Technological Innovations

APA Council Backgrounder

The February Council meeting will be a pilot of "Council 2.0" – a new way of discussing issues of strategic importance. This approach puts into action the feedback gathered during the assessment phase that Council wants to be more focused on the major issues of the discipline. We will be using a new methodology to engage Council as collaborative strategic partners using the process of a mega issue discussion. Mega issues are overriding issues of strategic importance that cut across multiple goals or outcome areas. They address key strategic questions the organization must ask and answer, illuminating choices the organization must make and the challenges that will need to be overcome in moving forward toward the envisioned future. If adopted by Council as a way of operating in the future, the process will evolve over time to reflect the culture of APA.

Rationale for This Mega Issue Status and Dialogue: Technological innovations have dramatically changed the world in which the discipline resides. Those changes impact every aspect of psychology: how it is taught, the tools available to researchers, options opening to practitioners, means of dissemination of scientific information and how we communicate with each other and with external groups. Further, those same changes, as well as changes in the market place and in social connections, have huge implications for APA as an organization, how it goes about fulfilling its mission and whether it retains its role as a central organizing structure for the discipline into the future. APA has historically been in a reactive stance with regards to technological change, and has recently spent significant energy trying to catch up. How does the organization change to get ahead of the curve? Is it possible for APA to be recognized as the go-to organization for understanding the interface of human behavior and technology? Because we view the world through a linear lens, we tend to anticipate that future changes will continue but in a manageable way. Yet the signs point to exponential rates of change and fundamental shifts in the impact that technology has on daily life, and by extension, on the discipline of psychology.

Mega Issue Question

Given the sea changes that will be occurring in communications and technology, what could psychology look like 10-15 years from now? What specifically should APA focus on in this area in the shorter term (next 3-5 years) and in the longer term (5-10 years) to prepare psychology and APA to thrive in this dramatic time of change?

Expected Outcomes:

1. Increased awareness among the Council and APA leadership of the scope of coming changes and implications for the way APA has traditionally operated
2. Identification of potential opportunities resulting from these changes and strategies to best position the discipline with particular implications for research, practice, teaching and public policy
3. Identification of high level strategies for capitalizing on those opportunities for the discipline as a whole and APA as an organization

Knowledge-based Strategic Governance is a mechanism for consultative leadership. It recognizes that "strategy" is the necessary and appropriate structure that balances leaders' responsibility to determine how the association's goals, policies and actions are determined, and in the staff's role to manage implementation. This approach begins with the premise that a shared knowledge base of information must be created in advance of a dialogue so that all participants approach the discussion from a relatively common base of shared knowledge.

The information pulled into the backgrounder is intended to answer 4 standard questions, either directly or indirectly: 1) What do we know about the needs, wants and expectations of our members, customers and stakeholders relative to this topic; 2) How is our members' world changing in this regard? 3) What is our organizational capacity and strategic position to address this issue and 4) what, if any, ethical issues are associated with this topic. This information creates awareness both about what is known as well as unknown about the topic at hand.

Senior APA staff members have developed this Backgrounder to prepare Council for the discussion so that everyone begins with the same basic framework. Information in the backgrounder draws extensively from existing resources and in some cases includes direct quotes from those sources. Although referenced in the text, this is not intended to be presented as original work. A list of references is included at the end of the Backgrounder.

The intent of this Backgrounder is not to fully detail all aspects of technology's impact on the discipline of psychology, as there are entire literatures devoted to sub-topics within this area. Instead, the purpose of the Backgrounder is to provide a "pulse" of the environment regarding technological innovation in relation to the discipline.

Section 1: Overview of Technological Change and Emerging Trends

1. Technological Change in Context

We are living in a world where the pace of change is accelerating at exponential rates. Innovation has exploded, entire new fields of study have been created, such as those spawned by nanotechnology, and existing fields are converging (e.g., telecommunications, media and computer technology.) In trying to understand the implications of these changes, it may be helpful to put this period of massive change in an historical context of technological paradigm shifts. Perez (Kleiner, 2005) writes that we have experienced five technological paradigm shifts that began with the Industrial Revolution in 1771. Since then, humans have moved through the era of steam engines, coal and iron railways (1829); the era of steel, engineering, telegraphy, steamships and early global markets (1875); the era of mass production, oil and automobiles (1908); and the current era of information technology, computers and telecommunications (1971). The next phase will be dominated by biotechnology, bioelectronics, nanotechnology and new materials,

Each era has a set of characteristics. The paradigm shift occurs every 45 – 60 years and entails three distinct phases (Installation – Interim period – Deployment). Installation is associated with widespread innovations and discoveries, major influx of funds moving from old paradigm industries into new ones and is a chaotic period that has a frenzied quality and frequently produces economic bubbles. The Interim period is often associated with the bubble bursting; followed by economic recession, societal

pessimism and a sense that change is impossibly difficult. This phase can last for a year or two or up to a decade. The third phase, Deployment, occurs when the technology is fully embedded in the fabric of the society; consolidation of multiple organizations into handful of huge corporations occurs; a new wave of regulations develop in response. Organizations either reinvent themselves or fade and the period is characterized by social euphoria - a belief that everything is possible. Perez terms this the Golden Age within each era.

Several years ahead of the current economic crisis, Perez stated that we were entering the Interim period of the IT / Telecommunications paradigm, approximately 30 years after the introduction of the first microprocessor in 1971. If her model holds, we are headed into the final stage of Deployment, in which the technology fully matures, in the next decade.

2. Major Trends Characterizing Technological Change

Technology analysis firm Gartner, Inc. has identified the major trends that organizations need to monitor and address. (Gartner, Inc., 2012)

Trend 1: Increasingly connected physical and social world

Until recently, our lives were pretty much bounded by geography and our interactions were with those within physical proximity. Communication across distances was slow and/or expensive and information was isolated (and aging) in libraries and reference materials. The evolution of technology and the rise of the internet have radically changed both the ways we can connect and how we access information, removing the barriers of geography. The pace of change is astounding:

- The World Wide Web first appeared in 1991 (Zakon, 2011) and online shopping debuted in 1994. It is estimated that in 1993 the Internet carried only 1% of the information flowing through two-way telecommunication. By 2007 more than 97% of all telecommunicated information was carried over the Internet (Hilbert & Lopez, 2011). Approximately 70 billion devices are connecting to the internet currently; this will increase to 200 billion by 2015.
- Facebook, a company that did not exist before 2004 had 800 million subscribers in Oct 2011 – and is estimated to hit 1 billion by August 2012 (McNaughton, 2012). In mid-2011, Twitter users sent 200 million tweets per day (Parr, 2012) and the average teen sends over 3,300 text messages a month. ("Average teen," 2012)

Trend 2: Interface with technology

The way in which we interact with technology is also rapidly changing and in some ways, technology is increasingly becoming "invisible" as it becomes an integral part of daily life.

Gestures replace keyboards: Touch screens as exemplified by the iPad have radically changed the way we interact with technology

- New gestural interfaces (e.g. Wii, Kinect Xbox) eliminate the need to be tied to a device and open the door for unexpected applications and access to digital content
- Augmented reality goes beyond the applications of virtual reality as an entertainment concept and moves into the realm of actual augmentation of human abilities (e.g., runner Oscar Pistorius clocking Olympic-level times with two prosthetic legs)

Artificial intelligence: The concept of artificial intelligence was first identified in 1956 and is defined by the Association for the Advancement of Artificial Intelligence as *"the scientific understanding of the mechanisms underlying thought and intelligent behavior and their embodiment in machines."* Progress

was slow up until the 1990's, but in the past 20 years, major breakthroughs have occurred and some predict the field is entering a period of rapid growth, such that computers with the equivalent brain power of a human being will be readily available by 2018 and by the 2030's a simple computer will be 1000 times more powerful than a human brain. (Kurzweil, 2005)

- Google now has a computer-driven car that has travelled from San Francisco to New York city without a driver. (See also video of the Google self-driving car (4 minutes) http://www.youtube.com/watch?v=bp9KBrH8H04)
- Computers with natural language processing (NLP) are integrative, allegorical, nonlinear, evaluative and goal-seeking in ways computers have not previously been designed to act; they can understand human generated text instead of requiring humans speak in their language. IBM's new super-computer *Watson* demonstrated NLP in beating the world's best Jeopardy champions. Computers with NLP are already providing hospitals with dramatic productivity gains through analysis of billing and documentation compliance in medical records. NLP shows promise in the ability to directly drive clinical decision-making through analysis of existing records.

