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NEOMILLENNIAL USER EXPERIENCE DESIGN STRATEGIES: UTILIZING SOCIAL NETWORKING MEDIA TO SUPPORT "*ALWAYS ON*" LEARNING STYLES

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ABSTRACT

Raised in the "always on" world of interactive media, the Internet, and digital messaging technologies, today's student has different expectations and learning styles than previous generations. This net-centric generation values their ability to use the Web to create a self-paced, customized, on-demand learning path that includes multiple forms of interactive, social, and self-publishing media tools. First, we investigate the formation of a burgeoning digital pedagogy that roots itself in current adult and social learning theories, while integrating social networking, user experience design strategies, and other emerging technologies into the curriculum to support student learning. Next, we explore how current and emerging social networking media (such as Weblogs, iPod, RSS/XML, podcasting/audioblogs, wiki, *Flickr*, and other self-publishing media) can support neomillennial learning styles, facilitate the formation of learning communities, foster student engagement and reflection, and enhance the overall user experience for students in synchronous and asynchronous learning environments. The data included in this article are intended as directional means to help instructors and course designers identify social networking resources and other emerging technologies that will enhance the delivery of instruction while meeting the needs of today's neomillennial learning styles.

INTRODUCTION

The basic idea of the Web is that an information space through which people can communicate, but communicate in a special way: communicate by sharing their knowledge in a pool. The idea was not just that it should be a big browsing medium. The idea was that everybody would be putting their ideas in, as well as taking them out.

Tim Berners-Lee

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A new era of teaching and learning is on the rise: a student-centered, technologically- and socially-rich environment that promises breakthroughs across the educational spectrum. This new era embraces the bi-focal perception that high quality education is shaped by changes in the characteristics of student learners and the ways in which they use new technologies to exchange information. One thing is clear: the convergence of social networking technologies and a new "always on" pedagogy is rapidly changing the face of education.

LEARNING THEORY AND COURSE DESIGN

Modern research in adult learning theory, or andragogy, is largely based on the research of Malcolm Knowles and Robert Mager. The theory of Andragogy was originated by a 19th century German educator by the name of Alexander Kapp (Nottingham Andragogy Group 1983, as cited in [1]). He coined the term to operationalize Plato's theory of education. This term uses the prefix *andr,* meaning man, to contrast with the term pedagogy, which uses the prefix *paid,* meaning child.

This notion of adult-focused education received only mild scholarly attention until Malcolm Knowles developed his critical assumptions that frame the characteristics of adult learners as distinct from child learners [1]. The original four assumptions were advanced by a critical fifth assumption that learning is derived from internal motivations later (see Table 1).

Table 1. Knowles Five Learning Assumptions

Self-concept	As a person matures, his self-concept moves from one of being a dependent personality toward one of being a self-directed human being.
Experience	As a person matures, she accumulates a growing reservoir of experience that becomes an increasing resource for learning. Information that has little "conceptual overlap" with what is already known is acquired slowly.
Readiness to learn	As a person matures, his readiness to learn becomes oriented increasingly to the developmental tasks of his social roles.
Orientation to learning	As a person matures, his time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly his orientation toward learning shifts from one of subject-centeredness to one of problem centeredness.
Motivation to learn	As a person matures, the motivation to learn is internal; protecting one's self-concept and/or self-esteem are strong motivators to acquire new information.

Source: [1].

Pedagogy, Andragogy, and Learning

Jarvis provides a helpful explanation of these theories [1]. With pedagogy, learners are dependent and teachers direct when, where, and how a subject is learned and assessed. The teacher is there to help learners move toward independence. With andragogy, learning is self-directed; the teacher encourages and nurtures this approach. With pedagogy, the learner's experience is of little value and, as a result, teachers often use a didactic approach.

In pedagogy, the learner's experience is of little value and, as a result, teachers often use a didactic approach. In andragogy, the learner's background is an essential component. Discussion and role-playing are often employed as teaching strategies. With pedagogy, students learn what society expects them to learn. Thus, a standardized curriculum is the norm. With andragogy, students learn what is worthwhile in their own, real-life application. With pedagogy, curriculum is developed around specific subjects that students need to learn. With andragogy, learning is organized around experiences, which support the performance needs of the adult learners [1].

Robert Mager's (1962) book, *Preparing Objectives for Programmed Instruction*, identifies three key components for behavioral objectives: Behavior, Condition, and Standard [2]. The behavior must be capable of observation and must be specific in nature. The conditions for learning should be clearly stated and should include description of necessary materials. The standard is the desired performance level, including the accepted range of correct answers [3].

Applications to Educational Technology

In 1985, Robert Gagne developed "9 Types of Instructional Events" through which learning is framed [4]. This is a unique way of understanding the way that external instructional events, such as social media, can lead to internal learning processes and foreseeing ways that new technologies can empower improved modes for learning.

Many, like Barron [5], are skeptical about the impact of educational technology: "Unfortunately the learning process is difficult to replicate and seems impossible to portray it entirely in an automated model." Gagne, on the other hand, takes a more holistic approach, identifying the universal elements to the learning environment. Gagne, on the other hand, takes a more holistic approach, identifying the universal elements to the learning environment (Table 2).

Patsula, of Sookmyung Women's University in Seoul, further explored the ways that Gagne's learning theory can serve as the basis for selecting the appropriate media [7]. Moreover, Patsula outlines how to apply this approach in the Web-based environments (Table 3) [7].

