# Generational Differences in Learner Attitudes Toward Technology in Education at the University of Wisconsin-Stout

by

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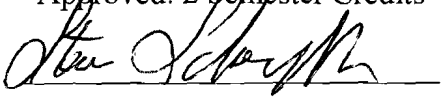

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## ABSTRACT

In any postsecondary classroom there are age, economic, ethnic, educational background, and/or life experience differences among the learners. One difference that may be overlooked is generational learning style. The greatest generation gap may be between the instructor and the Net Generation learner. This generation gap may be viewed as a digital divide in education between how the Net Generation learns and how they are being taught. By understanding the characteristics, learning styles, and technology use of the Net Generation, educators and administrators gain insights into how that generation learns, sees themselves, and is motivated. These insights can then be used for designing classrooms and developing curriculum to better engage the Net Generation learner. The purpose of the study was to identify student attitudes toward the use of technology in education by identifying and comparing selected demographics, learning styles, and technology use between the Net Generation learner and other generations at the University of Wisconsin-Stout. The results of the study indicated that the differences in use

of technology may be a result of the delivery method rather than a generation gap. Distance education students, regardless of generation, tended to use more technologies in the classroom than on-campus students. This contradicts the initial thought that the Net Generation learner would be better engaged by technology than either the Baby Boomer or Generation X learner. It is recommended that a future studies look at how the delivery method, degree program, or additional training would impact the differences attitudes toward the use of technology in the classroom.

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# Chapter I: Introduction

## *Background*

In any postsecondary classroom there are age, economic, ethnic, educational background, and/or life experience differences among the learners. Although these are all important, one difference may be overlooked by postsecondary instructors. This difference is generational learning style. For the first time in history, there are four distinct generations working and learning together (Thor, 2007; Whitmore & Concelman, 2006b). Although there are four generations in today's workplaces and universities, only the Baby Boomer (born 1946 -1964), Generation X (born 1965-1981), and the Net Generation (born 1982-present) will be included in this study (Coates, 2007; Howe & Strauss, 2000; Oblinger & Oblinger, 2005; Tapscott 1998). Each generation of learner has unique sets of characteristics and learning styles. The question raised with more and more generations attending postsecondary schools at the same time is whether the generation gap continues to widen (Levin & Arafeh, 2002).

The generational differences go beyond the obvious difference of age. Social, economic, environmental, political, and technological differences greatly impact who each generation is and how they learn (Hartman, 2005). Baby Boomers, Generation X, and the Net Generation all have very distinct general characteristics and basic learning styles. Each generation is a product of their environment, has different attitudes, and different expectations of their education (Oblinger, 2005). To better illustrate the gap in these three generations, the characteristics and learning styles of each group will be discussed.

The first generation is the Baby Boomer generation. This generation takes work very seriously. They tend to do whatever it takes to get the job done. If that means working nights, weekends, or extra hours, Baby Boomers are willing to do it (Bernstein, Alexander, &

Alexander, n.d.). In addition, Baby Boomers typically only have one career and often begin working at and retire from the same company (Oblinger, 2005). This generation believes in a hierarchal form of leadership. It is important for Baby Boomers to show respect for people in power and acknowledge the accomplishments of others. This generation communicates using body language and prefers face-to-face conversations (Zust, 2003). For Baby Boomers, family is not the main focus, work is. Consequently, work is one of the biggest forces controlling their lives (Bernstein et al., n. d.). Technology, such as the World Wide Web, is somewhat of a mystery to this generation (Oblinger). Baby Boomers see technological advancement as a necessary evil needed for progress (Bernstein et al.).

Because Baby Boomers have the ability to conceptualize abstract concepts, their learning styles tend to be based on Kolb's theory of learning (Brown & Fritz, 2001). Kolb's theory of learning is based on a learning cycle in which four processes must occur for learning to take place. These four processes are active experimentation, reflective observation, abstract conceptualization, and concrete experience (Clark, 2000). This older generation of learner responds well to traditional lectures, transparencies, board notes, class discussions, and practical real-life examples. Baby Boomers prefer practical hands-on applications they can relate to or use on their jobs (Brown & Fritz).