Computer-brain interface: Early commercial applications have been mind-controlled games but researchers are exploring it as tool for stroke patients to communicate, control of prosthetic limbs or even commanding robots.

Trend 3: Analytics

Big data: The amount of data generated by those 70 billion devices connected to the web is staggering. Enormous opportunities exist for those who master the ability to manage and understand the "volume, velocity, variety and complexity" of incoming (versus historical) publicly available data. (See Bluefin Labs video for example of how one company is effectively mining social media data (1 minute) http://www.bluefinlabs.com/solutions/)

Predictive analytics: A blend of advanced mathematics and artificial intelligence is used to predict patterns and relationships from massive amounts of data in order to determine the probability of future events; capabilities continue to increase along with the rapid rise in computational power.

3. On the Technological Horizon

Advances across multiple areas that are interdependent and converging suggest that we can continue to experience exponential rates of change; includes concurrent advances in artificial intelligence, robotics, engineering, nanotechnology, biotechnology, gene therapies and genomics (individualized treatments based on personal DNA profile), and computational power. Some examples of technology that will change our world:

3D printers

- The creation of 3D objects from a digital image is accomplished by ejecting successive layers of particles from a print head and then sealing each layer with a binding element. This technology is now available commercially for the office (Z Corporation), as an online mail order service to create consumer-designed objects (Shapeways) and even as personal printers for home hobbyists (MakerBot).
- 3D bio-printers capable of creating human organs from a patient's own stem cells are in development and will revolutionize how disease is managed (King, 2012). (See also videos on 3D printing demonstration (4 minutes)

http://www.youtube.com/watch?v=8aghzpO_UZE&feature=related , dramatic repair for burns with a "skin gun" (3 minutes) http://www.youtube.com/watch?v=eXO_ApjKPaI and Printing a kidney (16 minutes) http://www.ted.com/talks/anthony_atala_printing_a_human_kidney.html)

X Prize Tricorder competition

- The X Prize Foundation uses incentives to encourage innovation in technology to solve big problems and recently offered $10 million for development of the equivalent of the Star Trek tricorder – Dr. McCoy's handheld medical diagnostic tool. It is expected to create a paradigm shift in health care by turning the cell phone into a tool that gives unprecedented access to one's personal health data. Given the high utilization of cell phones in underdeveloped countries, this has the potential to dramatically improve health around the world. ("Qualcomm Tricorder Competition," 2012) (See also video on Tricorder Prize (4 minutes) http://www.youtube.com/watch?v=KBtt3XpTQuQ&feature=youtube_gdata_player)

Nanotechnology

Nanotechnology refers to the manipulation of elements at the atomic and molecular level. Nano particles are incredibly small –up to 1 million could fit on the head of a pin. Researchers have discovered that elements alter their properties drastically when looked at on this small scale, essentially creating infinite variations on the periodic table. The promise of nanotechnology is almost unfathomable and may allow us to address the biggest problems facing the planet. Some applications are already on the market, such as super-strong lightweight materials and water and stain repellant materials. Concepts in development include super-sensitive remote monitoring of everything from blood pressure to the structural integrity of bridges; thin, transparent and flexible organic light emitting displays (OLEDs) to replace light bulbs and display screens; solar panels as thin as paper that could be sprayed onto a roof; new green materials for everything from construction materials to furniture and wall paint; tools for early cancer detection, highly targeted cancer treatments and DNA repair; and high-efficiency energy storage solutions that make "the grid" obsolete. Further out are ideas that seem like science fiction today (a space elevator to link earth to a satellite space station; brain implants that allow us to communicate through thought alone to others and to machines anywhere in the world; a household appliance that can create any object desired on demand.) Nanotechnology may be the key to unlocking Perez's Golden Age in our near future (Kowalenko, 2008; RMIT University, 2011; National Cancer Institute, 2011; Foresight Institute, 2012; and Schmidt, 2007). Yet it is not without controversy or possible negative impacts. For an excellent summary of the societal implications of nanotechnology, see Roco and Bainbridge (2005).

Sometimes a picture is worth a thousand words. If you are interested in learning more about the field of nanotechnology, the following videos open a window onto what is possible:

- *How does nanotechnology work?* (2 minutes) http://www.youtube.com/watch?v=y-Gnm7B69UU&feature=youtube_gdata_player.
- *Nokia Morph Concept Device.* (5 minutes) http://www.youtube.com/watch?v=jcFmpg012K0
- *National Cancer Institute: Video Journey into Nanotechnology*. (3 minutes) http://www.youtube.com/watch?v=jC8CUIID2HA
- *Nanotechnology takes off.* (10 minutes) http://www.youtube.com/watch?v=S4CjZ-OkGDs
- *DNA repair nanorobot.* http://www.youtube.com/watch?v=Q8tAj8A4pc0
- *All Things Science: The world of nanoscience.* (17 minutes) http://www.allthingsscience.com/video/1182/The-world-of-Nanoscience

Section 2: Use of Technology in APA Member Services

APA members and customers expect a marketplace level of services when interacting with the Association including for membership services, product ordering and fulfillment and delivery of technology based services and content. The web has revolutionized how people work, communicate and shop. APA members and customers expect the same speed and level of service from the association they expect and receive from on-line retailers such as Amazon. Over the past five years APA has worked to improve its technical infrastructures to ensure that our level of services meet market-place standards and requirements. There is more work to do in this area including the installation of a new business system and a new telephone system (2012 work projects).

New technologies offer APA new ways to communicate with and engage members. APA has employed new web-based tools to better communicate with and provide services and a sense of community for members. Examples include the new member e-newsletter *APA Access*, *MyAPA* personalization and services page on APA.org; a new opt-in platform for members to tailor the email and other communications they receive from the Association (under construction), *APA Communities* – a web-based platform for APA groups (governance groups, divisions, etc.) to communicate, share ideas, and edit documents.

A question for APA and other membership organizations is should association content (beyond peer-reviewed research articles) be available to all in the field or limited to members? Association executives across many disciplines are involved in an on-going dialogue about the wisdom of placing content behind web "firewalls" to add value to membership; i.e. premium content available to members only. Some association executives advocate adding to membership value by positioning the organization as the premier source of web-based information on a topic; i.e. content available to all. Many associations are taking a hybrid approach of allowing access to broad sections of the association's web content to all visitors but reserving some content access to members only.

A second question for APA is how to judge members' acceptance of new communications technologies. A challenge for APA is the reality that a large cohort of the membership is 55 + years of age and may be less likely to be actively engaged in electronic communications and social media platforms. On the other hand, we also have a critical part of the membership – for the most part graduate students and early career psychologists – whose primary method of engagement and communication is via social media.

The Association will have to find the right balance between new and traditional media in all communications with members from dues collection to news delivery.

Some data are available to help in that planning:

- For the last five years APA has been encouraging members to pay their dues on line. The adoption rate to the electronic dues payment process (replacing the pay by mail or phone process) has grown each year. During the 2011 dues collection process approximately 40 percent of members (across all membership categories) paid their dues on-line.
- Approximately 21% of the membership (across all member categories) is opening the email announcing the availability of the on-line digital issue of the *Monitor on Psychology*; about 5 percent of members are actually reading the Monitor on-line. In a 2008 survey, 35 percent of student members told us they want to read *gradPsych* on-line.

