

TECHNOLOGY USE IN HEALTH EDUCATION: A REVIEW AND FUTURE IMPLICATIONS

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Abstract: Technology use in health education is growing and ever changing. Technology skills can greatly enhance the learning environment. Information and communication technology is an efficient support tool that enriches the quality of health education by delivering content through multiple modalities. The purpose of this review was to examine the existing literature on technology, particularly web 2.0, and social media integration within the health education classroom. Findings from the review indicate current trends in technology use can be beneficial in a health education classroom environment if introduced and used properly. Based on the results of the review, views on social media were mixed between being helpful for student use or hinder student performance. Use of social media is an area that health educators could improve upon to maximize the benefits of technology use in the classroom.

Keywords: *Health education and technology, web 2.0, social media, public health, Facebook, information technology*

Introduction

Technology use is a skill set used to enhance learning capabilities. Information and communication technology has quickly become an abundant and crucial support tool for well-crafted health education programs and also enriches the quality of education by delivering content through multi-modalities (Lee, Park, Whyte, & Jeong, 2013). However, with an array of technology forms to choose from, health educators must learn to choose the most effective method for their students' learning environment. This review investigates the overall use of technology in health education, particularly web 2.0 resources and social media.

Method

An extensive literature review was conducted via electronic databases including Academic Search Complete, CINAHL + Nursing, ERIC, Google Scholar, Medline Plus, PsycInfo, and SPORTDiscus. For the purpose of this review, the search included topics of technology use in health education, web 2.0 for public health, and social media in the health education classroom. The keywords used to search for the included topics contained *public health education, health education and web 2.0, social media, Facebook, Twitter, technology in health education, public health and web 2.0, Facebook and the classroom, and web 2.0 in education*. The criteria for the review search included literature that contained the keywords/theme and were published between 2006 and the present. Materials that were excluded from the search-included dissertations, theses, and any unpublished material. To better interpret the findings, Garrard's Matrix Method was used to color code articles that related to subthemes and provide brief notes on each such as to which form of technology was used, subjects included, number of subjects, purpose, and findings. After completion of the matrix, three main topics emerged. Further revision included only the three main topics of technology use, web 2.0, and social media. The search results yielded 29 relevant articles included within this review. The references were compiled to better illustrate the findings in relation to the review themes (Table 2).

Technology Use in Health Education

"We need technology in every classroom and in every student and teacher's hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world" (Warlick, 2014, p.1). In 2010, researchers from the University of Maryland conducted a study to determine which methods of technology are most commonly used in an online classroom environment. While the sample size was limited ($n = 90$) and the subjects' areas of study varied greatly, the technology used within their classrooms was very similar (Liebowitz, 2013).

Researchers have found web 2.0, eBooks, virtual worlds, mobile computing and cloud computing respectively were most commonly used in classrooms (Liebowitz, 2013 & Löfström & Nevgi, 2006). However, within the next 2-3 years post study (2013-2014), educators felt they would adapt to utilize web 2.0 tools (81%), eBooks (78%), virtual worlds (50%), mobile computing (50%), and cloud computing (47%) (Liebowitz, 2013). Web 2.0 technologies were commonly found to be the most beneficial to the students' learning needs.

Learning through technology can be a useful tool for students' educational purposes. As the 'net generation' gains more popularity with innovation, more technological advancements have been created for educational purposes (Evans & Forbes, 2012). Net generation students are often more comfortable with an online learning environment or using technology in a face-to-face classroom. Online learning allows for students to maximize self-motivation, adopt time management skills, independently learn, acknowledge responsibility for one's own educational development, and actively participate (Figueroa & Lee, 2012; Evans & Forbes, 2012).

Evans & Forbes (2012) discovered that 'net generation' students often look for mentoring from health education faculty members. Within this relationship, the faculty learns from the students in a reciprocal relationship. Educators must constantly redefine themselves in order to remain current with present day practices (Hammond & Barnabei, 2013; Swenty & Titzer, 2014). 'Net generation' learners bring forth skills that older faculty members may not have yet acquired. The 'net generation' students have a specific skill set meaning they are digitally literate, constantly connected, experiential and often enjoy collaboration with others in a well-structured, task-oriented environment (Evans & Forbes, 2012).