Table 2. Gagne's 9 Types of Instructional Events

Gain attention	To ensure the reception of coming instruction, give the learner a stimulus.
Tell learners the learning objective	Tell the learner what they will be able to do because of the instruction.
Stimulate recall of prior learning	Ask for recall of existent relevant knowledge.
Presenting the stimulus	Display the content.
Providing learning guidance	Help Understanding (semantic coding) by providing organization and relevance.
Eliciting performance	Ask the learner to respond, demonstrating learning.
Providing feedback	Give information feedback on the learner's performance.
Assessing performance	Require more learner performance, and give feedback to reinforce learning.
Enhance retention and transfer to other contexts	Provide varied practice to generalize the capability.

Source: [6].

Social Learning Theory and the Web

According to Vygotsky, optimum cognitive development is contingent on the full social interaction of the learner [8]. Moreover, instruction is most efficient when students engage in activities within a supportive (social) learning environment and when they receive appropriate guidance that is mediated by tools ([8] as cited in [7]). The result of situating learning in a collaborative and social learning environment is an increased range of skill, versus what can be attained alone [8].

In the past, attaining "full social interaction" required students and teachers to be tied to a physical space—such as a traditional classroom. But as Web-based and other technologies (tools) have evolved, students and teacher alike are achieving many of the social benefits of social interactions in synchronous and asynchronous Web-based learning environments.

Social networking media provides the opportunity to take the social interaction to deeper levels as well as address learning styles rooted in digital technologies.

Table 3. Applying Learning Theory to Online Design

Instructional Objective: Recognize an equilateral triangle (Kearsley, 1994a)	
Gain attention	Show a variety of computer generated triangles
Identify objective	Pose question: "What is an equilateral triangle?"
Recall prior learning	Review definitions of triangles
Present stimulus	Give definition of equilateral triangle
Guide learning	Show example of how to create equilateral
Elicit performance	Ask students to create five examples
Provide feedback	Check all examples as correct/incorrect
Assess performance	Provide scores and remediation
Enhance retention/ transfer	Show pictures of objects and ask students to identify triangles

Source: [7].

Course design, especially online design, must keep the end user experience in mind. How will the use of any particular social media element help the student achieve full cognitive development? How will the use of social media support neomillennial learning styles? How will the use of social networking technologies facilitate learning situated in a social context?

NEW METHODOLOGIES FOR THE DIGITAL AGE

It is time to refine our understanding of instructional design and investigate new content delivery options to support both the asynchronous and synchronous educational activities that most benefit the expectations of today's learners. This will require course designers and teachers to increasingly be among the early adopters of new social networking technologies and integrate them into the user experience and learning style of the online course design.

Designing for Neomillennial Learning Styles

Online learners have grown up surrounded by the digital world, and as a result have developed new ways of understanding, learning, and processing new information. As a result, there is a dissolving line between frontline and online education. A multi-faceted approach that blends current adult learning

theory and social technologies is the most effective in designing online courseware and teaching.

Instructors will need to increasingly address the needs of the neomillennial student (those born after 1982) when integrating technology into their course design. An effective course will need to situate the more "traditional" learning theories of Mager, Gagne, and Knowles and the social learning theory with the reality of the digital world.

The current generation of learners is "hardwired" to simultaneously utilize multiple types of Web-based participatory media. This is a technologically savvy generation of learners who have no concept of using the 26-volume set of encyclopedias. They have grown up with the Web, are "always-on," and expect to utilize technology in their learning (Table 4). Students, especially on college campuses, are perpetually connected to their peers, professors, and course content through laptops, social networks, PDAs, and iPods [10].

Individually, these multiple sources of information and social network tools are individually complete and collectively inconsistent [11]. Together, however, they hold the promise to enhance the user experience, dovetail with the digital learning style and expectations of the neo-millennial student, and support student learning.

In many ways, the instructor needs to design courses around the core idea that students are an "end user" who will be conducting most of their learning outside the traditional classroom. Moreover, instructors should understand how the integration of Web-based learning communities and social networking technologies into the course design has a positive influence on student retention and self-regulation in online courses [12].

The key is to design courses with these new learning styles in mind, creating content that allows students the flexibility to work as an individual and as a member of a group, while embracing the "always on" reality of the neomillennial student. Toward that end, an instructor's ability to integrate social media technologies as a tool to support learning while understanding the unique learning style of the neomillennial student is vital.

Table 4. How the *Always-On* Generation Uses Technology

74% use IM every week
94% surf the Web for homework help
41% use IM or e-mail to talk to teachers
30% have used IM to find new friends

Source: Perkins, as cited in [9].

Reading Text on the Web

Jakob Nielson of the Nielson Norman Group studied teens as a distinct group of computer-assisted learners [13]. Nielson found that neomillennial favor learning environments where they are "doing something as opposed to just sitting and reading, which tends to be more boring and something they say they do enough of already in school." Interactivity and constructivist-based activities are vital. Nielson further concluded, "When teenagers surf the Web, they often have different goals than adults do. But some interesting features draw them in: big type, lots of pictures and a reasonable dose of respect" [14].

In another study conducted by Morkes and Nielson on the way users read on the Web [15], they found that 79% of test users always scanned new Web pages; only 16% read word-by-word. They advocate Web designers use what they term as the "scannable text" approach to designing Web pages (Table 5).

Yet there remains a great divide on the issues of text and image intensity. While young and adult learners dislike Web pages that overflow with text, adult learners are much more tolerant when it comes to the ratio of text-to-images on a given page. Adults are also more willing to focus on Web pages that have worthwhile content but poor aesthetic design, if it yields the desired results [14].

