

Advanced digital communication skills in medical education:

When precision matters

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Background

This paper builds on the discussion about digital communication skills development in postsecondary education that was introduced in the Adobe white paper *Silent Transformation: Evolution and Impact of Digital Communication Skills Development in Post-Secondary Education*. The premise of that paper is that today's expectations of and opportunities for effective digital communication extend beyond the domain of graphic and visual artists, videographers, and web designers. Competencies that have traditionally been associated with art and design professionals are now expected from professionals working in such disciplines as journalism, education, and medicine. Institutions are also becoming increasingly aware of the value that advanced digital communication skills offer, enabling subject matter experts with deep technological ability to represent complex information in scientifically accurate, visually compelling ways in the classroom, the laboratory, and the clinic.

Introduction

Advanced digital communication skills development is especially important for subject matter experts working in the medical and dental fields. In these settings, scientific accuracy is a driving goal, as is representing complex statistical information in visually compelling ways. In medicine, scientific accuracy and precision is more than just a matter of creative expression, and competence with professional digital tools can significantly improve diagnosis, treatment, and outcomes.

The evolution 21st century digital communication skills

Adobe's interest in exploring 21st century literacy is long-standing, particularly as it relates to digital communication skills development. Facilitated by the staff of the New Media Consortium, Adobe convened an assembly of authors, researchers, policy makers, educators, and artists in the spring of 2005 to explore the dimensions of a 21st century literate person: someone with a "set of abilities and skills where aural, visual, and digital literacy overlap. Necessary skills included the ability to understand the power of image and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms" (Johnson, 2005, p. 2).

Today the notion of 21st century digital skills includes an ever widening range of capabilities. Technology is a natural and integral part of today's educational landscape. Proficiency with the latest technological innovations is a clear expectation for today's college graduates—even though some of those skills may not yet be a part of their college faculty's repertoire (Smith and Caruso, 2010).

Evidence gleaned from institutional software licensing data and refined through interviews with higher education faculty, staff, and students suggests that today's essential digital skills are clustered within two broad categories:

- Digital communication skills—The ability to share insights, ideas, and information in cross-curricular activities that may feature one or all of the following practices:
 - Digital storytelling
 - Documentary and micro-documentary production
 - Design, creation, publication, and distribution of content assets, including presentations, videos, and movies for use in cross-curricular academic settings
 - Humanities, arts, science, and technology collaboratories
 - ePortfolio development
- Advanced digital communication skills—The ability to conceptualize, design, and produce rich digital assets and experiences. Examples include:
 - Producing representations of the results of complex statistical analyses in visually compelling displays
 - Offering simulations of real-world decision-making situations that facilitate risk-free rehearsal
 - Providing multiple visual perspectives of complex scientific, sociological, and geographical relationships
 - Producing and distributing scientifically accurate documentation, reports, and publications, including electronic theses and dissertations
 - Producing mobile content and applications

Digital communication skills development has long been an expected part of developing expertise in majors such as art and design. In areas of study like education and journalism, the emphasis with learning digital communication skills has typically been driven on developing competence with particular kinds of software required in the field. Today, however, with the increasing popularity of digital storytelling and vehicles like Internet micro-documentaries as a way to communicate concepts, it has become increasingly clear that digital communication skills are valuable across a broad range of disciplines, and transcend knowledge of tools alone.

An appreciation for the power of scientific simulations and the application of high standards in producing visual representations of data have also had a direct, positive effect on driving advanced digital skills development among subject matter experts outside art and design, particularly in schools of medicine and education. Advanced digital communication skills development emphasizes proficiency with leading graphics and visual design, video, and animation products such as Adobe® Flash®, Dreamweaver®, Photoshop®, Fireworks®, and Adobe Premiere® Pro software. This focus shows that subject matter experts such as physicians, dentists, medical researchers, and other health and human services practitioners have come to recognize that their professional communications requirements increasingly call for competence with digital tools that help communicate complex ideas and information in visually compelling ways.

Digital communication skills for scientific representation

Medical education has been profoundly affected by the use of digital technologies in instruction. Today's imaging technologies make it possible to accurately represent highly complex physical systems using photographs, video, and data models. Capturing such complex images and giving viewers the ability to manipulate these resources have made a significant contribution to our understanding of how the human body operates, as illustrated by the following example.

The Visible Human Project (http://en.wikipedia.org/wiki/Visible_Human_Project#Data) and anatomical analysis tools such as the VH Dissector (www.toltech.net) have transformed how medical students complete coursework in subjects like anatomy. The VH Dissector and other 3D visual tools make it possible to virtually explore human physical systems in a way that in the past could only be done via physical dissections in "cadaver labs."

With digital tools, students can learn anatomy interactively interact with anatomical learnings in a safe, non-threatening environment. Movies built with Flash technology highlight entire systems, making it possible to "see" how the heart pumps blood through the body, and show how one physical system depends upon others for its health and well-being.

Dr. Viktor Spitzer, a professor of cell and developmental biology at the University of Colorado Health Sciences Center School of Medicine, is the energy behind the Visible Human Project. He has a long-held passion for human anatomy and 3D imaging, and his work at the Center for Human Simulation, featuring digital scientific medical representations, has transformed the way doctors-in-training in US universities earn their anatomy.



