Chapter 6: Digital skills in healthcare practice

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Learning objectives

1. To familiarise readers with developments in digital technologies in both education and healthcare settings.
2. To acquaint students with some of the main debates around the introduction of emerging technologies into education and healthcare settings.
3. To inform users about some of the digital tools available for learning, research, collaboration and career development.
4. To make readers aware of the risks and challenges associated with the use of online, digital technologies in education and healthcare settings.
5. To introduce some of the key terms associated with the discussion around digital technologies for study and for use in the workplace.

1. Introduction

The healthcare industry is rapidly evolving in tandem with a demand for increased flexibility in the delivery of education in our fast-paced society. As a result, the passive reception of content by students, delivered by an expert from the front of the class, is becoming increasingly redundant. Students are now being taught, ubiquitous connectivity allowing widespread access to online materials (Collier, Gray, & Ahn, 2011). Programs such as nursing are often offered in an external, online delivery mode (Wright, 2013). Due to an increasingly aging population, healthcare is by far one of the fastest-growing industries, and graduate job seekers choosing to enter healthcare, will need to ensure they have developed sound **digital literacies**, particularly as they apply to professional communication. It is imperative that students develop and leverage emerging communication technologies as part of their portfolio prior to seeking employment (Clark, 2009; Hargittai & Litt, 2013).

2. Glossary

Digital literacies: The skill sets needed to effectively use digital technologies in order to access, understand and participate in the digital world (Eisenberg, 2008).

Media literacy: The ability to decode, evaluate, analyse, and produce messages in a wide variety of media formats (Koltay, 2011).

Information literacy: The ability to recognise when information is needed, and the capacity to locate, evaluate and effectively use the retrieved information (Eisenberg, 2008).

Multiliteracies: The skillsets needed to create meaning in ways that are increasingly multimodal and in which text interfaces with oral, visual, audio, gestural, tactile and spatial patterns of meaning (Koltay, 2011).

Critical digital literacy: Digital literacies with a focus on critical thinking skills (Avila, Pandya, 2013).

Intranet: A private network of an organisation based on internet technology and accessed via the internet. An intranet is usually protected from unauthorised access by firewalls (Welsh, 2012).

Social media: Websites and applications that enable users to share content and participate in social networking (Mcdonald, 2004).

1. Context of Digital skills in healthcare practice

Research reveals that the more a hospital embraces digital technologies, the better off its patients will be. The evidence indicates there are likely to be fewer cases of patient harm and fewer complications associated with document management. Unfortunately, only a small percentage of hospitals and doctors' offices are currently embracing digital technologies, and the majority of healthcare providers lag far behind those in other more developed healthcare settings in implementing these innovations (Govindan, Van Citters, Nelson, Kelly-Cummings, & Suresh, 2010; Wetterneck et al., 2006). However, researchers, legislators and digital technology experts hope this change will come about over the next decade with some strong investment in infrastructure. Such investments should enable the adoption of healthcare education technologies such as remote access systems, telehealth, electronic health records, and patient tracking systems and, most importantly, staff and patient education in these areas (Gill, 2013; Gyurko & Ullmann, 2012). Due to the rapid advancement of technologies that have enabled the gathering and sharing of information, and real-time communications in healthcare,

the healthcare professionals of tomorrow (who are learning today) essentially need to become experts in the use of these technologies. For example, student nurses studying today need to familiarise themselves with digital technologies to ensure their application in the clinical context is safe, effective, and user-friendly. The digital skills learned today will save time in the workplace, streamlining processes and expediting communication (Dudding, 2009). By way of example, though telehealth is more common than it once was, certain technical, social and infrastructural barriers prevent more common use in nursing. As restrictions around nursing licensure change to accommodate changing practices and technologies, telehealth use by nurse practitioners will only increase. In order to move forward, student nurses need to embrace these communication technologies with their professional development.

Telehealth can also play a key role in the ongoing training of student nurses engaging in clinical placement. The technology allows training and technical support for the use of distance learning while nursing students are on clinical placement. Greater support at the bedside for students has never been more possible than right now. Mobile applications such as FaceTime or Facebook, and free communication tools like Skype can now provide students with remote support for their learning needs (Gassert, 2000; Nguyen, Zierler, & Nguyen, 2011).

2. Mobile and online communications: distance learning strategies

Online learning allows any student the ability to learn at their own convenience and at their own pace (Hamilton & Friesen, 2013; Sawyer & Howard, 2007). Some would argue, however, that the physical separation from fellow learners and teachers may result in a reduction in communication and important social interactions, and the development of an uncertain sense of attachment to a community of learners. Researchers argue these feelings of detachment may affect a student's motivation and could lead to reduced performance, dissatisfaction and increased attrition (Horn, 2013; Kelland, 2011). Hence, those opposed to online learning would suggest that face-to-face interaction can positively influence learners' motivation, active participation and interest in learning (Thompson & Lynch, 2003). However, these theories fail through not considering the options for flexibility that online technologies afford. Online technologies do offer a sound platform for personal interaction, with the capacity to facilitate effective communication (Gyurko & Ullmann, 2012). In addition, face-to-face learning is not an option for many rural and remote learners. For some learners there is no alternative but to participate online and at a distance (McLeod & Barbara, 2005).

