Feature Article

Integrating Web 2.0 in Health Education Preparation and Practice

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ABSTRACT

Competency in 21st-century health communication involves an understanding that the internet landscape has evolved from static webpages to applications that engage users. This evolution to "Web 2.0" includes such applications as blogs, wikis, social-networking sites, and podcasts. This review presents trends in Web 2.0 internet usage, summarizes Web 2.0 applications as platforms for health promotion, discusses guidelines for using Web 2.0 applications, and identifies Web 2.0 learning outcomes. Greater awareness of Web 2.0 can provide health educators with new channels for health communication and will help stimulate additional research to further define best-practice models.

Health communication involves the "art and technique of informing, influencing, and motivating individual, institutional, and public audiences about important health issues."[1] As a public health strategy, addressing future public health problems and challenges requires that health educators be competent in health communication.[2] In particular, proficiency in health communication is necessary in order for health educators to interact effectively with diverse audiences.[2] For more than a decade, the internet has been recognized as an important health communication channel.[3]

Trends in how audiences acquire information have important implications for health education preparation and practice. The communications environment is changing as the number of new communication channels increase,[1] particularly with the advent of Web 2.0 technologies. These new channels, as exemplified through online communities, include characteristics of community participation and ownership, both of which are fundamental to community health.[4] A Centers for Disease Control and Prevention (CDC) expert panel has recognized the value of virtual communities and using the web as a platform for health promotion by recommending the expanded use of such technologies in practice.[5] Given the potential for these communication channels to influence health education, an exploration of the emerging internet communications environment and the competencies required to integrate this new media into health education preparation and practice is warranted.

21ST-CENTURY INTERNET COMMUNICATION CHANNELS

Twenty-first-century communication channels distribute information through both traditional and new media. Traditional media, including print newspapers, analog television, and radio, have been extensively used by health educators for mass communication. These channels remain important options for promoting messages, health recommendations, and programs in general. However, the communication landscape is rapidly changing and providing health educators with new media that use digital platforms for production, storage, and dissemination of information. Health education activities using new media, although closely associated with old media activities (Table 1), include a new generation of internet applications referred to as Web 2.0.[6]

Web 1.0 and 2.0

Traditional internet applications characterized by the development and management of webpages are now being referred to

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Table 1. Comparison of Old Media and New Media Use in Health Promotion Activities

Channel	Health Promotion Activities
Old Media	
Newspapers	▪ Paid advertisements ▪ Press releases ▪ Op-eds ▪ Letters to the editor ▪ Media events ▪ Press conferences
Radio	▪ Paid advertisements ▪ Talk shows ▪ Public service announcements ▪ Media events ▪ Press conferences
Television	▪ Paid advertisements ▪ Talk shows ▪ Media events ▪ Press conferences
New Media	
Web 1.0 Static "read-only" webpages	▪ Website development ▪ Paid advertisements ▪ Public service announcements ▪ E-mail
Web 2.0 ▪ Interactive "read and write" webpages ▪ Applications for aggregation (e.g., podcasts, webcasts, digital video), social networking (e.g., MySpace, Facebook), and content sharing (e.g., wikis, blogs)	▪ Website optimization ▪ Writing for the web ▪ Online media products (e.g., press releases, op-eds) ▪ Press release distribution services ▪ Online newspaper blogs ▪ Online editorial position statements ▪ Citizen journalism ▪ RSS feeds ▪ Creation of audio scripts and digital files ▪ Video on demand ▪ Blog development ▪ Integration of health content into virtual games

Note: Adapted from the U.S. Department of Health and Human Services.3

by many as "Web 1.0." The term generally includes static applications characterized by read-only webpages normally created and published by a website developer. Despite emerging internet technologies, Web 1.0 has an important place in providing content information and building trust with users.[7] It has provided many health educators with the opportunity to refine their skills at developing websites and messages that attract attention from target audiences/consumers. It has also created vast opportunities for health consumers to acquire relevant health information over the internet. These opportunities have led to the establishment of a new field of study: consumer health informatics, or the study of consumer health information needs.[8] In addition, by providing greater access to health information, Web 1.0 has reduced the gap between consumer knowledge and professional knowledge.[8] However, health educators must always be mindful that the internet is not a panacea for all health communication