Novice health educators face many challenges in not only using technology in the learning environment, but also finding the proper technology to use. Sinkinson (2014) discovered that pre-service health educators need more technological skills training in their programs. Pre-service health education teachers also feel that it is essential to know how to operate new and innovative technology to engage students (Sinkinson, 2014). Technology use in health education does have a promising future. Of the 51 pre-service health education teachers in a study conducted by Sinkinson (2014), most saw technology as being very helpful by allowing students to work together (16%) and supporting students in their in class work (19%). Within this study, one pre-service teacher wrote "I believe that technology is the way of the future in education and it is vital that teachers take an E-learning initiative to make learning more meaningful and relevant to students" (Sinkinson, 2014, p.240). Technology is also an area of interest where learners across the world can find a commonality. Sultan (2010) discussed the use of technology, specifically cloud computing, in various other areas of the world including Europe and Africa. With further training and continuing education, technology in health education can be a powerful tool for educators and students worldwide.

Advantages and Disadvantages of Technology Use

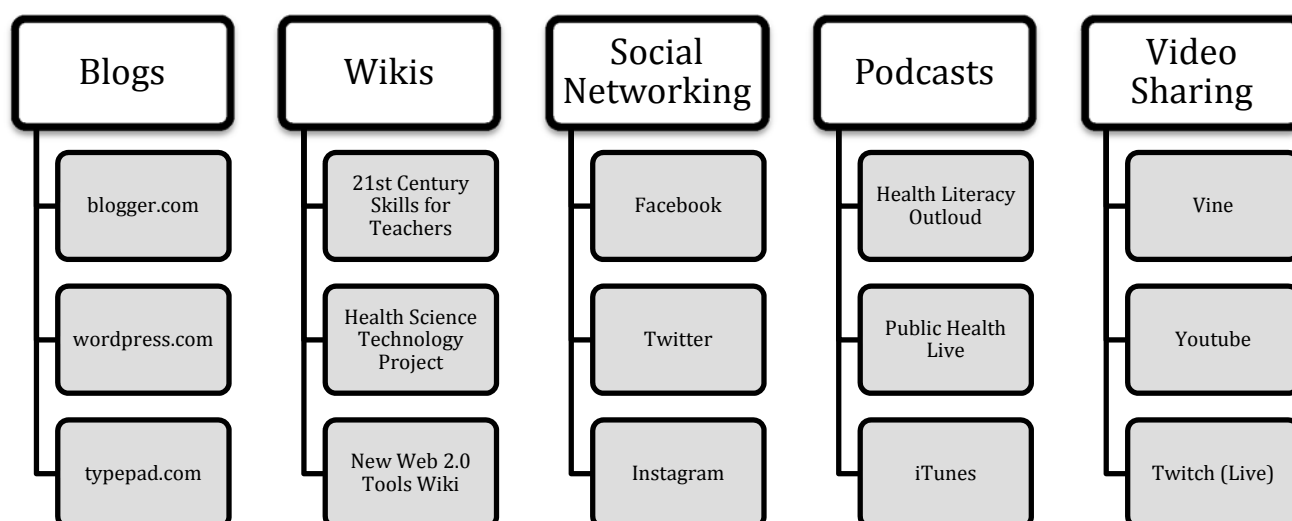
Integrating anything new comes with apprehension. While older generations of health educators may be apprehensive to use technology within the classroom, younger generations are more in favor of the integration (Sinkinson, 2014). If health education is presented in the form of virtual materials, Figueroa & Lee (2012) found that the learning

environment schedule is flexible, the students learn responsibility through holding themselves accountable for grades, and most importantly students must actively participate. Active participation allows for those who may have self esteem issues to have a voice. However, students must also be knowledgeable of how to operate the technology required. Whether face-to-face or virtual, students must also have access to technology. Not all students (of any age) own and know how to successfully operate technology such as computers, tablets, smartphones, etc. There are, however, typically public access computers available in libraries and other public venues. Another area of real concern is academic integrity. Figueroa & Lee (2012) discovered that with more materials being readily available online, plagiarism and cheating are a major concern. Whether a student is in a face-to-face or online environment, finding information online is easy and information could be easily copied. Also, without built in safeguards for online exams (e.g. using random question generation) students can easily cheat or work on an exam on the telephone with a friend by testing at the same time. Students must be cognizant of the consequences of academic integrity violations. These should be covered in detail in course materials and examples of technology violations clarified for students. Overall, there are thousands of technology tools and methods that can be incorporated into a health education-learning environment. The instructor must be knowledgeable so that they may choose appropriate applications; while students must be open to using and applying technology.

