

Technology-Enhanced Education and Millennial Students in Higher Education^[8]

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Abstract

Today's higher education students are more technologically savvy than past generations. For metropolitan universities this phenomenon is particularly important as they attempt to provide an engaging and rigorous environment for these digital natives who view their world somewhat differently than other generational cohorts. Because of contemporary student characteristics, the authors focus on the possible added learning value that technology can bring to higher education in the metropolitan environment.

Metropolitan Universities and the Changing Landscape of Higher Education

After land grant institutions, metropolitan universities represent the next great movement in higher education because they provide students with educational access at an unprecedented level. They accomplish this strategic goal by removing obstacles for students and by providing a variety of technology-enhanced opportunities, most recently through Web-based courses and programs. Organizations such as the Sloan Consortium chronicle the effect of these largely asynchronous learning platforms through a series of metaphorical pillars: access, learning effectiveness, student satisfaction, faculty satisfaction, and cost effectiveness (<http://www.sloan-c.org/effective/index.asp>). As a result, the impact of technology on higher education is impressive. For example, the results of the latest Sloan-C survey show that 3.2 million students took an online course in the past year (Allen and Seaman 2006). In its latest survey of undergraduates and information technology, the EDUCAUSE Center for Applied Research (ECAR) reports that the majority of students credit information technology as the contributing factor for enhancing their communication skills, improving their collaboration ability, facilitating interaction with instructors, and expanding control of their learning environments (Salaway et al. 2006; Kravik and Caruso 2005).

Metropolitan universities focus on preempting time, space, and cost barriers to obtain an education. This focus is a benefit of online and blended education. However, predominant course management systems can be out of sync with personal technologies that students use for communication and entertainment, thus creating discordance with the current structure of higher education. The following statement appeared in a recent preliminary report of the task force on the general education

requirement at Harvard University:

“Too many students in liberal arts colleges graduate having only a passing acquaintance with the science and technology that will shape their lives, both personally and as members of the public” (Kosslyn et al. 2006, 5).

By incorporating technological pedagogies into their strategic planning, however, urban universities step up to that challenge, making education an interactive process that empowers their students to learn well beyond the boundaries of traditional classrooms. In this article, we explore several issues associated with education in a technology-intensive environment on metropolitan campuses: existing research, the millennial generation and opportunities, challenges for students in technology-enhanced classrooms, the generational presence on campus, and student satisfaction.

What the Literature Says...

Internet use among adults has reached an all-time high with 73 percent of Americans, or about 147 million adults, using the Web in 2006 and 42 percent having broadband connectivity (Pew 2006). On college campuses, nearly 88 percent of students report having a computer with 41 percent owning a laptop (Student Monitor 2005). They are more technologically savvy (Lorenzo and Dziuban 2006) and diverse than ever before with the trend for previously “non-traditional” students quickly becoming the norm. During 2003-2004, 33 percent of undergraduates reported being employed full-time and 21 percent reported being married. These characteristics deviate from the students of past generations who were able to devote much more time to higher education. Most contemporary students have to manage the conflicting demands of their work, family, and educational lives.

Metropolitan universities are recognizing that today’s students are older and employed, responding by offering options that include blended and online courses that maximize access and accommodate their lifestyle complexities (Diaz 2002; Whiteman 2004; Muse 2003). Courses that replace all or part of face-to-face class time with asynchronous instruction increase flexibility, allowing students to experience the best of both instructional modalities. Typically, satisfaction is high in technology-enhanced course environments where, in large scale surveys and focus groups, students express a preference for the flexibility provided by reduced face-to-face contact or learning at a distance (Moskal et al. 2006; Leh 2002; Willett 2002; Dziuban, et al. 2005; Bold 2005).

Characteristics of a Successful Web Course

While the reduction of face-to-face class time in online and blended courses provides a more convenient way for students to fit an education into their lifestyles, this approach can offer substantial challenges. With instruction provided online, students need to become more responsible and more proactive. Also, lack of face-to-face contact can leave some learners feeling isolated and ambivalent, particularly those new to this modality (Arbaugh 2004). Students, however, consistently report a higher satisfaction level for online and blended courses that incorporate interactive learning strategies involving such things as learning communities, chat rooms, postings, and ready contact

with instructors (Kim and Moore 2005; Bollinger and Martindale 2004; Bold 2005; Lorenzetti 2005).