Table 2. Comparison of Web 1.0 and 2.0

Web 1.0	Web 2.0
Using hypertext markup language (HTML), a programming language for defining the formatting of static webpages	Using asynchronous Javascript and XML (AJAX), technologies that allow for interactive webpages
Creating personal websites	Creating personal blog sites and participating in blogs
Webpages that are rarely updated, and by web developers only	Webpages that are updated frequently, and by web users
Page views as a way to track webpage traffic	"Cost per click," where advertisers are charged only when a user clicks into their website
Content-management systems for sharing digital files such as electronic documents, images, and audio	Wikis where webpages can be created and edited collaboratively
Britannica Online, an online encyclopedia with subscription plans available for greater access	Wikipedia, a free online encyclopedia that anyone can edit
Attracting website traffic by enhancing site attractiveness and "stickiness"	Syndication of webpages by creating web feeds to provide users with updated content
Domain name speculation as a way to increase website traffic	Search engine optimization as a way to increase website traffic
Directories (taxonomy)	Tagging ("folksonomy")

Note: Adapted from O'Reilly[6] and Kamel Boulos et al.[12]

needs. Some challenges remain, as evidenced by disparities in internet access and poor-quality information.

The use of Web 1.0 for the development of computer-mediated communication technologies has been a precursor to today's Web 2.0. These computer-mediated communication technologies, called "interactive health communication" when applied to health, are defined as the interaction of an individual with or through an electronic device or communication technology in order to access or transmit health information or receive guidance and support.[9] To date, interactive health communication applications are mostly internet based[10] and include personalized webpages, online articles, discussion groups, support groups, and games.[11]

As opposed to the static read-only nature of Web 1.0, Web 2.0 applications tend to be "read and write." That is, the content for these pages is "easily generated and published by users, and the collective intelligence of users encourages more democratic use."[12] Web 2.0 includes a "second generation of web-based communities and hosted services such as social-networking sites, wikis, blogs, and folksonomies, which aim to facilitate creativity, … collaboration, and sharing among users."[13] Web 2.0 pages are frequently updated with user-generated information so that they include the collective intelligence of all contributors, not just one site developer. Web 2.0 builds on the otherwise flat content of Web 1.0 by engaging and empowering users. Rather than branding a product through Web 1.0, Web 2.0 is about bonding with users, having a "deeper, more intimate, conversational relationship with consumers."[7] Table 2 illustrates the contrast between Web 1.0 and Web 2.0.

Dawson [14] characterizes Web 2.0 as encompassing applications that allow for easy content creation and sharing by all users (participation), common interfaces for accessing content and applications across the web (standards), and power emerging from distributing applications and content over many computers rather than on centralized systems (decentralization). In addition, Dawson suggests that Web 2.0 developers and companies provide transparent access to applications and content (openness); that Web 2.0 emerges from many components or modules making a whole that is greater than the sum of its parts (modularity); that users control the content they create and data captured about their web activities (user control); and that users control their identity how they please (identity).

Trends

Evidence suggests that the internet and Web 2.0 are changing the extent to which old media channels of communication are used. For example, daily circulation of newspapers has declined 3–4% annually since 2005, with the 50 largest newspapers declining 4–5%.[15] Newspaper readership steadily declined

to four in ten Americans up until 2002.[16] Since that time, readership has remained steady due to the increased availability of online newspapers. One out of every three Americans regularly get their news online; however, online sources in general are reportedly still deemed supplemental to traditional media outlets.[16] Hard copy newspaper weekday readership has steadily declined for every age group except those 50 and above since 1970.[17] Also, despite a large growth in potential audience members over the past 10 years, the number of listeners to public radio has flattened.[15]