No Link Left Behind

In just a few seconds, users will make a snap decision on whether or not the link will help them fulfill their need for information. How do users decide which link will yield the most favorable results? What steps can designers take to help users decide which links will meet the users' expectation for that link?

Table 5. How Users Read on the Web

Highlighted keywords	Hypertext links serve as one form of highlighting; typeface variations/color
Meaningful sub-headings	Do not use "clever" sub-headings; the user doesn't have the time to decipher your intended meaning
Use one idea per paragraph	Users skip over additional ideas and/or scan the text for the necessary information
Less is more on the Web	Use half the word count (or less) than conventional writing
Use an inverted pyramid style	Start with the conclusion, then provide more detail

Source: [15].

When a user encounters a link on a Web page, their mind quickly evaluates and creates a mental image of the information is contained at the other end of the link [16]. Neomillennial students, well versed in the Web, are especially adept at quickly scanning a Web page and deciding which links hold the promise of producing a "mother load" of information or valuable content.

Jesse Garrett, a pioneer in the field of user experience design, points to three key elements that help users determine the potential benefit of choosing any link [16]: language, design, and user expectation (Table 6).

Another user-centered design element that can provide navigation clues is encoding hyperlinks with a title attribute. A hyperlink encoded with the title attribute can provide information regarding the link, help the user predict where the link will take them, and allow the user to decide whether or not the link will meet their expectations or informational goals. The title link is easily added as part of the HTML code when making a hyperlink (Table 7). Not all links should have titles; rather, the title attribute should be assigned when the link itself doesn't provide enough context for the user to decide whether or not to click the link [17].

When used together, these design strategies will help students process multiple sources of information, decide which links to follow, and create a user experience that meets their expectations and learning goals.

Table 6. Garrett's Psychology of Navigation

Language	• Users look for specific words to conceptualize their mental image as their target • Users look for similar word usage for clues on which links will lead them to new information • Users will mentally flag link that reassure them they are on the right path
Design	• Location of links denotes importance. For example, a link located at the top of a Web page denotes importance. • Users will try to extract all the information they can from the visual treatments of links, Web page design, and content • Links that are visually clustered together are viewed as conceptually related.
Meeting user expectations	• Effective use of language, visual design, and vocabulary may override users' preconceived mental image • Designers need to "predict" what content users are expecting to find by clicking a link • Users have experience on the Web and are looking for conceptual similarities

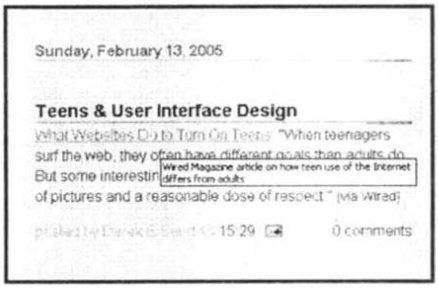
Source: [16].

Table 7. Using the Title Attribute

HTML Code

```
<a title=”Wired Magazine article on how teen use of the Internet differs from adults” href=”http://www/wired.com/news/culture/0,1284,66514,00.html”>What Websites Do to Turn On Teens</a>: “When teenagers surf the web, they often have different goals than adults do. But some interesting features draw them in: big type, lots of pictures and a reasonable dose of respect.” <span style=”font-size:85%;”>{via <a href=”http://www.wired.com/”>Wired</a>}</span>
```

How Title Attribute Appears in Browser



Designing the Neomillennial User Experience

The learner-initiated structure of the relationship requires the user to mediate their level of interaction within the hierarchy of the peer-developed community of users. As Boyd noted [18], the end user acts as a bridge mediating their interface with the social network. In an online learning context, this “bridge” provides students with the freedom to negotiate which social media will help them enhance their own experience, support their learning style, increase their range of skill, and ultimately meet their intrinsic learning goals.

While the use of animation, simulation, and other social media tools can greatly enhance the online user experience and provide students with opportunities for full social interaction within their learning community, it’s vital that their use be closely tied to the course learning objectives.

Simulations lend themselves to task- or skill-related objectives but are less effective in knowledge-based objectives. Animations, demonstrations, video instruction, or even some text-based media tend to be better for knowledge-based learning objectives [19]. Simulations and other participatory media also provide opportunities for experiential learning, which appeals to the active, “real world” sensibility of neomillennial learners.

Dede notes the influence of digital media on student learning, pointing to what he termed the "Napsterization" of education [11]. In this model, users have "personally tailored" learning paths, picking and choosing from multiple sources of media, resources, projects, or other curriculum content which they can then bundle together to meet their individual needs and learning styles.

Effective neomillennial user design should provide engaging content that allows the user to draw connections between the context of the learning objectives while utilizing multiple sources of Web-based media; maintaining the users' ability to mediate their level of communication within social networks, or similar interactive environments.

SOCIAL NETWORKING MEDIA AND THE ONLINE CLASSROOM

In the 1990s, as the digital age began to bloom, teachers were among the first to embrace the Internet and other first generation digital technologies (e-mail, Web quest, instant messaging, Web-based groups, and threaded messaging boards), finding creative and innovative ways to integrate these digital technologies in their classrooms.

Critics of e-learning often characterize online classrooms as neutral spaces devoid of human connection, emotion, or interaction with instructors or peers. However, effective use of social networking and media technologies provides course designers and instructors with the ability to interject emotion in the online space, thereby providing opportunities for students to make emotional connections with classmates just as they do in the "real time" world of the brick and mortar classroom model.