Research that has focused on online communication in education has generally centred around the generation of personal interactions, reading and writing capabilities, or the effects of online learning on communication (Wright, 2013). This research has demonstrated that online communication tends to lead to more balanced contributions than with face-to-face engagement, with less dominance by highly opinionated personalities (Gill, 2013; Hamilton & Friesen, 2013; Warschauer, 2001). Participation in communication is an essential ingredient to learning. Many of those introverted personalities who are less likely to contribute in face-to-face discussions, are more likely to participate and make valuable contributions to discussion in an online environment (Yan, 2013). This gives digital communication platforms a distinct advantage when compared to traditional, didactic systems of learning. There is clear evidence that reading and writing skills can improve when students are also asked to engage with online learning materials. Well-validated research indicates this arises because students take more pride in their work when posting something on an online platform (McAllister & Watkins, 2012; Roper, 2007). The impact of online learning can be measured by the extent to which it improves access to information and therefore, the generation of knowledge. The online delivery of programs and courses allows students to participate irrespective of their geographical location. A message, activity or piece of content can reach a wide audience in a matter of seconds (Gill, 2013; McLeod & Barbara, 2005). Often people seek expert opinion, viewpoints, and points of clarity on given topics or best practices. Ready access is the key to keeping people engaged and mobile communication via online media allows this (Collier et al., 2011).

It can be difficult to keep up to date with the latest information. Even the best-intentioned student can forget how to complete every procedure, or remember all the processes and policies needed to work in a hospital or other health setting. Mobile devices have the potential to revolutionise the way nurses learn and keep up to date with the latest information. In 2014, some 70% of Australians owned a smartphone or a tablet device, with nearly one third of people owning both. The average Australian adult owned four mobile devices (Deepend, 2014). Ownership rates in New Zealand are comparably high: in 2012, 60% of New Zealand adults owned smartphones and 19% owned tablets (News, 2013).

Because mobile devices are easily carried with a person, they serve as portals to online information. Textbooks and articles can readily be accessed, searched and read using mobile devices, particularly tablets (Duffy, 2012). YouTube or Vimeo videos can be viewed showing

examples of processes and procedures (Clifton & Mann, 2011). By using mobile devices for learning, educators are leveraging the skills and technologies students already have, making them more likely to be adopted for study or in the workplace.

3. Emerging learning technologies

Those in favour of mobile and online learning technologies tend to believe they offer a learner the ability to interact synchronously or asynchronously with their teacher and peers, in real time at any hour of the day, regardless of time zones. This can also mean that for learning to occur, the teacher does not always need to be present; rather, students engage with each other at their own convenience. Although communication with a teacher may be delayed, it can still occur and an individual's learning needs can be met (Bozalek et al., 2013; Herrington & Parker, 2013). University academics often make use of online communication and learning strategies inclusive of discussion forums or real-time virtual classrooms. The virtual classroom can enable group communication and facilitate effective discussion, even allowing for group work in rooms within the virtual classroom before reconvening class discussions (Martin, Parker, & Allred Oyarzun, 2013; Taras et al., 2013). Researchers are also working on remote-access systems that enable a high fidelity of learning such as emulated intravenous pumps. These offer learners basic through to complex learning scenarios that have been shown to be as effective as face-to-face training (Bowtell et al., 2012). In this way, the need for face-to-face practical or clinical sessions can be emulated online.

YouTube, multimedia, and open learning resources in the form of short snippets or lectures, simulations, animations, and virtual world scenarios provide academics and students with a variety of teaching and learning tools (Gill, 2013). These can be applied and adapted to learning needs in various ways ensuring personal learning styles are not neglected. Many of these platforms offer the learner a chance to effectively practice the art of communication prior to engaging in real-world scenarios (Bowtell et al., 2012).

Open online learning resources can help students to learn who have never fully mastered key concepts, or who have perhaps forgotten them (Bowtell et al., 2012). They provide options for students who have struggled to follow or engage in classroom tutorials (Gill, 2013). Even textbooks are changing to incorporate video and audio clips, animations and rich graphics.

These textbooks are becoming more interactive, allowing both instructors and students to annotate, add or change material including interactive assessment questions and feedback. These electronic texts are, of course, accessible via smartphones, tablets, eBook readers and other mobile devices (Brown, 2012; Rockinson- Szapkiw, Courduff, Carter, & Bennett, 2013).

