

Novel Approaches to Educational Technology: Lessons Learned from Steve Jobs

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At the American Academy of Optometry meeting last October in Boston, many of us saw the glass walls of the Apple Store covered with Post-It note dedications, and the sidewalk stacked with iPod cases and McIntosh fruit. Those who weren't there perhaps saw a similar outpouring of emotion on social networks. Some were surprised that these expressions of grief stretched around the globe at the untimely loss of the co-founder and longtime CEO of Apple, Steve Jobs.

When his biography, *Steve Jobs* by Walter Isaacson, went on sale, it outsold all other books printed in 2011, a particularly remarkable achievement considering it was rushed to publication in late October. Those who remember Jobs from the Macintosh computer may have wondered why so many felt this way, particularly in a persistently Windows world. But whether one is an Apple or PC user, it is undeniable that Jobs' foresight and innovation changed the way we use computers, particularly in the area of educational technology.

Although I am recording these thoughts on a Macintosh laptop, I wasn't always an Apple user. I was one in that fortunate first generation of students who came of age with the first personal computers in the 1980s, but I was a PC user. In fact, before entering optometric education, I once taught Microsoft applications (before they were available

cross-platform) and even DOS 6.22. Yet I couldn't help but notice the innovative products that Apple developed, particularly after Jobs' triumphant return in 1997.

As optometric educators, whether we use Macintosh, PC, or both, we can benefit from reflecting on the following six lessons that Jobs taught us.

Lesson #1: Market Research Can Lead You Backward, Not Forward

Consumers, be they retail customers or optometry students, are often more comfortable with what they know than what they don't. Imagination of how things could be can fail the young and the old alike. Jobs knew this. In the early days of Apple Computer, the Apple II generated more than two-thirds of the company's profit. It's hard to believe that a circuit board and attached keyboard was all it was.

If Jobs had surveyed his customer base back then, he would have only made the small stylistic changes in Apple's best-selling product, like improving the keyboard and adding an internal (albeit floppy) disc drive. If market research had been important to Jobs, the sleek, stylish Apple IIc would have marked the end of a good run for the company, and it probably wouldn't be with us today.

Fortunately, Jobs trusted his intuition

more than market research. Despite the fact that there seemed to be no demand for it, he insisted that Apple pursue a new, all-in-one computer, which eventually became the first Macintosh. While Xerox can be credited with invention of the first graphical user interface, it was Apple that was able to mass-manufacture and popularize it. This eventually gave us the Macintosh OS X, and led Microsoft to mimic it with Windows. This benefitted us all (except in the short term, DOS teachers like me).

Another idea Jobs took from Xerox and made popular was the computer mouse. You couldn't ask consumers what they thought of a computer mouse back then; no one knew what they were. But Jobs correctly intuited that end-users of technology wanted to use their hands to manipulate technology, a truth that led Apple to the mouse as well as the touch screens on iPhones and eventually iPads.

The lesson that market research is overrated can be applied to optometric education. For example, I have noticed that many of my students have a hard time weaning themselves off hard-copy paper notes and exams. They aren't asking for change. However, when given the opportunity to go paperless for lectures and exams, they discover the many benefits. For example, many can type faster than they can write; many prefer the ergonomics of an upright computer

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display over flat hard copy; and in this age of disappearing print media, they all benefit from having a light, portable, digital version of their notes to take on their external rotations.

It's hard to believe that the younger generation would have trouble adjusting to change. After all, today's students have taken their Optometry Admission Test on a computer and will soon take parts of their national board exams that way. However, we are creatures of habit, and the more demands that are put on our time, the more we tend to resort to familiar old habits. The same is true of students. They will not demand change, and there are no more early adopters of technology among them than there are among their teachers. So, while we need to pay heed to course and instructor reviews the students take the time to fill out, when students bemoan learning new and clearly improved ways of learning, we need to remember that young and old alike do not generally enjoy learning new tricks.

Lesson #2: Innovate To Where Things Are Going, Not Where They Are Now

The greatest ice hockey player of all time, Wayne Gretzky, is credited with saying "Skate to where the puck will be, not where it is." Jobs knew how to apply this principle to technological innovation. While at Apple and his startup NeXT, he was famous for making technological changes before it was clear where technology was going. Eventually, Apple products drove innovation – they determined where the puck would be. You might say they became the puck. Examples abound.