Section 3: Technology and Education

Technology has had a transformative impact on every facet of education, and will continue to do so. There are journals that publish empirical research in the area (e.g., *Computers & Education*) and multiple texts devoted to the topic. There are also formal associations of individuals and of organizations that have as their primary mission the advancement of technology in education. One of the most prominent is EDUCAUSE, which has a membership of more than 2,200 colleges, universities, and educational organizations, including 250 corporations. Numerous resources are available on its website at www.educause.edu. The use of technology to enhance student learning and assessment has been well documented.

With respect to psychology and technology, a recent Google search revealed 268 million returns, with 183 million relevant to psychology, technology and education. There are organizations such as the Society for Computers in Psychology (http://www.scip.ws/Home), journals such as *Computers in Human Behavior* (Elsevier) and a number of texts such as the recently published *Best Practices for Technology-Enhanced Teaching and Learning: Connecting to Psychology and the Social Sciences* (Dunn, Wilson, Freemen & Stowell, 2011).

Obviously the implications of technology for psychology education are too extensive to be covered adequately in 2-3 pages, thus only highlights of a few selected topics central to education at all levels will be addressed here. Technology has perhaps had its greatest impact on the delivery of education itself (courses and programs), pedagogies used, and classroom management. In addition, education in the use of technology has become a core component for program curricula and professional development. In reviewing this material, the reader is encouraged to reflect on "What specifically should APA focus on in the shorter term (next 3-5 years) and in the longer term (5-10 years) to prepare psychology and APA to thrive in this dramatic time of change?"

Brief Synopsis of APA Initiatives

Over the last decade APA has had numerous initiatives related to technology in education. For some time the APA Board of Educational Affairs had a subcommittee on Technology and Curriculum and it convened several projects on relevant topics. BEA has also co-sponsored numerous symposia and presentations (including interactive demonstrations) at convention and other professional meetings over the years. The Education Directorate staffed the Board of Directors Task Force on Distance Education and Training in Professional Psychology, 2002, (www.apa.org/ed/resources/index.aspx) and has featured technology in education as part of its annual Education Leadership Conferences. It has provided technology enhanced education through its Office of Continuing Education in Psychology (e.g., the APA Online Academy, Clinician's Corner webinars), its Center for Psychology in Schools and Education (e.g., teacher education modules), and the Office of Precollege and Undergraduate Education (e.g., OnLine Psychology Laboratory, Assessment Cyberguide). We collect all data for *Graduate Study in Psychology* which is published online as well as in print and thus permits comparative searches. Our Graduate and Postgraduate Education website promotes the culture of competence in professional psychology. In general we have used technology to advance the preparation of psychologists, the teaching of psychology and the development of skills in the use of technology itself. We have also used technology to survey programs and APA members on issues of interest and to obtain public comment on policies under consideration. Technology is fundamental to our advocacy training and grassroots efforts for our Education Government Relations Office as well. And our Accreditation and Sponsor Approval systems have increasingly moved online. Staff and BEA members also participated in the APA Board of

Directors Technology Applications Advisory Group (TAAG) whose 2001 report provided numerous recommendations for APA, including the creation of the current Chief Information Officer position.

1. Education Delivery Systems

According to the most recent analysis of online education, *Going the Distance: Online Education in the United States* (2011)[1], over 6.1 million students took at least one online course during the fall 2010 term, the growth rate of online enrollments far exceeds the growth of overall higher education enrollment, and 31% of all higher education students now take at least one online course. Sixty-five percent of institutions report that online learning is a critical part of their long-term strategy, and the growth rate is highest in the for-profit sector. Although some predict a plateau in the rapid growth over the last decade, there is no sign that its usage will diminish.

However, these data actually underestimate the use of technology in the delivery of education, as they only track courses in which most or all of the content is delivered online, without face-to-face meetings. The use of web-based technology to facilitate a traditional face-to-face course is ubiquitous, as are courses that blend online and face-to-face delivery.

With respect to the offering of entire programs online (not just courses), the penetration rate in psychology was approximately 25% in Fall 2007, with the highest rate in public institutions and 24% in for-profit institutions. With respect to type of institution (Carnegie classification), the highest rate was in the associate category (36%), followed by specialized (24%), doctoral/research (19%), master's (17%) and undergraduate (11%). According to Eduventures, 10 fields accounted for 81% of all online enrollment; 6% of that is psychology. A simple web search reveals numerous institutions offering online bachelor's, master's and doctoral degrees in many of the subareas of psychology, including clinical and counseling.

Many issues have been identified with online delivery of education; one of the first to arise has been that related to quality. There have been concerns about the technology itself, security, honesty in participation, and a variety of other issues related to the loss of in-person experiences. Proponents have pointed out the increased opportunity for discussion online by all students without domination by one individual, and the lack of awareness during discussion of characteristics that may promote stereotyping. It has also been lauded for its potential to increase access, especially for nontraditional adult learners and those with disabilities. Others have worried about a different kind of digital divide than is customarily described; what would be the impact if only those with greater financial resources had the opportunity for on-campus face-to-face learning experiences?

Despite the fact that there is considerable empirical research supporting aspects of online learning, "One-third of all academic leaders continue to believe that the learning outcomes for online education are inferior to those of face-to-face instruction." (Allen & Seamon, 2011, p5). Industry guidelines for distance learning have been promulgated by the Council of Graduate Schools, the American Association of University Professors, the Council of Regional Accrediting Commissions, and the Institute for Higher Education Policy among others. However, the American Psychological Association does not have

[1] The Sloan Consortium began tracking online education in the United States nearly a decade ago. Numerous reports are available at http://www.babson.edu/Academics/centers/blank-center/global-research/Pages/babson-survey-research-group.aspx.

policies related to distance education programs other than those articulated for the process of accreditation of doctoral professional psychology programs.[2]

According to Implementing Regulation C-27, "Although the Guidelines and Principles for Accreditation of Programs in Professional Psychology (G&P) do not set a pre-determined limit on the extent of distance education that is permitted, a doctoral program delivering education and training substantially or completely by distance education is not compatible with the G&P and could not be accredited. This is because face-to-face, in-person interaction between faculty members and students is necessary to achieve many essential components of the G&P that are critical to education and training in professional psychology, including socialization and peer interaction, faculty role modeling, and the development and assessment of competencies."

This, of course, does not preclude the use of online learning as part of doctoral preparation, nor does it prohibit the use of telesupervision. A separate Implementing Regulation (C-28) is related to the latter and states in part that "*Telesupervision may not account for more than 50% of the total supervision at a given practicum site, and may not be utilized until a student has completed his/her first intervention practicum experience. Furthermore, it is the doctoral program's responsibility to ensure that the student has had sufficient experience and in-person supervision in intervention at the doctoral level and possesses a level of competence to justify this modality of supervision in his/her sequence of training."*

APA has tried to provide resources for those interested in distance education. A 73-page task force report, *Principles of Good Practice in Distance Education and their Application to Professional Education and Training in Psychology* (www.apa.org/ed/resources/index.aspx), examined a wide range of issues. (APA, 2002).

In summary, the use of technology in the delivery of educational material by course, degree or certificate program is widespread and growing. Increasingly open courseware has become available and students are obtaining education experiences from a variety of institutions. Some predict that the entire educational system will evolve to the attainment of "badges" that certify basic skills or competencies and that may come from multiple institutions. As there is increased emphasis on vocational training vs. broad education, this may be more likely.