Box 1: Case study

A university's nursing program has taken its entire program to an external online student cohort. They have done this to help capture a wider population of students into the program and to address the likelihood of strong, sustainable enrolment numbers.

1. How are students going to be able to ensure equitable and comparable access to effective communication in the online system, compared with how they communicate with their lecturer face-to-face?
2. How will students seek clarity on content?
3. If a student is struggling with content, how are they going to be able to ensure they receive the support from the teaching team or other students?

4. Digital learning as a substitution process

Time is always a limiting factor when it comes to learning opportunities or, more importantly, an exposure to the best learning opportunities. This particularly occurs when students need to acquire a certain competencies in a given timeframe (Bowtell et al., 2012; Miranda & Lima, 2013). In a typical nursing program, most students have limited exposure to simulated patient scenarios or real clinical experience. The capacity to learn and test effective communication skills is therefore somewhat limited. It is imperative that trainee health professionals get adequate exposure to high fidelity communication scenarios involving patient interaction and interaction with other healthcare professionals. This can occur using several frameworks (Peters, 2004), for example, ISBAR (Introduction, Situation, Background, Assessment, and Recommendation) is a well-known tool used to communicate patient issues with colleagues. It was originally developed in the military to ensure effective communication of key issues from one person to another. By using the tool, a person can better plan their communication, making it clear and precise for the end receiver and thereby reducing the likelihood of misunderstanding (Brindley & Reynolds, 2011). It is particularly effective in ensuring all key

messages are summarised, particularly if a health professional needs some urgent action regarding a patient. Another valuable tool is called PACE (Probe, Alert, Challenge, and Emergency). This tool is of particular value when a healthcare professional believes a patient may be at a significant risk due to the actions of another healthcare professional. Using graded assertiveness, a healthcare professional can learn to PACE their way through some effective communication in order to prevent patient harm (Brindley & Reynolds, 2011).

In real-world training environments, there is often minimal exposure to these types of situations, where nurse or other health professional students can develop and make use of such communication tools. Digital learning environments such as virtual clinical settings can provide a platform for repetitive exposure to conflict scenarios or challenging situations that require effective communication. This enables a student to better develop communication competence and confidence. As another example, simulated nursing labs offer students an effective means to practice communication with patients regarding everyday procedures such as wound management or medication administration (Bowtell et al., 2012).

5. The driving societal forces for online learning

Online teaching platforms are fast becoming more popular with their use expanding well beyond the university sector and into the business and healthcare domains. It can only become more popular within university climates that include remote training and instruction, and video web conferencing (Peters, 2004). Together with the popularity of online learning, website development and innovative learning technologies are also being developed by academics to cater for the conversion to learning via distance modes. Therefore, one of the major driving forces has been the changing expectations towards academic learning in online learning. Applications with specific operations and purposes are also being created to cater for the increasing online demand and presence of students (Shen, Cho, Tsai, & Marra, 2013). These are being designed to aid learning, ensuring there is equivalence with traditional face-to-face models, while also matching the everyday social expectations of online **social media** (Macdonald, 2004).

The sudden escalation in and popularity of social media applications has made it possible to create an environment with variety and flexibility. This means that modern students need to remain current and open to rapid change in learning systems. A variety of communication

applications such as practice labs, student self-checks, teacher lesson plans, social forums, virtual classrooms such as Blackboard Collaborate, chat, and other forums enable a means for effective communication with teaching staff. The modern student wants to balance family, work, and study; the development and further refinement of innovative online systems and supporting applications is now making this desire a reality (Cui, Lockee, & Meng, 2013).

Without the rapid evolution of these applications, online delivery might not have received the wide endorsement it currently enjoys. Online applications offer a conducive environment for students and their teachers as well as trainees and instructors. Such applications help with the creation and management of flexible lesson planning, access and management of digital library resources, ready and cyclical student feedback with online surveys, electronic assignment submission, and online examination (Cui et al., 2013). Access to internationally relevant content is now a key feature and a driving demand from students. The internet has opened up the ability to rapidly acquire information and synthesise it into something of meaning (Keengwe, Adjei-Boateng, & Diteeyont, 2013; Shen et al., 2013).

6. Digital literacies and learning inequalities

In online learning environments, students need to be able to identify, locate, evaluate, and effectively use information for the purposes of their own professional learning and personal improvement. This means they must be able to navigate a plethora of new technologies that are rapidly evolving. We tend to think younger generations, especially, are like sponges and generally adapt very quickly to new systems and applications. However, it is wrong to assume every individual has the competency and capacity for such an adaptation. High school curricula still invest little energy into this new way of learning and many school leavers are still not digitally literate (Beach et al., 2009; Cui et al., 2013), therefore the university sector must formulate orientations that familiarise new students with the online environment (Roper, 2007).