Unlike traditional media, which collectively appear to be declining in use and relevance, use of new media is on the rise, as evidenced by *Time* magazine naming "You" as person of the year in 2006, referring to Web 2.0 and other phenomena that allow millions of people to make an impact via small contributions.[18] Based on February–March 2007 data from the Pew Internet and American Life Project,[19] 71% of men and 70% of women in the United States use the internet. Whites (73%) use the internet slightly more than Hispanics (72%) and markedly more than Blacks (62%). Despite greater public access to the internet and lower cost personal computers, evidence suggests there continues to be a "digital divide" or unequal access to information, especially health information among racial and ethnic groups.[20] Lorence, Park, and Fox[21] report that during 2000 and 2002, Whites searched for online health information more often than Hispanics and Blacks, suggesting the persistence of "digitally underserved groups." Additionally, the use of computers and the internet were strongly associated with income level. Adults with higher incomes typically had more opportunities to use computers than lower income adults.[21] Unsurprisingly, internet usage decreases with age as well. Despite these discrepancies in access rates, however, internet usage in general continues to increase. Forty-two percent of Americans now have a broadband connection, with 73% reporting internet use in 2006, up from 66% in 2005.[19]

Other forms of new media appear to be increasing in use as well. According to CyberJournalist.net,[22] Technorati, an internet search engine for blogs, tracked its 50-millionth blog in 2006 and reported that the "blogosphere" is doubling about once every six-and-a-half months. Even factoring out spam blogs, inactive or dead blogs, or blogs with minimal entries, use of blogs in general has undergone significant growth. And based on August 2006 data from Pew,[19] 15% of men and 8% of women had downloaded a podcast at least once in their life. Although this data may seem modest compared with the total number of internet or blog users, Pew asked the same question in February–April of the same year and found that only 9% of men and 5% of women answered affirmatively. This suggests that podcast users nearly doubled within only four months.

Social-networking applications are also growing very quickly. As of November 2007, Facebook.com had 55 million active users, with that number doubling every six months, making it the sixth-most trafficked site in the United States.[23] Furthermore, MySpace.com now has over 100 million users and is signing up 500,000 new ones per week.[24]

Part of the reason for new media's appeal is interactivity and dialogue that may lead to clarity of thought and increased personal empowerment. Unlike old media, which seeks to push information down to individuals, many new media applications allow users to easily obtain personally relevant information or contribute to the development of personally relevant content. Many new media technologies on the internet (e.g., blogs, wikis, "Google Docs") allow two-way communication rather than the one-way communication of television, radio, print newspaper, and traditional webpages. Websites that allow blogs, wikis, podcasts, and other forms of online sharing, networking, and collaboration comprise today's Web 2.0 landscape.

APPLICATION FOR HEALTH EDUCATION

Health educators should recognize that Web 2.0 has the potential to establish and empower larger communities of users. It is considered the "social web" made by and for the people and as such has driven social movements, citizen journalism, and a more equitable distribution of information.[25] As a key community organization concept, empowerment is closely linked to the important health education values of self-determination, freedom of choice, and the rights of people to make their own informed decisions.[26] Therefore, as long as target audiences have access to the technology and understanding of its use, Web 2.0 can become another useful health communication tool to support empowerment and social change.[25] Taking advantage of the Web 2.0 environment means that health educators can provide opportunities for more engagement and conversation through their websites. Added user engagement may promote messages and ideas that are processed and more fully internalized instead of merely communicated.

To explore the new Web 2.0 landscape, our discussion is segmented into applications for content sharing and applications that aggregate or collaboratively filter content.[14] Examples that illustrate their application to health education are also provided.

Content Sharing

Web 2.0 content sharing includes web-based applications such as blogs and wikis, and social-networking applications such as Facebook or MySpace. Blogs, or web logs, are internet applications that allow for the management of online content; specifically, entries from users are posted like a journal and listed in reverse chronological order.[27] Consistent with data presented earlier, in one year (December 2005–Decemeber 2006), online newspaper blog traffic increased 210 percent, motivated by the fact that "responding to a blog posting is like writing an instant letter to the editor."[28] In fact, blog usage has increased proportionally with the decline in print newspaper readership[29] and has provided a means for new dialogue between government and citizens.[30] Sudar et al. have examined the landscape of mental health blogs and report that blog authors include health care professionals (e.g.,

nurses, psychiatrists, psychologists), mental health advocates, caregivers, and patients.[31] Their primary purposes for blogging include social connectedness and interest in helping others, with the majority of blog posts relating to treatment and coping. In general, the reasons for blogging vary from professional to personal. According to Pew, the primary motivation is creative expression.[29] Another study, however, reported that nearly half of all bloggers use the technology as a form of personal therapy.[32]

