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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

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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,"

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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.

References

1. Denial A. Do students still need to be proficient in gathering data? *Optometric Education* [Internet]. Winter-Spring 2017 [cited 2017 June 22];42(2). Available from: <https://journal.opted.org/article/do-students-still-need-to-be-proficient-in-gathering-data/>.