The internet provides access to a staggering variety of information from online academic journals to practitioner blogs, YouTube videos, Facebook groups, and websites of all descriptions. The problem is not with a lack of information but in determining which of these sources is reliable and credible. In the healthcare setting, using incorrect or out-of-date information can have significant consequences. The ability to search for, locate, evaluate and use the information needed is known as '**information literacy'** (Eisenberg, 2008). It's not

enough to be able to use a computer or mobile device. The modern practitioner needs to be able to apply those computing skills to address the real-world situations and challenges encountered and be able to locate the information that will help to solve those problems.

A number of attempts have been made to better define 'digital literacies' and their relationship to acquiring knowledge and skills. Other educational goals inclusive of traditional learning modes, such as computer training, library access and use, and clinical reasoning skills, relate to information literacy. The necessary digital literacies are evolving over time and are essential tools to ensure social and academic well-being in a complex and rapidly evolving society (Macdonald, 2004).

Governments and educational institutions around the world need to challenge traditional methods of learning and embrace the flexibility and diversity that online systems and applications offer. In modern-day learning, there is a need to move away from the traditional learning of effective communication. Communicating online requires the development of quite specific skills. These skills might include knowing how to use videoconferencing, teleconferencing, opening and listening to Mp3 and Mp4 files, or something as simple as sending an email. It is imperative that a student entering the academic world learns the etiquette of communicating via these tools (Macdonald, 2004; Duffy, 2012).

7. Media literacy

Very few healthcare students are exposed to online media as a tool for learning. This is surprising given the potential to assist in the development of learners' critical thinking and creative abilities. The true benefits of using online media in learning is that the information has no fixed location, no clear philosophy and no conclusive receivers; it is dependent on the erratic nature of news broadcasters and enables a communication of what is currently topical and important in the learner's surroundings. Often very good case studies can come at timely points in the learning cycle to reinforce key messages. By using and interpreting the media, students are able to analyse, evaluate, and generate messages in a vast array of media, genres and configurations. Students who are media literate stay informed of current and relevant events affecting their profession. This indicates current trends and issues within the healthcare sector and can help generate timely reactions and solutions to minimise public outrage (Lukinbeal, 2014; Sur, Ünal, & İşeri, 2014).

Media literacy is the ability to decode, evaluate, analyse and produce both print and electronic media (Aufderheide, 1992). Someone who is media literate should feel comfortable with all forms of media from newspapers to social media, television and even internet search engines. Media can be a form of entertainment and a way of accessing culture, either our own or those of another. Media literacy is also critically important for learning. With so much media available in our society, the student needs to be able to critically analyse that media, gauging its quality and accuracy. For example, this becomes very important when assessing the value of a medical aid or treatment that is being advertised (Koltay, 2011). Media literacy includes the knowledge of when discretion with media is required, for example, to maintain patient privacy.

Box 2: Learning activity

1. Look at your current social media profile. How can that be leveraged to increase your professional profile?
2. If you don't engage with social media, choose an appropriate platform to write about. Note down the elements you think would contribute towards a professional social media profile.
3. If you have an account, you may want to implement these strategies.

8. Multiliteracies

Multiliteracies is a recent label used to reflect the way people communicate with new technologies. Mobile phones and social media have created a shift in the way the English language is used, meaning a new 'literacy' must now be embraced. As an example, people now use emoticons to describe how they are feeling or use abbreviated terms that enable timely replies. In healthcare, these new forms of communication need to be incorporated into learning. Ubiquitous connectivity makes the world seem smaller, cultures have become intertwined and there is now a mix of languages giving rise to variations in the English language (Rowland, Canning, Faulhaber, Lingle, & Redgrave, 2014; Tan & Guo, 2014).

These variations, combined with the rapid evolution in technology and multimedia, has caused a sudden shift in communication. Today, text messaging via phones is not the only way to communicate. Text messages provide a way to interact with sounds and images, movies, posters, different websites and television programs. To survive and thrive, an individual needs to be familiar with these differing modes of communication and know what it means to live in a multimedia world (Sur, Ünal & İşeri, 2014; Aufderheide, 1992).

9. Critical digital literacy

C**ritical digital literacy** is necessary in order for all students to effectively learn in online environments. Students require the technological skills and confidence that enable effective access, navigation, and use of online information. With the evolution of digital learning platforms, curriculum design has now become more complex, meaning multiple tools can be used to engage students in their own learning (Avila & Pandya, 2013). In nursing, teachers like to communicate with storytelling or situated practice. The benefit to the nursing student is they can learn from realistic case studies receiving high-fidelity learning experiences prior to engaging in the real world. This communicates the true nature of healthcare, and enables the development of required clinical reasoning skills prior to students taking on real-life problems. Online engagement allows a student to repeatedly receive instructions, and this can build confidence with difficult or complex scenarios or tasks. Healthcare students need to build their perception skills, i.e. their ability to recognise non-verbal cues or hidden elements in the communication process. The concept of emotional intelligence is paramount and online case studies or even patient communities can enable the development of better critical thinking processes, enhance perceptual skills, and help students discover their own emotional intelligence in perceiving when colleagues or patients need assistance. The development of critical digital literacies has the capacity to help transform practice. It can enable students to make connections with key concepts before entering the real world, something that can offer students safer and more confident practice (Avila & Pandya, 2013; Greene, Yu, & Copeland, 2014).

