were too general (three), requiring more direct answers or clues (one). Four participants mentioned the balance between the provision of answers and the need for practice with one participant stating, "The answers were good because sometimes they were straightforward and others led you to the correct answer so you would understand it better."

Do objectives increase the ease and efficiency of study and provide correct test expectations?

Twenty-two participants completed this survey section. When they were asked whether the objectives made it easier to know what they should learn, the Likert scale responses (SA, A, N, D, SD) were (9, 11,

2, 0, 0). When asked whether objectives made their study time more efficient, the Likert scale responses (SA, A, N, D, SD) were (13, 7, 2, 0, 0). When asked whether the test questions were consistent with their expectations from the course objectives, the Likert scale responses (SA, A, N, D, SD) were (13, 8, 1, 0, 0). Finally, when asked whether the test questions were consistent with their expectations from the self-tutorial exercises, the Likert scale responses (SA, A, N, D, SD) were (14, 6, 2, 0, 0). Participants were asked if aspects of objectives in the course had hindered their study. All 20 who answered this question replied 'no' (expressed in various ways).

Finally, when asked if any test questions were unanticipated, of the 20 participants who completed this question, five noted unexpected questions from the chapter on ocular aberrations and one stated that the questions on laboratory class topics were unexpected, and recommended more guidance to prepare for these.

Discussion

Inquiry 1. How do students actually use objectives?

Attention to objectives

Participants in this study were paying attention to the objectives, as evidenced by the strong disagreement with strategy 8 in **Table 1**. Most used them often or very often. Other estimates of students' actual use of objectives vary widely.[7–9,?11] Mast et al. identified several factors in the use of objectives by medical students,[13] and many of these factors were probably favorable in the current course. Nevertheless, the wide variety in students' attention to objectives[7–11] suggests that the cognitive mediation paradigm[11] should be modified to include attention to the objective as one of its components.

Student use of objectives

A wide variety of strategies and patterns were found in this study. Some of these are consistent with published strategies[9,?12,?13] (Table 1), and some are consistent with the cognitive mediation paradigm.[11] Participants in the current study expressed statistically significant agreement with only eight of 18 published strategies for the use of objectives (Table 1). There are not strong a-priori reasons to expect that all students everywhere should indeed all use the same set of strategies, since some strategies may be more effective than others in particular courses, programs or educational settings. As an example of the diversity in educational settings, Duchastel studied female students of a Swiss college (equivalent to U.S. grade 11 and 12),[9] and Bassett and Kibler[12] and Mast et al.[13] studied, respectively, communications students and medical students, at U.S. universities.

Past studies demonstrate a focusing effect of behavioral objectives: They increase instructor-specified learning, while suppressing incidental and self-directed learning.[13,?16,?17,?28–32] Consistent with these findings, participants in the current study did not generally formulate their own objectives **(Table 1, strategy 17)**. Nevertheless, the focusing effect was incomplete: They also studied parts of the course materials not directly covered by the objectives **(Table 1, strategies 9 and 15)**. This suppression of self-directed learning may be a concern to some instructors. If so, it is possible to counter the effect through course activities such as goal-setting exercises,[33–35] practical scenarios[36] and assignments, where students are encouraged to set their own learning goals.

Consistent with earlier studies,[9,?12,?13] participants in this study rarely mentioned others in their descriptions of how they used the objectives or self-tutorials. However, few researchers have studied how course objectives might influence students' learning relationships and the ways in which students seek to help their peers.[21,?37]

Only a small proportion of participants reported a step-wise process for their use of objectives consistent with the order of the parts of the cognitive mediation paradigm.[11] Nevertheless, about half of the participants reported one or more of the parts somewhere in their responses. These results are somewhat supportive of the cognitive mediation paradigm. Furthermore, the current content analysis suggests that the components of the cognitive mediation paradigm[11] should be considered as parts rather than as ordered steps.

Inquiry 2. Do students have previous experience in the use of objectives?

This group of optometry students had extensive experience with both types of objectives by self-report **(Table 2)**. Of concern in interpreting these data are the large standard deviations for the optometry program, where all students actually take the same courses (apart from a few students who have the option to add one or more elective courses). This suggests that participants' interpretations of the supplied definitions for behavioral and non-behavioral objectives may have varied considerably. An alternative could be for the investigator to perform a detailed analysis of the text of actual course materials. In this way, the investigator could apply the definitions for behavioral and non-behavioral objectives carefully and precisely, rather than relying on students' memories of their course syllabi.