Clearly, the key to a successful online user experience is to help students find ways to construct relationships with their peers, while simultaneously meeting their neomillennial-based learning styles. A digital ethnographic study done by Goldman-Segall pointed out how these social media tools create a constructivist learning environment which allows people to build interpretations of their data and utilize their individual life experience, multiple intelligences, while still working as a part of a collaborative team [20]. Tosh and Werdmuller point out that students can use social networking to create their own learning and social communities [21]. These self-directed learning communities could then provide resources, increase engagement in the course content, as well as provide a "network of knowledge transfer."

There are many social media tools, including several on the horizon, which can be integrated into the curriculum to support learning and provide effective channels for content delivery in both synchronous and asynchronous learning environments. At the core of this new wave of social media tools are Weblog (blog) and other XML-based technologies such as Rich Site Summary (RSS) and MP3 feeds.

RSS

Rich Site Summary (RSS) technology is an XML-based format that provides the backbone for the distribution of Weblog, podcasting, and other content. RSS allows users to easily syndicate or publish their content for use by others. The benefit is the user's ability to pick and choose (subscribe) to a particular RSS feed and then have the content updated in real time. In this manner, RSS is an important tool to facilitate and support the "always on" learning styles of neomillennial students.

There are several free news readers available, including *Bloglines*, *My Yahoo!*, and *FeedDemon*. After a user subscribes to a RSS feed, the content (blogs, Websites, online community groups) automatically updates and is displayed in the feed reader. RSS readers also allow students to self-publish and share their content feed with members of their learning community. The use of RSS further supports neomillennial learning by allowing the user to select which content is relevant and then have it delivered directly to them for viewing at their convenience.

RSS feeds allow the instructor to have the student's homework or projects delivered directly to their aggregator, saving the instructor the time-consuming task of having to enter each student's URL in order to view their portfolios.

Weblogs and the 21st Century Classroom

Weblogs are a social networking technology that is particularly well suited for education because of their interactive, reflective, and collective qualities. Weblogs are excellent for project-based learning so valued in student-centered, constructivist learning environments.

The users' ability to connect with members of their learning community via synchronous or asynchronous media is an important consideration for the neomillennial learner. As stated before, their "always on" learning style is contingent on technology that allows students to develop and maintain a sense of connection with the group "on demand."

A study done by Tosh and Werdmuller discusses the concept of "deep learning through engagement" and focuses on how Weblogs (and other social networking media) can be used to create a "learning landscape" that allows users to actively engage in the learning process with their peers. In the same vein as Vygotsky and other social learning theorists, their "power in the process" hypothesis states that the development of optimum cognitive development is rooted in the social exchange of information on both "the individual and collective levels," resulting in "opportunities to build one's learning instead of just being the recipients of information" [21].

Weblogs, in particular, allow individuals to self-publish their thoughts and reflections while still participating in a collective environment. As students reflect on their own Weblog entries, read Weblog entries of their peers, receive feedback,

and network with their community of learners they are creating an environment for knowledge transfer to take place. In addition to providing students with an opportunity for reflective learning a Weblog by-product is an increased fluency in writing.

Weblogs as a Communication Tool

Tech savvy administrators are also using blogs as a tool to keep parents, teachers, and students informed of the things going on in their schools, both on a local and state level. Dr. Mark Stock, Superintendent of the Wawasee School District uses his Weblog as a way to keep stakeholders in the school district informed of pending legislation, delays in school construction, and other pressing matters [22]. The experiment has been so successful, that starting next year all principals in the school district will have their own Weblogs.

Weblogs as the "Second Generation" Web

Godwin-Jones explains that "First-Generation" Web tools were oriented around asynchronous and synchronous technologies, whereas the "Second-Generation" Web tools feature social, interactivity, and collective social engagement tools such as Weblogs, RSS, and wiki [23].

Will Richardson, Supervisor of Instructional Technology, Hunterdon Central Regional High School, researchers new social media tools available for educators. In *Blogging and RSS—The "What's It?" and "How To" of Powerful New Web Tools for Educators*, he states that "the promise of the Web as more than just a readable, searchable resource has been slow to be realized . . . until now" [24].

Richardson also cites Weblogs and RSS (Rich Site Syndication) as the prime modes of breakthrough learning by "redefining the way students and teachers use the Internet, turning them from mere readers into writers to the Web as well, and making it easier to filter and track the ever-growing number of resources coming online each day" [24].

Moreover, Richardson refers to RSS as "structured blogging" because they can supply "rich meta-data about Web-based resources, which can then be automatically retrieved and catalogued by RSS software" directly to the student [24]. Not only do neomillennial students expect that instructors use Weblogs as part of a course, as they continue to see corporations, politicians, and other organizations adopting Weblog technology, they also view acquiring Weblogging skills as a key skill set (Table 8)

Student privacy remains a key obstacle to the integration of the Weblog into many classrooms. These are valid concerns and are an issue that second generation Weblog providers are beginning to address. For example, Yahoo is currently beta testing a new (free) Weblog service, *Yahoo! 360*, which allows the user to control access to any and all parts of their blog.

Table 8. Student Perspectives on Blogging

Source	Comment
Synchronous course discussion	"One 'attitude' that might have changed for me regarding blogs, is that they don't necessarily have to be eloquently written" (personal conversation, March 1, 2005).
Course blog	"Other than using mandatory course-related academic discussion boards, I have never participated in this particular style of communication medium. It is necessary to become technologically informed and literate so thanks for providing this opportunity" (personal conversation, February, 2005).
Synchronous course discussion	"I think if there is a focus or topic to blog on then the impact on a learning community would be tremendous—a guided blog. This type of journaling would offer a variety of POVs (point of views) and foster a culture of learning" (personal conversation, March 2, 2005).