10. Digital exclusion

Being digitally literate can create job opportunities through allowing flexibility when working remotely. Students with the right skill sets can receive a live lecture from the other side of the globe. With the emergence of cheaper forms of communication and increasing social network interactions, the development of online skills and knowledge have become paramount. Without paying attention, students and their teachers can easily be left behind in the light of these rapidly changing innovations that make extensive use of the internet (Aleixo, Nunes, & Isaias, 2012).

Digital inequality is a significant issue and, if left unrecognised, can mean dimished communication with a student or with a patient in a healthcare setting. Individuals without access, appropriate skills or the right motivation and knowledge will miss out on the digital revolution. Access to information in order to learn, improve and to remain engaged with the world is considered by many to be a human right. In this digital world, it is questionable whether printed newspapers will continue to exist; many believe it is almost inevitable that news will soon be accessed exclusively online or via broadcast media. This could potentially lead to further social isolation for particular individuals or communities. Research now shows a clear correlation between digital resource development and social exclusion. The reality is that individuals who are already disadvantaged and who possibly have the most to benefit from digital communications are the least likely to know how to use it (Aleixo et al., 2012; Wong, Fung, Law, Lam, & Lee, 2009).

For those studying to be part of healthcare, it is imperative they keep up with advances in digital technologies as the future is likely to be increasingly digital. Electronic health records are more prevalent, radiology is now digitalised, and medication charts will soon be in a digital format. Nurses and other health professionals need to be digitally literate, ready with the required skills and knowledge (McIntyre, McDonald, & Racine, 2013; Wong et al., 2009).

11. Digital technology and learning outcomes

Evidence suggests that behaviours change when interacting with online technologies (Bowtell et al., 2012; McIntyre et al., 2013). Much of the literature refers to readiness for learning. In nursing, a readiness for learning means the right online preparation has occurred, enabling an individual to explore their own and other's lifelong learning requirements. Digital technologies have been shown to provide rich cognitive resources which can have a profound effect on an individual's learning experience. As an example, research has shown that three-dimensional

objects better stimulate the human visual system, and lead to high-recognition processes, particularly with clinical reasoning. Examples online include three-dimensional exploration of the human body or specific parts of the anatomy in a simulated environment (Sinha & Poggio, 1996).

Learning technologies have never been more affordable and laptops, voice recognition software or text-to-speech software can greatly assist students with learning deficits. Online gaming is making learning more engaging (and fun) for the participant, and evidence suggests this type of learning engenders greater memory recall (Collier et al., 2011). Technologies are enabling learners to fully benefit from flexible and optional learning platforms, meaning it is easier to cater to a person's individual learning style. In academia, online learning strategies may include the provision of written materials supported with audio-visual delivery and remote access to devices with which students can practice and apply learned materials; the previously mentioned remote access intravenous pump emulation is a very good example (Sawyer & Howard, 2007).

12. Online safety

Many people have an online presence and enjoy using social media sites such as Facebook, Instagram or Twitter. They comment on blogs and news stories, share photos and music with friends, or even sign up for online dating. This kind of sharing is now commonplace and can be a positive and enriching aspect of our lives. Even so, sometimes this sharing can go very wrong. The media is littered with reports of online scams, cyberbullying and identity theft. This danger generally comes from oversharing personal information over the internet with people whose identity can't be verified.

There are a number of ways these risks can be minimised. The most obvious way is to only use only a screen name or nickname online. Users of social media sites are often encouraged to share a picture of themselves, but a safer option would be to use a cartoon avatar or a picture of a favourite band. Users should not share too much private information via social media: they

should never supply an email address, surname, phone number or home address. Where possible, profiles should be kept private and only shared with friends or family members.

It is important to remember that anything posted can be disseminated more widely than the user is aware. For that reason, students must be cautious about uploading images or creating posts that can portray them in an unprofessional or unflattering light. A digital footprint can surface many years after the original posts were made, and many employers now conduct social media searches of those they are interviewing or recruiting. A few indiscreet pictures from a party can potentially impact a person's chance of securing a job. Users need to think twice before they post.

