

"Which Technology Should I Use To Teach Online?": Online Technology and Communication Course Instruction

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Abstract

Over the last few years, higher education has been transformed by numerous technologies available for course content delivery. Whereas university instructors once asked, "Should I deliver course content online?" the emphasis has shifted so that instructors are now asking, "Which technology works best for which desired teaching outcome?," "Which technology can I quickly learn?," and "Which technology can I manage (while fulfilling my research and service duties)?" To answer these questions, the authors used and evaluated 10 different online instructional technology tools, analyzing each one's potential application in communication courses to address Angelo's four dimensions of higher learning (declarative, procedural, conditional, and reflective). The tools are compared and contrasted to assist university instructors in making informed decisions about which to use in their courses.

Keywords: new media, instructional technology, online instruction, communication courses, teaching effectiveness

Introduction

Over the last decade, advances in technology and its potential for online instruction have transformed higher education. Whereas university instruction was largely relegated to face-to-face contact just a decade ago (Green, 2000), today, higher education's prioritization of the adoption of new technologies (Newman, 2001), university emphasis on online learning to gain student market share (Wilson, 2002), advances in educational platforms (e.g., affordability, ease of use), and student willingness to adopt emerging technologies have made online instruction a staple of university curriculum. Indeed, the 2008 *Sloan Survey of Online Learning* corroborates this fact: Whereas general university enrollment in the United States increased just 1.2% during the 2006-2007 academic year, online course enrollment increased 12% during the same period of time; further, more than 20% of university students in the U.S. were enrolled in an online course during the year (Allen & Seaman, 2008).

Most universities have capitalized on advances in technology by offering more online courses to embrace modern media and help manage a growing student body. To achieve these goals, higher education administrators have championed online learning by encouraging instructors to teach online or combine modes of delivery via the hybrid course (i.e., content is partially delivered face to face and partially online). While the prospects of teaching exclusively online is daunting for many instructors, Johnson, Aragon, Shaik, and Palma-Rivas (2000) and Wilson (2002) contend that the hybrid course has become a preferred method of instruction because it offers a less threatening point of entry into online instruction, it minimizes the demands of meeting with students at the same time and place, and it does not compromise student learning outcomes and satisfaction.

While technology has been peddled as the panacea for education's ills, university teachers have found themselves wrestling with the challenges associated with understanding an increasing array of technologies and determining which ones are worth adopting for online instruction. Although the pressure placed on the university instructor to make sense of emerging technologies could be alleviated by research that succinctly reviews and critiques a range of more prevalent technologies now on the market, scholarship in this regard is scarce. Consequently, research on this topic is warranted. A review of online instructional literature to date serves as an apt starting point for such an inquiry.

Literature Review

The number of societal changes brought about by new technology in recent years resonates with Alvin Toffler's (1970) predictions in his book *Future Shock*. Like many other contexts, the academe has been greatly impacted by modern advancements in media and technology; however, much of the instructor's confusion regarding this technological tidal wave has stemmed from the language used to describe it. Consequently, by defining a few main terms, one is able to compare many of the prevalent technologies now being adopted for online instruction.

Media versus Technology

While "media" and "technology" are often used interchangeably in academic literature today, the use of these terms as synonyms is a somewhat recent development because, by definition, they refer to different concepts. Traditionally, "media" has been used to describe the channels for delivering content

(Shannon & Weaver, 1949). For example, the telegraph, telephone, and television are media for message exchange; each exists as a channel. In contrast, "technology" is the hardware and software used to generate message content (Puffenberger, 2010). Today, [Facebook](#) and [Instagram](#) are social technologies used to create messages for online (i.e., a medium) distribution and reception. Likewise, [Verizon's](#) unique hardware and software used to transmit mobile telephone messages are technologies, not media.

As simple as media versus technology may be, differentiating media and technology is critical for understanding the role each concept plays in online course delivery. As [Wright \(2008\)](#) notes:

Technology is more than just the media appliances used to deliver content. Technology ... includes the pedagogy guiding that use of the media; it includes the teaching strategies driven by stated objectives; it drives toward desired outcomes, using a healthy mix of experiences, activities, and tasks. It mingles collaboration with reflection. Technology is not the buffet where you can pick and choose; it is the entire seven-course meal. You may not polish off every course; but you'd better get a good sample from each. (para. 2)

In short, while expeditious, using "media" and "technology" interchangeably tends to obscure how one approaches online content delivery.