2. Pedagogy

Technology has been used in multiple ways to enhance pedagogy. The following are only a few examples:

Multimedia Classroom

The classroom has gone from a blackboard, teacher centered experience to one involving multimedia. Sound systems allow for large lecture halls and high volume enrollment. Many institutions now require laptop computers for enrollment and have sophistical audiovisual departments as well centers for teaching and learning that facilitate the incorporation of technology on their campuses. Hypermedia presentations can replace or augment lectures and texts, and are routine parts of homework

[2] See http://www.apa.org/ed/accreditation/index.aspx for more extensive information about APA policies regarding the accreditation of professional psychology programs.

experiences and self-study. Video and PowerPoint are perhaps the most common technologies, although as the renowned educator Charles Brewer notes, there is sometimes more power than point.

Computer-based Instruction

CD-ROMs and DVD's can be developed on virtually any topic in psychology and can be interactive in nature, a major feature of the more advanced educational technologies. Texts then become "non-linear" in their approach to learning, requiring more understanding about the scaffolding of knowledge and the learning process. As computing power has increased, so has computer usage in education. Computer animations are used to model topics such as the brain and the functioning of the immune system. Virtual realities have been created to facilitate both content and skill acquisition. Educational virtual environments can also promote team collaboration and social negotiation, not only among participants but between participants and avatars (Mikropoulos & Natsis, 2011).

Factors influencing effectiveness of computer assisted instruction are educational level, student characteristics, faculty training and support, and instructional context. Coming soon are increased numbers of apps for personal digital assistants -- mobile devices that can facilitate just-in-time and point-of-service learning, areas seen as increasingly important for continued professional development, especially in the health professions (IOM, 2010; http://www.iom.edu/Reports/2009/Redesigning-Continuing-Education-in-the-Health-Professions/Report-Brief-Redesigning-Continuing-Education-in-the-Health-Professions.aspx).

The Internet

The computer also provides access to the Internet, which itself has revolutionized communications and access to information. Faculty-student communication by email is already common, but now faculty and students can link to nearly any place in the world to access information and to bring other students and professors into the classroom via videoconferencing. Online learning communities can be created with opportunities for discussion and individualized feedback to enhance learning. Podcasts of previous lectures and live webinars are common at all levels in psychology. (Monthly Clinician's Corner Continuing Education Webinars are offered by the APA Education Directorate.) Students can also link to virtual worlds, where some psychology faculty have used vehicles such as Second Life in their teaching efforts. To enhance research training, the Directorate obtained a grant from NSF to develop the OnLine Psychology Laboratory which contains a series of online psychology experiments whose utilization has grown rapidly, currently receiving nearly 2000 page views per day. Dealing with intellectual property rights and piracy are only two of the issues involved in web-based instruction.

Social media

Social media is a relatively newer area of focus for technology and education. According to recent work by the Babson Survey Research Group, more than 80% of college faculty are using social media, with more than half using these tools as part of their teaching. YouTube, Facebook, Skype and Linked In are most commonly used for communication with students. (http://www.babson.edu/Academics/Documents/babson-survey-research-group/social-media-in-higher-education.pdf) Within psychology, a recent study reported that on the average, faculty use social networking sites a few times a month, and students use them several days per week to daily. Concerns are focused around boundary issues and for student clinicians, special issues were raised regarding privacy settings and ethical issues related to searching the web for client information.

Simulations

Simulations have been especially helpful for the acquisition of knowledge, decision-making and for skills training. They can promote skills in both individual and team functioning, and hold great promise for improving safety and quality. An extensive review of computer simulations in science education document enhancements over traditional instruction (Rutten, van Joolingen, van der Veen, 2012). And a review of the use of virtual patients in the health professions revealed positive outcomes for knowledge, clinical reasoning and other outcomes, but effect sizes are small (Cook, Erwin, & Triola, 2010). We need more information about their comparability to live training and how best to utilize them in psychology. Simulations are the cornerstone of pilot training, and are already a staple in medical education. Although psychologists have been responsible for many of these developments, the application to education in psychology has lagged behind.

Audience Response Systems (ARSs)

ASRs in the classroom, such as clickers, are used to assess student performance, facilitate student involvement, gather anonymous opinions, stimulate discussion, and provide in vivo feedback to the instructor on the process of teaching and learning. There are documented positive impacts on attendance, participation, interaction, discussion, and learning as well as other variables (Kay and LeSage (2009).

3. Classroom Management

Technology can assists classroom management from the taking of attendance to the assessment of learning outcomes. Even high stakes testing of learning in psychology (EPPP) is computer based. Technology has been used to detect plagiarism in student work products and concerns have been raised regarding student monitoring and privacy. Technology also provides challenges for classroom management when telephones ring and students text and surf the web, requiring policies on classroom etiquette.

4. Education and Training in the Use of Technology

Suffice it to say that with the increased use of technology in psychology, there is a corresponding need for increased education of psychologists in its use. Indeed health informatics has been articulated as a core competency for the education and training of all health professions (IOM, 2003). Future training needs to include not only the technical aspects of usage, but attention to legal and ethical issues as well. As noted in a previous BEA report, “The computer and engineering sciences have given us powerful tools. We ought to use them. Learning how to use them is an exercise in psychology, not technology.” (APA, 1994, p. 19)

Discussion

Technology has and will continue to transform education in psychology. It is inherently neither good nor bad, but does present issues for the field to consider with respect to its implications, standards, evidence base, ethics and legal issues. “What specifically should APA focus on in the shorter term (next 3-5 years) and in the longer term (5-10 years) to prepare psychology and APA to thrive in this dramatic time of change?”

Section 4: Technology and Science

1. e-Technologies in Psychological Science Research

APA's Committee on Human Research has been reviewing the impact and opportunities of technology in research and methodology in psychology. The current background was prepared by Committee members Frank Y. Wong and Vivian Ota Wang, along with Science Directorate staff members Sangy Panicker and Jena McGwin.

In recent years, the use of electronic and cyber modes of communication have increased substantially. More individuals have taken to the Internet to connect with long lost friends and relatives on social networking sites, express their opinions and share ideas on blogs and forums, and keep abreast of current events by following up-to-the minute news feeds. Over the last decade, researchers from diverse disciplines have been using the Internet and other electronic technologies (e-technologies), such as smart phones, PDA's, and global positioning system (GPS)-mounted wrist watches to recruit research participants, collect, integrate, transmit data, and also use as a primary source of data Gosling & Johnson, 2010). Many researchers have turned to e-technology as a cost-savings mechanism that provides increased access to a large, diverse pool of potential research participants. In addition, because of the vast array of information that can be obtained using e-technologies, researchers have the opportunity and ability to study a variety of topics such as development, behavior, and attitudes.

However, the use of e-technologies for research is not without challenges. When conducting research using e-technologies, researchers need to be cognizant of the ethical, legal, and social issues that may arise. In addition, most often research conducted using e-technologies still constitutes research with human participants; thus, like all other research with human participants, the principles of respect for persons, beneficence, and justice undergird the conduct of such research. Recently, concerns have been raised regarding acquiring information without obtaining consent, especially when the information or data are derived from social network media such as Facebook (http://tinyurl.com/3ug89zt). Additionally, the issue of public versus private information on the Internet is driving much debate and merits attention when using e-technologies for research. Furthermore, researchers are also faced with competing issues of greater convenience and accessibility to research participants with addressing concerns of data security, and safeguarding privacy and confidentiality of the participants.

Due to the nature and complexity of myriad issues that can arise while planning and conducting research using emerging technologies, scientific organizations have been examining the ethical, legal, and social as well as practical and policy implications of using new technologies in research. For example, in 1999, APA's Board of Scientific Affairs convened an Advisory Group on the Conduct of Research on the Internet, which published an in-depth report on the opportunities and challenges of online research (Kraut, Olson, Banaji, Bruckman, Cohen, & Couper, 2004). The same year, the American Association for the Advancement of Science (AAAS) also organized a workshop on the ethical and legal aspects of human subjects (*sic*) research on the Internet (http://tinyurl.com/7m8tppx).