In addition, new self-publishing tools, such as *Blogbinders*, will allow students to transform their Weblogs into book format on demand. For all intents and purposes, the Weblog, as a learning medium, is in its earliest stages of development. However, as the technology evolves and as more people adopt the technology new, innovative ways will be developed to use the Weblog in the classroom.

TOOLS ON THE HORIZON: iPOD, PODCASTING, FLICKR, WIKI

Even as Weblogs, instant messaging, and other Web-based technologies become more mainstream, new synchronous and asynchronous social networking technologies are being developed and hold great promise to support student learning.

These burgeoning technologies are important because they address the needs of neomillennial learning styles and provide students increased opportunities for collective reflection, collaboration, and interaction without being tied to the constraints of physical space, while still addressing their "always on" learning styles.

Flickr

One of the main pitfalls of introducing new technology into the classroom (online or otherwise) is the risk of having the technology frustrate the user to the

point that it distracts them from their original learning goal. *Flickr* is important because its ease-of-use allows the student to keep their focus on acquiring new skills, building on existing knowledge while at the same time developing writing, software, and strengthening social ties within their learning circle.

While not originally developed as an education tool, *Flickr* and other social networking technologies have the ability to play an important part in student motivation, retention, and learning—especially in distributed learning environments. Social networking technologies and media are important tools because of their ability to foster interaction and communication between students. This is especially important in online learning communities, where students may have limited face-to-face time to build a support network with their peers.

The social networking aspect of *Flickr* effectively uses:

- Groups (both public and private)
- Tags (keywords)
- Notes
- Comments
- Slideshows
- Instant Messaging (FlickrLive)
- Photosets (albums)
- Email (FlickrMail)
- Real-time photograph posting

Students and instructors can dialogue via the group discussion board, where they can respond to threads started by members of the group. In addition, they can post comments below each individual photograph. In both instances, students are constructing new knowledge, while at the same time building and deepening human relationships with the members within their learning community.

Another key feature is the integration of *Flickr* with most of the major Weblog services, which easily allow students and instructors to upload photographs into their Weblog with a click of the "*Blog This*" button. *Flickr* also provides RSS support so that students and teachers alike can syndicate their photos into their course Web pages, Web logs, or e-portfolios.

- Architecture student takes a walking tour of a historic district and takes photographs of various architectural elements. He can then organize the photographs into a photoset and then use them as digital slides during an oral report to his class.
- A botany graduate student on a field research expedition takes photographs of different types of plant life found in the jungles of Costa Rica, and then includes these photo illustrations in her written report and/or research Web log. As a graduate teaching assistant, she holds an online help session in *FlickrLive* (IM) and uses her photosets as reference material for her students.

- A student can use the *Flickr* photo archive to illustrate a report on Africa. (A good example of the type of photographic resources can be found at: http://www.flickr.com/photos/18929289@N00/sets/71138/) In addition, the student can engage in deeper discussions and conversations via the *Flickr* discussion boards.

Flickr has partnered with Creative Commons licensing to provide a way for its community members to legally share content and use photographs for non-commercial use. Images are clearly marked with a Creative Commons license providing the standards for the way photographs may be reproduced or used, thereby circumventing potential digital copyright issues for both students and the school alike.

Apple iPod: Beyond Music

Duke University is an example of an educational institution that has embraced new, technology-based learning resources. In 2004, it distributed Apple iPods to all incoming freshmen to help encourage the use of technology in learning across all spectrums of campus life. Students use the iPods to download audio and text data and are preloaded with helpful university content related to freshman orientation and the academic calendar [25].

Students were also able to download course content including lectures, audio books, lessons, and music. Provost Peter Lange, Duke's senior academic officer, reports, "This iPod pilot program is an exciting new component of Duke's strategic plan, which seeks to use information technology in innovative ways within the classroom and across the campus" [25].

In April 2005, Duke University announced that it would not only continue the iPod program, but expand it to all class levels. While there were undoubtedly students who didn't use them for educational purposes, Duke officials were pleasantly surprised how many ideas the faculty came up with to use the iPods in their classrooms [26], and how receptive students were to using the iPod in an educational context. As one Duke University professor noted, "Students are comfortable with it. They use it without thinking" [27].

Students found innovative ways to use the iPod, including recording lectures, taking notes, and downloading audio files from their professor's course Website. For example, at Duke, engineering students used them to study sound waves while journalism students used them to record interviews [27].

The Duke iPod experiment has been closely watched by many in the higher education community and several colleges and universities will begin testing iPod technology in an education setting this fall [28]. Drexel University, for example, is providing iPods for students in the school of education. In addition to the iPod, Drexel is distributing the Pod2Go software, which allows students to turn their iPod into a PDA, receive over 1,000 news or other RSS content feeds, as well as the ability to read or write Word, RTF, or text files [29].

Podcasting: Download, Listen, Learn

Even universities that don't provide students with iPod hardware are utilizing this technology in the classroom by creating and distributing original content for their students through a *podcast*. A podcast is a MP3 file that can be automatically downloaded to a computer, iPod, or MP3 player through a podcast aggregator, which is based on RSS and XML technology.