Wikis are also web-based content management applications that allow users to add and edit content. Wikis provide an opportunity for documents to be created collectively through a web browser.[33] Crespo recommends using them as a way to create a bottom-up knowledge base of best practices, where health professionals contribute findings and have complete access.[4] This "wikihealth" model could provide, for example, a way for practitioners to post successful strategies to address childhood obesity in schools, rural communities, urban communities, and ethnic communities.[4] At the University of Maryland School of Public Health, Dr. Nancy Atkinson has implemented the Public Health Informatics Wiki Project as a course strategy to display and share content related to public health informatics among her students (see http://phiwiki.wetpaint.com). And at at Brigham Young University, public health methods students are using online wikis to collectively develop electronic press kits with community organizations for media advocacy (see www.394.wetpaint.com).

Other social-networking applications, such as Myspace and Facebook, allow users to create profiles that include their name, age, occupation, location, interests, and other information. Users can then search for other users who they already know or with whom they share common interests. Users can designate each other as "friends" on the site, thus linking their profiles together. These sites also provide opportunities for nonprofits and other organizations to create "groups" designed to provide information about specific topics of interest to users. There is no cost to set up a group. Users can then join groups and use them as a way to inform fellow users of upcoming events related to the group topic. Finally, groups can be used to raise money for relevant causes.

Many health-related groups exist on Facebook and MySpace and cover a variety of health topics, from preventing AIDS to diabetes care to colon cancer. Some groups exist purely to increase awareness among users while others aim to facilitate community mobilization efforts.

Because users can search for groups based on a particular public health topic or concern, social-networking sites are an ideal place to communicate with populations that may otherwise be difficult to identify and reach. As users present themselves to groups, group administrators are provided with an audience for their health messages. In order to most effectively use social-networking sites in health education, practitioners should seek to create intriguing, interesting groups and present engaging content on the group pages so that users are likely to join the group and invite their friends to do the same, thus creating an audience poised to receive health messages.

As noted above, a common characteristic of Web 2.0 applications, including social-networking sites, is that users control their own identity. Although this characteristic contributes to the appeal of social-networking applications, the challenge is ensuring that any health information retrieved comes from a valid source. One study found that 89% of MySpace users appear to be using their real names.[34] The other 11%, however, used fake or fantasy names. In addition, 6.2% reported their location as somewhere other than on earth. These statistics suggest that validating the identity of social-networking users can be difficult. Users must therefore be cautious of health information received from an unknown source and should be encouraged to verify such information with a health professional prior to taking action.

Podcasts—a term derived from the iPod portable media device and the word "broadcast"—provide users with a convenient way to receive up-to-date information, news, and entertainment when wanted and needed. This technology is similar to TiVo, where individuals can record information and then listen to it at their leisure.[35] Using portable devices like iPods or MP3 players, users can listen to digital audio files or watch digital video files; these files can also be accessed on a computer or streamed directly from websites.

Podcasts are just beginning to be used for health education. However, there is potential for broad application as more and more individuals begin using feed readers and aggregators (discussed below). For example, the American Public Health Association offers podcasts on pandemic flu preparedness,[36] and the CDC provides weekly podcasts using content from *Morbidity and Mortality Weekly Report*.[37] The CDC podcasts, intended for lay audiences, are available in two lengths: one minute ("A Minute of Health with CDC") and 4–6 minutes ("A Cup of Health with CDC"). In addition, the University of California has offered a video podcast for health care professionals on the topic of disaster preparedness.[38]

Aggregation and Collaborative Filtering

With the vast amount of online content currently available, it can become time consuming and onerous for users to acquire the most useful information in a timely manner. Aggregation is a process that allows users to subscribe to personally relevant internet content, such that updated content is fed to them on a regular basis. For example, internet-distributed digital media such as audio and video files, typically in the form of podcasts, can be aggregated by users through the use of "really simple syndication" (RSS) feeds. When an individual subscribes to a website's RSS feed, a feed "reader" or "aggregator" (e.g., Google Reader) automatically notifies them through when new content is available. The user can then download the material to their computer or portable device and read or listen at their leisure. To find the RSS feed on a website, users need only look for a small orange rectangular box with the acronym. Many feed readers allow users to search for and subscribe to

webpages with RSS feeds from within the reader application.