The second generation is Generation X. For Generation X, work is just something they do so they can have a life outside of work. Much as the Baby Boomer views technology as a necessary evil, Generation X views work as a necessary evil in order to make money to enjoy life (Codrington, 1998). In addition, this generation tends to have multiple careers throughout their lives and switches jobs often in order to gain higher wages, better benefits, advancement opportunities, and achieve family/work balance (Oblinger, 2005; Smith, 2001). Due to

government scandals and big business layoffs, Generation X does not hold authority figures in high regard and is skeptical of both government and corporate institutions (Codrington). Rules are viewed as guidelines rather than directives and are meant to be interpreted, revised, and manipulated to fit their needs (Bernstein et al., n. d.). This generation utilizes an informal style of communication primarily through e-mail. In addition, Generation X wants to get right to the point, receive information often, and expects to be asked to give feedback (Zust, 2003). For Generation X, technology such as the World Wide Web is viewed as a tool (Bernstein et al.).

Generation X is primarily made up of visual learners (Brown & Fritz, 2001). Because visual learners think in terms of pictures, this generation prefers information presented as short videos, images, diagrams, flipcharts, maps, charts, and interactive software (Brown & Fritz; "Visual Learners," 2001). This generation of learners would prefer classroom lectures to be followed up by hand-outs and detailed notes so they have information to view at a later time. Visual learners tend to be good at puzzles, comprehending graphs and charts, and interpreting visual metaphors and analogies ("Visual Learners").

The last generation this study is concerned with is the Net Generation. To the Net Generation, work is about deadlines not schedules. As long as the job is finished on time it does not matter when they do it (Bernstein et al., n. d.). Because this generation is made up of active information seekers, they value autonomy and see themselves as the experts (Skiba & Barton, 2006). Communication for the Net Generation is of great importance. There is a need for this generation to feel like they are always connected. To keep connected, the Net Generation utilizes tools such as instant messaging, cell phones, text messaging, chat rooms, and e-mail (May, 2005). The Net Generation is eager to please friends, family, and educators. The Net Generation is able to identify with their parents' values and is often close to them. In addition,

this generation believes family and work should blend together rather than be kept as two separate entities (Bernstein et al.; Oblinger, 2005). This is a generation that thrives on teamwork and collaboration. The Net Generation's loyalties lie with anyone they are teamed up with to complete a project (Bernstein et al.). The Net Generation was the first generation to grow up with computer access at home, school, and work. To this generation, computers are not new technology. The Net Generation has been coined "Digital Natives" of technology by Marc Prensky, author of Digital Natives Digital Immigrants. Because the Net Generation grew up with computers, videogames, instant messenger, and cell phones, Prensky referred to them as "native speakers" (Prensky, 2001, p. 1).

Net Generation learners are active learners. According to Brown (2005), this generation does not ask what something means or how it works, but instead how to build it. This generation prefers group and collaborative activities over individual assignments. The Net Generation also tends to be doers rather than listeners. Because the Net Generation would rather do than listen, they prefer learning activities that allow them to explore, discover, and experiment. In addition, this generation enjoys activities that involve social interaction such as debates and class discussions.

For instructors, teaching to the Baby Boomers and Generation X are the least of their concerns. Most instructors fall into one of these categories themselves and therefore have similar characteristics and general learning styles to those of their learners. In addition, these two generations have internal motivators, such as the desire to learn, before they begin attending school (Brown & Fritz, 2001). In comparison, the Net Generation seeks external motivators. They want the instructor to challenge them and engage them in active critical thinking activities (Oblinger, 2005).