Media and Technology

As Levinson (2009) notes, the convergence of media and technology occurred principally because of the Internet's increasing accessibility. The media/technology fusion has altered *who* may produce a message (i.e., messages could be produced by virtually anyone for the masses), *when* a message is produced, and *how many* may consume it. Further, technological advancement has produced a variety of incarnations of traditional media (e.g., newspaper, radio, television) and has given way to "new new media" (e.g., [Second Life](#), [Twitter](#), [YouTube](#)). Levinson says *new new media* are:

- typically free to the consumer and to the producer;
- produced by someone who is not being paid;
- produced by the consumer;
- produced by someone who can choose the medium that best fits his/her knowledge and skill set and/or desired outcome (e.g., from podcasting to blogging);
- supported by web search platforms ([Yahoo!](#) and [Google](#)) but are not dependent on them;
- supported by each other and older media.

In brief, *new new media* give the consumer the ability to produce content that can be disseminated to "hundreds of millions of ... new, new media producers" (p. 4). While fascinated by the seemingly limitless uses of tools for online course delivery, many instructors have also been paralyzed by the many technology options because the instructors are uncertain how to proceed and are intimidated by all the options.

New Media and Higher Education

The onslaught of newer media and the Internet have impacted higher education in three ways. First, the explosion of new media has slowly placed increasing pressure on instructors to incorporate online media in a way that achieves learning outcomes equal to face-to-face instruction. Second, technological advancements have changed how professors deliver content to students. Whereas for millennia teaching consisted exclusively of face-to-face contact, today the Internet's pervasiveness and advances in social media (e.g., prevalence, no or low cost, ease of use) has transformed the classroom in ways unimaginable to students 20 years ago (Friedman, 2005). Third, advancements in technology have changed the teacher–student relationship. While the teacher–student relationship was once limited to the classroom, teacher–student relations now extend to e-mail, blogs, and other social media (e.g., [Facebook](#) and [Twitter](#)). In short, the Internet and emerging technologies have redefined the instructor's role, especially how the instructor and learner approach each other. Indeed, the adoption of the new media is rife with challenges. It requires that instructors determine if a medium functions best as a primary mode of instruction or a secondary or supportive medium of instruction.

Research Questions

Three factors come together to inspire the research questions for this study. First, universities are placing an increasing emphasis on instructional technology. Then, [Wright's \(2008\)](#) admonition to consider the efficacy of emerging technologies and their capacity for online course delivery spurs this exploration. Finally, *new new media* is so new that social scientists have not yet been able to determine their impact on society, in general, and on education, in particular (Levinson, 2009). Therefore, this paper asks three questions designed to benefit today's university instructor exploring instructional technology:

- 1) Which technology works best for my online course to achieve the desired learning outcome(s)?
- 2) Which technology can be quickly learned for online instruction?
- 3) Which technology can be managed over time (and still fulfill my research and service duties)?

Method

In order to answer the three research questions, six faculty members at [Kennesaw State University](#) took steps to learn, examine, and use newer media to determine each one's usability and perceived effectiveness. To this end, the authors of the present paper reviewed current literature regarding online instruction, and then tested 10 different web-based technology tools – [PBworks](#) (wikis), [Final Cut Pro](#), [Adobe Audition](#), [Facebook](#), [Twitter](#), [Camtasia](#), [Adobe Captivate](#), [Wimba](#), [GoToMeeting](#), and [Second Life](#) – in order to: (1) determine each one's effectiveness for online instruction; (2) detail each technology's ease of use; (3) distinguish how each technology has been used to date; and (4) propose how each technology might be used in the future.

The authors used a constructivist philosophy to design this study. Paulo Freire famously rejected the "banking" approach in favor of more practical, problem-solving teaching strategies (Freire, 2010, p. 38). In much the same way, the authors recommend various instructional technologies in relation to the problems that instructors desire to solve in the online classroom. This study provides instructors with the informational tools they need to evaluate the instructional technologies and answer the question of "What technology do I use to teach online?" In the search for the answer to that question, there is a second component. The instructor also has to assess what type of learning takes place in each medium of instruction ([Angelo, 1991](#)). Angelo describes four dimensions of learning that the higher education instructor needs to consider when assessing instruction (pp. 18-19):

- 1) declarative learning (learning what);
- 2) procedural learning (learning how);
- 3) conditional learning (learning when and where);
- 4) reflective learning (learning why).

In exploring which medium functions best for online instruction, instructors must look at each dimension and determine how the medium could best be used to facilitate that type of learning.