Collaborative filtering is another tool that makes it easier for users to sort through thousands of possible websites, blogs, or other online content. "Collaborative" refers to the fact that users contribute to the process of sifting through internet content, with the user benefiting from the collective knowledge of many users. In the end, the most popular web content rises to the top of a list. This sifting occurs as users rate the websites, videos, blogs, and other content they view. These ratings are then used to let future users know which content people liked the best. On many websites, users can click a button to cast a vote for how much they like the site, content, story, video, or other content. The site then ranks the results accordingly.[39]

Websites such as Digg (www.digg.com) list the results from this collaborative filtering process. The advantage to the user is that instead of having to review many websites to find the most highly rated content, they can go directly to Digg.com and see overall results. In addition, once on the Digg site, users can cast their vote for various listings. In the health care arena, collaborative filtering has been used to empower consumers by helping them make decisions regarding physicians and health care organizations.[12] For example, in the United Kingdom, PatientOpinion (http://patientopinion.org) enables patients to share their health care experiences online via ratings. These ratings assist other patients with their decisions regarding health care and ultimately improve the system. The latter effect is magnified because information provided through the site is used by National Health Service managers for developing and improving services.[40]

WEB 2.0 COMMUNICATION SKILLS

To ensure competency in a variety of evolving health communication methods and techniques, health educators must be adept with new technologies for communication. Health educators who understand how to use the 21st-century internet communication landscape will be prepared with additional important tools for health promotion practice. Taking advantage of the Web 2.0 environment requires that health educators (1) are competent in using Web 2.0 applications, (2) know how to promote web content through the new Web 2.0 environment, and (3) are able to evaluate website usage.

Guidelines for Using Web 2.0 Applications for Health Communication

As mentioned previously, wikis, blogs, podcasts, and social-networking pages are among the most promising Web 2.0 tools for health communication. Regarding wikis and blogs, user-friendly internet applications have made it easy to create either item. For example, a number of free wiki websites exist that provide opportunities for groups and communities to collaborate and contribute to the development of content (e.g., Wetpaint.com, Wikidot.com). Creating a wiki involves visiting one of these websites and following step-by-step instructions that generally include the following: (1) establishing a domain name, page name, and access parameters for editors, (2) selecting the page style/layout, and (3) creating usernames and passwords for those with editing privileges. When fewer users are involved in generating content (e.g., students in a university class), several web applications (e.g., Google Docs, Zoho) can allow them to collaboratively create and edit digital files online, including word-processing documents.

Similarly, creating blogs has been made more user-friendly by several free online applications. These programs are easy to use and host user blogs on specific sites (e.g., www.livejournal.com, www.xanga.com). Typically, these programs require a blog title, a unique address (URL), and a choice of template design. In addition, through an advanced setup function, Blogger (www.blogger.com) provides a way to host a blog on one's own website instead of the Blogger site.

Creating podcasts is a relatively simple process as well. First, users must select software that will allow them to record audio and create audio files. Two commonly used free programs for this purpose are Audacity (http://audacity.sourceforge.net/) and Windows Sound Recorder. To create an audio file using the latter, users simply click the Start icon within Windows, followed by Programs/Accessories/Entertainment/Sound Recorder.[41] They then use the recorder window like a tape recorder. Recorded content can be saved as a WAVE file (.wav) by selecting "save" from the file menu. In order to reduce the size of WAVE files and make them compatible with portable audio files, users should compress them to MP3 format. This can be done by using simple converter software programs. Many of these programs (e.g., "Wave 2 Mp3 1.1") can be obtained for free (see http://www.freewarefiles.com). Created MP3 files can then be uploaded to webpages for distribution purposes. Syndicating these digital files, or preparing them for distribution via the internet, requires the creation of an RSS feed as outlined below.