Identifying and resolving the emerging issues and challenges facing scientists using newer e-technologies in research, such as smart phones, PDA's, and GPS devices is essential as the use of these new forms of accessing research participants and collecting data increase. Possible questions and issues that merit consideration include: What are the ethical and legal issues researchers should address to ensure that veracity of the research participants and the data they contribute? What are the technical

and social issues and implications of data storage, access, and sharing for researchers and research participants? Are there unique challenges facing scientists conducting Internet-based research involving human research participants?

Given the growing availability and use of e-technologies in psychological science, it is incumbent upon APA to begin addressing emerging issues and questions regarding the use of these e-technologies in research. What could psychology look like 10-15 years from now as a result? What specifically should APA focus on in this area for the shorter term (next 3-5 years) and in the longer term (5-10 years) to prepare psychology and APA?

2. Data Sharing

Research in psychology is capable of generating data in vast quantities. This capacity carries with it significant challenges in managing and archiving those data. Additionally, digital technology has made data sharing easier than ever, yet psychologists are among the most reluctant of scientists to share their data with others (see Breckler, *Dealing with data*, http://tinyurl.com/7s2osrw). We often have good reason to be cautious in this regard, especially when it comes to protecting research participants. Excessive caution, however, may impede scientific progress, especially in the context of growing consensus across scientific communities that data sharing is expected. The National Academy of Sciences' Committee on National Statistics (CNSTAT) summarized this sentiment as early as the mid 1980s:
…sharing scientific data with colleagues reinforces the practice of open scientific inquiry. Cognizant of the often substantial costs to the original investigator for sharing data, the committee seeks to foster attitudes and practices within the scientific community that encourage researchers to share data with others as much as feasible (http://tinyurl.com/7lkawpy).

A strong data sharing and data archiving culture exists in some of the subfields of social and behavioral science. Indeed, the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan serves as both a data repository and source of expertise on data management and sharing in the social and behavioral sciences. ICPSR provides guidance in the development of data management plans (http://tinyurl.com/7ohyhg2), as well as a summary of federal agency policies on data management and sharing (http://tinyurl.com/7qyx369).

A broader perspective on data sharing is pursued by The National Science Foundation. NSF has been looking at this issue very carefully, and is expected to invest research funds in improving and growing data sharing infrastructure and to revise its policies bearing on the sharing of data generated with NSF support (http://brtf.sdsc.edu/).

Psychology has been slower to embrace a culture of data sharing (Clay, *Set your data free*, http://tinyurl.com/7nrgrb5; Breckler, *Dealing with data*, http://tinyurl.com/7s2osrw). APA does have some long-standing policy relating to data sharing, but its focus is primarily on verifying published results:

8.14 Sharing Research Data for Verification

a) After research results are published, psychologists do not withhold the data on which their conclusions are based from other competent professionals who seek to verify the substantive claims through reanalysis and who intend to use such data only for that purpose, provided that the confidentiality of the participants can be protected and unless legal rights concerning proprietary data preclude their release. This does not preclude psychologists from requiring that such individuals or groups be responsible for costs associated with the provision of such information.

b) Psychologists who request data from other psychologists to verify the substantive claims through reanalysis may use shared data only for the declared purpose. Requesting psychologists obtain prior written agreement for all other uses of the data.

In the context APA's data sharing policy, the Publications and Communications Board (P&C) convened a special task force on the matter as it pertains to journal articles. The task force report (http://tinyurl.com/7q9kuz6) reviews many of the extant issues, and provided four recommendations for the revision of APA's own policies:

1. Reword the APA policy statement on data sharing to be compatible with the vision of a multipurpose view of data in science.
2. Develop a plan that would put APA journals at the forefront in data sharing.
3. Encourage APA to consider the implications of including or excluding psychology within national strategies for data sharing and linking.
4. Encourage the APA Education Directorate to consider the training needs of psychologists in adapting to the culture change of shared data resources.

Among the most recent developments in this area is a request for information issued by the Office of Science and Technology Policy (OSTP). OSTP invited stakeholders to comment on issues connected with public access to digital data resulting from federally funded scientific research (http://tinyurl.com/7vwdl48). APA responded to the request (http://tinyurl.com/8y2r464), emphasizing at the outset that:

Federal agencies should work with researchers and other stakeholders to create appropriate policies to make digital data resulting from federally funded scientific research freely available to the public. Every stakeholder has an important role to play. Governmental and other funding agencies have a special contribution to make in identifying international standards and best practices for the management of primary scientific data generated by taxpayer or other research grant funding. This role could also include standards for the interoperability of data repositories with the published research literature. To ensure that deposited datasets become an integral part of the record of science over the long term, publishers would encourage the establishment of common practices around the bi-directional linking of data and publications and around standards for the citation of data. We encourage agencies to investigate and establish contacts with a number of initiatives already underway or recently concluded that are examining data stewardship and public access issues in this context.

3. Designing Technology to Improve Cognition and Behavior

Psychology has a long history in shaping and developing new technology. A good example is found in the history of applied behavioral science at Bell Laboratories (Hanson, 1983), where considerable pioneering work was done throughout the second half of the 20th century in human factors and human performance technology.

Today, psychology plays a central role in developing assistive technology in rehabilitation (LoPresti, Mihailidis, & Kirsch, 2004; Kirsch & Scherer, 2010) and in a vast array of human factors applications (as an example, see research published in the quarterly journal *Ergonomics in Design*). Indeed, the National Transportation Safety Board (NSTB) has called for a nationwide ban on drivers' use of portable

electronic devices, primarily as the result of psychological science (see Breckler's Monitor Column, February 2012).

Major technology firms, such as Microsoft and Apple, employ psychologists for their expertise in behavioral and cognitive science. Nearly every facet of modern design, from architecture to consumer electronics to health care, relies on contributions from psychological science. Here, the role of psychology is to shape the future of technology.

Discussion

Against this backdrop, many questions face the discipline of psychology and APA. What will psychology look like 10-15 years from now in light of its role in shaping current and new technology? What specifically should APA focus on in this area in the shorter term (next 3-5 years) and in the longer term (5-10 years) to prepare psychology and APA to continue in its long-standing tradition of applied behavioral science?

4. Open Access

Public Access to Scholarly Publications

For the past five years, a debate has been raging on Capitol Hill as to whether the public is entitled to free access to scholarly publications reporting on the findings of federally-funded research or whether such access would violate publishers' copyright interests. The various stakeholders – Congress, federal agencies, scientific society and commercial publishers, librarians, universities, academicians, and patient groups – hold very different and often times competing perspectives. APA has been actively involved in this matter given that the association publishes 65 scholarly journals and 7 databases accounting for about 70% of its operating budget. APA serves with other major scientific society publishers, including the American Chemical Society and the American Institute of Physics, and commercial publishers as part of a large coalition under the auspices of the Association of American Publishers.

University librarians and patient groups argue that scholarly publications have become too expensive and that the public deserves free access to them since the research on which they are based is funded by taxpayer dollars. Scholarly publishers, in turn, maintain that peer-reviewed manuscripts and scholarly publications are not the direct "result" of federally-funded research. They argue that it is essential to take into account the value added by private sector publishers to the scientific enterprise through such critical functions as editorial selection, peer review, copyediting, design production, dissemination, and archiving. They note that publishers are also currently engaged in, and exploring, a variety of approaches to increase public access to their publications, which include free access to abstracts with reasonable costs for the full article, free access for patients, and free access to developing countries.