The generation gap in classrooms between instructors and learners is more about a mismatch between teaching style and learning style than it is about age differences (Brown & Fritz, 2001). Instructors, much like learners, have preferred teaching styles. This can often lead them to teach to just one or two styles, rather than varying it for individual lessons or providing multiple options for the learners. An instructor must not only be aware of the students' learning styles, they must be aware of their own teaching styles. Awareness of these two factors can assist them in designing educational experiences that will meet the needs of all learners ("Learning Styles and Multiple Intelligences," n. d.). Failure to recognize the differences in the instructor's teaching style and the students' learning styles, especially those of the Net Generation, can increase the large generational gap already present in today's educational institutions (Brown & Fritz). The closer the teaching style is to the learning style, the more effective the communication and respect level is between instructors and learners.

As more and more Net Generation learners join the ranks of the college bound, it is a necessity to find new teaching strategies to accommodate these learners. The addition of the Net Generation to the postsecondary educational system will require curriculum modifications, high tech classroom environments, and technology savvy instructors. According to Barone (2005, p. 14.1), "a new academy is forming that acknowledges the changes manifested in the Net Generation, uses the power of technology to enable deeper learning, demonstrates the interplay of culture and technology, and changes the nature of interaction among the members." Technological change and the addition of the Net Generation are forcing institutions to go beyond the traditional classroom to accommodate the needs of this new academy. Within this new academy, the digital divide between how the Net Generation learns and how they are being taught will be bridged.

*Statement of the Problem*

There is a digital divide in education between how the Net Generation learns and how they are being taught. By understanding the characteristics, learning styles, and technology use of the Net Generation, educators and administrators gain insights into how that generation learns, sees themselves, and is motivated. These insights can then be used for designing classrooms and developing curriculum to better engage the Net Generation learner (Salaway, Caruso, & Nelson, 2007).

*Purpose of the Study*

The purpose of the study is to identify student attitudes toward the use of technology in education by identifying and comparing selected demographics, learning styles, and technology use between the Net Generation learner and other generations at the University of Wisconsin-Stout (UW-Stout). The study will assess the relationship between the use of technology and generational learning style preferences by surveying UW-Stout students. Specifically, the research will examine generational learning styles, technology use, and the need for integrating learning technologies into the UW-Stout to better engage the Net Generation learner. To accomplish the above purpose, a survey will identify differences in the use of technology, selected demographics, and learning style preferences of UW-Stout students by generation.

*Research Questions*

This study will address the following research questions:

1. How do the learning styles differ among the Net Generation, Generation X, and the Baby Boomer learners?
2. How does the utilization of technology differ among the Net Generation, Generation X, and the Baby Boomer learners?

3. How does the frequency of technology use differ among the Net Generation, Generation X, and Baby Boomer learners?
4. How does the desire of UW-Stout students to incorporate technology in education differ among the Net Generation, Generation X, and Baby Boomer learners?
5. How do the selected demographics differ among the Net Generation, Generation X, and the Baby Boomer learners?

*Importance of the Study*

This study is important for the following reasons:

1. Learning style and teaching style mismatch: A mismatch between learning style and teaching style may cause learners to become bored, inattentive, or unresponsive (Felder, 1993). This could result in poor test scores, low attendance, and discouragement in themselves, courses, curriculum, and the institution. Extreme cases of mismatch between teaching styles and learning styles can cause higher institutional and program dropout rates.
2. Overly critical instructors: As a result of poor learner performance, instructors may become overly critical of the learners (Felder, 1993). They may unintentionally raise their expectations so they are no longer attainable by any of the learners. This could in turn cause learners to become even more disenchanted with the educational system.
3. Instructor's self-doubt: Learners who drop the program could also cause the instructor to question his/her place in the teaching profession(Felder, 1993). Instructors with a wealth of knowledge who have not adapted to the new generation of learner may feel they are no longer competent to teach. Rather than adjusting their teaching style to accommodate new learning styles, they leave the profession.