Inquiry 3. Are there ways to present objectives to enhance learning?

A majority of participants preferred the current placement of objectives at the start of each chapter. In contrast, previous studies found best performance for objectives interspersed within the paragraphs of the text.[14,?15] Perhaps student preferences are not optimal for performance. Possibly, students in this course preferred objectives at the start of the chapter because they had not been offered alternatives. A third possibility is that the objectives in this course required the student to do more than simply look for a fact in a nearby paragraph, which would otherwise have favored in-text placement. A fourth possibility is that the advance organizer at the start of each chapter made the list of objectives more accessible[38] and possibly more useful.

Inquiry 4. Does completion of questions promote learning, irrespective of the ability to articulate an objective?

Practice and feedback are important components of learning[39] and of objectives-based curricula.[11,?18–22] It was satisfying to find that most participants were using the self-tutorials as a way to practice and to self-test, and that they tended not to rely simply on reading study group answers to objectives **(Table 1, strategy 16)**. In addition, most students found the exam questions to be consistent with their anticipations from completing the self-tutorials.

Inquiry 5. Do objectives increase the ease and efficiency of discovering what should be learned?

Most participants stated that objectives made their study time more efficient, consistent with previous research.[13,?23] They also found that the objectives made it easier for them to know what to learn, in contrast to two previous studies.[18,?19] Participants could not recall any way in which objectives had hindered their study, and this is consistent with previous studies.[13,?17,?40,?41]

Inquiry 6. Do exam questions meet students' prior expectations of learning?

Most participants found that the exam questions were consistent with their expectations from reading the course objectives and from completing the self-tutorials. This is a useful finding because providing correct expectations has been proposed as an important rationale for the use of objectives,[24] and only one previous study of a genuine educational setting has asked students to rate whether exams met their expectations.[13]

Strengths and limitations of the study

Overall this study has added to the small amount of information on how students actually[9,?12,?13] use supplied objectives in a genuine[13] educational context, and it is the first to report students' prior experience with behavioral and non-behavioral objectives.

Additionally, this study's extensive content analysis of student uses of objectives suggests new directions for future research to address criticisms of earlier approaches.[11,?40–42] One new direction would be to make detailed studies of individual students within particular educational settings. An ethnographic approach would be well-suited to this purpose.[43,?44] This is important because with the exception of Mast et al.[13] and of the current study, researchers have wholly ignored genuine courses within genuine educational settings. A second direction for new research, suggested by Duchastel and Merrill,[40] would be to make factorial experimental studies of the complex interactions between objectives and other characteristics of the educational settings, with a view to theory development.

One limitation of this study is that although multiple, non-coercive recruitment methods were used, the resulting sample has the potential for selection bias from non-response bias.[45] This in turn potentially limits generalizations from the current findings to the whole class.

A limitation of the paper survey is that written descriptions provided by the participants may have been incomplete or the verbiage they used was difficult to interpret without further questioning. (For example, contrary to the cognitive mediation paradigm, no participants specifically mentioned 'interpreting' the objectives. Instead, they used words such as 'reading' and 'reviewing'.) More complete accounts could be elicited using interview or observational methodologies.

Although the current findings from a visual optics course in an optometry program are not formally generalizable to other courses and programs, some instructors may nevertheless wish to make use of the findings in their courses. Mast et al.'s study of medical student education may also be helpful for its analysis of several factors in the use of objectives across a healthcare curriculum.[13] For example, students in that medical program reported that objectives were more useful in the basic science track than in pre-clinical and clinical tracks.

A new model of students' use of behavioral objectives

The descriptions of real students' actual uses of objectives in this study are quite complicated. Therefore the results of the current study were combined with those from three other studies of students' natural use of objectives,[9,?12,?13] and with the cognitive mediation paradigm[11] to provide a model that can be tested in future studies. The components of the new model are:

1. Instructor, Course and Curriculum. When students enter a course that has behavioral objectives, various factors such as instructor emphasis,[13] the quality (clarity) of the written objectives,[13] and alignment of testing to the objectives[13] can lead the students to adopt a:
2. "Doing" Orientation. The behavioral objectives lead the student to ask, "What must I be able to do?" (as opposed, say, to "What must I remember?"). With this orientation, students demonstrate:
3. Attention to the Objectives. This attentional focus is not complete, as students still engage separately in incidental learning (e.g., reading the handbook without objectives in mind). Once students attend to the objectives, the following four components of learning may be found (not necessarily in this order):
4. Interpretation of the Objectives[11–13]
5. Goal-Directed Learning[11–13]
6. Self-Testing to the Objectives.[11–13] This includes practice (e.g., completing self-tutorial exercises)
7. Constructive Learning. An example is the creation of original, personal study guides.