The first step in the direction of increasing public access was the introduction of the "Federal Research Public Access Act," in the U.S. Senate in 2006. This bill would require federal agencies with research budgets of $100 million or more to provide the public with free online access to research manuscripts stemming from such funding no later than six months after publication in a peer-reviewed journal. Although no public hearings have yet been held on this bill, it has served as a lightning rod for the various stakeholders. It ultimately provided the basis for a successful effort by the National Institutes of Health (NIH) to put forward a public access policy that was included (without an opportunity for public input) in a federal appropriations bill that became law in 2007. The NIH policy requires all NIH-funded investigators to submit or have submitted for them an electronic version of their final, peer-reviewed

manuscript resulting from NIH-funded research to PubMed Central to be made publicly available within 12 months after the actual date of publication. For several years prior to this time, the NIH policy had been voluntary rather than mandatory. With respect to the establishment of embargo periods, it is vitally important to take into account variations across disciplines. While some publications (e.g., Nature, Cell) might recoup their expenses within six months to a year of publication, others like APA would not. In this regard, it is noteworthy that the lifetime usage of articles across the ten APA journals with the most articles reporting on NIH-supported research is only 16.3% in the first year.

APA, along with other publishers, has raised concerns about possible unintended consequences of the NIH policy at an NIH public comment session, at a separate meeting with NIH officials, and in communications to the agency and to members of Congress. These possible consequences include: a reduction in the number of peer-reviewed journals, a shift toward "author pays" models of publishing, privileged access to publishing based on ability to pay, and commercial exploitation or re-use of content that is otherwise protected by the legitimate copyright and intellectual property interests of authors and publishers.

APA has also supported legislation drafted with publisher input to preclude the federal government from exerting control over scholarly publications that reflect significant value added by private sector publishers. APA has argued that it is not in the public interest to use taxpayer funds to duplicate services that are currently well provided by publishers. Such an action draws funds away from critically needed research and risks stifling innovation in a rapidly evolving industry. The most recent version of this bill, entitled "the Research Works Act," has become embroiled in the intense public debate over the "Stop Online Piracy Act," about which Wikipedia shut down for a day in protest. It has also led to a call by the academic community to boycott Elsevier, an international publisher.

Other federal agencies are now considering adopting a public access policy as encouraged by the Obama administration's guiding principles of "transparency, participation, and collaboration." It is noteworthy that the bill enacted in 2010 to reauthorize the National Science Foundation (NSF), the America COMPETES Reauthorization Act, requires NSF-funded investigators to submit their final project reports and citations of published research documents resulting from their research, *along with a summary specifically for the general public that describes the nature and outcomes of their research project.* These materials are to be made publicly available in a timely manner and in electronic form through the NSF Web site.

APA expressed support for the NSF public access policy as a model for other federal agencies in its recent response to a Request for Information by the White House Office of Science and Technology Policy. APA explained that the NSF policy provides the public with accessible and more readily comprehensible information about the results of federally funded scientific research without jeopardizing the copyright interests of authors and publishers. (See submission #202, http://www.whitehouse.gov/blog/2012/01/30/your-comments-access-federally-funded-scientific-research-results).

The concluding line of the "Open Government Directive" that Office of Management and Budget Director Peter Orszag detailed in his 2009 memorandum to the heads of executive departments and agencies is particularly instructive: "Moreover, nothing in this Directive shall be construed to suggest that the presumption of openness precludes the legitimate protection of information whose release would threaten national security, invade personal privacy, breach confidentiality, or damage other genuinely compelling interests."

Discussion

Should the future of scientific publishing be regarded as among these "genuinely compelling interests?" Will the quality of scientific publishing be compromised and/or federal funding for scientific research reduced? How can both of these critical factors underlying scientific progress be safeguarded and enhanced? What are the best available options for APA to consider?

Against this backdrop, many questions face the discipline of psychology and APA. What will psychology look like 10-15 years from now in light of the rapidly developing issues connected with data sharing and digital technology? What specifically should APA focus on in this area in the shorter term (next 3-5 years) and in the longer term (5-10 years) to prepare psychology and APA to thrive in this dramatic time of change?

Section 5: Technology and the Public Interest

Technological advancement has made profound contributions to our overall health and well-being. It has also been instrumental in removing barriers and enhancing opportunities for disenfranchised segments of our population. Technologies may also magnify the disparities of wealth and privilege and pose new challenges to maintaining health and well-being if not equally available to all.

1. Technology, Healthcare and Underserved Populations

Access to Health and Social Services

The use of technology can increase access to care and create new, innovative ways for health care providers to deliver services to traditionally underserved populations who manifest a disproportionate burden of acute and chronic illnesses and disability. Telehealth technologies, for example, allow health providers and systems increased access to evidence-based and emerging health care diagnostics and treatments. They also provide a vehicle for wide dissemination of consumer and professional health education materials and learning opportunities, and foster increased interaction between professionals and consumers and among consumers (e.g. virtual support groups). Telehealth can provide individuals from culturally diverse populations with increased access to culturally competent care and professionals. It has also been used to streamline and facilitate enrollment and retention in public health insurance programs. For instance, California's One-e-App Web-based system helps families enroll in a number of health and social service programs online. The National Council on Aging Benefits Checkup matches older adults with 2,000 federal, state and private benefits programs available for prescription drugs, health care, utilities, and other basic needs.

Technological advances in communication can facilitate the electronic exchange of client information among health care and social service providers and teams resulting in greater coordination of care between providers and delivery systems, decreased gaps in care, increased efficiency, reduced program costs and significantly improved client outcomes (APA, 2007; Gluckman & Phelps, 2010; Milbank Memorial Fund, 2010).

Innovative telemental health has also been effectively used to improve access to mental health services for underserved populations. Interactive videoconferencing and other technologies offer innovative opportunities for the effective delivery of specialized child and adolescent mental health services

(Pignatiello et al., 2011). There has been demonstrated success in the delivery of self-directed low intensity cognitive behavioral therapy (CBT) prevention programs for anxiety and depression via the Internet for children and adolescents (Calear et al., 2010). For families of adolescents with traumatic brain injury, Online Family Problem-Solving Training (OFPS) is a skill-building intervention focused on improving post-injury family adaptation through treatment sessions consisting of self-guided, web-based sessions and synchronous online videoconferences with a therapist (Wade, et al., 2008). Social Problem-Solving Telephone Partnerships Skill Training eases the transition from rehabilitation hospital to home for family caregivers of recent stroke survivors (Grant, et al., 2002). Remote delivery of mental health services through telehealth can relieve caregiver burden, particularly depression, for those caring for people with Alzheimer's disease (Eisdorfer et al., 2003; Czaja & Rubert, 2002; Finkel et al., 2007). Such interventions can be structured to provide effective, culturally-sensitive support (e.g., Belle et al., 2006).

Escalating health care costs, increased prevalence of chronic conditions, improved survival rates for people with those conditions, the cost of maintaining institution-based care, the preference of individuals to receive care in their homes, and a wide range of technological innovations are helping to drive the migration of health care service provision into the home. The health care that results varies considerably in its safety, effectiveness, and efficiency, as well as in its quality and cost (National Academy of Sciences, 2011). It also raises a host of issues, including the necessity of matching the design and selection of technologies for home use to the capabilities and limitations of users and to the home environment. Human factors research and practice can inform the safety, quality and effectiveness of home health care for diverse populations (National Research Council, 2011) and the other initiatives described in this section.

Technological barriers are often cited as a significant cause of the disappointing telehealth adoption and utilization rates. Barriers include user costs, uncertainty about the adequacy of a system to support clinical activities, system reliability, ease of use, and limited access to the technology (e.g., the absence of broadband Internet access especially in rural and poorer urban areas, and public libraries and other sites of public access with limited funding).