For this analysis, each newer media is described noting its unique features, addressed in terms of how it may be applied for educational purposes, and assessed in terms of how it may be used for teaching in the future. Instructors make specific recommendations regarding its use. The criteria for evaluating newer media for instructional purposes are:

- 1) ease of use;
- 2) ability to help instructors solve the problem of how best to assist students in achieving learning outcomes;
- 3) cost;
- 4) suitability for addressing [Angelo's \(1991\)](#) dimensions of higher learning.

Above all, the study serves as a comparison of newly emerging technologies so university instructors in communication as well as those in related disciplines can make informed decisions when selecting a medium for online instruction.

Media Description, Application, and Assessment

The subsections that follow first examine technology tools that assist the instructor in preparing for the online classroom. Attention is then turned to tools that actually serve as the online classroom. The technologies are organized into four groups, which are presented in the following order: wikis (PBworks), audio/video-editing packages (Final Cut Pro and Adobe Audition), social networking services (Facebook and Twitter), screen-recording software (Camtasia and Adobe Captivate), synchronous web conferencing platforms (Wimba and GoToMeeting), and finally, 3D virtual worlds (Second Life).

Wikis

[PBworks](#) is a wiki platform that allows multiple users to access pages online in order to collaboratively work on the content. Wikis "can be used by all to publish new content direct to the Web, including text, images and hyperlinks; to edit existing content; and also, because the wiki is fluid and open to all, to 'roll back' if necessary to previous versions" ([Wheeler, Yeomans, & Wheeler, 2008](#), p. 990). Wiki possibilities range from small tasks, such as allowing individual students to build their own schedules, to massive collective work, such as building a free online university like [Wikiversity](#). Wikiversity is a sister project of [Wikipedia](#), the world's most-used wiki. However, to date, wikis have only been used on a limited basis in academics. In a recent study, [Ramanau and Geng \(2009\)](#) found that 78% of a total of 1,150 undergraduate students surveyed at a UK institution had "never" or "virtually never" used wikis (p. 71). The free, easy-to-use PBworks is a good introductory platform.

Wikis have garnered attention because they provide users the ability to produce high-quality work in much less time (e.g., 10 carpenters can work faster than one carpenter). As [Parker and Chao \(2007\)](#) tell us, "collaborative learning becomes even more powerful when it takes place in the context of a community of practice. A community of practice consists of people engaged in collective learning in a shared domain. Thus, learning becomes a collaborative process of a group" (p. 58). Assessing wiki work depends on the project because a wiki is like a blank sheet of paper waiting to be used either individually or collaboratively in a digital environment. A good starting point is [ReadWriteThink's \(2006\)](#) easy-to-use rubric that provides fundamental categories for assessing wikis, including content, organization, attractiveness, contribution to the group, and accuracy.

Table 1 contains examples of how each of [Angelo's \(1991\)](#) four dimensions of higher learning may be addressed through the use of a wiki such as PBworks.

Table 1. *Wiki examples*

Learning Dimension	Example Using Wikis
1. <i>Declarative learning</i> (what)	A wiki is an effective tool for gathering facts on a topic. Similarly, it is well suited for group idea-generation exercises.
2. <i>Procedural learning</i> (how)	A wiki may be used so students may collaborate in teaching one another processes; for example, how to gather news for a newspaper article.
3. <i>Conditional learning</i> (when and where)	An instructor may achieve conditional learning by facilitating discussion on where or when a given procedure may be applied.
4. <i>Reflective learning</i> (why)	An instructor may use a wiki by having students compile lists of what they have learned and how a given topic has changed how they think about themselves and others.

Audio/Video-Editing Packages

Nonlinear editing systems such as Apple's [Final Cut Pro](#) provide both amateur and professional filmmakers and video editors with a way to tell their stories. While DVDs and online components bundled with textbooks is nothing new in a college environment, individual instructors do not normally include podcasts or video footage of routine lectures. The instructor, using a camcorder, may use Final Cut Pro to edit and update videotaped lectures on a DVD. While regular lectures often include many audio/visual components, these videotaped lectures could be edited together with the instructor's dialogue in a nonlinear editing application to form a DVD of lectures. The end product would be a seamless content delivery addition to a regular classroom class or an online or hybrid program.