Web 2.0 in Health Education

What exactly is web 2.0? While many definitions were found, one in particular by Anderson (2007) that states that “web 2.0 is a socially connected web where anyone can access, edit, create, and collaborate within the information space” (p. 7). Tools often referred to as web 2.0 tools include blogs, wikis, social media, video hosting, photo processing, graphic arts services, and dating and relationship services (Boulos & Wheeler, 2007). Web 2.0 is designed to be more personal, connected, and integrative than web 1.0. How exactly would a health educator incorporate this into a learning environment?

Figure 1. Forms of Web 2.0 Technology Tools



Within Figure 1, a compiled list of findings for commonly used web 2.0 tools in health education can be found. Educators within health education often find that using a mixture of these integrative web 2.0 tools in the classroom is

best practice (Sarieva & Peytcheva-Forsyth, 2011; Swenty & Titzer, 2014; Ward, Moule, & Lockyer, L., 2009). The utilization of technological tools in a health education-learning environment may not be simple for health educators to implement. Adaption to technology among educators who are in a routine and may be unwilling to change could delay the implementation process. The most common form of technology used to better communicate and illustrate class activities is social networking (Sarieva & Peytcheva-Forsyth, 2011). To better understand what these commonly used tools are, Anderson (2007) briefly defines all of the above technological tools (Table 1).

Table 1. Forms of Technological Tools in Health Education

<u>Type of Technology Used</u>	<u>Definition</u>	<u>Health Education Example</u>
Blogs	Simple website with brief opinions and information in the form of posts	http://thehealthcareblog.com The Health Care Blog (compiled of current health trends and issues)
Wikis	A webpage that allows for anyone to add, omit, & edit information	http://www.webicina.com/public-health/public-health-wikis Public Health Wikis (9)
Social Networking	A webpage designed to connect users and allow for communication	American Public Health Association Facebook page https://www.facebook.com/AmericanPublicHealthAssociation http://hedir.org Email based platform to allow maximum communication amongst health educators
Podcasts	Audio recordings in the form of lectures, interviews, and chats	http://my.clevelandclinic.org/health/multimedia-center/healthtalks-podcasts Health Talks Podcasts – Cleveland Clinic This podcast includes 19 different health related topics
Video Sharing	A webpage that allows for video files to be uploaded to public or private viewers	https://www.ted.com/topics/health TED Talks in the Health topics http://hplive.org Health promotion webinars This website produces hundreds of video files on various health-related topics

Chou, et. al, 2013 state that there is a growing body of literature that indicates that the digital divide may be closing in. With this gap closing, it is good practice to keep learning outcomes in mind. Hanson (2008) presented

guidelines for health educators when using web 2.0 tools that include creating blogs and wikis, digital audio files (often mp3), a social networking website, and uploading digital photos and videos. In a study conducted by Prybutok (2013), health educators and the Centers for Disease Control and Prevention (CDC) found that YouTube reaches high levels of engagement and comfort for younger users. In this particular study, a group of 18-24 year old undergraduate students ($n = 33$) were divided into two groups. The first group ($n = 15$) watched an entertaining YouTube safe sex educational video and the second group ($n = 18$) watched a more focused and factual YouTube sex education video. Students in both groups reported the videos shown were health informing and could potentially lead to a healthy behavior change. Most importantly, students could easily remember the information relayed in the video (example: remembering what safe sex meant). The final and most important product of this study was to conclude that students felt YouTube was a reliable information channel for health-related information.

While web 2.0 has created many challenges for health educators, it allows for many potential benefits for students such as engaging with others, collaboration and creativity when working together. Web 1.0 experiences were somewhat engaging, but are very one-sided and only foster user communication and independent participation (Boulos & Wheeler, 2007). Now with web 2.0 utensils ready to use, health educators should find themselves in a good place to proceed forward using current technology to implement into classrooms, community centers, and workforce environments (Chaney, Chaney, & Stellefson, 2009).

Social Media Application

Using social media allows for a new set of skills to be established (Huffman, 2013). Usher (2012) claimed that when using web 2.0 technologies (social media specifically), qualities such as multimodality, networkability, message-editing capabilities, and temporal flexibility are often enriched. Each one of the above qualities is developed through technology use, which can also translate into specific health education applicable learning outcomes.