Course design is a critical component for successful online learning (Shea, Pickett, and Pelz 2003) with students preferring consistency across the instructional elements of their courses and programs (Lao and Gonzales 2005; Northrup 2002; Young and Norgard 2006). In addition, they react favorably to courses that foster evolving learning communities (Shea and Li 2006; Shea et al. 2005; Sener and Humbert 2002; Lao and Gonzales 2005). They value interaction with each other and timely interactive feedback from their instructors (Morgan 2001; Prendgast 2003). Irrespective of modality, students rate instructors higher if they perceive their teachers as able to facilitate learning and communicate ideas and concepts effectively (Dziuban, Cook, and Wang 2004). Good instruction is good instruction—Web technology or not.

The Millennial Generation on Metropolitan Campuses

Friedman (2005) argues that the United States' economic advantage is diminishing because of converging global perspectives and emerging technologies that create a Web-enabled playing field with new participants from all over the world as well as horizontal collaboration. According to Friedman, major progenitors of the convergence involve digital, mobile, and personal technologies—a phenomenon he calls “the steroids.” A casual walk across any metropolitan campus will show a majority of students connected to “steroids” in some way. Cell phones, iPods, MP3 players, and personal computers facilitate students' interactions with each other, their courses, and the information they need for assignments. They “Google” for information, consult Wikipedia, participate in wikis and blogs, broadcast and tune into YouTube, have RSS feeds, meta-tag, benchmark, and get their news from Google news (<http://news.google.com/>), Digg (<http://digg.com/>), and Technorati (<http://technorati.com/>). They have profiles on Facebook and MySpace and evaluate their teachers on ratemyprofessor.com. Most student centers offer continuously playing television screens, video games of all varieties, and kiosks where students can register for several semesters or obtain instant transcripts. Residence halls provide wireless access so that on any given day one can find undergraduates engrossed in virtual games with players from all over the world. Students participate in trans-media storytelling with films such as “The Matrix” and spoiler communities surrounding television reality shows (Jenkins 2006). The digital generation makes its appearance on metropolitan campuses with an impact that leaves faculty and administrators scrambling to keep pace.

Various authors identify these young people with different prototype designations: millennials (Howe and Strauss 2000), the net generation (Oblinger and Oblinger 2005), digital natives (Prensky 2001) and so on, all of which reflect characteristics that impact their lives and those of their instructors. On that stroll across campus, we see any number of these students using their laptops with at least three windows open, listening to their iPods, and text messaging on their cell phones. In class, their laptops are open so they can multitask in the same way, simultaneously connected to multiple resources. In interviews at the University of Central Florida and the University at

Albany, students tell us that they start surfing as soon as the lecture gets boring. This behavior relates to what Jenkins and others (Jenkins et al. 2006) call affiliation in formal and informal media communities, expression in creative formats, collaborative problem-solving, and circulation by customizing the flow of information (e.g., podcasts). According to Jenkins, the new generational learning skills are play, performance, simulation, appropriation, multitasking, distributed cognition, judgment, trans-media navigation, networking, and negotiation. These learning styles reflect this generation's preference for graphics first vs. text, learning by fantasy vs. reality, and traversing multiple technologies on a daily basis.

While there is consensus about the net generation student's affinity for mobile technologies, there is some disagreement about their personal and social characteristics. Howe and Strauss (2000), for example, characterize these young people as the most sheltered generation in history assuming society will provide any and all support they need. According to them, this self-perceived status transforms into an assumed ability to succeed both personally and financially. They follow social norms that demonstrate civic responsibility, provide service to their communities, and follow the rules. In direct contrast to Howe and Strauss (2000), Twenge (2006), who terms these young people "Generation Me," portrays them as believing that the individual is of utmost importance, making them more self-absorbed than any other cohort in history. She describes them as discounting the opinions and values of others and, therefore, much more likely to disregard societal norms.

Howe and Strauss (2000) see millennials as achieving teens and adults who feel the pressure to succeed and contribute to the solution of societal problems. They assume that their academic and extracurricular achievements foreshadow their eventual success. Twenge (2006), however, describes them as abandoning their excessive self-confidence as they approach late adolescence, believing that they should be enabled by who they are, not what they accomplish.

The millennial generation is complex and presents an array of opportunities and challenges for higher education. Contemporary students' technology skills reflect individual empowerment so they are able to interact, collaborate, and retrieve information in a seamless fashion leaving other generations on campus flummoxed. Because of their community commitment, metropolitan universities respond to the technological rhythms of today's college population with effective learning strategies even as we anticipate students that Dede (2005) terms "neo-millennial learners." Whether the net generation is special, achieving, and committed or self-absorbed, isolated and cynical, metropolitan universities can provide them with vibrant, exciting, and challenging environments. A major contributing factor to students' success is the continual adaptation of technology to the learning environment.

