

## Educator's Podium

# Teaching Optometry Students How to Study Actively

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Students enter optometry college with varying undergraduate backgrounds and a wide variety of study skills. They are eager to learn but are not always prepared to learn for mastery: the deeper understanding of material that can be recalled and applied later to clinical situations. In optometry college, cramming for exams and/or trying to memorize everything just does not work. In a study of first-year optometry students, McGinley, Carlson and Hoppe<sup>1</sup> (2008) found the study skills students reported using in undergraduate college would be inadequate for the volume and intensity of work that would be expected of doctoral level students in their didactic program. In a follow-up study, McGinley and Carlson<sup>2</sup> (2010) found that over the course of the first year in their professional program, a significant number of students improved their time management skills and their consistency in studying and decreased cramming.

First-year optometry students spend approximately 30 hours per week in lecture, labs, seminar and clinical activities. Students take seven or more courses during their first semester, a larger load of courses than most of them had as undergraduates. Furthermore, all courses are important, and none can be largely ignored successfully. Time management becomes crucial when so much time has already been committed to the academic schedule. Students must learn how to study efficiently, continue to take care of their health with good nutrition and exercise, and have some fun. Faculty can help students who need to improve their study skills through individual meetings or group presentations and discussions. This Educator's Podium explores study methods that have been successfully used by students in health professions programs and makes recommendations for faculty and students for the didactic portion of their programs.

### What Can Be Learned from the Literature?

The journal *Optometric Education* published only three articles related to study skills for optometry students in the past five years.<sup>3-5</sup> Yet optometric educators know that many of their students need help. As soon as the first midterm exams are over, there are always students wanting to know why they have done so poorly when they have put so much time and effort into preparing. A discussion with these students often reveals that they have only studied for two to three nights before the exam rather than throughout the term; their study method is to re-read their course handouts or notes several times; they have not done the required reading or the recommended reading; and have not studied with anyone else in their class. These students clearly need to learn to study differently. They need to be more actively engaged with the material they are learning in order to truly master it. While memorization has a place in optometry college, deeper learning or mastery is also needed to be able to recall information later and apply it to patient care.

In the 1990s, Bonwell and Eisen<sup>6</sup> promoted active learning techniques for the classroom and for studying. Active learning helps students to analyze, synthesize and evaluate course material and leads to longer retention of information to use later in clinical situations. Re-reading course notes or trying to memorize everything in the course is very passive and does not promote long-term retention of material.

Freeman, Eddy, McDonogh, Smith et al.<sup>7</sup> (2014) reviewed 225 studies comparing traditional lecture to active learning activities and found that student performance improved an average of 6% if they were engaged in active learning activities rather than just passively listening to lectures. Students who did not participate in active learning were 1.5 times more likely to fail the course they were taking.

Prince<sup>8</sup> (2004) looked at the effectiveness of active learning among engineering students. He found that students remember more content if some active learning activities are introduced in lecture and if they engage in collaborative and cooperative learning. One strategy he recommends is having the lecturer pause for a few minutes during class while students work with each other to make a brief summary in their own words to clarify their notes on the presentation. This has been shown to improve student long-term retention of basic concepts. Prince also reports on studies done by Johnson, Johnson and Smith<sup>9,10</sup> (1998) that show that academic achievement and self-esteem improved among students who worked collaboratively with one another.

### **Active Study Skills**

While few articles have been written for optometry students about study skills, many papers and websites can be found for college students in general and for medical students and other health professions students. These articles, including those written by community college faculty, can be very useful for teaching optometry. Heller and Marchant<sup>11</sup> (2015) recommend a structured, content-learning approach in their introductory psychology course that resulted in the students in the intervention group performing significantly better on three exams and achieving higher course grades for the semester. Heys and Wawrzynski<sup>12</sup> (2013) presented results of a study that showed that male students who are peer educators show significant growth not only in the content area they are teaching but also in interpersonal skills, awareness of diversity and communication skills. This supports the report by Prince on cooperative and collaborative work among students. McDaniel<sup>13</sup> (2014) presents a list of five do's and don'ts to promote critical thinking rather than just teaching to the test. These papers, and many others, can help faculty to teach students efficient ways of learning.

Bonwell and Eisen<sup>14</sup> (1991) recommend techniques to use in the classroom setting to actively engage students in discussion and in learning the material during class. Active learning can be done in or out of class, by individual students or by a group of students, and either orally or in writing. Active learning promotes the deeper type of learning needed by healthcare students. Re-reading notes many times, a strategy that may have worked for undergraduates, does not engage students fully enough to help them to master the material.

Much of the information on how to study in medical school emphasizes active study skills. Some of the information is in journal articles and some on websites, frequently from the student services offices at medical schools. For example, in her article "How to Drink from a Fire-hose without Drowning," Apperson<sup>15</sup> describes the problem with studying that medical students face as similar to that of optometry students: a large volume of material that must be mastered with less available study time than they had as undergraduates. She recommends active study techniques including knowing the big picture by scanning notes and/or PowerPoint presentations before class, organizing information by annotating class notes right after class, memorizing what is necessary and frequently reviewing it, and trying to apply information to more complex clinical situations through quizzes and practice problems. Jacobs<sup>16</sup> (2014) gives the same list as Apperson but for pharmacy students.