In a study conducted by Maloney, Moss, & Ilic (2014), 142 students in varying years of study, were asked 20 questions specifically related to their social networking site (SNS) use and the relationship between social networking site use for education. Interestingly, only two out of the 142 subjects did not use a social networking site. Facebook and YouTube were the most frequently used forms of SNS for educational purposes with 97 (60%) of subjects using these tools. The most beneficial finding of the study was that 85% of subjects believed that social networking sites could benefit their education (if used properly). Four common themes were found within this study. Subjects stated when using social networking sites, peer collaboration are highly used, communication is enhanced, complimentary learning (in addition to coursework) occurs, and there is a need for personal and professional realms (Maloney, Moss, & Ilic, 2014).

In addition, Huffman (2013) added more benefits to using social media. These social networking sites allow for youth of all ages to explore the boundaries of who they are as a person, through building relationships, self reflection, and exposure to other groups of individuals (specifically a set of diverse people). In many ways, using social media can benefit the student since students are most commonly using these means to communicate, collaborate, and develop materials together. Kelm (2011) found that traditional education methods without the proper use of social media often appear as teacher driven, non-interactive, and lecture based. Löfström and Nevgi (2006) created a list of objectives in which social media can be used to enhance learning. The table below provides those objectives along with a set of examples specific to health education.,

Table 3. Ways in Which Social Media Can Be Used in Health Education

Objectives	Example in Health Education via Social Media
Benefit from the process of working to achieve a goal	Constructing a Facebook page concerning heroin addiction within Northeastern Ohio
Emotions, actions, and thoughts lead to growth in responsibility, commitment, and empowerment	Reaching out to individuals within a specific region who are suicide survivors. Share survivor stories and information on support groups through social media
Collaborate with others, share knowledge, and receive feedback	Create a Twitter page with daily tweets about healthy eating habits. In addition, allow for “re-tweets” of your information
Connect information to the real world and use knowledge on new applications	Information learned and relayed through social media can be applied to daily life. Example: Sharing healthy recipes and incorporating healthy eating into your life
Develop knowledge as a collaborative activity	Actively discuss with others on social media sites health related topics of concern to develop and gain more knowledge
Build on previous knowledge	Collaborate with others through tweeting, posting, and resharing posts/tweets and retain the new information
Actively set objectives	Set objectives or goals for yourself, friends, family, or a specific group of individuals to begin daily physical activity & share these with your network
Reflect on the process and absorb new information	Share with others your successes by posting photos of a healthy meal cooked at home & inspire others to do so

The objectives provided by Löfström and Nevgi (2006) are derived from student-centered collaboration, exploration, and learning efforts. To support this idea, Vollum (2014) recognized that social interaction is one of the key qualities that using social media specifically in health education would enhance. Social media is a popular way of reaching out to others and creating social interactions. In both K-12 health education and K-12 physical education national standards, social interaction is a key developmental area that must be applied in order to obtain new knowledge (Vollum, 2014). In addition to social interaction, the development of relationships could lead to peer pressure with either negative or positive outcomes. In turn, with the continuous increase of social interactions via social media methods, comes the implication that informed decisions will be made (Vollum, 2014). By using social media, students can develop relationships that could possibly lead to health, lifestyle, and behavior changes.

Social media gives students an array of opportunities to work together. It also gives students the ability to spread messages to thousands of individuals. Social media gives health educators a platform from which to speak and educate others on current and relevant health information (Zailsakite-Jakste & Kuvykaite, 2012).

One main issue within the realm of using social media for health education purposes is how to evaluate the quality of the social media used or the information relayed. Frimming (2011) conducted a study where 127 subjects (learners, $n=92$; pre-health and fitness professionals, $n=35$) reflected on their social media experiences. Within the learner group, 51% believed that long-term use of social media sites benefit their fitness regimen (Frimming, 2011). Over half (52.9%) of the pre-health and fitness professionals stated they actively learned from their peers (Frimming, 2011). The main finding from this study was that the university is an ideal setting to use social media in order to

enhance students' health knowledge.

