Optometric Technology and the Millennial Generation

Today's students gravitate toward the latest diagnostic tools, but might they and their future patients lose something in the process?

James Kundart, OD, MEd, FAAO, FCOVD-A

Dr. Kundart is the Immediate Past Chair of the Educational Technology Special Interest Group for the Association of Schools and Colleges of Optometry. He is a researcher and author and an Associate Professor at the Pacific University College of Optometry. He can be contacted at (503) 352-2759 or kundart@pacificu.edu.

As technology continues to advance at a dizzying pace, a growing list of classic optometric diagnostic devices go largely unused by the generation of students currently learning in our classrooms and clinics. As educators and clinicians we certainly welcome improvements in patient care capabilities, but I can't help but wonder whether our students' reluctance to utilize what have been some of our most useful tools might someday influence the way patients are diagnosed and treated.

Direct Ophthalmoscope

Take for example the venerable direct ophthalmoscope, which seems well on its way to becoming just a spare handle in the diagnostic kit before the end of students' first year. Perhaps that makes sense for an instrument invented more than a half century ago. However, even though features such as LED bulbs and lithium batteries have improved the direct scope, our students want to avoid it. They are hampered by its monocular views, which require alternate suppression of one eye, and its magnified views can exaggerate the optic cup-to-disc ratio. Perhaps most challenging for students is that they attempt to learn how to use the direct scope on undilated eyes. Consequently, they tend to begin early to show a preference for binocular indirect ophthalmoscopy.

The same might be said for examination of the fundus with the biomicroscope and a high-plus lens. For many, the binocular view at the slit lamp trumps the monocular view of the handheld ophthalmoscope. When a patient declines dilation and a view of the posterior segment is still necessary, most students would rather add undilated high plus to their anterior segment exam, which already necessitates a slit lamp, rather than use the direct ophthalmoscope.

Figure 1
Students seem hampered by the monocular views of the direct ophthalmoscope.

Despite its drawbacks in the minds of students, the direct scope has distinct price, portability and availability advantages over a slit lamp and 90D lens. Furthermore, there remain clinical situations in which the direct scope is advantageous. Examples include its use in the Bruckner test for detection of subtle strabismus in pediatric patients and as a quick check for media opacities prior to refraction, especially when autorefraction is done in preference to retinoscopy. Niche uses for the direct ophthalmoscope exist as well. It has been observed that its optics provide an advantage in diagnosing the distinctive reflectance of talc retinopathy.

Manual Lensometer

The manual lensometer is another analog instrument to which the Millennial Generation has an aversion. The wide assortment of instructional videos about it on YouTube attest to this fact. Further evidence is that most students would rather make a trip to the dispensary to use the autolensometer than use the manual one in the exam room in front of the patient. Our students' discomfort can likely be attributed to the seemingly arbitrary steps involved in manual lensometry, such as which lines to focus first, and the arithmetic required to calculate the difference between sphere and cylinder powers as well as the add. All of these things require comfort with a number line laid out on an analog knob, both of which are foreign to many Millennials. When progressive lenses and the occasional prism are added to the mix, many students feel adrift. To them, the habitual prescription is all too often an optional data point because of the perceived difficulty of obtaining it. In contrast, to seasoned optometrists it is one of the most valuable pieces of information in a refraction, and many swear by the accuracy of manual lensometry in comparison to autolensometry.[1]

Perhaps because manual lensometers cost so many times less than autolensometers they will remain in widespread use for years to come. Or maybe the ubiquitous nature of autolensometers will make the skill of manual lensometry obsolete. Yet another potential scenario is that our future optometrists will be content to keep the manual methods solely in the realm of optical technicians.