Privacy is becoming increasingly important as nurses and other health professionals take their mobile devices into the workplace. Mobile devices can be used to take photographs or videos, or to look up information. The diversity of apps enables users to do a wide variety of activities, with users able to post 'selfies' or pictures of co-workers direct to their Facebook page, for example. Care must be taken to respect the privacy of patients when using mobile devices. In April 2014, a picture-sharing app for doctors and nurses made the news for all the wrong reasons — the app allowed practitioners to share photos of lesions with other practitioners and enable discussion to aid diagnosis. The app did contain some tools to help conceal the identity of the patient, however, there was no compulsion to use these (Smith, 2014). With a little additional information, the patient could be identified from the pictures and many doctors and academics expressed dismay at the lack of guidelines to ensure patient privacy and confidentiality.

13. Making digital technologies work for you

Old models of scholarship were based around solid artefacts. Journals were all paper-based and university libraries were populated with hard copies of books. Those students studying at a distance would have to submit requests for reference materials in a letter and those materials would be posted or copied and sent to the student. The delivery system relied on an efficient postal system so students in regional, rural and remote areas were often at a significant disadvantage as materials could take weeks to arrive.

With the arrival of the internet, the delivery models for these resources have changed. Though hardcopies of journals and books still exist, university libraries are increasingly buying subscriptions to online journals, book series and databases so any student with an internet connection can access a particular article or resource at a time convenient to them (Pearce, Weller, Scanlon, & Ashleigh, 2010). This is perhaps expressed best by Christine Borgman who states: 'The internet lies at the core of an advanced scholarly information infrastructure to facilitate distributed, data and information-intensive collaborative research' (Borgman, 2007). This may be in the form of datasets which are assembled by one research team, then made available for others to use in new ways (Borgman, 2007).

Another way the internet is opening up scholarship is through Web 2.0 technologies such as blogs, and social media tools such as Twitter and SlideShare (Dabbagh & Reo, 2011). These technologies allow discoveries and experimental results to be disseminated widely and quickly to both scholars and the general public (Pearce et al., 2010). These sources become important in rapidly changing fields whereby the length of time between submission and publication of journal articles can sometimes be counted in years. Dissemination through social media substantially shortens those timeframes but on the downside, this material can lack the rigorous process of peer review. This is where media and information literacy become very important. Consumers of these sources must be able to weigh up the credibility and validity of the data collection, as well as its analysis and the conclusions drawn from it. There is no gatekeeper to ensure the quality of these sources, so great caution and discrimination must be exercised when choosing whether or not to accept the conclusions.

There are many ways to search the internet for information yet the one most people use is the Google search engine. For academic writing, many people use Google Scholar to find articles. Google and Google Scholar can help unearth all sorts of information from a variety of places. It can help find websites, images, videos and news items. What is often forgotten is that Google is a multinational corporation that makes substantial profits from advertising and partnership deals. For that reason, Google has attracted considerable criticism for directing searches towards its own products and those of its partners (Hazan, 2013). A Google search will undoubtedly reveal much information, however, it may not be the best information for a particular need. It is always worth trying one or two others and comparing the results. Other popular search engines include Bing and Ixquick.

For reliable academic information, many university libraries have their own *customised* search engines which will search the databases and journals to which they subscribe. Using this method has the added bonus that a student will be able to directly access the resources they find. If a student does not have access to this customised service, the next best thing to do is to search the *general* databases to which the university subscribes. Certain databases tend to focus on particular topics or disciplines, and most libraries will recommend databases for particular disciplinary areas.

No matter where a student searches for information, there are a few strategies to maximise the value of the search. To make searching more effective, it is best to use Boolean searches using the terms 'and', 'or' and 'not'. If 'and' is used, the search will reveal those sources that contain whatever term is linked by the 'and', which is useful because it helps to narrow the search. For example, a search for 'AIDS' may reveal many thousands of results, but the search 'AIDS and Africa' will reveal far fewer. The term 'or' finds those sources that have either or both of the search terms. This is helpful when more results are needed or when something is known by more than one name. An example would be the search for 'croup or laryngotracheobronchitis'. The Boolean search term 'not' can help exclude results; it is used when a search turns up many results that aren't relevant. An example of this kind of search would be 'arthritis NOT rheumatoid'. By using just these three Boolean search terms, a search can be refined so only relevant results are returned.

Box 3: Case study:

A new graduate of the university's nursing program wants to create an online professional presence for himself in order to find some work.

1. Which tools will he use and why?
2. How will he ensure his profile remains safe and how will he protect himself from identity theft?
3. What will he do about some unflattering photos of himself at a party that were posted to Facebook two years earlier? Are they likely to impact on his career?

Box 4: Using digital literacy to improve the quality of your assessment pieces

Think about the latest piece of written assessment you submitted. Now you've learned about digital technologies for study and in the workplace, how would you do this assessment differently using the tools and techniques you've just learned?