With social media being an effective learning tool in health education, health educators can disguise learning as entertainment. Polsgrove & Frimming (2013) identified several ways of doing so which included pairing returning students and entry year students in groups to foster a mentor-mentee learning environment. In many ways this type of relationship could be beneficial for both parties involved. The mentor (senior level student) learns effective communication methods, gains confidence, and strives to become a better leader. The mentee benefits in a different way where they can constantly access the information and knowledge from senior members of the group. In this environment, teachers, coaches, and health educators can offer a more comprehensive educational format for all students (Polsgrove & Frimming, 2013). In addition, Usher (2011) stated that four other skills/qualities emerge from using social media in health education that include an increase in self efficacy by having the ability to communicate and control information, manipulate text, and segment information specific to a population.

In terms of what form of social media is most popular, Facebook is the winner within the health education realm. While Pander, Pinilla, Dimitriadis, & Fischer (2014) found Facebook to be extremely useful for the support of education in the health field, there is a lack of conclusive evidence illustrating the effectiveness of learning via social media. In a literature review conducted by Pander, Pinilla, Dimitriadis, & Fischer (2014), Facebook was most often found to be used to find exam materials, share material, and organize face-to-face interactions. Overall, when used properly, social media can easily be implemented to enhance the health education student's learning goals through means of communication, collaboration, reflection, and interpretation.

Discussion

In this review, technology, web 2.0, and social media use was discussed in relation to health education practice. Through the article review process, many discoveries were made. One weakness within this area is that there is not an existing body of literature supporting the effectiveness of general technology use within health education (Sinkinson, 2014). On a positive note, more relevant studies are being published and most of the literature chosen for this review is 2012 and newer. A few of the studies were specific to various countries, Australia being a main one. A primary concern throughout the body of literature is that terminology is not consistent while discussing specific terms such as web 2.0 and social media (often referred to as social networking). While many of the terms overlap with each other, it would be difficult for a reader to follow if they do not have a technological background.

While many of these areas still have room for development, the more current studies published have included much detail and lay the foundation for further growth in this topical area. Studies conducted by Chou, et. al. (2012); Maloney, Moss, & Ilic (2014) & Sinkinson (2014) reflect the growing body of literature within this area and relay the message that with proper use of technology, all learners can benefit. Skills that are essential, everyday skills can be applied and learned through technology use within the health education discipline. Communication, collaboration, reflection, and interpretation are such skills that can flourish when using technology in health education (Pander, Pinilla, Dimitriadis, & Fischer, 2014).

An area of opportunity for research related to this topic is the training required and quality of training for instructors and health educators in general to effectively use technology. Sinkinson (2014) concluded that pre-service health education teachers needed more training time with technology. Allotting more time and resources for purposeful training of current teachers may potentially close the technology generation gap. Veteran health educators may feel more confident in their abilities to use unfamiliar equipment or resources with quality training. While technology use is

growing in all disciplines, health education could be in the forefront of technology utilization with the correct preparation and effort.

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Table 2. Themes of Technology Use in Health Education

		Theme Association		
Author(s)	Year Published	Overall Technology Use	Web 2.0	Social Media
Anderson, P.	2007		X	
Boulos, M. N. K. & Wheeler, S.	2007		X	
Chaney, J. D., Chaney, E. H., & Stellefson, M. L.	2009		X	
Chou, W. S., Prestin, A., Lyons, C., & Wen, K.	2013		X	
Evans, R. R. & Forbes, L.	2012	X		
Figueroa, R. & Lee, M.	2012	X		
Hammond, J. K. & Barnabei, C.	2013	X		
Hanson, E.	2008		X	
Huffman, S.	2013			X
Kelm, O. R.	2011			X
Lee, E., Park, H., Whyte, J., & Jeong, E.	2013	X		
Liebowitz, J.	2013	X		
Löfström, E., & Nevgi, A.	2006			X
Maloney, S., Moss, A., & Ilic, D.	2014			X
Melton, B., & Burdette, T.	2011	X		
Millery, M., Hall, M., Eisman, J., & Murrman, M.	2014	X		
Pander, T., Pinilla, S., Dimitriadis, K., & Fischer, M. R.	2014			X
Polsgrove, M. J. & Frimming, R. E.	2013			X
Prybutok, G.	2013		X	
Sarieva, I. & Peytcheva-Forsyth, R.	2011		X	
Sinkinson, M.	2014	X		
Sultan, N.	2010	X		
Swenty, C. L. & Titzer, J. L.	2014	X		
Usher, W.	2011			X
Usher, W.	2012			X
Vollum, M. J.	2014			X
Ward, R., Moule, P., & Lockyer, L.	2009			X
Zailsakite-Jakste, L. & Kuvykaite, R.	2012			X