Technology and its Impact on Socio-Emotional Health

Social media use has grown dramatically across all age groups (Pew Internet, 2010). This technological advance has created a complex mixture of protective and risk factors for optimal development of socio-emotional health across the lifespan. There is concern that media technology (e.g., computers, cell phones, video games) may diminish children's social-interaction skills, their ability to relate to the world around them, and their empathy for others (Institute of HeartMath, 2011). Daily overuse of technology has been correlated with risks for anxiety, depression, and other psychological disorders, as well as susceptibility to future health problems among children, preteens, and teenagers (Rosen, 2011). Conversely, researchers have found socio-emotional benefits to the use of social media in the areas of civic engagement (KirkHart et al., 2008), the lessening of social anxiety and improvement of self-esteem and peer relations (Boniel-Nissim & Barak, 2011). Social networking sites such as MySpace and Facebook have been rapidly embraced by adolescents and young adults and particularly by young lesbian, gay, bisexual and transgender (LGBT) individuals (Hillier et al.; Koblin, 2006; Egan, 2000). Virtual and online spaces are seen as sites where youth can explore their identities and interact with others (Maczewski, 2002). Social media has been used to connect and support this population with targeted health message related to homelessness and HIV, and cyber bullying and suicide prevention (Suicide Prevention Resource Center, 2008). Individuals 50 and older have been especially enthusiastic about embracing new social networking, with use doubling from 22% to 42% from 2009 to 2010 (Pew Internet, 2010). Efforts building upon this trend include e-communities for family caregivers and web-based coordination

tools that allow family and friends to coordinate their assistance to individuals needing help with daily tasks.

The Public Interest Directorate is mobilizing various forms of social media to promote psychological knowledge, inform, and educate, for example, via Facebook, Twitter, and LinkedIn. The directorate developed APA's first ever "ecards," for users to customize and forward to interested others, and is exploring other social platforms, including blogs and youtube content as well.

2. The Digital Divide

Technologies enabling access to information are not distributed evenly among various groups of people. For some, information continues to be a scarce resource, which puts them at an economic and social disadvantage. The term *Digital Divide* has typically been used to describe decreased access to information technologies, particularly the Internet, for racial and ethnic minorities, persons with disabilities, older adults, rural populations, and those with low socioeconomic status. The National Telecommunications and Information Administration report, *Falling Through the Net: Toward Digital Inclusion* (2000), confirmed that noticeable gaps existed. More recently, the Pew Internet & American Life Project reported the following disparities in internet usage:

- Households with incomes greater than $75,000 are more than 20 times more likely to have Internet access than are households in lower income brackets.
- Two-parent households are nearly twice as likely to have Internet access as single-parent households. In inner-cities, only 22.8% of female-headed households have Internet access.
- Children in low-income families are half as likely to have a computer as children in households with annual incomes over $75,000, are a third as likely to have Internet access, and a sixth as likely to have access to broadband. This access varies widely by ethnicity for children ages 7 to 17. Just 41% of Native American youth, 43% of African American youth, and 44% of Latino youth have access; compared to 75% of Asian American youth and 80% of White youth (KirkHart et al., 2008).
- African Americans and Latinos continue to experience the lowest household Internet access rates at 23.5% and 23.6%, respectively compared to 41.5% for households nationally. Asian Americans and Pacific Islanders maintain the highest level of home Internet access at 56.8%.
- People with disabilities are only half as likely to have access to the Internet as those without a disability: 21.6% compared to 42.1%. And while just under 25% of people without a disability have never used a personal computer, close to 60% of people with a disability fall into that category.
- The use of Internet falls off sharply with age: 85% of 18-34 year olds, 65% of 55-64 year olds, 39% of 65-74 year olds, 24% of 75-84 year olds, and 8% of those 85+ use this technology.
- Only 62% of adults living with chronic disease go online, compared with 81% of adults who report no chronic diseases. When demographic factors are controlled, internet users living with chronic disease are slightly *more* likely than other internet users to access health information online. Thus, lack of internet access, not lack of interest in the topic, is the primary reason for the gaps. 36% of adults living with chronic disease who say they or someone they know has been helped by health information found on the internet
- Fifty-two percent of all rural households had in-home Internet access compared with 64 percent of urban households. Throughout this decade, broadband access has increased, but is less likely to be found in rural areas (USDA, 2009).

3. Ethical Issues

The infusion of health technology into society has sparked discussions regarding a number of ethical issues. Developments in genetic testing present complex social, ethical and legal challenges related to discrimination, privacy, autonomy, informed decision making and societal participation. *Faces of Genetic Discrimination: How Discrimination Affects Real People* (2004) notes: "*Scientists have already identified genetic markers for various diseases and health conditions, including cancer, diabetes, Alzheimer's disease, Huntington's disease, cystic fibrosis, and potentially thousands of others. Although none of these tests predict with full certainty that a condition will develop, they provide a new opportunity for individuals to know more about the potential risk of disease for themselves and their families….. Along with the increasing prevalence of genetic testing comes a growing fear that employers and health insurance companies will use genetic information to deny access to employment or health insurance coverage. Numerous respected surveys report that the vast majority of Americans want to keep their genetic information private. The more individuals know about genetic technology and their own risk for a genetically linked condition, the more likely they are to report concerns that employers or insurers will misuse their information. Discrimination based on genetic information is especially pernicious because genetic markers nearly always indicate only an increased chance, but no certainty, that a manifested condition will develop."*

A major concern of the disability community is whether prenatal genetic testing is used to increase reproductive choice or to reduce disabilities by way of termination of the pregnancy once a disability has been detected. More broadly, genetic discrimination in health insurance and employment are two additional areas of concern. Use of genetic profiles to deny insurance coverage for healthy individuals, as part of the underwriting process, deny employment, fire current employees, or deny workers compensation benefits are all issues that have been identified. "Genetic information may be linked to certain ethnic and racial groups, many of whom have suffered from discrimination and eugenic policies that historically were "justified" by genetic findings" (Rothenberg, 2001). The results of testing may also have a ripple effect to encompass other family members and future generations of family members. A 2004 survey by the Genetics and Public Policy Center at Johns Hopkins University found that 92% oppose allowing employers access to their genetic information, and 8 out of 10 (80%) oppose allowing health insurers access.

Genetic testing also can have an impact on scientific advancement. As noted by Drs. James Watson and Francis Collins in 2003, ***"****Without protections in place, individuals who do participate will represent a self-selected group that could skew research results, producing a negative impact on all of us who look to genetics to help find better ways of diagnosing, treating and preventing disease…The longer this problem remains unresolved, the greater the damage that will be done to U.S. science and medicine.****"***

Specific to the field of psychology, as noted in the review of the APA book, *Genetic Counseling A Challenge for Families and Psychosocial Professionals Alike authored by Andrea F. Patenaude, PhD* (Lossi, 2005)*, "the completion of a comprehensive sequencing of the human genome brought along the realization that society needs a similar exploration and advancement of the social sciences that will help to apply and communicate the newly discovered knowledge to those whose lives will most be affected by it."*

Privacy issues also have been raised with the introduction of Smart Homes and other home health care monitoring systems that allow adult children to monitor their aging parents or the mobile monitoring of gait and vision to prevent falls of individuals with disabilities.

APA Public Interest Resources

HOPE Online courses: http://www.apa.org/pi/aids/programs/hope/online-ce.aspx
End of Life: http://www.apa.org/ed/ce/resources/eol.aspx
Cyber Mentors: http://www.apa.org/pi/aids/programs/cyber/index.aspx
Family Caregivers Briefcase: http://www.apa.org/pi/about/publications/caregivers/index.aspx
Disability Mentoring Program: http://www.apa.org/pi/disability/resources/mentoring/index.aspx
Public Interest Webinars such as: "Mental Health Needs of Family Caregivers: Identifying, Engaging and Assisting," "Psychosocial Health Disparities Among Cancer Patients: Understanding the Influence of Race, Ethnicity, and SES on Mental Health Service Utilization"

APA Publications has books on assistive technologies and genetic counseling

Discussion

1. In what ways can psychology impact the development of accessible and appropriate technologies? How can it support the development of an infrastructure that supports telehealth interventions for underserved populations?
2. Does technology create or solve social issues? Who will investigate the costs and risks of technologies? Will intended consumers have any control over the decisions to deploy technology?
3. How can we assure that the development of technologies (e.g., personal health records, patient portals to design systems) will fully address the needs of diverse consumers?
4. How do we target new communication and health technologies to the background, experiences and knowledge of diverse consumer groups?
5. What is the responsibility of the public and private sectors to make health technology universally available?
6. How can psychologists help to apply and communicate genetic findings to those whose lives will most be affected by it in a meaningful way?