It seems obvious in retrospect that floppy discs would disappear, but when the first bond-blue iMac was released in 1998 with a CD-ROM but without a floppy drive, it surprised many. Less-often mentioned is the removal of the parallel printer port, and its replacement with up-and-coming USB interfaces. Apple did this because USB ports were demonstrably better: they were smaller, had no pins to bend, and even allowed small peripherals to draw power. Though printer manufacturers and others had to scramble to make adapters for proprietary Apple peripherals,

this seed change allowed the company to tap into the future.

Jobs wasn't even afraid of abandoning the keyboard. It turns out that like the floppy disc drive that everyone thought was essential at one time, once you abandon hardware that has outlived its usefulness, there's no going back.

How does this impact optometric education? From continuing education lecturers using their iPads to deliver content, to interns in our clinics inputting data into the electronic health record without a keyboard, these devices do more than save you a sore back hauling a heavy laptop around. They make computing fun. Optometric educators need to recognize that if we want students to continue working on our classes at home, we need our lessons to be compatible with a tablet digital interface, or smaller. It may not be in our nature for most of us to embrace change, but remember, it's not where the puck is. It's where it will be.

Lesson #3: Technology Is Better With Limited Options

One of the few compromises Jobs made in the original Apple II was allowing those eight expansion slots that were so popular in the 1980s. The hollow space that eventually led many of us to have large computer towers on (or under) our desks was a security blanket for customization that many of us would never need. Jobs realized this, and he vowed never to make that mistake again. Soon, Apple products from the iMac to the iPhone would become slimmer and sleeker, but did not have cases the consumer could open, or space inside to monkey around. While this would provoke the ire of some consumers when their rechargeable iPod battery needed to be replaced, Jobs understood that in general, the fewer options that we have, the fewer things that can go wrong with technology.

Here's an area in which students often teach us. While respecting HIPAA, they prefer to use their smartphones to take pictures of ocular disease through the slit lamp. They find it simpler than taking their patients to the fundus cameras with much higher resolution. Even when said camera is in the room with

them, if it's too complicated to use, they will gravitate to their much less powerful, but familiar, camera phone. While privacy issues are paramount, I understand their inclination.

It reminds me of the iPod Shuffle, a device so small and light they have even removed the display. You can skip a song, but you can't see what's on it, or even what's playing. You have to listen. Shuffles are inexpensive, and the battery lasts a long time. You can choose the color of the case, but otherwise, you have limited options.

We'd do well to learn from this example. Sometimes when I replace a piece of diagnostic equipment, instruct a patient on a treatment plan, or even teach a student how I perform my refractions, I think of the principle of the superiority of limited options. When designing and delivering lectures for the information era, when we are increasingly moving from the "sage on the stage" to "the guide on the side," we need to constantly be aware that less is often more.

Lesson #4: Print Media Have Been Traded For Desktop Publishing

Early Macintosh computers democratized desktop publishing and graphic design. While Windows computers have largely caught up, Apple's contributions under Jobs' leadership cannot be overstated. Graphic design goes beyond the eponymous profession to include what we optometric educators create daily with our PowerPoint and Keynote presentations. But has it impacted literacy among our students?

Many in education who remember the world before digital connectivity was ubiquitous can be quite displeased when confronted with students who eschew traditional textbooks. While this may be a trait of many who came of age at the turn of the millennium, it is also true that they are, as a rule, a very creative generation.

In other words, some have argued that what we've lost in reading literacy, we've gained in design and execution of creative projects. While I would not say students today are better at writing than reading, I would say their grand rounds presentations are often more facile than those assembled by seasoned optom-

etric physicians who are not educators. And have you seen the review packets they put together from their class notes and freely share? It makes you wonder how the NBEO prep courses are able to sell what they have to offer in this collaborative age.

An unforeseen challenge of the creative age is one that concerns many educators: intellectual property. This concern leaves us in a rather conflicted position. On one hand, many teachers regularly cite the Fair Use law when they educate their students with limited use of copyrighted material. On the other hand, we are often very protective of our own intellectual property, despite the Optometric Oath that we will “share information cordially and unselfishly with my fellow optometrists and other professionals for the benefit of patients and the advancement of human knowledge and welfare.” How can we reconcile these contradictory principles?