[Adobe Audition](#) is an audio production tool for recording and sweetening podcasts, lectures, and voiceovers. It makes the voice sound more professional by utilizing the available post-production tools that this software has available. While originally made exclusively for Windows PCs, Adobe Audition now

also exists in a Mac version. It was originally called [Cool Edit Pro](#) before being purchased by Adobe ([Adobe Audition, n.d.](#)). This precursor is now available as a freeware download online. The current version, Audition 3.0, incorporates real-time amplitude rendering, among other major upgrades.

Not only is Audition useful for editing audio projects, but it can also be used for audio-for-video editing, which is easily integrated into Adobe's video-editing software, [Adobe Premiere](#). All one would need to do is to import or export the video files to Audition, including Audio Video Interleave (AVI), digital video (DV), and proprietary high-definition (HD) files.

When producing voiceovers or narrations, one records directly into Audition, using the "multitrack" or the "edit" screen. Then one can streamline one's work by clarifying the characteristics of one's voice. The user will view a waveform, which shows wavelength, amplitude, and frequency of the sound recording.

Some essential tools of Adobe Audition (these are performed in the "edit" screen) are:

- *Hiss-pop eliminator*: Helps in restoring damaged or poorly recorded audio.
- *Noise reduction profiles*: Works like "white balancing" in video production, by eliminating specific sounds that you select, throughout your soundtrack.
- *Dynamics processing and flanging*: "Shines up" the voice to make it sound the most professional. The "lite flange" setting works very well.

Examples of how Final Cut Pro and Audition might be used to address the four dimensions of higher learning identified by [Angelo \(1991\)](#) are shown in Table 2.

Table 2. *Final Cut Pro and Adobe Audition examples*

Learning Dimension	Example Using Final Cut Pro	Example Using Adobe Audition
1. <i>Declarative learning</i> (what)	Learning terminology and "buttons" of the interface.	Learning terminology and "buttons" of the interface.
2. <i>Procedural learning</i> (how)	Learning the editing procedures and processes.	Learning the editing procedures and processes.
3. <i>Conditional learning</i> (when and where)	Displaying editing ability using necessary software settings.	Displaying editing ability using necessary software settings.
4. <i>Reflective learning</i> (why)	Learning the grammar of the edit and areas of control for editing decisions.	Learning the grammar of the edit and areas of control for editing decisions.

Social Networking Services

Although social networking's historic [Friendster](#) can take credit as being the first social media site to enjoy mainstream uptake and use ([Buckley, 2010](#); [Friendster, n.d.](#)), two of the most popular sites as of 2012 are [Facebook](#) and [Twitter](#). Facebook originated in 2004 and continues to set new records for users to connect with friends and other users. Facebook is considered to be the most active social networking site by unique visitors.

Facebook can be used in the classroom by setting up a class page and having students "like" the page, and then using the page as a forum for comments and announcements related to the class. One caution seems to be that students value Facebook as a means of personal communication and may be resistant to the encroachment of university professors into their private turf. In one study, it was found that "individual students' differing expectations about the balance between socialising and academic activity in a Facebook study group, and group mechanisms to maintain this balance, must be ... resolved for a group to function successfully" ([Gray, Annabell, & Kennedy, 2010](#), p. 975).

At the same time, Facebook pages have also been established by groups with common interests, including academic content. Businesses and public and non-profit organizations use Facebook and Twitter to connect with customers and other stakeholders. Facebook and Twitter have roles to play in specific disciplines, such as public relations, crisis management communication, and journalism, for instance, and, as such, are incorporated into classroom study. In one study, closed-group tutorial Facebook pages were created to create "a safe space for students ... bringing social networking into a classroom space where learners can think critically about it" ([Reid, 2011](#), p. 78).

Twitter is one of the relatively newer social networking sites where users may send and receive text that is limited to no more than 140 characters or video links; it is also defined as a free microblogging service

(Crawford, 2009; Dobler, 2012). Twitter is also seen as a tool "for monitoring and engaging public discourse during the crisis process" (Tinker, Dumlao, & McLaughlin, 2009, p. 25). The site is used for business and networking purposes, to inform the public about problems or new products, to provide real-time information about emerging crises, and to connect friends worldwide (Tinker et al., 2009; Gainey, 2012). Michael Weisch, cultural anthropology professor at [Kansas State University](#), is quoted as saying about Twitter: "It's not just about information. It's about linking people in ways that we have never been linked before, and in ways we can't predict. Every six months there is a new tool that connects us in new ways" (Bradley, 2009, p. 7).