Creating a social-networking page through applications such as MySpace and Facebook is also a simple and straightforward process. Users can go to the homepages of these sites (www.facebook.com, www.myspace.com) and click on the "sign-up" button, whereupon they must provide some basic information in order to create an account. Facebook requires users to provide name, birthday, and e-mail address, and to create a password for logging in. Facebook then sends the users an e-mail with a link to their new account. Users can then begin building their Facebook profile, providing as much or as little information to other users as desired. They can also adjust their privacy settings to specify who ("friends" versus any user) may see certain elements (photos, comments from other users, etc.) of their profile. Similarly, users can create a MySpace profile by providing their name, e-mail address, birthday, country, postal code, gender, and a password. However, MySpace allows users to start building their profile immediately without first e-mailing them a link. MySpace also allows users to adjust privacy settings.

Guidelines for Promoting Digital Content in the Web 2.0 Environment

Effective health communication and

marketing involves target audiences receiving, understanding, and applying health messages and ideas. When health educators use old media, the target audience is the recipient of information "pushed" to them. In contrast, when new internet communication channels are used, the audience not only receives information, but also actively "pulls" it. In this way, the Web 2.0 environment has made it easier for users to receive relevant information. For example, a common health communication practice is for health educators to create newsworthy press releases and submit them to news media gatekeepers (editors and journalists), who then determine the release's true newsworthiness and value to readers. Ultimately, the hope is that media gatekeepers will approve of the release's content and run a story on the issue. Through Web 2.0, health educators do not have to rely on the media gatekeepers because they can distribute news releases themselves, either online or via various electronic delivery methods. Interested readers who subscribe to the content can pull this information directly, without waiting for television, radio, or newspaper to report the story. Yet, this fact should not preclude health educators from continuing to use old media channels for health communication and advocacy. In fact, Web 2.0 technologies can be used to distribute press releases to media gatekeepers who may in turn distribute the content through old media channels. Beat reporters can be invited to subscribe to electronic press releases from an organization and receive regular press release updates through RSS feeds.

Ultimately, if health educators are going to use new internet communication channels, they must learn how to increase traffic or visits to websites using Web 2.0 tools. For example, establishing a blog does not ensure that that it will be visited by a large number of users unless steps are taken to connect the blog with the blogging community—the blogosphere. For example, connecting a new mental health blog to the existing mental health blogosphere requires linking blogs. The five most common ways of increasing the number of visits to a website are search engine optimization (SEO), pay-per-click advertising, tagging/social bookmarking, RSS, and linkbacks.

Two of these methods—SEO and pay-per-click advertising—have helped revolutionize the marketing of digital content and therefore have important implications for health educators wishing to reach target audiences more effectively through the internet. SEO requires an understanding of how search engines retrieve information. To optimize the retrieval process, optimizers manipulate websites so that they are more attractive to search engines—that is, they make the web link (URL) more popular to search engines. Ideally, health educators would have their web content listed first in search engine rankings. Many SEO companies exist to provide this service; however, health educators can enhance search engine ranking and, ultimately, traffic to their websites on their own by submitting site information directly to the search engines (e.g., users can go to "Google Sitemaps" or www.google.com/addurl to add a URL to Google). Additionally, website link popularity can be enhanced by ensuring that a new URL is placed on a site that has previously been indexed by a search engine. Link placement can be achieved when optimizers approach and request "link exchanges" with relevant pages, purchase one-way links, or post their URL on forums, blogs, and social-networking sites relevant to their keywords.[42]

Because search engine programs use web crawlers (i.e., software that automatically browses the web) to find new sites, additional strategies for SEO require identification and inclusion of keywords throughout the website content. Keywords or "tags" are descriptive terms used to characterize the content of a data file, allowing for the classification and searching of the file. An optimized site requires that tags be incorporated in the title and body of the web content. In addition, anchor text, or the words in a website or digital text file that are hyperlinked, should include keywords that will be attractive to search engines. Keywords that are too broad (e.g., health) will have a lot of competition and require advanced optimization skills to earn a higher search engine ranking.[43] Therefore, keywords and phrases should be developed following careful consideration of what words the target audience is likely to use when searching for certain content.[43] Online programs such as Worktracker (www.wordtracker.com) can assist with identifying the best keywords.