Challenges for Technology-Enhanced Education

One primary reason students express satisfaction with blended and fully online courses is that these modalities reduce the opportunity costs for obtaining an education, thereby making it easier for students to achieve a degree. Conversely, some of these students voice a number of challenges in the same environment. Experience teaches us that some of the most common issues involve ambivalence over the loss of face-to-face class time, learning inefficiency created by technology problems, reduced instructor assistance, and an increased workload that can be overwhelming.

Earlier in this article, we cited the multitasking behavior of net generation students as a possible learning strength. However, not everyone concerned with education agrees with that proposition. Johnson (2006), for example, considers multitasking to be a superficial behavior that precludes many deep learning experiences. Stone (Torkington 2006) refers to this continuous partial attention as the disease of the Internet age remarking,

“We are so accessible that we are inaccessible. We can’t find the off switch on our devices or on ourselves....We want to wear an iPod as much to listen to our own playlist as to block out the rest of the world and protect ourselves from all that noise. We are everywhere, except where we are physically”
(Friedman 2006, A27).

Based on this, Friedman (2006, A27) proposed a post modern opinion editorial entitled, “A woman driving her car while on a cell phone ran over a man jogging across the street while listening to his iPod.”

Rago (2006) contends blogging, another highly praised affectation of Internet learning, rarely purveys considered or organized thought. He argues instead that blogs feature endless rehashing of arguments and opinions developed elsewhere with a noticeable absence of rational thought. His contention is that a climate of unmediated informality dominates blogs, in which authors pronounce rather than attempt to persuade and feature non-vetted instantaneous opinion.

However, blogs in higher education can be genuinely transforming where students actively participate in the instruction and co-creation processes, assuming much of the responsibility for the learning environment. Ganley (2007) and Sawhill (2007) provide excellent examples of higher order learning and creativity using blogging in creative writing and language learning. Lorenzo (2007) indicates that the ostensible loss of control with blogs results in learning committees where reflective practice becomes the instructional platform, reenergizing class environments.

All change involves opportunity costs that require a careful analysis of comparative advantages; technology-enhanced education is no exception. Successful students and faculty members in online learning must stay connected, be comfortable with a change in role expectations, embrace participatory education, and participate in co-creation within a dynamic educational environment.

Generational Representation in Technology-Enhanced Learning

We have discussed the millennial generation at some length in this article, but other cohorts also appear on metropolitan campuses. Table 1 presents the generation distributions in online and blended courses for over 115,000 enrollments in a seven semester period at the University of Central Florida from summer 2004 to summer 2006. One may observe that baby boomers (born from 1946-1964) and Generation X (born from 1965-1980) populate the online learning environment as do younger learners. The mature generation (born prior to 1946) does have a presence on campus, but represents such a small percentage of the student population that we have not considered them for analysis in this study. Quite probably their appearance in online learning is worthy of a separate study, however.

Table 1 demonstrates that if we were to draw one person at random from the online course population there would be a 75 percent chance that he or she would be a millennial student. In the blended population that probability increases to .81. Table 1 demonstrates that if universities chose to respond to the learning characteristics of their present online student population, then that response would necessitate accommodating the immediacy of the net generation.

Table 1				
Registrations in Online and Blended Courses by Generation*				
	Online		Blended	
Generation	N	%	N	%
Millennial	60,258	75	28,828	81
Gen X	12,591	16	4,145	12
Baby Boomer	7,089	9	2,695	8
*Percentages rounded				

The generational distributions by course level for online and blended course in Table 2 demonstrate that millennial students populate the vast majority of lower and upper level undergraduate courses for both modalities and represent almost half of the graduate courses registrations. A millennial student is approximately 13 times more likely to appear in a lower undergraduate class than a Generation X student and 46 times more likely than a baby boomer; the trend is similar for upper undergraduate studies. In graduate studies, millennial students appear 1.5 times more often than a Generation X learner and twice as often as a baby boomer. These data demonstrate that digital learners are not just a lower undergraduate phenomenon, but have already permeated all levels of higher education impacting teaching and learning even at the graduate level.