Conclusions

Students used behavioral objectives in a wide variety of ways, some of which are consistent with past studies and with Jiang and Elen's cognitive mediation paradigm.[11] It is suggested that the cognitive mediation paradigm be expanded to a seven-component model that captures the main themes of students' natural uses of objectives noted in the current study and in previous studies. Clearly written objectives that covered material emphasized in the course, along with self-tutorials made learning easier and more efficient and provided appropriate expectations of examination questions.

Acknowledgments

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Features

Editorial

Why Tenure is Important

Aurora Denial, OD, FAAO | Optometric Education: Volume 42 Number 3 (Summer 2017)

Aurora Denial, OD, FAAO

The American Association of University Professors (AAUP) defines a tenured appointment as “an indefinite appointment that can be terminated only for cause or under extraordinary circumstances … .”[1] The AAUP further defines tenure as “a means to certain ends; specifically: (1) freedom of teaching and research and of extramural activities, and (2) a sufficient degree of economic security to make the profession attractive to men and women of ability.”[2] The AAUP has been involved with setting standards and guidelines for higher education since 1915. In the late 19th century and early 20th century, faculty members were at risk of being terminated for teaching or voicing views that may not have been in agreement with the institution’s administrators or board of trustees. As faculty members, we all have a responsibility to advance, transmit, disseminate, interpret and apply knowledge. Academic freedom in research and teaching allows educators to fulfill their responsibilities without the threat of retaliation. Tenure with the goal of academic freedom has impact on student learning, society and the advancement of a profession or discipline.

In 1940, the AAUP and the Association of American Colleges and Universities jointly formulated the *Statement of Principles on Academic Freedom and Tenure.* This standard for tenure has been widely adopted by colleges and universities.[1] The standard includes a probationary period of usually seven years before the final tenure decision.[3] Denial of tenure at some institutions can lead to a terminal contract. The criteria for tenure vary among institutions and are usually demanding, requiring excellence and significant accomplishments in scholarly activities, teaching and service. Usually faculty set the criteria for tenure with approval from the governing administration or board of trustees. In addition to excellence and significant accomplishments, momentum for continued productivity throughout a faculty member’s career is also taken into consideration. Securing tenure brings rewards of academic freedom and due process. However, it also brings a moral obligation of collegial support, a high level of performance and productivity.

No Shortage of Debate

Debates about the merits of tenure are plentiful in the literature. Some of the arguments against tenure are the potential of publishing insignificant research just to acquire a sufficient number of publications, negative consequences of a “job for life,” and the creation of a divide among faculty members. Negative consequences of a “job for life” might include, over the course of a career, decreased productivity or motivation for scholarship, teaching or service-related activities. However, tenure does not ensure a job for life. Tenure ensures that due process is followed in the event of termination. Termination of a tenured professor usually occurs with evidence of incompetence, unprofessionalism or extenuating circumstances such as significant financial exigency.[1]

Arguments supporting tenure include the potential for increased ability to recruit and retain faculty members, academic freedom, job security and a higher level of productivity. The culture of academia supports the concept of tenure in higher education and optometric education. The Association of Schools and Colleges of Optometry (ASCO) reports that 19 out of the 23 member optometry schools in the United States and Puerto Rico offer tenure to optometric faculty.[4]

Tenure is Preferable to Long-Term Contracts

Within an institution, administrators come and go, and every four years a new cadre of students enrolls, but the faulty represent the mainstay of the educational process. The faculty at most institutions is comprised of many unique individuals all contributing important skills and talents to create a sustainable learning environment. Each faculty member of an institution is integral to the educational process and valuable. ASCO reports that of the 638 full-time optometric faculty, 223 (35%) are tenured, 107 (16.8%) are in the tenure track, and 308 (48.3%) are not in the tenure track.[4] The tenured faculty can offer continuity and stability to an institution. Academic freedom allows faculty to take risks and think outside the box. Furthermore, it allows a system of checks and balances, whereby faculty have the opportunity to evaluate and challenge academic and administrative policies. Job security and the assurance of due process are reassuring to faculty and therefore have the potential to increase productivity.