Pay-per-click advertising provides website developers with a new avenue for generating web traffic and, ultimately, marketing websites. This service provided by search engine companies allows advertisers to be charged only when a user clicks on their site. For example, Google AdWords allows advertisers to create their own advertisements/websites and have them appear as sponsored links when users search Google. Advertisers select and submit to Google keywords to generate hits to their websites. Following a Google search, the hits show up on the right-hand side of the results page under the heading "sponsored links." The cost for this service is based on the number of clicks to the site. Google allows for a cap on the number of clicks so that daily advertising budgets might be created and managed.

Also of interest is Google AdSense, which allows advertisers to have Google-approved advertisements posted on their own websites while providing another avenue for selectively targeted communication. Advertisements displayed on sites are selected based on their relevance to the site, ensuring that they accurately target the content of the site and, as a result, the readers most likely to be interested. One advantage of AdSense for those producing health promotion websites is that Google will provide the site owner with advertising revenue once the ads are displayed. In addition, advertising revenue can also be generated by simply adding a Google search box to one's website. One disadvantage of this system, however, is that site developers still do not have full control over the types of ads that Google ultimately posts.

Tagging is a process used by site developers and users to categorize digital content such as photos, blog posts, and videos.[19] Collaborative social tagging, or folksonomy,

is when users collectively create and manage tags and categorize content.[44] For example, Web 2.0 sites such as http://del.icio.us, www.youtube.com, and www.flickr.com allow users to organize digital material using personal keywords. Up to 28% of internet users in America have tagged or categorized content they share online.[19] Folksonomies, as opposed to taxonomies, grew in popularity with social bookmarking applications such as http://digg.com, http://reddit.com, and www.stumbleupon.com. "Tag clouds" are a visual representation of keywords or user-generated tags, usually listed in alphabetical order, where tag frequency is indicated by font size and color.[45] Tag clouds show the relative popularity of information on the site, and each tag within the cloud is usually hyperlinked to the information it represents. For example, the CDC uses a tag cloud to alphabetically list the most popular search topics on its website. By clicking one of the tags, users are directed to additional information on the topic. Whether developed collectively by users or by website developers, tags provide an easy way to categorize information, which helps users obtain relevant information more readily.

Working in the Web 2.0 environment also requires that health educators know how to syndicate content created through these applications. Syndication is a free method of distributing digital content and requires digital file developers to either enter the necessary XML code to their digital files or use a feed creation program. As noted above, RSS feeds have grown in popularity with the diffusion of podcasts; moreover, this important syndication tool should not be overlooked for distributing other digital content such as regularly updated websites and blogs. Many syndication programs exist as open-source or shared tools and provide users with a friendly method of creating feeds for a site.[46] By using these step-by-step wizards, users are less likely to make mistakes.

Although competency in creating RSS feeds is important for enhancing reach through the internet, health educators should at minimum be familiar with using RSS feed readers. Readers, also called aggregators, give users a unique space for up-to-date internet information similar to a "personal newspaper."[47] As such, they can be very useful for getting the latest information on issues of interest. A number of free readers/aggregators are available, including Bloglines (www.bloglines.com) and Google Reader (www.google.com).

Linkbacks occur when authors of blogs are notified other authors have referenced their site. Blogging software (e.g., Wordpress.com) supports trackbacks, a type of linkback that automatically notifies an author through pingbacks when a link is made to their page.[48] When authors become aware that they have been referenced, a common courtesy is to link back to the site in question. Once this reciprocal process occurs, the new site becomes part of the blogosphere, which is ultimately conducive to increased traffic and readership.