Generation	Lower Undergraduate		Upper Undergraduate		Graduate	
	N	%	N	%	N	%
Online						
Millennial	9,243	91	45,412	79	5,603	46
Gen X	708	7	8,235	14	3,613	30
Baby Boomer	237	2	3,958	7	2,894	24
Blended						
Millennial	12,984	98	12,283	82	3,561	48
Gen X	220	2	1,753	12	2,172	29
Baby Boomer	73	0.5	932	6	1,690	23
*Percentages rounded						

Satisfaction with Online and Blended Education from the Macro Level

Table 3 presents the student satisfaction distributions with fully online and blended courses for over 1,000 students. The data indicate that slightly more than half (52 percent) the students who have taken fully online courses express very high satisfaction, while 43 percent of the respondents in the blended environment evaluate their experience with a very satisfied response. Table 3 indicates that very few students are dissatisfied with online learning in either modality. However, these findings demonstrate that university students are more positive toward their online experience than toward blended learning. Also, these data show greater student ambivalence toward blended learning. We (Dziuban, Moskal, and Futch 2007) contend that the extreme ends of these Likert scales (Very Satisfied and Very Dissatisfied) represent non-ambivalent responses and that the second most extreme points indicate a lesser degree of satisfaction or dissatisfaction, indicating students have some ambivalence toward online and blended learning. In our judgment, the middle scale point does not represent neutrality, but more accurately designates genuinely ambivalent feelings toward learning online.

Level of Satisfaction	Online		Blended	
	N	%	N	%
Very Satisfied	587	52	359	43
Satisfied	354	31	311	37
Neutral	95	8	101	12
Dissatisfied	75	7	58	7
Very Dissatisfied	28	3	15	2
*Percentages rounded				

Table 4 presents the non-ambivalent, very satisfied percentages for the generational cohorts. For fully online courses, the satisfaction levels are monotonically decreasing across the generations from baby boomers to millennial students with the millennials showing a 14 percent less positive rating of their online experiences than the boomers. The blended course format produces a similar, but less dramatic satisfaction pattern with baby boomers being 8 percent more satisfied with their blended learning environment than the millennial students. Student satisfaction for each generation is higher for online courses than it is for blended learning.

Table 4				
Non Ambivalent (Very High) Satisfaction Levels for Online and Blended Courses by Generation*				
	Online		Blended	
Generation	N	%	N	%
Millennial	257	45	196	39
Gen X	213	58	104	48
Baby Boomer	117	59	59	47
*Percentages rounded				

Table 5 presents data that portray non-ambivalent (very high) student satisfaction toward online and blended learning by experience with each of the modalities—ranging from having taken one or two courses to completing five to six sections. For the online environment, experienced students who have taken at least five courses are 19 percent more likely to indicate satisfaction than novices who have taken only one or two courses. A different pattern emerges for blended learning. The mid-range group shows the highest satisfaction levels, followed by novices, with experienced learners responding least positively. However, the differences between experience levels are much less dramatic in the blended environment.

Table 5				
Non-Ambivalent (Very High) Satisfaction With Online and Blended Courses by Experience Level*				
	Online		Blended	
Experience Level	N	%	N	%
(1-2) Novice	199	43	204	42
(3-4) Persistor	133	49	109	46
(5-6) Experienced	262	62	52	39
*Percentages rounded				

The Student Narrative

The authors examined student narratives to clarify the millennials’ lower satisfaction rates, greater ambivalence with blended courses, and the experience level disconnect between satisfaction with the two modalities. A series of focus groups, with students

engaged in online and blended formats, concentrated on the reasons for their satisfaction or dissatisfaction with learning in the Web environment. What is indigenous about satisfaction with the online environment? A number of studies (Bold 2005; Dziuban et al. 2004; Kravik and Caruso 2005; Rivera and Rice 2002) cite the terms “convenience and flexibility” as the primary reasons for students valuing these course formats. In most student focus sessions, those two terms surface immediately as respondents use them interchangeably followed by clarifying statements such as: better scheduling options, reduced logistical demands for attending class, and the instructor responding to my lifestyle demands, among others.

On the surface, convenience and flexibility appear intuitively obvious and straightforward, but they foreshadow a much more complex student satisfaction profile. As focus groups play out, students develop an informative subtext. That narrative describes an enabling constellation of course characteristics that leads to learner satisfaction in the metropolitan online environment. The study funded by the Alfred P. Sloan Foundation at the University of Central Florida and the University at Albany, identifies some preliminary reasons why students gravitate to what the Sloan Consortium terms Asynchronous Learning Networks (ALNs).