Section 6: Technology and the Practice of Psychology

Within the past decade alone, developments in communications and technology have dramatically affected the health care system. With major implications for both administrative practices and the delivery of services, developments in information technology are changing the world on a scale not seen since the Industrial Revolution. Although practicing psychologists are typically slow to embrace the application of new technologies to their professional activities, the rules resulting from the Health Insurance Portability and Accountability Act (HIPAA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act are driving more practitioners into the information age. Although emerging technologies and their implications are ubiquitous, this discussion will focus on three major areas: telehealth; electronic health records; and social media.

1. Telehealth

Telehealth, or telemedicine, is a widely used term that may be defined broadly or narrowly. These terms are often used interchangeably and there is no uniform definition as to what constitutes telehealth or telemedicine services. According to the Health Resources and Services Administration (HRSA),

"telehealth" is defined as the "use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration." Telehealth technologies may include "videoconferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications."

Telebehavioral health is a rapidly growing subset within telehealth, encompassing telepsychology, telepsychiatry and teletherapy. The increased use of technology for the delivery of psychological services is strongly suggested by recent survey data, the increasing discussion of telehealth in the professional literature, the increasing use of and payment for telehealth services by Medicare and private payers as well as the proliferation of provider practice guidelines for telehealth. In addition, a number of states have enacted statutes or regulations governing telehealth services furnished by psychologists. Perhaps more so than other practice domains in psychology, telepsychology has implications for practice across jurisdictions. There exist certain barriers to full implementation of telehealth, including certain restrictions on interstate practice, reimbursement policies and health information privacy and security issues. However, some of these barriers do not impact the federal system so federal agencies such as the U.S. Department of Veterans Affairs and the Department of Defense have become leaders in incorporating telehealth in provision of health care services.

However, due to a lack of national guidance on telepsychology practice for psychologists, APA recently determined that there is a need for the development of telepsychology guidelines, since neither the APA Ethics Code nor existing APA guidelines address issues relating to telehealth. In 2011, APA approved the creation of a joint task force with the Association of State and Provincial Psychology Boards (ASPPB) and the APA Insurance Trust to develop telepsychology guidelines for psychologists. The Task Force has met several times and is in the process of developing draft guidelines, which are anticipated to be made available for public comment later this year. The Task Force is considering a myriad of technologies, including but not limited to, telephone, Internet, social networking, video-conferencing, web-cam, and email in the delivery of psychological services.

2. Electronic Health Records

Experts anticipate a complete shift to electronic health records in the coming years, with increasing use of "smart" technology and expert systems that provide enhanced decision support and clinical management. Additionally, as technology becomes more user-friendly and embedded in our everyday activities, the tools will become less intrusive. This development will allow for new ways to monitor health behaviors, track essential data elements and document treatment and progress.
Electronic health records offer many potential benefits to both patients and practitioners, including more coordinated care, reduced medical errors and an opportunity to showcase the value of psychological services. Electronic health records will also make it easier to report quality and quantity measures—a feature that will be critical given healthcare reform's emphasis on greater accountability and the use of outcomes measures.

In addition to helping other healthcare professionals see psychology in a new light, electronic health records may also change the way patients see their own health care. The ability to easily access their own records may increase patients' engagement and view of themselves as partners in their own care. Along with the potential benefits, come challenges related to building new competencies, safeguarding electronic health information, financing expensive new technologies, and ensuring the appropriate use of clinical outcomes and performance data.

The federal government is so eager to establish electronic health records that it is giving physicians a financial break for buying and implementing such systems. For psychologists, there's no such incentive —at least not yet. The HITECH Act of 2009 excluded psychologists and most other non-physician providers from the list of "meaningful users" of electronic health records. As a result, psychologists aren't eligible for Medicare and Medicaid incentive payments and grant funds designed to encourage adoption of these pricey, complex systems.

While physicians must adopt electronic health records by 2014 or face escalating cuts to their Medicare reimbursement, there is no similar mandate for psychologists, but that day will eventually come. And private insurers are likely to follow the path laid out by the Centers for Medicare and Medicaid Services and begin requiring electronic health records, too.

For some time, Practice staff has been actively engaged in the legislative and regulatory aspects of electronic health record implementation. Practice Staff has met with members of Congress and their staff to advocate for inclusion of psychologists and psychology practice in national efforts to foster electronic health record adoption. Staff has reviewed proposed regulations and commented in order to further the appropriate involvement of psychologists and their practices. Staff has also participated in efforts to identify required and desirable criteria for electronic behavioral health records. Throughout all of these activities, staff has focused on safeguarding patient privacy and record security while furthering the engagement of psychology in these national efforts.

An initial staff work group was formed to engage in the legislative and regulatory efforts and that group has been reconstituted to address the practical needs of psychologists, including the evaluation and selection of EHR solutions. Recognizing the need for member education regarding EHRs, Practice Communications staff prepared an introductory article for the Winter 2012 issue of *Good Practice* magazine (APAPO member access only) that provides an overview of developments in EHRs to help members better navigate this new landscape. A series of future articles is also planned to further educate members and prepare them for additional steps related to the adoption of EHRs.

3. Social Media

In *The Social Life of Health Information, 2011*, the Pew Internet & American Life Project reports:

- The internet has changed people's relationships with information. Our data consistently show that doctors, nurses, and other health professionals continue to be the first choice for most people with health concerns, but online resources, including advice from peers, are a significant source of health information in the U.S.

- As broadband and mobile access spreads, more people have the ability – and increasingly, the habit – of sharing what they are doing or thinking. In health care this translates to people tracking their workout routines, posting reviews of their medical treatments, and raising awareness about certain health conditions.

- These are not yet mainstream activities, but there are pockets of highly-engaged patients and caregivers who are taking an active role in tracking and sharing what they have learned.

Some health care organizations, such as the Mayo Clinic, see the potential for social media to help individuals access quality health information, connect with health care professionals, support each other, and make healthy behavior choices. Larger health care organizations are beginning to embrace social media (including 1,229 U.S. hospitals as of October 2011), but many health care professionals are still reluctant to use social media tools in their professional activities. In a 2011 survey of APA Practice Organization members, although 28 percent reported that they use LinkedIn for professional networking, only 12 percent reported that they used Facebook professionally and just 4 percent reported using Twitter. In all, 66 percent of respondents said they did not make professional use of any social media tools.

The use of social media in health care does carry risk and to meet one's professional obligations, issues including privacy and confidentiality, informed consent, multiple relationships, and conflicts of interest must be addressed. Additionally, psychologists need to develop technical competence with the social media tools they choose to use, including detailed knowledge of privacy settings.

When used in an ethical and professionally appropriate way, social media can help practicing psychologists define their professional image, stay up to date on developments in their areas of practice, build and maintain a strong professional network, and share their expertise with the public. APA has begun to use social media to share its research, policies and other information with members and the public and is exploring the use of enterprise social networking platforms to enhance its communities. Additionally, APA's Public Education Campaign and Psychologically Healthy Workplace Program make heavy use of social media tools to support their activities. At a grassroots level, Practice staff has also trained its Public Education Campaign Coordinators and members of its Disaster Response and Psychology in the Workplace Networks in the use of social media to enhance their communication and outreach efforts.

Discussion

In light of these technology developments, what could psychology practice look like 10-15 years from now? What specifically should APA focus on in the shorter term (next 3-5 years) and in the longer term (5-10 years) to prepare the profession and APA to thrive in this dramatic time of change?

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