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## Millennial E-Learning Systems and Their Academic Performance in Mathematics

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### ABSTRACT

This paper uses digital and technologically enhanced learning processes to present the millennial generation's E-learning systems in mathematics courses, attitudes, and academic performance. It aims to determine the e-learning systems of college students in their mathematics classes and their effects on their academic performance. This study used qualitative and quantitative methods and descriptive–correlational and descriptive-comparative research methods involving 72 college students taking p mathematics courses. The results show that regarding e-learning materials, the majority strongly agreed with preferred using Technologies to solve problems using application software, web assignments submitted on yahoo chat, emails, messengers, and solving problems in class using a calculator's math lab and math way. Millennial e-learners prefer Online based learning, Video conferencing, yahoo groups, group chats, messengers' groups, video calls, emails, Twitter, Instagram, Math software, and online chat. Students' academic performance improved when the e-learning system was used, and it was found that their academic grades differed significantly when e-learning systems over traditional learning systems. The E-learning style is recommended in teaching mathematics courses.

### INTRODUCTION

The Millennial generation is the most computer-literate (Lancaster & Stillman, 2002). also known as the Net Generation, they were raised in an era of instant access (Coomes & DeBard, 2004; Lancaster & Stillman, 2002). Their learning and communication style is through multimedia; their communication forms are text messaging, instant messaging, and cell phones. Education has even moved to web-based tools such as the web, online courses, online journals, and downloads. Millennial generation college students' attitudes were measured regarding the learning style they use, prefer, and which method has successfully resulted in their acquiring and retaining knowledge. The teacher who stands in front of a classroom of Millennials or any students has been concerned with whether and how their students learn the material (Marías, 1970; Smith & Clurman, 1997). There may even be a question if the student is genuinely taking notes on the shielded black box on their desk or simply checking on the plans among friends for the evening's activities. Millennial learners have a more global orientation and understand the need for interconnectivity worldwide (Alch, 2000). Millennials are p generation that merely depends on technology (Pelton & True, 2004). that has experienced real-time games and reality television MTV (music television), which has been around their lives (Coomes & DeBard, 2004). According to generational consultant and researcher Cam Marston (2005), the Millennials "feel entitled to life's rewards without paying their dues," and they have had less free time than any other generation (Howe & Strauss, 2000). They are said to have strict parents (the over-involved Boomer parent) (Sacks, 2006).

The Millennial has been described as techno-literate, techno-savvy, technologically fluent, and even dependent on technology (Lewis, 2003; McGhee, 2006; Zemke, Raines, & Filipczak, 2000). In a nationwide survey of 1,171 college students, 97% of these Millennials owned cell phones, s and over two-thirds had sent text messages on them. Over half of the students in the study said that "instant messaging was their top choice of communication" (McCasland, 2005, p.8). Millennials are said to be experiential, engaging, and interactive (Skiba, 2006). They download podcasts and music, can take photos with their phones, and text message one another in their created messaging language (McCasland, 2005). Millennials have a "curious blend of collaboration, interdependence, and networking to achieve their ends" (Alch, 2000), and their technology seems to bring and keep them together. Their creativity and investigation of electronic media, expressions, strong views and the need for independence without restraint are noted facets of their generation (Alch, 2000). Their style is high-tech and highly networked, and Millennials "will want to be able to work quickly and creatively, and they want to do it their way" (Zemke, Raines, & Filipczak, 2000). Millennials' most widely used cell phones and text messaging (McCasland, 2005). Instant messaging, text messaging, and chat rooms may be essential to urban and suburban millennial connectivity (Cox, 2004). The experiences of connectivity through text messaging, instant messaging, blogging, and video gaming, socializing through technology such as Camera phones, e-mail, instant messaging, and chat rooms, many 'buddies' on their 'buddy list' (chat mail contacts) have never been met in person (Cox, 2004). Millennials are accustomed to relating and collaborating

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with others through technology. They like teamwork but prefer collaborating and working with their generational peers (Lancaster & Stillman, 2000; Skiba, 2006). Also described as self-reliant and independent, Millennials are known for their ability to create with technology (Marston, 2005; Martin, 2005). Millennials communicate technology (Murray, 2004, p. 106). Considering the characteristics of the Millennial generation, there is some concern about the effects on their learning process. “Many young people today are accustomed to watching TV, talking on the phone, doing homework, eating, and interacting with their parents simultaneously” (Frاند, 2000). Typical multitasking behavior may have shortened their attention span and caused them to lack critical thinking skills and introspection (Murray, 1997). Although there may be a concern for Millennials’ analysis of the material, there is confidence in their media usage that can be a tool for learning. Constance Yowell, MacArthur Foundation’s director for digital media, knowledge, and education, noted that digital technology, “a peer-driven learning,” is very familiar to this generational cohort as “young people are way ahead of the adults in understanding how to use these tools” (Trei, 2006). Yowell asks, “in 10 to 15 years, will kids coming into public education be thinking, behaving or acting differently, or expecting different things because they have been engaged in digital media?” (Trei, 2006). According to the foundation’s statistics, they will be, as nearly seventy-five percent of young people use instant messaging and eighty-three percent play video games (Trei, 2006) – a particular indication of changed attitudes towards learning and interaction.