Manual Keratometer

I purchased my first optometric exam lane in 2000 and it included a manual keratometer. Working in a small solo practice without a corneal topographer or even an autorefractor, the Helmholtz-era device was useful for fitting contact lenses and diagnosing corneal ectasia. For the typical soft lens fit, getting a starting base curve was as simple as adding one to the radius of curvature from the keratometer knob. Today's students don't necessarily see the usefulness of the keratometer. Not all exam rooms have them, which reinforces the idea that keratometry is not necessary for addressing a patient's chief complaint. It's hard to convince today's students of the usefulness of knowing the toricity of the front of the cornea for determining refractive cylinder when they have access to autorefraction, on which autokeratometry is almost an afterthought.

For students, the keratometer presents challenges similar to those they perceive with the manual lensometer, primarily the analog knob. It requires a level of comfort with the number line, which they may not have been taught in elementary school. The unlabeled demarcations, to be read to the nearest 0.125D, combined with 20th century concepts in physiological optics make them unconsciously think of the keratometer as an anachronism. To them, it's a slide rule, one in which it's embar-

Figure 2

Most students would rather make a trip to the dispensary to use the autolensometer than use the manual one in the exam room in front of the patient.

Figure 3

The analog knob on the manual keratometer seems to be a foreign entity to many Millennials.

rassingly difficult to find the patient's eye. Thus, we shouldn't be surprised when we see the dust covers on these instruments even in lanes where exams are in progress. This may be unfortunate given that our students may discover keratometry skills can come in handy once they are out practicing on their own. The managed care or commercial practices where many graduates are working may give them access to auto Ks but not to topography. They may be able to fit soft contact lenses from auto Ks, but fitting RGPs or diagnosing corneal ectasia is much easier with the information a keratometer can provide about the central 3 mm of the cornea.

Cell Phone Cameras

Private practitioners are already using cell phone cameras to obtain photos at the slit lamp, and many have posted online tutorials showing how it's possible to capture high-quality images.[2] Despite the challenges this creates with HIPAA privacy laws, many student clinicians find it incredibly easy to obtain pictures from the slit lamp with their cell phones. What they lack in resolution, the images more than make up for in convenience and connectivity. It might behoove optometric educators to overcome the HIPAA concerns by having our teaching clinics own some small digital cameras with which to teach our students. We know that once they are established in their own practices, they will be able to perform ocular photography with any camera they choose.

Staying Focused on What Matters Most

The latest automated diagnostic instruments provide many advantages, including ease of use and reduced training time. They often combine multiple capabilities in a single device. They enable doctors to see more patients in a day and bolster the perception of a state-of-the-art practice. Most are digital as well, making them very appealing to tech-savvy Millennials.

On the other hand, they are costly and may not be available in every practice setting. Perhaps more importantly, they can be less accurate than tried-and-true diagnostic methods due to loss of qualitative data, making assumptions, for instance, concerning position of gaze and clarity of the ocular media.[3] Many of these new instruments also have the potential to make specific clinical skills less needed as a matter of routine. Will the erosion of such skills serve our students, or their future patients, well? Just because anterior segment OCT could potentially replace gonioscopy, or mfERG could replace threshold visual fields, doesn't necessarily mean they should.

These are issues we should not lose sight of as optometric educators. While we share our students' enthusiasm for the latest technology, we should remain vigilant in ensuring they learn and maintain the key skills that make up the diagnostic acumen necessary for delivering the highest quality of patient care.

References

1. Automated vs. Manual Lensometers. OptiBoard Discussion Forum. http://www.optiboard.com/forums/showthread.php/8523-Automated-vs-manual-lensometers. Accessed 01-28-2014.
2. Smart Phoneography - How to take slit lamp photographs with an iPhone. EyeWiki website. http://eyewiki.aao.org/Smart_Phoneography_-_How_to_take_slit_lamp_photographs_with_an_iPhone. Accessed 01-31-2014.
3. Automated Ophthalmic Equipment vs. Manual Ophthalmic Equipment. Veatch Ophthalmic Equipment website. http://www.veatchinstruments.com/info.asp?topic=Auto.%20Vs.%20Manual%20Ophthalmic%20Instruments. Accessed 01-31-2014.