Podcasting, or audioblogging, will allow teachers to easily publish (or *podcast*) lectures, photos (perfect for the art history or architecture student), or foreign language drills, along with a myriad of other course content. As instructors develop their own MP3 content, students will be able to subscribe to a course RSS feed and then automatically receive the content on their iPod. In a distance education context, podcasting could very well serve as a social support tool, since in many cases the learning community has very few, or limited, face-to-face interactions with each other.

While podcasting is a burgeoning technology, third party content is already becoming more readily available for download. One prime example is the BBC series *In Our Time* (a weekly series which investigates the history of ideas and debates their application in modern life), which provides podcasts, links, and reading lists [30]. Podcasts from reputable sources could easily augment the content in a traditional classroom setting, providing students with new and exciting ways to receive content and structure their learning on their own time and schedule.

Wiki

A wiki is a type of collaborative Website where members can add, delete, and change the content as needed. The first wiki was created in 1995 by computer programmer Ward Cunningham. He coined the term wiki for these Web sites after learning on a trip to Hawaii that the shuttle buses at the Honolulu Airport were called "wiki wiki," the Hawaiian word for "quick."

A variant of the Weblog, a wiki offers the same sort of collaborative experience for a group. Wiki's can be used to brainstorm on ideas, create "work-in-progress" drafts, organize content, and is a user-directed learning activity. Since wiki's are also easy to use and provide a high degree of interaction between participants, collaborative projects can be greatly enriched through the use of wiki's [31]. Because the wiki environment isn't bound by physical limitations it allows the conversations to flow in an organic manner.

The Wikimedia Foundation is a non-profit organization that maintains several wikis, including one of the most well known, Wikipedia, a Web-based collaborative encyclopedia project (Table 9). Since WikiMedia is an open-source technology, students can actively contribute to any of the WikiMedia projects. One possible curriculum application would be to have students form groups, conduct research on a topic of their choice, and then add their findings to the corresponding entry in Wikipedia.

Table 9 . WikiMedia Foundation

Wikipedia	**Wikipedia** is a Web-based, free-content encyclopedia that is written collaboratively by volunteers. Entries on traditional encyclopedic topics exist alongside those on almanac, gazetteer, and current events topics. Its purpose is to create and distribute, worldwide, a free encyclopedia in as many languages as possible. Wikipedia is one of the most popular reference sites on the Web, receiving around 50 million hits per day. Its articles are edited by volunteers in wiki fashion, meaning articles are constantly subject to change by anyone. Wikipedia contains approximately 1.5 million articles. As of March 2005 it contained over 95 active language editions. (http://en.wikipedia.org/)
Wikibooks	**Wikibooks** is a collection of free textbooks with supporting book-based texts that is being written collaboratively on this Website. The site is a WikiWiki, meaning that anyone, including you, can edit any book module right now by clicking on the edit this page link that appears in every Wikibooks module. The project was started on July 10, 2003 and there are 7660 modules that are being worked.
Wikiquote	**Wikiquote,** a free online compendium of quotations in every language, including sources (where known), translations of non-English quotes, and links to Wikipedia for further information! The English version of Wikiquote has 2906 pages so far with many thousands of quotations and proverbs.
Wikinews	**Wikinews** are a group of volunteers whose mission is to create a diverse community where citizens from around the globe (including you) can collaborate to report the news on a wide variety of current events. All stories on Wikinews are in the public domain. By making our content perpetually available for free redistribution and use, we hope to contribute to a global digital commons. Wikinews also aims to write stories from a neutral point of view.
Wiktionary	**Wiktionary** is a sister project to Wikipedia intended to be a free wiki dictionary (thesaurus, lexicon therein) in every language. Wiktionary can be used for: • explaining meaning of words, terms, and abbreviations • finding synonyms for words and thesaurus • translating from one language to another

Source: [32].

In an educational context, a wiki can provide a community of users in a asynchronous environment with a platform to collaborate on evolving ideas, concepts, or projects tied to course content.

Social Bookmarking

Social bookmarking applications (*Furl, Yahoo! MyWeb 2.0, BlinkList, del.icio.us*), are based on social networking, tags (a keyword or mental note), folksonomies, and collaborative knowledge sharing. As social bookmarking users search the Web they can easily save the Web searches, tag them with keywords and/or descriptions, and then depending on whether they have marked their links private or public, share their cache of knowledge with an online learning community.

What differentiates Web-based social bookmarking from the traditional folder-based bookmarking is that the community works as a collaborative team of information architects, assigning tags, structuring, and organizing the information in a manner that best suits them. The process of a group spontaneously categorizing information in a non-hierarchal manner is known as a *folksonomy* [32].

BlinkList describes tags as "multiple mental notes that might make sense, depending on what it is that you are saving." Since only you know what tags will help you find your data, you get to decide how to label and organize your content. While some social bookmarking sites will auto-suggest tags, ultimately the end user has the final word.

A click on a tag from a community tag cloud or doing a tag search allows users to find others who share common interests. You can then view what resources they are sharing with the online community and add the ones you find most relevant to your own bookmarking list. And vice-versa. *Yahoo! My Web 2.0* allows users to form private groups ("My Community"), wherein only members are allowed to view, share, and contribute links to the knowledge pool. This feature, like *Yahoo! 360* (Weblog), is noteworthy because it provides students an increased level of privacy.

Because social bookmarking is a Web-based tool, you can access your links and those of others in the community from any Web-enabled computer or mobile device. Most social bookmarking Websites also allow users to export and import RSS feeds for a specific category (tag), making it even easier for members to draw from and share information from the community knowledge pool.