**METHODOLOGY**

This paper will address the questions regarding the learning preferences of the Millennials. What are Millennials’ preferences for learning methods? Which teaching format is preferred? How do they try to improve their learning? Students’ mathematics courses were invited to participate in a survey. Approximately 72 students take part in the survey. Of the responses from the 72 surveys

returned, 72 were Millennials and used for this study. The response rate was less for some items that were skipped/missed, but all surveys used included the respondents’ demographic data.

The survey instrument included some items adapted from a previous study by (Messines *et al.*, 2007) that focused on college students’ preferences for learning class material, specifically for active learning in large classes. Additional created items included locations of studying and attitudes toward Service-Learning work that is not a part of this paper. Although large enough to generalize attitudes, the sample size of Millennials may reflect a distinguishable different state university. The sample also only included those Millennials in the advanced stages of education, an opportunity only available for some Millennials. Within this cohort, there are still some who “have notes regarding access to technology (Brownstein, 2000). The study also only reached those with Internet access. Web-based surveys may not get responses from those uncomfortable with technology (Shannon, Johnson, Searcy & Lott, 2002).

**RESULTS**

Of the 72 respondents, 44 were female, and 28 were male. This disparity is not surprising considering the school’s demographics. Only about 39% of students are male. In response to the question, “What study methods help you to understand a course topic better?” students show that listening to recorded lectures dominates among strongly agreed study methods, adding notes in class to printed PowerPoints slides are decided by the majority, typing notes in a course in power points disagreed understanding materials before grace is vehemently opposed.

In response to the question “What types of electronic resources do you use for your assignments?” google was rated as frequently used, e-e-journals websites, blogs/wikis, Wikipedia, and you tubes were rated as seldom used, and e-books and emails were ordered do not use.

The meaning of 4.92 was noted for “always” Fa Facebook, YouTube (4.49), and Wikipedia (3.94) were registered as most often used, and Myspace, online library, and other

**Table 1:** Study methods of the millennial math Learners

What study methods help you to understand a course topic better				
	SA	A	D	SD
TNC	15 20.83%	20 27.78%	26 36.11%	11 15.28%
ANCPSS	20 27.78%	25 34.72%	19 26.39%	8 11.11%
TNCPS	18 25.00%	18 25.00%	25 34.72%	11 15.28%
RMBC	10 13.89%	20 27.78%	8 11.11%	34 47.22%
RMA	15 20.83%	16 22.22%	22 30.56%	19 26.395
LRL	25 34.72%	18 25.00%	15 20.83%	14 19.44%

**Table 2:** Preferred Electronic resources of millennial students

	What types of electronic resources do you use for your assignments?					Remark
	SA	A	D	SD	X	
E-books	10	20	22	20	2.28	DU
E-journals	19	12	33	8	2.58	S
E-mails	12	21	29	10	2.49	DU
Web	19	42	10	1	3.10	S
blogs	18	17	28	9	2.61	S
Google	65	3	2	2	3.82	F
Wikipedia	27	23	16	6	2.99	S
Social web	15	20	30	7	2.60	S

sources were cited as sometimes used. An additional item reiterated the preferences of Google and “other” search engines over library resources when asked how an information search was started.”

How essential study methods were perceived to improve their learning of course material was asked by the following item in Table 4 below. Google was again the most used starting point, followed by “other As

**Table 3:** Electronic resources are referred to in doing an assignment.

	What types of electronic resources do you USE for your assignments?					Mean	Remarks
	Often Used	Moderately Used	Sometimes Used	Rarely Used	Not used		
Online Library	15	18	19	15	5	3.32	Somewhat
Google	24	22	16	4	6	3.75	Moderately
Wikipedia	28	21	16	5	2	3.94	Moderately
Social web applications	15	25	23	8	1	3.63	Moderately
Facebooks	69	1	1	1	0	4.92	Agree
Myspace	11	9	12	29	11	2.72	Somewhat
YouTube	45	19	6	2	0	4.49	Moderately
Other sources	24	12	13	17	6	3.43	Somewhat

Wikipedia was omitted, it is possible that “other” had Wikipedia, which one respondent wrote as an answer. Regarding preferences for learning course material, most of the 72 respondents strongly agreed (42.9%) and approved (42.9%), preferring PowerPoint slides and lectures. Collapsing strongly agree and agree categories and strongly disagree and disagree categories, other learning method results were: Interestingly, solving

problems in class, a mixture of course material, and preferring frequent exams with various ways to earn grades ranked in the 90th percentile. However, the lowest ranking (62.6%) of the items was for the lecture as the format of class instructions but still agreed by the other respondents. Solving problems in class helps me learn the course material using math application software 92.3%) was the majority as highly ranked as others.