From my observations, the tenured faculty form a core group of faculty who are dedicated, hardworking and successful. Their expertise and experience support them as leaders and mentors for the institution and the profession. To reach high educational standards and maintain quality for future generations of students and faculty, we need to support the stability and productivity of the tenured faculty.

The argument has often been made to replace tenure with long-term contracts. Although at some institutions long-term contracts can be a viable option, these contracts do not necessarily protect a faculty member from a lack of due process upon termination or safeguard academic freedom. Additionally, the intrinsic motivation to be successful and the sense of accomplishment in achieving tenure may be missing in long-term contracts.

In 2009, I achieved tenure status. This accomplishment came with an enormous sense of responsibility. I viewed it as an acknowledgement of my accomplishments and the ultimate compliment. My institution believed in me enough to grant me this status; therefore, I needed to be more productive than previously, an exemplary role model and an even stronger advocate and supporter of the college.

Why is tenure important? To answer this question I asked myself: Would I be comfortable writing this editorial if I were not a tenured professor?

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Industry News

In Response

A Digital Means to an Analog End?

Paul M. Dobies, OD, FAAO | Optometric Education: Volume 42 Number 3 (Summer 2017)

Paul Dobies, OD, FAAO

The previous issue of *Optometric Education* included a thought-provoking editorial titled “Do Students Still Need to be Proficient in Gathering Data?”[1] Before I share my thoughts in response, I acknowledge that our individual experiences inform our biases and our judgments. In the years prior to joining the faculty at Western University of Health Sciences, I practiced full-time with ophthalmologists providing primary and secondary medical and surgical eye care. In those settings, 75% of my patients were age 75 or older, which is hardly a standard optometric patient population. However, 100,000 patients later, the experiences had prepared me to be a full-time clinical educator. From this non-standard perspective, I offer the following response.

- ***Patients are human beings and human beings are analog.*** It’s true that our individual neurons fire “all or nothing” in “digital” fashion. However, spending as much time as I did with a senior patient population I saw that rather than becoming more similar to one another with the passing of time, people become more different from one another as they age, and the range of analog human experience and expression can be truly breathtaking if we take the time to notice. In other words, as we age, we become more “analog” in terms of the rich variations of human experience and less “digital” in terms of information approximations.
- ***Digital is an approximation of analog.*** Digital contains less information than analog. For example, each currently available digital refractor has its own quirks that make binocular testing of analog human beings less than ideal. Also, for example, the best digital laser full-field retinal images are decidedly less nuanced than my own eyes and cannot substitute for a full-field BIO evaluation. Digital images in no way communicate subtle differences let alone expand my ability to see them with my analog BIO-enhanced eyes. Digital images can document what my analog eyes see but not with the same resolution or nuance. Showing someone a digital picture of your favorite vacation spot cannot substitute for, much less expand upon, what your human analog eyes saw being there.
- ***Visual testing is subjective and requires two analog human beings: a patient and a provider.*** The eyes are not separate entities. Myriad interconnections between them create

something akin to a miracle as we experience human analog binocular vision. On the other hand, digital autorefractors are actually autoretinoscopes. Granted, I have seen autorefractors identify cylinder power and axis in some senior patients better than I can with my retinoscope, but even the best autorefractor cannot match what I can see with a retinoscope in a dynamic way, such as accommodative stability, pupil size changes and media changes. Additionally, other than its sanguine 0.12D measurement markings, an analog keratometer provides tear film assessment and central and peripheral corneal distortions in addition to the opportunity to notice other nonverbal clinical clues in a dynamic way vs. a static moment-in-time digital autokeratometry measurement.

- ***In daily primary care optometric practice, an analog approach to data-gathering provides more information about patients, most of whom have normal eyes.*** The return-on-investment of expensive digital equipment for an essentially normal patient population is certainly low-yield for most entry-level graduates. To put it another way, just because we educate students medically and just because expensive digital equipment is available doesn't mean that an essentially normal patient population is going to change (even with the aging of the Baby Boomers) commensurate with provider cost and actual patient need, unless, of course, one practices in an area with a greatly elevated proportion of seniors.