14. Communication and collaboration

Digital technologies are providing many opportunities for communication and collaboration (Dabbagh & Kitsantas, 2011). This potential is being realised in someone's personal time. Phone calls are increasingly giving way to text messaging and instant messaging through social media apps (mobile applications) such as Facebook, Skype, WhatsApp and a range of others. Pictures are shared across devices and applications, and ubiquitous connectivity means that a friend or colleague is never far away, no matter what time of the day or night. These technologies can be harnessed for use in professional life and have several advantages over more traditional forms of communication: they are instantaneous, they can remove the need for travel, a digital record can be made of the interaction, and it is generally very low cost.

Teleconferencing once required the use of high-end technical equipment that was generally only found in business or on a university campus. Now teleconferencing can be accessed for free via a variety of social media platforms. Skype, Facebook, Google Hangouts and FaceTime all offer free teleconferencing, usually with other features such as screen sharing, text messaging and recording. These applications will work as long as each user has an account, access to a mobile device or computer, and reasonable internet access. Some applications such as Skype will allow others to join the conversation via a phone number.

Document sharing applications such as Google Docs, Wikispaces or Office 360 allow multiple users to edit the same document at the same time. This is a boon for collaborative writing, even when writers are in different time zones or in different countries. These applications allow users to annotate their changes or leave explanations or descriptions of changes for other users to see. Storage applications such as Google Drive or DropBox can be used for sharing large files between collaborators (Lasater, Johnson, Hodson-Carlton, Siktberg, & Sideras, 2012). This is another way to facilitate collaborative writing, with individual collaborators working asynchronously on a document which is then synced to the version held in the storage app. All these applications can be accessed either via personal computers or via a range of mobile devices including smartphones or tablets.

15. Learning through simulations

It is often not possible to see every possible medical emergency when doing a clinical placement. Some clinical emergencies remain relatively uncommon. To make sure a nursing student can experience a wide range of emergencies, virtual world simulations may be used. A virtual world is an internet-based social environment that persists even when the user is logged out. The user interacts with the environment via a motional 'avatar', a representation of the user. This avatar can communicate with others via voice chat or text chat. *Second Life* is the most popular virtual world and many universities use this environment for learning and teaching (Farley, 2011). Simulations may supplement clinical placements and reduce the load on those clinicians supervising clinical placements (Chodos et al., 2010).

Virtual world simulations provide immediate feedback on the consequences of clinical reasoning decisions and therefore reinforce appropriate decision-making processes. Simulations may feature automated virtual patients which are artificial intelligence 'bots' (robots) which have the capacity to respond immediately and realistically to the variety of treatment options that might be administered by student nurses. Students can use simulations both synchronously and asynchronously, by themselves or collaboratively with other students and/or academics (McCallum, Ness, & Price, 2011).

16. Career and identity management

Though students should be cautious when using social media to ensure their identities are safe, the ability to disseminate information about themselves can help to promote their careers. For the scholar, there are social media sites that are designed specifically to help disseminate research (Giglia, 2011). There are three commonly used sites: academia.edu, ResearchGate and Mendeley. There is no cost associated with joining any of them. Scholars have the opportunity to upload papers, ask questions of colleagues and find collaborators both within and outside their own institutions. If a student doesn't have access to a university library, these sites act as useful places to find full text articles supplied by the people who wrote them.

Another useful site to help build a career profile is LinkedIn. LinkedIn allows a user to create a profile, describe their work and list their study history. It is also helpful when looking for a job. A user can indicate their availability and allow potential employers to connect with them. As with all social media, the user must be careful to protect their identity and not reveal too much personal information. They must also critically assess the contacts made through this medium. As with all social media, not everyone is who they appear to be. A user should always try to verify the identity of the person they are communicating with by other means.

17. Communication technologies for study and in the workplace

Nearly every university hosts a learning management system (LMS) that supports the student through a course or program (Dabbagh & Kitsantas, 2011). Even if a course is taught face-to-face, there is still usually a component that is available online through the LMS. There are several different kinds of LMS: Moodle and Blackboard are the most common but there are several others including Sakai and Desire2Learn. All operate in a similar way: there is usually a virtual space or series of spaces where course materials including lecture recordings, multimedia and readings are held. Discussion boards facilitate communication and collaboration between students and instructors. There is often a capacity for self-marking online quizzes or the ability to submit more substantial assessments such as assignments and essays. The LMS usually makes use of a range of Web 2.0-like tools such as wikis or blogs. The student who is familiar with using Web 2.0 tools and social media is unlikely to have much difficulty navigating the institutional LMS.