From the VH Dissector promotional video (www.toltech.net/products/vh_dissector/video.htm)

The Center for Human Simulation also uses 3D data "to generate photorealistic surgical simulations never seen before." In doing such work, it has also actively pursued a research training program to educate what it calls the "anatomist of the 21st century, a new type of anatomist/computer-imaging specialist"—someone with advanced digital skills. Dr. Spitzer's staff members at the center are specialists in working with industry-leading professional digital tools including Photoshop and Flash Professional to create the virtual models and representations that they develop on a daily basis.

Dr. Spitzer believes that digital medical professional have the same technology requirements as other digital professionals, "To be clear—I'm not an artist. I'm a scientist," he says. I really don't need most of the features that are included in today's Photoshop. However, the professional features I need I really DO need. Medical imaging is a precise science, and we need highly precise tools. For this reason we always use the professional [Adobe] products in our laboratory when we produce our digital assets and resources. And I strongly encourage the doctors we support in our lab to do the same."

However, Dr. Spitzer and his colleagues do want their physicians and physicians-in-training to have access to informational/graphical specialists such as those on their staff—people with the advanced digital skills needed to turn scientific medical data into easily understood visual representations. In fact, over the past 15 years, the field of medical informatics (www.faqs.org/faqs/medical-informatics-faq/) has emerged as a new professional discipline that addresses the growing demand for medical specialists with advanced digital communication skills.

A number of Visible Human spin-off projects continue to showcase advanced digital skills among members of the center's research and teaching team and associates. Dr. John C. Deutsch is a member of the Gastroenterology Department, Cancer Center, St. Mary's Medical Center in Duluth, Minnesota. He formerly was a professor of internal medicine at the University of Colorado Health Sciences Center, as well as a fellow with the Center for Human Simulation. Dr. Deutsch and Dr. Spitzer have collaborated on various aspects of the Visible Human Project, and Dr. Deutsch launched a video journal, the *Visible Human Journal of Endoscopy*, as part of the project. The VHJOE gave cancer specialists with access to highly specialized video and ultrasonic imaging to help train physicians in techniques for diagnosing esophageal and intestinal disease. "Videos help us diagnose disease. If the videos can help us diagnose without surgery, that's even better. Being able to find problems before they become bigger problems is quite satisfying foreveryone," says Dr. Deutsch. Dr. Deutsch chooses to work with Adobe Creative Suite® 5 software, and in particular, Adobe Premiere Pro. "By using Premiere Pro for my videos I know that the team in the Human Simulation lab will have no problem extending files that I submit for publication and review since I know they will also be using the same Adobe professional tools that I am."

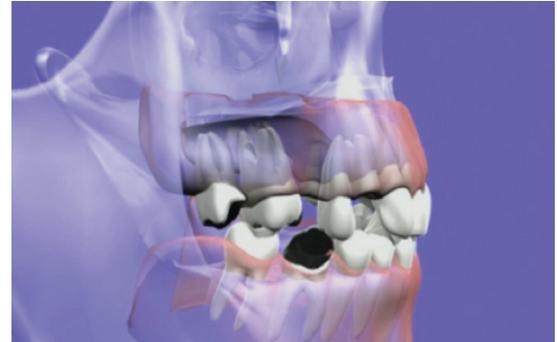


Detail from the cover of the *Visible Human Journal of Endoscopy*

Advanced digital communication skills in dental education and biomedical informatics

The development of advanced digital communication skills has also become an important part of the curriculum in dental education. Programs offered by the University of Pittsburgh School of Dental Medicine and the Department of Biomedical Informatics place increased emphasis on teaching students how to prepare and submit histological samples, radiological images, and other imaging artifacts derived from diverse lab equipment for quantitative analysis. The department hosts a Quantitative Image Analysis Project, in which a development team is creating educational resources for biomedical research using Adobe Photoshop Extended software. The adoption of such software, along with the digital skills students and faculty are garnering through a series of software training courses, is helping the department publish an array of digital images for a variety of quantitative analysis procedures (www.dbmi.pitt.edu/content/spalleks-teaching-proposal-wins-funding-provosts-advisory-council-instructional-excellence-a).

Dental faculty at McGill University and Wayne State University are among a number of North American institutions embracing the use of medical informatics for dental instruction. As is the case in medicine, biomedical informatics is filling the void between practicing dentists and the 3D resources that can help them stay current in their field. With the clear advantages for practicing dentists of being able to both read and see what's new in the areas of say, implants or prosthetics, online continuing education sites such as the ConEd Masters International SCHOOL web portal (www.cemisich.com) will continue to gain acceptance.



From the ConEd Masters International SCHOOL web portal (www.cemisich.com)

Summary

Medical education represents a unique setting for advanced digital skills development. Contemporary medicine has been transformed by the ability to collect massive amounts of information from diagnostic devices and to build accurate and predictive models for diagnosis and treatment. These same systems enable the production of simulations of medical crises that can be solved in a variety of ways, giving medical personnel opportunities for rehearsal and practice in risk-free environments. They also build an expectation for translating large amounts of digital data to create easy-to-understand visual representations that make it easier to compare results. This recognition of the importance of discipline expertise combined with advanced digital communication skills expertise has led to the emergence of fields of study such as informatics and medical imaging within medical education.

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