**Table 4:** Important study methods were perceived to improve their learning of course material.

	Importance of the effectiveness for improving knowledge of course material					Mean	Remark
	Very interested (VI)	Interested (I)	Somewhat Interested (SWI)	Uninterested (U)			
Dyad	5	10	18	39	1.74	SWI	
Peer tutoring	18	14	19	21	2.40	SWI	
Minute paper	9	19	12	32	2.07	SWI	
Lectures	3	20	23	26	2.00	SWI	
Discussion	10	14	16	32	2.03	SWI	
Game-based Learning	20	26	18	8	2.81	I	
Take home Test	5	14	18	35	1.85	SWI	
Web group discussion	10	25	21	16	2.40	SWI	
Online chat	15	24	21	12	2.58	I	

Online based learning	25	22	15	10	2.86	I
Team-Based Solving	16	18	20	18	2.44	SWI
Problem-based Learning	16	20	18	18	2.47	SWI

Online-based learning (2.86), game-based Learning (2.81), and online chat (2.58) were rated as essential others were rated as somewhat necessary however, lectures, Discussion, and Minute paper methods were rated as the lowest among the rest. This could be the result of the efforts of the student using the material and

the design and form of the material itself. This implies that both experimental and controlled groups belong to the developing level or stage of academic performance during the pre-test. The standard deviation shows the homogeneity of the student's academic performance during the re-test.

**Table 5:** Level of academic performance in mathematics during pre-test

Academic Performance	(Controlled Group)		(Experimental Group)	
	Pre-test	Level	Pre-test	Level
Mean	71.74	Failed	74.42	Failed
Standard Deviation	2.00		3.47	

This implies that the post-test results increased significantly, and the experimental group's results increased by 2.58 percent higher than the control group. This means that technology teaching enhances

the student's academic performance in mathematics. This signifies that training with the aid of technology is better than lecture-or traditional teaching methods. This implies that students who underwent the teaching

**Table 6:** Level of academic performance in mathematics during Post-test

Academic Performance	(Controlled Group)		(Experimental Group)	
	Pre-test	Level	Pre-test	Level
Mean	75.26	Passed	80.46	Fair
Difference From Pre-Test	3.52 (increased)		6.04 (increased)	
Standard Deviation	2.98		3.28	

methods using technology performed better than those who experienced lecture-type forms in teaching math. This means that teaching using technology improves and

enhances students' academic performance. This signifies that technology-enhanced teaching strategies are better than lecture-type methods.

**Table 7:** Level of academic performance in mathematics during the first semester

Academic Performance	(Controlled Group)		(Experimental Group)	
	First-semester grade	Remarks	First-semester grade	Remarks
Average	83.51	Good	87.63	Very good
Standard Deviation	2.56	2.66	3.47	

## CONCLUSION

The results of this study indicate many uses of technology, such as typing notes in class and searching online, for Millennials. It is still interesting to note that in a school where laptops are required of students, a small percentage brings them to class for typing notes. This could be due to the burden of carrying a computer to class or the typing skill of the user. As for research, the low percentage of scholarly research sites is a concern. In the 2007 study, Millennial students used Google frequently and thought Google a more helpful tool than those provided by the library and frequently used Wikipedia for assignments. (Nicholas & Lewis).

Mathematics students learn with the 5 R's for millennial learning styles; they prefer to use technologies in learning

and quickly get bored with the traditional way of teaching mathematics. Techno-literacy is the preference of millennial students in understanding mathematics. They prefer research-based learning relevant learning, which is accessible at "searching" and discovering information; Rationalized learning, wherein a less authoritative environment teaching environment; Relax learning environment, which is usually a fun rapport oriented learning environment wherein they like instructors showing personal interest on their most preferred learning styles and easy to be with, they hate terror teachers.

Learning methods will have to adapt to engage and educate this generation continually. Their answer to favoring PowerPoint classes shows their interest in multimedia. However, does that add entertainment and

prevent discussion or problem-solving? However, there was a dictation that these respondents valued group work and problem-solving case analysis. Does the preference for more testing indicate a short-term memory and not retaining the knowledge for future needs and analysis?