With the invention of iTunes, Jobs was in the center of this debate. He was eventually able to succeed where no one else had when he successfully negotiated with all the record companies to include their music catalogs for sale on iTunes, in order to counter online piracy. Now, iTunes allows both Windows PC and Macintosh users to legally download and own audio and video content of all sorts, including video podcasts of optometric education on iTunes University. Mine are up there.

Of course, digital democratization cuts both ways. Just as digital photography has made imaging available and affordable to us all, and legal digital music has freed us from being hostage to buying an entire album to own one good song, we cannot always protect our intellectual property as we would like. For my part, I have chosen to video podcast using classroom capture technology and offer it to all on a public iTunes U channel using a Creative Commons, non-commercial, no-derivatives license. My students appreciate it.

Lesson #5: Fewer Versatile Devices Are Better Than Many

Jobs and the company he helped found and run for most of his life hit a home

run with the invention of the iPhone. Now in its fourth incarnation (with a fifth eagerly anticipated on the horizon), the iPhone combined a telecommunications device with not just a high-quality camera but a robust MP3 player, usable calendar and e-mail device. True, it costs more than other smart phones, but by now it is obvious that many find the cost worth it. Why? Many remember when a digital calendar and address book were kept on a Palm Pilot, and phones, music players and cameras were separate devices. It wasn't that long ago when your music collection took up a whole wall of your house, and your calculator and travel alarm were separate appliances.

Like the pre-iPhone era, the optometric exam room has become cluttered, and our latest gadgets like scanning laser ophthalmoscopes cost tens of thousands of dollars. No solo practitioner can afford to own the diagnostic equipment that seems to be necessary to meet the emerging standard of care. Yet the optometrist with a retinoscope and BIO can still address more chief complaints for the average patient arguably better than the same doctor can with only an optical coherence tomographer. To a great degree, it can be argued that the equipment our students buy (and haul around to various clinics and rotations) can often be used to address as many chief complaints as the much more expensive rooms full of equipment the schools provide. While we all know that we need cutting-edge special testing ability for the care of our most challenging patients, the equipment we all purchased as students tends to get used on most everyone our interns see.

As we move toward digital phoropters and beyond, it's worthwhile to ask ourselves how many devices we need, and plan accordingly. From a patient's point of view, it may be fewer than we think.

Lesson #6: Those Who Say It Can't Be Done Should Stop Interfering With Those Who Are Doing It

By all accounts, Jobs was no saint. He had an abrasive personality and, while he could be charming, he also had an uncanny knack of cutting you off at

the knees if you did what he considered substandard work. He believed that if you allowed B-level players on the team, they would drag the A-level players down.

You have to admire where this philosophy got Apple. When the plastic screen on the prototype for the first iPhone that Jobs was carrying around in his pocket for weeks became scratched, he demanded that the rollout be stopped until a durable glass screen could be found, manufactured, cut and shipped. It turned out Corning Glass of New York had a patent for nearly unbreakable “Gorilla Glass” that was invented in the 1960s but never found an application until the iPhone. Jobs convinced Corning to retool a factory in Kentucky and ramp up production of all the Gorilla Glass they could make. And in eight short months, they delivered.

Jobs' famous “reality distortion field” had a way of convincing those around him that what was thought to be impossible was in fact possible. Very few people possess this gift. Yet it's human nature to underestimate our potential. As optometric educators, we are charged with inspiring the optometrists of tomorrow to achieve all that they can, often more than they themselves believe they can.

We have to remember how stressful optometry school can be. Many students have never faced the massive credit loads, lab schedules and practice requirements that we rightfully expect of them. While all of the schools and colleges recruit students they believe will succeed and be an asset to our profession, there are times when even the best students become homesick, are disappointed by a poor proficiency score or midterm exam performance, or are taken off guard by a particularly challenging patient encounter.

At times like these, we need to remember that we optometric educators are, like Jobs, the bigger-than-life personality the students need to lean on for encouragement, inspiration and, sometimes, the tough love that teachers need to exhibit to bring out the best in their students. In this way, Jobs' legacy can be a lesson for all of us.