Colleges, universities, and organizations are engaging with and using Twitter in a number of ways:

- Some faculty members have found it a "global faculty lounge" to help build professional networks and assist with research (Young, 2009, para. 1; see also Bradley, 2009); K-12 teachers are also finding Twitter useful as learning networks to share information, ideas, and experiences (Dobler, 2012).
- Other faculty use Twitter or other social media sites to post thoughts about the use of social media in public relations, pitch stories to journalists, build relationships with journalists, connect with students, post tips for students, reach new audiences, interact with more people, see what other students are saying, foster peer-to-peer learning, conduct group projects, post announcements, and serve as a medium for collaboration, participation, and engagement (Bradley, 2009; Young, 2009).
- Today's employers in advertising, public relations, sales, media, technology, marketing or communications are favoring job applicants with social media skills (Knorr, 2009).

In terms of assessment using [Angelo's \(1991\)](#) four learning dimensions, some examples of Facebook and Twitter use that relate to each of the four dimensions are given in Table 3.

Table 3. *Facebook and Twitter examples*

Learning Dimension	Example Using Facebook/Twitter
1. <i>Declarative learning</i> (what)	Students clearly know the "what" of developing social content on sites such as Facebook and Twitter. They are readily able to share information on these newer media.
2. <i>Procedural learning</i> (how)	Students clearly know the "how" of developing social content on sites such as Facebook and Twitter. For example, they have little problem exchanging procedural information concerning any number of processes.
3. <i>Conditional learning</i> (when and where)	In general, students understand the "when" and "where" of developing social content on sites like Facebook and Twitter; however, an instructor must give specific attention so students understand the line between a social media's professional versus personal use.
4. <i>Reflective learning</i> (why)	For students, reflective learning is most relevant for educators wanting to engage students academically through social media, because students are often unclear about Facebook's and Twitter's power and/or fail to recognize the social impact of Facebook and Twitter beyond their personal use.

In sum, part of the ongoing challenge is to encourage students to expand their definition of social-gathering sites such as Facebook and microblogging sites such as Twitter from purely "personal space" to spaces for individual and corporate learning and exploration.

Screen-Recording Software

TechSmith's [Camtasia](#) and [Adobe Captivate](#) are two tools for creating audio and video recordings from the computer. For instructors who lecture with PowerPoint, Camtasia provides an easy way to transfer their classroom teaching style to an electronic teaching style. Adobe Captivate is a similar tool, but it requires that audio be added to each slide individually, while Camtasia allows the user to narrate seamlessly from slide to slide. Like Captivate, Camtasia also has a quizzing function so that the instructor can stop the lecture and add questions to facilitate interaction. Using the [Sharable Content Object Reference Model \(SCORM\)](#), quiz grades can be recorded in a learning management system such as Blackboard. Camtasia also allows screen capture, for creating electronic library tours, for example. Captivate is the better software for persons creating software tutorials, as it has unique screen capturing

tools. However, for those who teach in the humanities and social sciences, Camtasia's seamless audio quality makes it a natural choice for use in creating voiceover PowerPoint lectures. Two more advantages to Camtasia are that it allows for picture-in-picture recording (although the resulting file size is generally so large as to make the option unattractive), and it allows the user to save in a variety of formats, including those for the iPod and iPad, while all but the most recent versions of Captivate only allow for [Adobe Flash](#).

Camtasia and Captivate are both outstanding tools for teaching declarative learning, procedural learning, conditional learning, and reflective learning. Table 4 provides examples of learning tasks or assignments corresponding to each of [Angelo's \(1991\)](#) learning dimensions that could be delivered with Camtasia and Captivate.

Table 4. *Camtasia and Adobe Captivate examples*

Learning Dimension	Example Using Camtasia	Example Using Adobe Captivate
1. <i>Declarative learning</i> (what)		To explain what a mechanical pencil is, an instructor could load a slideshow with various views into Captivate and annotate it with Captivate's annotation functions. The multimedia presentation could be produced to share via a learning management system.
2. <i>Procedural learning</i> (how)	To explain how to bowl, an instructor could use Camtasia to add a video about bowling into a slideshow about bowling and produce them in a format that could be shared via a learning management system.	
3. <i>Conditional learning</i> (when and where)	To demonstrate the different settings where it is appropriate for a teacher to use measurable verbs, an instructor could create several videos that illustrate the concept and place them together in Camtasia, interspersed with quizzes. The entire presentation could be produced and shared via a learning management system.	
4. <i>Reflective learning</i> (why)		To help students learn why they would use various library databases to perform research, an instructor could "go to the library" online and explain to the students which databases are helpful for which research. After the explanation, the concepts could be reinforced using Captivate's simulation function. The presentation can be packaged and shared via a learning management system.