In the workplace, the LMS is sometimes used to deliver specific training to employees (Pandey & Pathak, 2014). If it is a large organisation, there is usually an **intranet,** a private computer network that uses protocols and software usually developed for the internet. Access to the intranet is usually restricted to employees of a company or government department. The intranet usually allows access to a range of documentation necessary for the consistent functioning of the company, so there may be access to policies and procedures, report and presentation templates, training modules and so on. Within this secure environment, patient logs, systems for incident reports and ongoing alerts can also be housed, allowing ready access for employees while keeping the information secure from those outside of the organisation (Welsh, 2012). There may be discussion boards or instant messaging enabled within the

intranet to allow easy communication between employees and as an alternative to email communication. In other cases, proprietary social media channels could be used. A common social media, instant messaging tool used within organisations is Yammer, which allows the formation of special interest groups, or more general dissemination of short messages and information sharing within a company or department. BuddyPress is a similar tool that allows instant communication and the sharing of resources and links (Santos, Brogueira, & Bernardino, 2014).

18. Electronic records and clinical documentation

The concept for computer-based patient records or continuity of care records (CCR) has been around since the 1990s. These terms gave way to Electronic Health Records (EHR) which describes the idea of a cross-institutional collection of information pertaining to an individual's medical treatment and overall health (Hoerbst & Ammenwerth, 2010). The individual acts as a partner in the process by accessing and adding to the record and in that way supporting his or her own care (Ball, Smith, & Bakalar, 2006). EHRs are designed to bring information together and facilitate communication between clinicians in order to improve patient care (Lehnbom, Brien, & McLachlan, 2014).

The Australian Government rolled out eHealth records in July 2012, though the awareness and uptake remains relatively low (Lehnbom et al., 2014). The situation is more complicated in New Zealand where there is not yet a common system and a number of health organisations have their own systems in place (Stiftung, 2009).

Though EHRs have the potential to save much time and money through an efficient sharing of patient data between clinicians, there remain significant potential pitfalls that must be considered. There is always the potential of inappropriate sharing and dissemination of patient data and other breaches of confidentiality and privacy. Other issues identified include authorship ambiguities (particularly where patients are able to directly amend the documents), misleading histories, inadequate discharge summaries and miscommunications between clinicians and patients (Bernat, 2013). For the most part, these risks can be mitigated if appropriate measures are put in place, but this risk mitigation requires the providers of electronic health records systems to work closely with clinicians and other stakeholders to ensure an effective and secure system.

19. Remote patient management

One of the developments opened up by the rapid evolution of technologies and devices is the possibility of remote monitoring of patient health. This usually requires implanting devices into appropriate places under the skin of the patient. The advantages are numerous: it can remove the need for patients to travel to their clinician or hospital for monitoring, thereby saving time and travel costs and decreasing the strain on hospital resources. Remote management of patients with cardiac diseases is becoming increasingly common, even for people fitted with devices such as pacemakers and implanted cardiac defibrillators. Through a simple computer hook-up, clinicians are able to download data including electrograms, and access information about remote and recent cardio arrhythmic and haemodynamic events (Reynolds, Murray, & Germany, 2008). As technology becomes increasingly sophisticated, the potential for programming and adjusting these devices at a distance becomes feasible. Much research is being directed towards the use of chemical and physiological sensors that will allow the monitoring of chronic and acute illnesses (Reynolds et al., 2008).

20. Summary

The past decades have brought exciting advancements in technology in both healthcare and education. Many highly skilled healthcare professionals who understand and who will progress these technologies are an integral part of this movement (Gill, 2013). In a fast-paced environment, many patients now tend to seek out an instant diagnosis, quick information, or health treatment options from the internet before seeking professional advice (Ellis et al., 2013). The increasing advocacy for patient empowerment, primary prevention and effective self- management of one's own health has enthused many healthcare professionals and digital technology experts, encouraging them to further develop existing frameworks into a format for online, self-directed, patient education (Phillips, Heneka, Hickman, Lam, & Shaw, 2014; Yan, 2013). One absolute rationale for the development of digital education tools is the rapid evolution of digital technologies. To ensure both healthcare professionals and patients are ready, positive steps need to be taken to ensure that those intending to use or manage such systems are technologically literate (Gill, 2013; Tom, 2014).

Discussion and critical thinking questions:

1. What digital literacies do you think student nurses and other health-related students will need in the workplace of the future?

2. How are the technologies used for leisure now being used for study and the workplace?

3. What are the likely consequences of future health professionals refusing to engage with new technologies? How is this likely to impact on patient care?

4. How can student nurses and other health-related students ensure patient privacy and confidentiality when using digital devices in the workplace?

5. How can social media be effectively used for disseminating a relevant message?

Learning extension

Think of the classrooms you have learned in: has your learning experience always been perfect? Have the teaching techniques always catered to your learning style? Look back to the online learning resources detailed in the chapter. How do you think these compare to that classroom experience and with live tutorials or lectures you have experienced? Can online learning cater to your learning style and the learning styles of others? Make a table of the pros and cons to online education meeting your learning needs. You will of course need to define your learning style.

Further reading

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