Rooted in constructivist theory, social bookmarking is designed to act only as a facilitator, providing users with the tools to chunk, scaffold, and/or organize information in a format that best suits the user. In short, social bookmarking opens the path to learning by drawing on the strength of the community intelligence, social ties, and shared practice by providing a forum in which the information can be exchanged.

Flickr + BlinkList: A Dynamic Learning Duo

Here's an idea that provides an avenue for users with multiple learning styles to utilize two social software programs—*Flickr and BlinkList*—to meet their learning needs.

The Flickr Part

Use *Flickr* to create a (private) group, and then place a series of instructional screenshots in your group pool to assist users in learning a new software program (for example, *Dreamweaver MX*). Members of your group can use the *Flickr* group threads to discuss the configuration process, troubleshoot, and leave tips for others.

The BlinkList Part

Tag *Dreamweaver MX* articles and/or other Web-based resources with a specific *BlinkList* tag, which now becomes an *URL of resources* related to that software (in this case *Dreamweaver MX*).

The Social Part

Now post the tag link in your *Flickr* group and the *BlinkList* tag list becomes a specialized, organic, shared knowledge pool of community intelligence—a vital component of an (online) community of practice. Members of the learning community can also search the global *BlinkList* community tags for additional resources.

The Learning Part

What you have created is an (online) community that is able to draw from multiple social Web resources to meet a learner's intrinsic needs, while still providing opportunities to participate with their peers in a collaborative, social exchange of information. In a variation, you could use both ideas and link to *Flickr* and *BlinkList* from a course Webpage, Weblog, mlearning handheld, or content management system (CMS).

YackPack: The Social Life of Speech

YackPack is a social software product that allows users to record and send audio instant messages inside privately formed groups or "packs."

While there are other products that provide avenues for collaboration over the Web—most notably message boards, e-mail, and instant messaging—*YackPack* is among the first products to allow users to post asynchronous voice messages.

The ability to interject voice into an online space is important because it provides opportunities for members of a community to convey the expression, emotion, and intimacy embedded in human speech. The exchange of information, learning, and development of a community of practice is largely the product of social exchange.

These audio e-mails or voice messages provide a way for members of a community to develop social bonds, place information in a situated context, and support constructivist learning environments.

YackPack can provide audio-based learning and collaboration opportunities for students with multiple intelligences, physical, cognitive, or other issues which might preclude them from participation in a traditional online learning community.

The clean, easy-to-use interface will allow users to jump in and begin sending audio messages, without struggling to figure out how to use the technology. The combination of textual, visual, and auditory elements makes *YackPack* a powerful learning tool in online education.

CONCLUSION

The use of current and emerging social networking technologies offers neo-millennial learners the flexibility and ability to create learning communities, and revisit content as needed. These emerging technologies are clearly moving us in the education community closer toward Tim Berner-Lee's ideal of using the Web as "an information space through which people can communicate . . . by sharing their knowledge in a pool."

In this world of increased Web-based social interaction meeting the unique needs of neomillennial learning styles are the bottom line. Neomillennial students expect interactive, engaging content and course material that motivates them to learn through challenging pedagogy, conceptual review, and learning stye adaptation. This approach offers neomillennial learners flexible, self-paced, customizable content available on-demand (via RSS feeds). Interactive and engaging content motivates students to learn through the course materials and apply them according to their own intrinsic learning goals.

However, course designers should be careful not to use social networking for the sake of using social technology, and should keep in mind how the use of any type of technology element can support student learning—individually and as a collective group. In the 21st Century classroom, the neomillennial "always on" student will control the how, what, and when a task is completed.

Social networking media engages the user in the content and allows them to be included as an active participant as they construct a *learning landscape* rooted in social interaction, knowledge exchange, and optimum cognitive development with their peers.

DIGITAL RESOURCES

Digital resources are displayed in Table 10. Table 11 illustrates how online learning styles (in this case Howard Gardner's multiple intelligences), and social software technologies can work together to support learning and foster community and interaction in the online and blended classroom.

Table 10. Social Media Resources

User Experience & Instructional Design	
• Nielson Norman Group	www.useit.com
• Adaptive Path	http://www.adaptivepath.com/
• Jesse James Garrett	http://www.jjg.net/ia/
RSS Readers & Publishing Tools	
• Bloglines	www.bloglines.com
• Feedburner	www.feedburner.com
• FeedDemon	http://www.bradsoft.com/feeddemon/index.asp
• New York Times RSS Link Generator	
• My Yahoo!	http://myyahoo.com
• Google Reader	http://www.google.com/reader/things/tour
Weblog	
• Blogger	www.blogger.com
• Moveable Type	http://www.sixapart.com/movabletype/
• Yahoo! 360	http://360.yahoo.com/reg/whatis.html
• Live Journal	http://www.livejournal.com/
• Blogbinders	http://blogbinders.com/
Wiki	
• Wikipedia	http://www.wikipedia.org/
• Wikipedia Foundation	http://en.wikipedia.org/wiki/Wikimedia
• Kwki Kwiki	http://www.kwiki.org/
• PBwiki	http://www.pbwiki.com
Podcasting	
• Podscope	http://podscope.com/
• Odeo	http://odeo.com/account/betalogin
• Podcasting News	http://www.podcastingnews.com/
• BBC MP3	http://www.bbc.co.uk/radio4/history/inourtime/mp3.shtml
• Yahoo Podcasts	http://podcasts.yahoo.com
Social and Creative Networks	
• Flickr	www.flickr.com
• Creative Commons	http://creativecommons.org
• LuLu	http://www.lulu.com/
• OurMedia	http://www.ourmedia.org/
Instant & Voice Messaging	
• Google Talk w/VOIP	http://www.google.com/talk
• YackPack	http://www.yackpack.com
• Yahoo IM/VOIP	http://mesenger.yahoo.com
• Skype	http://www.skype.com/helloagain.com

Source: [32].