Synchronous Web Conferencing Platforms

[Wimba](#) allows instructors to deliver electronic content synchronously (i.e., live, in real time). It provides capability for presenting PowerPoint slides, sharing web pages, working together on a whiteboard, and collaborating with audio and video. In addition, students can engage in a "backchannel" chat with one another, raise hands to be given an opportunity to talk, participate in online polling, and express their opinions quickly using emoticons and other icons. Wimba also includes an extensive computer check feature at the beginning of a session to ensure a presenter or student's computer is ready to use Wimba.

If a student is unable to get his/her computer to connect to the Wimba session, the student can dial in and experience the audio-only option, and the presentation can be archived for students who cannot attend a synchronous session. Wimba also allows the instructor to put students into separate groups in the Wimba classroom and then reunite in the main Wimba classroom.

Wimba creates a live classroom environment, but students only need to be near a computer or telephone in order to partake in the rich interactions that are possible. Students using a computer do need a headset and microphone. As [Butler and Sullivan \(2007\)](#) point out, "if speakers are used, others in the class will hear a hideous echo" (p. 33). While a video lecture could be created without students and then archived for electronic, asynchronous delivery, such content could more easily be created and delivered with a program like Camtasia or Captivate. Some Wimba users credit the program with assisting in alleviating the feeling of isolation sometimes experienced by online students (Mallory, Ramage, Snow, & Coyle, 2009). On the other hand, many students say that if they were able to commit to two weekly three-hour sessions, they would be enrolled in on-campus mode and physically attending classes rather than studying online. It may not be appropriate or worthwhile to use synchronous virtual classroom software like Wimba with these students.

Those who use Wimba regularly state that for courses with heavy interaction in Wimba, "five students in a group is optimal, simply because the existing interface necessitates constantly scrolling up and down to view responses from a larger group of participants With more than 15 participants in the room, a 'lecture' type of Wimba environment worked best" ([Butler & Sullivan, 2007](#), p. 32). Moreover, for hybrid or traditional courses where a synchronous session is necessary, Wimba is an ideal solution. It is arguable that the time investment required for using Wimba does not make it an efficient tool for declarative learning; however, it is an excellent tool for targeting procedural, conditional, and reflective learning goals.

[GoToMeeting](#) is one of several commercially available online meeting software programs that could be used for online, synchronous classes. It is, in fact, number three in the hosted web conferencing services market after [Cisco WebEx](#) and [Microsoft Office Live Meeting](#), according to an article published in *eWeek* ([Boulton 2008](#)). All three have similar features and cost in the \$40-\$50 USD per month range for web conferences of up to 15 users, with price breaks per user for larger numbers. GoToMeeting, specifically, has a corporate option for multiple licenses for meetings of up to 1,000 participants, with the pricing negotiable, which would be appropriate for campus-wide licensing.

To start a meeting, the organizer simply clicks on a GoToMeeting icon on the screen, which will allow him or her to invite attendees by phone, e-mail, or instant messaging. For a recurring class, the meeting invitation need only be issued once at the beginning of the term. Students would follow the instructions on the invitation to get to the meeting website. Participants wishing to connect to audio using [Voice over Internet Protocol \(VoIP\)](#) will need a fast Internet connection (384 Kbps or more recommended), a microphone, and speakers (a USB headset is recommended). Alternatively, participants can log into the website and call a supplied telephone number (the institution can set up a toll-free line) to use their telephones for the audio portion of the class. To actually begin the class, the organizer (instructor) clicks on the "play" button and his/her computer screen appears on the class participants' computer screens. When class is over, the instructor simply logs off.

GoToMeeting is useful for lecture-style classes where the instructor wishes to talk while showing students PowerPoint presentations, videos or various websites. GoToMeeting is not designed specifically for the college classroom, although it can easily be adapted for that purpose. Citrix's marketing material indicates that it has been used in such a setting ([Mainstay Salire, 2012](#)), but the authors found it difficult to find any scholarly reporting on such use. If the software were available on a particular campus, it could easily be used for a semester-long online course or just for specific or emergency online meetings of regular classes.

Table 5 presents a number of examples of how learning in each of [Angelo's \(1991\)](#) four dimensions can be achieved through the use of Wimba and GoToMeeting.