Augustin<sup>17</sup> (2014) recommends repetition of information that must be memorized. In addition, testing the material on several different occasions helps students to retain the information. Feedback given after each testing session shows the students what to focus on to improve quiz or test scores for the next time and leads to longer retention. Active recall such as writing what has been learned rather than passively re-reading it also improves long-term retention. Quizzes given before information has been presented in

lecture helps students focus on what they need to learn and aids in retention of concepts. Augustin reported on an experiment by Storm, Bjork and Storm<sup>18</sup> (2010) that showed students who spaced their study at differing intervals retained more than students who studied the same material on a fixed interval schedule.

The website for the Academic Skills Center at Dartmouth College<sup>19</sup> lists the following for improving concentration, memory and motivation: study in chunks, study in daylight hours, study actively, and find the right place to study. The site also includes handouts, videos and links to other websites on how to study. The handout on How to Study Actively recommends reading before going to class, attending class, asking questions, reviewing notes right after class, outlining major topics, asking yourself questions, reading the text, doing homework and reviewing and integrating the material.

Petersen of The Albert Einstein College of Medicine<sup>20</sup> (2012) reported that nine out of 10 students find that working with other students improves their understanding and their exam scores. Working with a group helps a student figure out what he knows and what he does not know. Petersen recommends groups of three to four students with one serving as a monitor at each meeting of the group. The group should agree on the amount of time they will meet and what will be covered at the study session. Students should prepare for the session by bringing a list of key points to be covered and a list of their own areas of confusion. Students can teach each other and learn from each other through oral quizzes at group study. Study groups help students know what material they know well and what they need to work on. Being part of a study group also decreases procrastination: The student has to be prepared to work with others before the group meets.

The social media site KevinMD.com<sup>21</sup> (2012) gives the following advice to new medical students: cramming is bad; avoid study groups; focus, dammit; don't get down on yourself; learn what medicine is all about. While "avoid study groups" is in contrast to the advice from Dr. Petersen at Einstein Medical College, there is no one study method that will work for all students. "Cramming is bad" is a more direct way of saying that health professionals must learn for mastery and be able to recall information and apply it to patient care.

In his editorial "What Makes a Good Teacher? Lessons from Teaching Medical Students," Markert<sup>22</sup> (2001) says, "Learning is seen not as the storage of information but as the continuous process of filtering new knowledge through the structures we have developed from prior learning and

**TABLE 1**  
Active Study Strategies for Optometry Students

Review notes/handouts before lecture and mark the areas where you have questions
Attend class and take notes on your handouts to clarify concepts
Review the class notes after class
Condense notes into main points and use these to review often
Make flashcards for information that must be memorized: e.g., definitions, formulas, and review often
Study with a group: be sure everyone in the group is participating
Study as though you will have to explain the topic to someone else and do this often in group study; be sure everyone participates
Write questions for your study group and share them; think about what you think the professor will ask you on an exam
To maximize your lab experience, review the lab handout before lab, review relevant notes before lab, and do any assigned reading before lab
Review lab handouts after they have been graded and returned to you
Practice! Practice! Practice!
Ask for help when you need it (from your professor or from Student Services)
Review often
Stay healthy! (eat well, exercise, meditate)
Have fun!

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experience.” We need to help our students with study skills that will set them up for the lifelong learning that is needed in health care in the 21st century and give them ways to attach new information to previously learned information to make it easier for them to remember. Active learning techniques foster this.

Brown, Roediger and McDaniel<sup>23</sup> (2014) state, “Elaboration is the process of giving new material meaning by expressing it in your own words and connecting it with what you already know. The more you can explain about the way your new learning relates to your prior knowledge, the stronger your grasp of the new learning will be and the more connections you create that will help you remember it later.” Students can do this by summarizing what they know about a topic during their group study sessions and when they condense their notes for later review and study.

“See one, Do one, Teach one,”<sup>24</sup> is a popular learning strategy in medical education. The student observes what he will be doing, then does it with an expert watching and providing feedback. Finally, the student, in his own words, teaches what he has learned to another student. This strategy encourages active learning and helps the student to self-reflect on what he has learned. Simulations and web-based learning have replaced this strategy to some extent, especially for learning techniques that might be invasive or harmful to the patient. However, the basic principles in this learning method are sound and still useful.

### Active Teaching of Active Learning

Although optometry students are college graduates when they start optometry college, they are not always prepared for the volume, intensity and long-term retention that is needed to study optometry successfully. Faculty need to help students acquire study skills along with acquiring new knowledge. **Table 1** shows a summary of many of the active study techniques that were presented in this Educator’s Podium and can be given to first-year optometry students during orientation to help them hit the ground running and “not drown while trying to drink from a fire-hose.” Even the well-prepared students can benefit from learning new ways to study and make their studying more efficient. Students who are not doing as well as they expected can benefit from changing their study habits to more active techniques because studying in the same way they have been is likely to result in the same disappointing outcome.

Students also need to be reminded that they have to take care of themselves and remain healthy to maximize their learning. They need to eat three nutritious meals per day and maintain an exercise program to help reduce stress. Meditation is also a great stress reliever. YouTube<sup>25</sup> contains numerous sites for both long and short meditation sessions. The sites for “Mandala Meditation” have soothing music, great kaleidoscope graphics, generally play for less than 10 minutes and are very appealing to students, even those who have never meditated before. Students who meditate every day and also right before an exam generally have less stress than those who do not.

Finally, students need to enjoy their experiences at optometry college. They need to be involved in both social and service activities. Their classmates are their future colleagues and many are likely to be part of their lives throughout their careers.

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