Students’ willingness to engage in online and blended learning stems from their perceptions that these formats:

1. Reduce ambiguity by providing more defined learning environments with fully developed expectations that minimize anxiety and the disengagement that results from it.
2. Facilitate an authentic sense of student value by creating an environment that fosters recognition, reward, and respect.
3. Reduce ambivalent feelings toward higher education (not to be confused with ambiguity), that result from their perceived lack of relevance, mixed beliefs that face-to-face courses are the “gold standard” for education, and their diminished sense of cohesiveness in an increasingly pluralistic educational landscape.
4. Help them understand the rules of educational engagement that they perceive as fairer than those in more passive learning environments.
5. Increase the possibility that they experience individually responsive learning environments.
6. Increase the quality and speed of their interactions with peers and instructors.
7. Offer freedom from excessively large face-to-face sections that diminish their opportunities for creativity, engagement, and empowerment.

On the Other Hand...

Modern psychology teaches us that every positive experience has a negative possibility lurking in the background. Although the many positive components for technology-enhanced learning offer potential for transforming higher education, these learning environments can be quite fragile and derail easily. For instance, overly defined and restrictive rules of engagement can lead to robotic student behavior, especially when they feel ambivalent about a course and would rather just “go through the motions.”

Another less positive experience can come from an overly responsive environment that reinforces the dependent behavior that stifles self-initiated learning. Unfortunately, the freedom that students experience in online learning offers the possibility for them to conclude that there is little added value in face-to-face interaction, thereby making the erroneous assumption that expediency should be the primary consideration in learning. These counter examples validate theories that advocate offering a balanced online learning environment that realizes the greatest potential for student satisfaction (Garrison 2005). Without that equilibrium, the positive potential for online learning can be traduced into a blueprint for a diminished educational experience. Each one of the characteristics of an effective course must be present in the proper proportions. Failure to accomplish any one of them can result in a less satisfied and more disengaged student population.

The Role of Metropolitan Universities in the Digital Generation

Metropolitan universities will continue to bear the burden for providing a rigorous and accessible education to a population of students growing in size, diversity, complexity, and sophistication. That challenge is substantial and is being met by incorporating technological learning platforms into teaching and learning, not only in the classroom, but also in co-curricular and social aspects of campus life. On metropolitan campuses, traditional broadcast models of teaching are giving way to co-creation (Lorenzo, Oblinger, and Dziuban 2007), with both students and teachers using technology to become active participants in the creating and sharing of knowledge. Although not all students in higher education fit the millennial profile, they are the driving force on metropolitan campuses and understand that technology provides them with choices, freedom, and power. The concept of “a course” is changing dramatically when traditional boundaries blur to the point where today’s class presentation is tomorrow’s video on YouTube. Staid traditions like the library are giving way to notions such as Library 2.0 (Casey and Savastinuk 2006) and Web 2.0 (O’Reilly 2005), where students no longer simply find information. To function effectively in the growing morass of virtual information, students must become information fluent by developing proficiency in information literacy, technology literacy, critical thinking abilities, and communication skills that enable them to adapt to an employment environment that demands knowledge workers (<http://www.if.ucf.edu>). In modern society, we expect graduates to gather, evaluate, and use information effectively in a constantly changing environment. To make that happen on metropolitan campuses, instructors and students must integrate technology into learning.

Technology and the media are the most dominant developments affecting the mental capacity of young people on university campuses today. Those technologies are growing in complexity, demand, and reward. This is true of games, television, the Internet, and films (Johnson 2006). Contemporary technology engines allow students to rewind and replay; they expect to be able to do the same with their courses. Online and blended formats enable students to transport their classes with them wherever they go.

Given the complexities of the popular culture, metropolitan universities are the appropriate laboratory for understanding generational influences on students, the impact of technology on learning (both positive and negative), the resolution of ambiguity in a climate of uncertain mediation, and the establishment of a culture of information fluency in higher education. Organically, metropolitan universities represent a strategic initiative in higher education that responds to the growing pluralism in society. They teach us how to engage students; how to build assessment protocols that are interpretive, authentic, and contextual; and how to establish educational environments that value students, their culture, their participation, and their creativity. Ultimately, each student must build his/her own personal geography of learning and decide how he/she will integrate the components of information fluency into their learning styles. Stephen Hall (Harmon 2004) calls this process “orienting.” Students design personal landscapes for the tools, process, and values that they carry into the learning environment. According to Hall, the coordinates for these spaces are unique to each individual; each student builds a private learning protocol in a public forum. This is the fundamental value-added feature of a metropolitan education.

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