3D Virtual Worlds

[Second Life](#) is a virtual world in which users "navigate a three-dimensional [3D] online environment by way of an avatar" or representation of themselves ([Burgess & Caverly, 2009](#), p. 42). An avatar is able to do everything a person does in the "real" world including listen and talk to others. Second Life also offers the user access to other media (e.g., text-based conversation, e-mail, and video) for synchronous use. Moreover, an avatar can also fly and teleport (i.e., transport instantly to another location) in Second Life.

Table 5. *Wimba and GoToMeeting examples*

Learning Dimension	Example Using Wimba	Example Using GoToMeeting
1. <i>Declarative learning</i> (what)	The time investment required with Wimba does not make it a good choice for declarative learning.	GoToMeeting is perfect for the lecture format. An instructor can teach the "what" of a subject with a PowerPoint illustration.
2. <i>Procedural learning</i> (how)	Through Wimba's video share function, an instructor could present a video on "how to interview successfully for a job," for example. Then, students could ask questions, and the instructor could discuss more specific tips and examples.	A reporting class instructor could present a video on how to cover a disaster, for example. Then, students could ask questions, and the instructor could discuss techniques and writing tips.
3. <i>Conditional learning</i> (when and where)	To demonstrate the different situations that an editor might face with a client, students can take turns role-playing in Wimba while other students view the document and listen to the conversation. Then, the class can critique the different situations that arise.	To demonstrate the different situations that might arise in the field, the instructor could play the role of an official and have the students act as reporters at a news conference.
4. <i>Reflective learning</i> (why)	To help students understand common mistakes that are made at the scene of an accident, an instructor could show students in the Wimba classroom a video of an accident and the resulting scene. The instructor could stop the video at various points to question students regarding why emergency medical technical responses are correct or incorrect, what alternatives exist, and what judgments have to be made at various points during the response. The students can discuss their responses in groups in the Wimba space and then rejoin the rest of the class to defend and explain their answers and learn why they are correct or incorrect.	To help students understand common mistakes that reporters make on the job, the instructor could show a video of a reporter covering a story. The students can discuss the reporter's performance and analyze what they would do differently. The instructor would point out problems they might have missed in the reporter's performance.

In that Second Life is user generated, it offers a context for teaching a vast array of content in a topic-specific environment. While face-to-face instruction inherently requires that teacher and student meet a number of preconditions for learning (e.g., a physical learning environment, close physical proximity, travel time), instruction in Second Life is not limited by these factors. In terms of communication education, any theory, concept, or skill can be addressed in Second Life. Moreover, any communication skill may be performed in Second Life's countless environments (e.g., a workplace, dormitory, or home). If a given learning environment does not exist, it can be built. Since Second Life is a virtual environment, it may be accessed by teachers and students anywhere as long as participants have online access, and they are willing to take the time to grow familiar with it.

It is not such a surprise that higher education has gravitated to Second Life. [Burgess and Caverly \(2009\)](#) note that over 200 higher education institutions have a presence in Second Life. For example, [Harvard University](#), [Princeton University](#), [Pepperdine University](#), and [Stanford University](#) all have virtual campuses within Second Life. Additionally, the [Second Life Educators \(SLED\)](#) electronic mailing list consists of more than 3,900 members from across the globe ([Burgess & Caverly, 2009](#)).

Second Life can be used to satisfy each of [Angelo's \(1991\)](#) learning dimensions, as shown in Table 6. [Salmon \(2009\)](#) believes online 3D environments like Second Life will increasingly be used for instruction as developers continue to make virtual worlds more realistic and users become more comfortable with working in an environment that mirrors everyday life.

Table 6. *Second Life examples*

Learning Dimension	Example Using Second Life
1. <i>Declarative learning</i> (what)	Instructors can readily offer assessments online in Second Life. For instance, assessments can be designed to gauge a student's knowledge of communication principles and concepts (e.g., the steps to active listening).
2. <i>Procedural learning</i> (how)	Second Life offers a place where students can demonstrate new communication skills in different contexts (e.g., dyads or groups).
3. <i>Conditional learning</i> (when and where)	Second Life makes a variety of virtual environments available so students can tailor communication knowledge and skills to professional and personal environments.
4. <i>Reflective learning</i> (why)	Second Life gives an instructor the ability to create exercises designed to have students question why they act or believe as they do. For instance, Second Life permits the addressing of one's cultural uniqueness and prejudice.

