

Keeping Disruptive Technologies in Perspective | 1

In 1997, in his book “The Innovator’s Dilemma,” Prof. Clayton Christensen from Harvard Business School introduced the term “disruptive technology.”¹ In the book, Christensen distinguishes sustaining technology from disruptive technology. He characterizes sustaining technologies as those that introduce small changes that improve the performance of an existing technology. He describes disruptive technologies as those that displace an established technology, and thus “shake up” an industry, or ground-breaking products that create a completely new industry.² Often, disruptive technology can underperform established technology, at least in the short term.¹ However, according to Christensen, products based on disruptive technologies are typically cheaper, simpler, smaller and frequently more convenient to use. Some examples of disruptive technologies (and the technologies/conventions they displaced): the personal computer (typewriter), health maintenance organizations (conventional insurers), transistors (vacuum tubes), cell phones (land lines), laptop computers (desktop computers), smartphones (cell phones).^{1,2}

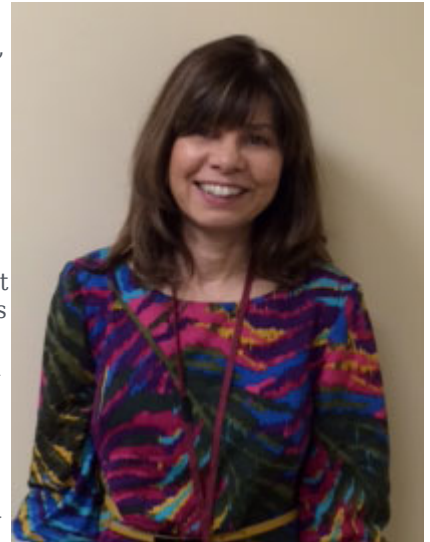
Disruptive Technologies in Eye Care

At a recent continuing education event at the New England College of Optometry, Dr. Howard Purcell, a Senior Vice President at Essilor of America, spoke about how disruptive technologies are impacting the profession of optometry. He urged practitioners “to look at the disruptive technologies and understand the value they can bring to your practice.”³ Dr. Purcell talked about smart phone apps, online and remote refractions, 3D printing, virtual reality devices and wearable technology. Also on the horizon is artificial intelligence software, which allows a computer to analyze conditions, symptoms, clinical findings, diagnosis and treatment.⁴ In 2013, at the 90th annual SECO International meeting in Atlanta, Dr. David Talley, who practices in Memphis, Tenn., described trends and technology in the profession. Trends included refractive lasers, expansion of scope of practice including the use of injectable medications such as Botox and minor surgical procedures.⁵ Technology included gene chip analysis, radio frequency technology, plasma surgery and tissue engineering and biomechanics, which includes organ regeneration and replacement, wound healing and adhesion.⁵

Adding Forward Thinking to the Skill Set

Optometric educators have a responsibility to provide students with the knowledge and practical skills that will enable them to practice in the world of today and tomorrow. Therefore, fostering an aptitude for forward thinking is a worthy goal. But how do we create a culture of forward thinkers both for faculty and students that embraces future technology and trends, yet acts in a responsible manner to ensure the safety of patients and a sound learning environment? We can nurture and support the characteristics that define a forward thinker. Although these characteristics are somewhat arbitrary, several that make sense to me are identified in the literature. Forward thinkers embrace both critical and creative thinking.⁶ Critical thinking ensures complete, unbiased thinking whereas creative thinking ensures that people are thinking outside of the box and creating a new vision.⁶ These qualities are particularly important for evaluating new technologies or trends. Forward thinkers do not dwell on the past.⁶ They learn from the past but do not reside in the past. They have the ability to see the larger picture and set goals for the future.⁶ Forward thinkers embrace risk-taking and persevere even if initial ideas are unsuccessful.⁶ They tend to possess “intellectual empathy, which is an awareness of the need to actively entertain views that differ from your own, especially those with which you strongly disagree.”^{6,7} This allows insight into different points of view and the capability to be receptive to new ideas. In academia, nurturing these characteristics involves creating an environment of trust, support and respect.

Future optometrists, throughout their careers, will evaluate and make decisions on the incorporation of technology into practice, changes in scope of practice and utilization of current trends. Technology, either sustaining or disruptive, represents tools for the profession. Disruptive technology has the potential to alter the appearance of the optometric setting and patient interaction. However, as disruptive as it may be, technology will never replace the clinical judgment, knowledge and communication that defines the profession of optometry. In the educational arena, faculty are constantly forming a balance between letting go of the past and incorporating the future in a responsible manner. Supporting a



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Keeping Disruptive Technologies in Perspective | 2

culture of forward thinkers supports the future of the profession.

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