I enjoyed using all of the digital equipment I had access to as I worked with my senior patients who were "normally abnormal." I used the technologies routinely to document (and occasionally find) what my analog eyes were seeing (or suspecting) in the course of data-gathering via physical exam. But other than the "show biz" factor, as I said, digital imaging of normal patients is decidedly low-yield. In most cases, the analog human eye, when trained, can identify when digital documentation is needed for patient diagnosis, treatment and management.

Therefore, I venture to say, we should focus on patients first and guard against attempting to see more patients in less time with standardized digital equipment. Because both patients and providers are analog human beings first, we should guard against "outsourcing" an actual physical exam, only to obtain to less information, in an era when both patients and providers are seeking more individualized care and stronger interpersonal and interprofessional communication. Human analog vision care takes time. Call me "old school," but I advocate working together to discover how digital equipment can free up more time as a means to the truly human analog end of improved quality face-to-face vision care.

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Industry News

Industry News

Desiree Ifft | Optometric Education: Volume 42 Number 3 (Summer 2017)

Industry News

Chewable Formulation of AREDS2 Vitamins

Alcon has added the SYSTANE ICAPS Chewable AREDS2 Eye Vitamin to its ICAPS line of eye vitamin formulations that are designed to support healthy eyes. The SYSTANE ICAPS Chewable AREDS2 Eye Vitamin contains ingredients used in the Age-Related Eye Disease Study 2, a clinical trial supported by the National Eye Institute that evaluated the effects of various combinations of nutrients on the progression of age-related macular degeneration. The new ICAPS are the first chewable AREDS2 formula to be available in the U.S. market.

Also: Stephen S. Lane, MD, joined Alcon as Chief Medical Officer and Global Head Franchise Clinical Strategy. In this role Dr. Lane leads the integration of scientific, clinical and commercial priorities across the company's Surgical and Vision Care franchises, with a focus on the needs of patients and eyecare practitioners. Dr. Lane also supports the generation of Surgical and Vision Care clinical evidence and represents Alcon to the academic, scientific and industry communities and government agencies.

Facebook Page Designed for Active Communication with Eyecare Professionals

Did you know Allergan has a Facebook page dedicated to enhancing the positive partnership between Allergan and eyecare professionals? At the Allergan Optometry Facebook page, you can find discussions about disease states including dry eye and glaucoma, helpful patient care resources, information about upcoming events and activities, and an actively engaged company that is listening and responding to you.

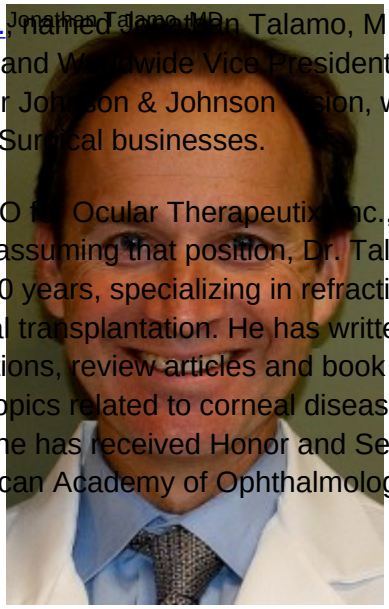
Lens Personalization Reaches a New Level

HOYA Vision Care has launched iD MyStyle 2 personalized lens technology and design. While the original iD MyStyle was the first to use HOYA's patented Integrated Double Surface Design technology and incorporate patient lifestyle parameters into the design of the lens, the second-generation, iD MyStyle 2 builds on that platform with the addition of unlimited design variations, Binocular Harmonization Technology (BHT), and lens design verification.

iD MyStyle 2 lens prescriptions take into account each patient's unique needs, lifestyle and history. BHT ensures that both eyes receive equal accommodative support so that optimal binocularity can be achieved. With design verification, every iD MyStyle 2 prescription is tested and verified before it is produced using HOYA's patented Binocular Eye Model and 3D visual acuity simulation.

NEW CMO Appointed

Johnson & Johnson Vision Care, Inc. named Jonathan Talamo, MD, as its new Chief Medical Officer (CMO) and Worldwide Vice President of Medical Affairs and Clinical Affairs for Johnson & Johnson Vision, which comprises both the Vision Care and Surgical businesses.