Discussion

The list of online instructional technology tools discussed here – PBworks, Final Cut Pro, Adobe Audition, Facebook, Twitter, Camtasia, Adobe Captivate, Wimba, GoToMeeting, and Second Life – is by no means exhaustive; it is merely a sample of some of the *new* new media available to the modern educator to support and enhance online instruction. Table 7 summarizes the four aspects of the tools that were evaluated: ease of use, ability to help instructors solve the problem of how best to assist students in achieving learning outcomes, cost, and suitability for addressing each of [Angelo's \(1991\)](#) four dimensions of higher learning.

Table 7. *A comparison of the tools analyzed in this paper*

Tool	Ease of Use (1-5) ^a	Ability to Assist in Achievement of Learning Outcomes	Cost (in US Dollars)	Suitability for Addressing Angelo's (1991) Dimensions of Higher Learning
PBworks (wikis)	1	Yes	Free	Good for all four dimensions
Final Cut Pro	5	Yes	\$299	Good for all four dimensions
Adobe Audition	5	Yes	\$99	Good for all four dimensions
Facebook	1	Yes	Free	Best for reflective learning
Twitter	1	Yes	Free	Best for reflective learning
Camtasia	3	Yes	Around \$300	Good for all four dimensions
Adobe Captivate	3	Yes	Around \$300	Good for all four dimensions
Wimba	2	Yes	Varies	Best for procedural, conditional, and reflective learning
GoToMeeting	1	Yes	\$49/month	Good for all four dimensions
Second Life	2	Yes	Free	Good for all four dimensions

^aEase of use is expressed on a scale of 1 to 5, where 1 is the easiest and 5 is the most difficult. For tools rated 5, instructors require formal training in order to be able to use them effectively.

As can be seen from the analysis in Table 7, wikis, Facebook, Twitter, and GoToMeeting are deemed by the authors to be the easiest to take up, while Final Cut Pro and Audition are considered so complex as to require formal training. Wimba and Second Life are slightly more difficult to take up, while Camtasia and Captivate are somewhat complicated, but not to the point of requiring formal training. All of them can be used to help faculty solve problems in delivering various types of instruction. Perhaps the most important element for instructors to keep in mind is that these technology tools are like the tools in a traditional toolbox. They are not interchangeable, they do not all serve the same purpose, and they are not capable of solving every problem equally well. Also, it is possible but highly unlikely that an instructor would use every tool in a single course. The authors advise instructors to think carefully about pedagogical problems

they wish to solve, consider which technology would best solve the problem, and experiment with that technology throughout a course. Wimba, GoToMeeting, and Second Life are useful programs for synchronous online class meetings but are of limited use for classes where students cannot all get together at the same time. Camtasia, Captivate, Final Cut Pro, and Audition are useful programs to know how to use to prepare materials such as podcasts to post on a website for an online class. Facebook and Twitter are powerful social media programs that allow instructors to stay in touch with their students, to send and receive messages beyond e-mail, and to create a class community. Final Cut Pro, Audition, and Camtasia are editing and lecture-delivery software programs used by the professor outside of the online classroom. Finally, cost may be an issue with some of the programs, as Final Cut Pro, Camtasia, and Captivate cost around \$300 USD each. GoToMeeting is the most expensive at \$49 USD a month. Wimba costs vary and Audition costs \$99 USD. Wikis, Facebook, Twitter, and Second Life are all free for basic use. While all can offer learning experiences in line with [Angelo's \(1991\)](#) dimensions of higher learning, Facebook is best for fourth dimension, or reflective learning. Wimba may entail too much of a time investment for first-dimension, declarative learning.

Summary and Extensions

There are many more possible programs available to instructors of online courses beyond those examined in this study. Additional research should be conducted looking at other software and services available to the online instructor, such as [interactive white boards](#) and the [WiZiQ Virtual Classroom](#). The research also could benefit from a more substantial and rigorous in-class trial of each of the programs examined here. While some of these programs have been used in class by the authors, others, such as GoToMeeting, were examined for the possible future use as an online classroom but have not been "road tested" as yet. (GoToMeeting was used, however, for the authors' online meetings.) Also of use would be a qualitative study in which instructors and students are interviewed about their practices in actually using the various technologies/applications. Their insights would help instructors of online courses decide which programs would work best for their classes. Future research could include experimental testing of student learning outcomes with and without the use of the various software programs, and should assess what outcomes actually demonstrate that a student has acquired critical thinking skills, for instance. Potential for all four of [Angelo's \(1991\)](#) dimensions of higher learning was found for virtually all of the media studied, but more rigorous assessment in the actual online environment is encouraged.

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