Table 11. Chart of Social Media and Gardner's Multiple Intelligence (MI)

	Social software	Resource
• **THINKING**		
Verbal-Linguistic: To do with words, spoken or written. People in this area are generally good at writing, oration, and learning from lectures.	• Self-Publishing • Wiki • Podcasting • Virtual Learning Environments (VLE) • RSS/ATOM • eMail	**Weblog/Self-Publishing** • Blogger • Type Pad • Yahoo 360 **Wiki** • Wikipedia • KwikiKwiki **Podcasting** • Odeo • iPodder • Yahoo Podcasts **VLE** • TI • Boddington.org • Moodle **RSS/ATOM** • Bloglines • FeedBurner • My Yahoo! **Instant Messaging** • YackPack • Yahoo IM w/VOIP • Skype
Logical-mathematical: To do with numbers, logic, and abstractions. Those who favor this intelligence generally excel in math and computer programming.	• Wiki • Asynchronous newsgroups • Social Bookmarking (organizing/structuring information) • iPod	**Wiki** • Wikipedia • WikiBooks **Asynchronous Newsgroups** • Yahoo! Groups • Google Groups **Social Bookmarking** • BlinkList • Furl • Yahoo! MyWeb 2.0 **iPod** • Pod2Go

Table 11. (Cont'd.)

	Social software	Resource
• **SENSATIONAL**		
Visual-spatial: To do with vision and spatial judgment. Such people excel in art or engineering.	• Photo Social Networking • Create Multimedia • Gamers • Instant Messaging	**Photo Social Networking** • Flickr • Snapfish • Picasa **User Generated Multimedia Content** • LuLu.com • OurMedia.com • Apple iMovie • Odeo.com • Creative Commons **Gamers** • Funbrain.com • PBSkids.com **Instant Messaging** • AOL IM • Yahoo IM • Google Talk
Body-kinesthetic: To do with coordination, movement, and doing. These people tend to learn better by doing things and interacting.	• Synchronous Learning Communities • Social Bookmarking • Online Gamers • Instant Messaging • Multimedia • Aggregator (RSS)	**Synchronous Learning** • Tapped-In • Boddington **Social Bookmarking** • BlinkList • Furl • De.lico.us **Online Gamers** • Funbrain.com • PBSkids.com **Instant Messaging** • Hello! (Google) • Yahoo IM • AOL IM • Meebo

Table 11. (Cont'd.)

	Social software	Resource
• **SENSATIONAL (cont'd.)**		
Body-kinesthetic (cont'd.)		**User Generated Multimedia Content** • LuLu.com • OurMedia.com • Apple iMovie • Odeo.com • Creative Commons **Aggregator** • Bloglines • BlinkList (export) • My Yahoo! • Google Reader
Auditory-musical: To do with hearing. Music helps them work better, and helps them learn better from lectures.	• Podcasting • Audio-blogging • Audio Books • iPod • Voice Messaging	**Podcasting** • Odeo • iPodder **Audio-Blogging** • AudioBlogger • AudBlog **Audio Books** • Audible.com • iTunes **iPod** • Pod2Go (record lectures) **Voice Messaging** • YackPack

Table 11. (Cont'd.)

	Social software	Resource
• COMMUNICATIONAL		
Interpersonal-communications: To do with interaction with others. Tend to learn better in discussions.	• Synchronous Learning Communities • Instant Messaging w/VOIP • Asynchronous Newsgroups • Wiki • Self-Publishing	**Synchronous Learning** • Tappin-In • Instant Messaging **Instant Messaging** • Skype • ParaChat • Yahoo IM • Google Talk **Asynchronous Newsgroups** • Yahoo Groups • Google Groups • HaloScan • YackPack **Wiki** • Wikipedia • Kwiki Kwiki • PB Wiki
Intrapersonal-communication: To do with oneself. Tend to learn better in self-regulated learning activities.	• Newsgroups • Social Bookmarking • Wiki • Podcasts	**Newsgroups** • Google Groups • Blackboard **Social Bookmarking** • BlinkList • Yahoo! MyWeb 2.0 • Furl **Wiki** • Wikipedia • Social Text **Podcast** • Odeo • Podcaster

Table 11. (Cont'd.)

	Social software	Resource
• **NATURALIST**		
Nature: People in this category are not only good with life but also with the various functions of it and mechanisms behind it. People in this group tend to end up in biology, or environmental oriented careers	• Newsgroups • Photo Social Network • Self-Publishing • Social Bookmarking • Multimedia • Podcasting • iPod	**Newsgroups** • Flickr • Yahoo Groups **Photo Social Networking** • Flickr **Self-Publishing** • Flickr (RSS Feeds) • Blogger • OurMedia.com **Social Bookmarking** • Furl • BlinkList • MyWeb 2.0 **Multimedia** • LuLu.com • OurMedia.com • Apple iMovie • Odeo.com • Creative Commons **Podcasting** • Odeo.com **iPod** • Pod2Go (import RSS Feeds)

MI Descriptions Source: (http://en.wikipedia.org/wiki/Multiple_Intelligence)

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