Dr. Talamo previously served as CMO for Ocular Therapeutix, Inc., a public biopharma company. Prior to assuming that position, Dr. Talamo owned a private practice for nearly 20 years, specializing in refractive surgery, cataract surgery and corneal transplantation. He has written more than 80 peer-reviewed publications, review articles and book chapters; he lectures worldwide on topics related to corneal disease, cataract and refractive surgery; and he has received Honor and Senior Achievement awards from the American Academy of Ophthalmology.

New Z-Type Slit Lamp Digital Tonometer

Keeler has expanded its range of tonometers with the D-KAT Z-type, the first digital applanation tonometer designed for Keeler Z Series slit lamps and other lower illumination style slit lamps. The D-KAT Z-type has fewer moving parts than conventional applanation tonometers, and its internal electronics deliver fast and accurate IOP measurement to one decimal point. The integrated LED display is easy to read in darkened exam rooms. In addition, Keeler offers the Tonomate disposable applanation prism for use with the D-KAT Z-type. Sterile, and individually packaged, Tonomate prisms are designed to be discarded after use, streamlining eye examinations and reducing the risk of infection transmission.

For more information, visit the Keeler Ophthalmic Instrument website, e-mail the company, call (800) 523-5620, or contact an authorized dealer.

Optometrists' Service Milestones Recognized

At an awards dinner held during its Annual Continuing Education Symposium, June 3-6, 2017, in Chicago, National Vision Inc. recognized 115 optometrists affiliated with the company for service milestones ranging from five to 25 years.

According to National Vision CEO Reade Fahs, "For the past decade our North Star has been that National Vision is striving to create environments where great optometrists want to spend their entire career. This special group of optometrists, who have spent their career with us, is a testament to the sort of talented, caring optometrists that make up our community at National Vision. We congratulate these doctors on their achievements, and thank them for making it possible for us to live our mission of making eye care and eyewear more affordable and accessible to all Americans."

Campaign Educates Consumers about UV and Blue Light

To bring its new advertising campaign Live the Good Light to life for consumers in 2017, Transitions Optical launched the Good Light Project ? an initiative that illustrates the role changing light plays in shaping our days and nights, and some of our most memorable moments. The company is introducing eyeglass wearers to the Good Light Project online and on social media and by partnering with influential Transitions lens wearers, including actress Jamie Chung. The company says a goal of the Good Light Project is to inform consumers how Transitions lenses can help “protect the eyes from both UV and harmful blue light so that we are able to embrace the goodness found in light and live life to the fullest.”

Educator's Podium

The SUNY Hackathon Series: Redesigning 21st Century Eye Care

Thomas A. Wong, OD | Optometric Education: Volume 42 Number 3 (Summer 2017)

Thomas A. Wong, OD

In May and November 2016 and June 2017, approximately 50 people met to participate in three hackathons hosted by the New Technologies unit of the State University of New York College of Optometry (SUNY). The participants included SUNY Optometry faculty, other optometrists, residents, students, alumni, researchers, industry experts and other professionals.

The goal of Hackathon I was to design “The Future Eye Exam.” Participant groups were given the task of creating a six-minute presentation to the National Eye Institute on how eye examinations should be conducted. Hackathon II centered on “The Future of Optometric Education.” Participant groups were asked to design a mobile app to be used for optometric student/intern/resident education, optometric continuing education and optometric board certification review. Zoom video conferencing technology was utilized, which allowed Munish Sharma, MD, OD, FAAO, from Western University of Health Sciences and Andre Stanberry, OD, from the University of Waterloo to participate. Their universities are intellectual partners with SUNY in designing and implementing a mobile app for optometric education. The focus of Hackathon III was Interprofessional and it was a collaboration with the nursing profession. It tasked participants with creating new models of communicating with patients, parents and families to convey the importance of vision in the learning process. Participants and speakers included Beth Mattey, President of the National Association of School Nurses, and Ashley Darcy Mahoney, PhD, RN, NNP-BC, who spoke about “Talk With Me Baby,” a program that President Obama had discussed at the Early Education Summit.

Why a Hackathon Series?