### RECOMMENDATIONS

There are several opportunities for future research about this generation and their learning preferences, and assessment of learning could be measured. Comparison with other ages and faculty attitudes, the personality of the participants, and gender differences could be discerned. Indeed, a larger sample could be used, and yearly comparisons could yield more information. This kind of learning should be investigated. Websites may become more popular with learning methods. Just as E-learning shows workplace cost savings (Macpherson, 2004), educational institutions may recognize the benefits of financial and student learning through new technological approaches. Educators and managers must adapt to new means of engagement to attract and retain the Millennial students and workforce.

### REFERENCES

Alch, M.L. (2000). Get ready for a new type of worker in the workplace: The net generation. *Supervision*, 61(4), 3.

Coomes, M. D., & DeBard, R. eds. (2004). *Serving the millennial generation*. San Francisco: Jossey-Bass.

Davidson, C. N. (2007). We can ignore the influence of digital technologies. *Education Digest*, 73(1), 15-18.

Dede, C. (2005). Planning for the new millennial learning styles: Implications for investments in technology and faculty. 15.1-15.22 in *Educating the Net Generation*. Oblinger, D. G. and Oblinger, J. L. eds., an EDUCAUSE eBook.

Elam, C., Stratton, T. & Gibson, D. D. (2007). Welcoming a new generation to college: Millennial students. *Journal of College Admission*, 2, 1-25.

Frاند, J.L. (2000). Information age mindset: Changes in students and implications for higher education. *Educause Review*, 35, 16-4.

Githen, R. P. (2006). Cautions: Implementing interpersonal interaction in workplace e-learning. *Tech Trends*, 50(5), 21-27.

Hawtrey, K. (2007). Using experiential learning techniques. *Journal of Economic Education*, 38(2), 143-52.

Lancaster, L. C., & Stillman, D. (2002). *When generations collide*. New York: HarperCollins Publishers Inc.

Manochehri, N. & Young, J. I. (2005). The impact of student learning styles with web-based instructor-based learning on student knowledge and satisfaction. *The*

*Quarterly Review of Distance Education*, 7(3), 313-316.

Mariás, J. (1970). *Generations: A historical method*. Translated by H.C. Raley, Alabama: University of Alabama Press.

Marston, C. (2005). *Motivating what is in it for me? workforce: Managing across generations*.

Martin, C. A. (2005). From high maintenance to high productivity: What managers need to know about Generation Y. *Industrial and Commercial Training*, 37(1), 39-4.

McCasland, M. (2005). Mobile marketing to millennials. *Young Consumers, Quarter 2*, 8-15.

Messineo, M. Gaither, G. Bolt, J. & Ritchey, K. (2007). Inexperienced versus experienced students' expectations for active learning in large classes. *College Teaching*, 55(3), 125-33.

Murray, J. P. (2004). Nursing: The next generation. *Nursing Education Perspectives*, 25(3), 106.

Newlin, M. H., Lavooy, M. J. & Wang, A. Y. (2005). An experimental comparison conventional DNSNs web-based instructional formats. *North American Journal of Psychology*, 7(2), 327-336.

Nicholas, A.J. & Lewis, J.K. (2008). Millennial Attitudes Toward Books E-Book sooks. *The International Journal of the Book*, 5(2), 1-92.

Pelton, L. E., True, S. L. (2004). Teaching business ethics: Why gen y? *Marketing Education Review*, 14(3), 63-70.

Shannon, D. M., Johnson, T. E., Searcy, S. & Lott, A. (2002). Survey professionals using electronic surveys. ERIC Digests, EDO-TM-02-02 4 pages.

Skiba, D. J. (2006). The Millennials: Have they arrived at your school of nursing? *Nursing Education Perspectives*, 25(6), 370-371.

Smith, J. W., & Clurman, A. (1997). *Rocking the ages: The Yankelevich report on generational marketing*. New York: HarperCollins Publishers Inc.

Trei, L. (2006, November 15). Researchers study how technology shapes how students learn. Stanford Report. Retrieved December 2007 <http://news-service.stanford.edu/news/2006/november15/Barron-111506.html>

Trotter, A. (2007). Projects probe new media's role in changing the face of learning. *Education Week*, 7(14), 1-10.

University College London (UCL) CIBER Group. (2008). *Information Behaviour of the Researcher of the Future (CIBER Briefing paper; 9)*. London.

Zemke, R. Raines, C., & Filipczak, B. (2000). *Generations at work: Managing the clash of veterans, baby boomers, Xers, and nesters in your workplace*. New York: American Management Association.