Evaluating Usage

Monitoring Web 2.0 user behavior is an important evaluation skill that can provide key feedback regarding reach and trends in usage. Commonly referred to as analytics, monitoring website activity is done through both logfile analysis and page tagging. Logfile analysis includes the use of web log analysis software that reads recorded server activity for a specific webpage. These programs have the ability to not only track the number of visits to a website, but also new visitors to the site, length of time viewing, and location of the viewer (IP address). Analysis of logfiles is generally performed within a given server and provides information about who, when, and how a server is visited.[49] Logfile software monitors all requests to a particular web server and is often referred to as server-side data collection.[50]

Page tagging involves data that is collected from the web browser of site visitors and processed by a third-party provider. Often referred to a client-side data collection, page tagging triggers a JavaScript code to run information to a remote server each time a certain webpage is accessed. Outsourcing this responsibility to a third party allows webmasters to avoid the hassle of maintaining the necessary software and storing the collected data.[50] One important benefit of using page tag applications is that they allow the tracking of Web 2.0 applications.

When considered separately, both logfiles and page tagging have limitations. These limitations can be avoided when the techniques are combined to form the most comprehensive analysis tool currently available—the hybrid. Hybrids use server logfiles plus page tags to collect data.[50] Google Analytics is one popular hybrid solution that is provided free to users.

CONCLUSION

The internet is an important channel of health communication; however, the internet landscape has changed in recent years, requiring a new level of proficiency in preparation and practice. This article has discussed the Web 2.0 environment (e.g., social and internet-distributed media) and important skills in promoting digital content through the internet. Proficiency in this new environment is necessary for health educators wishing to effectively promote health through the internet. The advantages of incorporating Web 2.0 applications into health education practice include greater time savings when acting as a resource person (e.g., subscribing to relevant websites through RSS feeds) and greater reach in health communication and marketing through additional channels. Advantages for health education preparation include greater ability to teach the new generation of health educators about innovative Web 2.0 health promotion applications and how diverse audiences are communicating.

As a result of this review, several important learning outcomes have been identified for professional preparation (see Table 3). These outcomes highlight content and process and provide a starting framework for introducing Web 2.0 health communication in professional preparation. This framework can be used as a guide for integrating Web 2.0 in health education courses such as computer applications, methods, and marketing. In addition, those currently engaged in health education practice might use these outcomes as a way to assess personal com-

petency in Web 2.0 principles.

Web 2.0 usage is becoming more mainstream as users recognize its value as a platform for "social praxis."[51] Despite its promise for health communication and health promotion, however, careful thinking and evaluation is required to identify best practices.[12] Creating awareness of the new 21st-century internet landscape within the health education profession is the first step toward advancing additional Web 2.0 research for health promotion.

Table 3. Web 2.0 Health Education Learning Outcomes

Defining Web 2.0
1. Describe users of Web 2.0 technology. 2. Contrast Web 2.0 with traditional web applications. 3. Evaluate the effectiveness of web content in reaching target audiences. 4. Describe the Web 2.0 application landscape (i.e., content sharing, collaborative filtering, and aggregation). 5. Explain the general application of Web 2.0 technology to health promotion. 6. Explain how each type of Web 2.0 application (i.e., content sharing, collaborative filtering, and aggregation) might be used in health communication.
Using Web 2.0 Applications for Health Communication
1. Effectively create blogs. 2. Identify online tools for the creation of wikis. 3. Establish a collaborative wiki website. 4. Establish a wiki document using an online application. 5. Add a blog application to an existing website. 6. Create digital audio files (i.e., podcast). 7. Save audio files in MP3 format. 8. Understand how to use RSS readers/aggregators. 9. Establish a social-networking website using an application such as Facebook or MySpace. 10. Create and upload digital photos and videos.
Promoting Digital Content in the Web 2.0 Environment
1. Describe the difference between traditional media products (e.g., press releases, op-eds) and electronic media products. 2. Describe the process for distributing digital files (e.g., e-press releases, MP3 files). 3. Apply RSS feeds to digital content. 4. Explain the process of linking a new blog to the blogosphere in an effort to increase traffic. 5. Apply principles of search engine optimization to digital files. 6. Identify optimal keywords using online tools. 7. Describe the process of using pay-per-click advertising to generate website traffic.

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