The SUNY Optometry New Technologies unit created its signature Hackathon Series to develop new models of patient care, education and communication with the goal of improving patient outcomes. Hackathons are digital-era tools designed to connect participants for the purpose of breaking down existing processes into discrete and new units, and rebuilding them from the ground up. The word

“hack,” when used as a noun, means a change, tweak or solution to a problem. When used as a verb, hack means to redesign or remix a product or solution to make it better. Thus, the term hacking refers to taking something apart and rebuilding it to make it better, give it a new function, or just do something surprising and disruptive. A hackathon is an event where participants “hack” on a problem or focus area for an allotted period of time, with the goal of building or creating a solution (via a product, service, tool, etc.) Hackathons seek to identify opportunities by understanding the user’s experience. Ideas + Action = Hackathon. Hackathons generally start with an overview presentation and end with a series of short presentations that are judged on several categories, e.g., innovation, ability to be implemented and quality of presentation. Prizes, which include sunglasses, T-shirts, notebooks, backpacks and smartphone chargers, have been awarded to all participants. The winning teams’ proposals serve as the initial template to be incubated within the SUNY Optometry New Technologies unit.

The SUNY Optometry New Technologies Hackathon Series is modeled after Georgetown University’s “Hackathon: Designing the Future University from the Inside.” Also, organizational concepts were derived from Stanford University’s “Collaborative Stanford-Centered Hackathon Experience,” and MIT’s “Hacking Medicine Series.” Prior to each SUNY hackathon, participants were sent TEDx videos on innovation, creativity and new concepts in education. Participants were encouraged to move away from the linear, analog thinking that has been the basis of education since the Industrial Revolution, and toward digital learning processes that are important for success in the new millennium. Digital learning processes are important for utilization of new technologies in medicine and eye care. It’s important to note that the SUNY New Technologies unit is not promoting digital, online exams. Quite the contrary, we maintain that digital learning processes are integral to improved time efficiency and quality improvement in professional optometric care.

Information from Hackathons II and III is still being studied and reviewed. These themes emerged from Hackathon I: The Future Eye Exam:

1. an integrated patient portal for online case histories, clinic hours and information, patient education, insurance verification, answers to patient questions, referrals, etc.
2. use of wavefront aberrometry for refraction and diagnosis
3. use of wide-angle fundus photography and similar technology as a screening procedure
4. use of automated visual acuity technology allowing for contrast sensitivity evaluation and real-world simulation
5. use of virtual and augmented reality simulations
6. delegation of data collection to technicians, with optometrists performing data interpretation
7. use of cloud-based services for biomedical informatics

Hackathons Aren’t Just for “Techies”

Hackathons are no longer just for computer programmers and engineers at internet companies — not just for techies! They are events increasingly used by major universities, state and federal governments, non-profit organizations, hospitals, architectural and engineering companies, and so on. We live in a connected world with no boundaries. Mobile health applications have been at the core of medical education for well over a decade. For our optometric profession to advance and fulfill its critical role in the delivery of health care, we need to utilize innovative technologies to improve patient outcomes and educate optometrists, optometric faculty, residents and students. Moreover, the ability to utilize innovative technology to enhance interprofessional relationships and integrate culturally competent care is essential to achieving the best possible results for our patients.

Dr. Wong is Director of New Technologies at State University of New York College of Optometry.

Industry News

Announcement

Journal Bestows 2017 Writing Excellence Award

Desiree Ifft | Optometric Education: Volume 42 Number 3 (Summer 2017)


Gregory Fecho, OD


Jamie Althoff, OD


Patrick C. Hardigan, PhD

Gregory M. Fecho, OD, Jamie Althoff, OD, and Patrick Hardigan, PhD, all faculty members at NOVA Southeastern University, received the 2017 Dr. Lester Janoff Award for Writing Excellence for their research paper "Assessing Student Performance in Geometrical Optics Using Two Different Assessment Tools: Tablet and Paper," which was published in the Fall 2016 (Volume 42, Number 1) issue of ASCO's journal *Optometric Education*. The award, presented every two years by ASCO, recognizes writing excellence based on significance of the research article topic, quality of the article and potential impact. A committee of the journal's Editorial Review Board chooses the winner from among all of research articles that had appeared in *Optometric Education* in the previous two years.

The award is given in honor of the late Lester Janoff, OD, MSEd, FAAO, who served as editor of the journal from 2002-2005 and a long-time member of the Editorial Review Board. Dr. Janoff was known as an exceptional optometric educator, administrator, contact lens clinician and researcher. He was also a

beloved mentor of young writers.

Industry News