4. Institutional Impact: The way administration and faculty view technology will need to be adjusted and curriculum will need to be redesigned (Hardin & Ziebarth, 2000). Rather than seeing technology as a nicety, administration will have to begin seeing the value technology has for the Net Generation learner. Faculty will have to learn new methods of teaching and new technologies in order to facilitate learning. Curriculum will have to be revised to incorporate different forms of instructional technology such as simulation software.
5. Teaching and learning style alignment: Faculty can utilize the information within the study to better understand the characteristics, learning styles, and technology use of the Net Generation (Felder, 1993). This understanding can assist educators in creating engaging activities and assessments to meet the needs of the Net Generation learner. Increased educational engagement of the Net Generation would increase the likelihood of their educational success.
6. Loss of qualified workforce: The decrease in the graduation rate in a particular program or in education as a whole would result in decreased hirability among the workforce (Felder, 1993). This decrease in hirability would mean an increase in unfilled jobs in business and industry. An excess number of unfilled jobs would affect the ability to meet economic supply and demand of products and services.

*Limitations of the Study*

The limitations of this study include the following:

1. Survey population: The study only looked at students attending UW-Stout in the spring of 2008. In addition, the study excluded anyone who was under the age of 18. The sample may not provide a diverse enough representation of the Net Generation, Generation X, and Baby Boomer learners.
2. Educational experience: Some students may not have completed enough coursework at the UW-Stout to provide sufficient data as to the number of instructors currently utilizing a variety of learning technologies in the classroom. This may lead to misrepresentation of technology use by the faculty of UW-Stout. More instructors may be utilizing learning technologies than reported in this study.
3. Survey: The web-based survey was developed by the researcher. Because the survey was developed by the researcher, it may contain unintentional errors, misinterpretations, misstatements, or omissions. In addition, the return rate on web surveys is less than that of other survey methods (H. Lee, UW-Stout Professor, personal communication, February 2, 2008).

*Definition of Terms*

The following terms have been defined to provide clarification:

*Baby Boomer.* Segment of population, especially people in the United States and Canada, who were born during the late 1940s to the early 1960s (The American Heritage Dictionary, 2003a).

*Generation X.* Segment of population, especially people in the United States and Canada, who were born during the early 1960s to the late 1970s (*The American Heritage Dictionary*, 2003b).

*Learning Style.* Cognitive, affective, and psychological behaviors that indicate how learners perceive, interact with, and respond to the learning environment (Felder & Brent, 2005).

*Learning Technologies.* The acquisition of new knowledge, skills, or attitudes through the use of devices, systems, and processes (S. Schlough, UW- Stout Professor, personal communication, February 16, 2007).

*Net Generation.* Segment of population, especially people in the United States and Canada, who were born during the early 1980's to the late 1990's (The American Heritage Dictionary, 2003c).

*Teaching Style.* Skills and techniques used by an instructor in conjunction with personal knowledge, preparation, and experience to create an effective learning environment (Reitz, 2007).

*Technology.* The use of devices, systems, and processes to increase human potential (S. Schlough, UW-Stout Professor, personal communication, February 16, 2007).

# Chapter II: Literature Review

## *Introduction*

This chapter will discuss generational differences among the Baby Boomer, Generation X, and Net Generation learners. Within each generation, three areas will be explored: characteristics, learning styles, and use of technology. This chapter will conclude with a four year longitudinal case study.

## *Baby Boomer*

Throughout their lives, Baby Boomers have been surrounded by many formative events that have contributed to and defined their generation. Radical movements such as the civil rights movement, women's liberation movement, and gay and lesbian liberation movements questioned their views on racial equality, gender roles, and the traditional family nucleus (Gianoulis, 2002b; DeVinney, 1991). The atomic bombs dropped on Hiroshima and Nagasaki, Japan resulted in an increase in bomb shelters and school atomic bomb drills, making Baby Boomers "the first generation to know humankind possessed the power to destroy itself" (Gianoulis, 2002a, p. 2; Pyle, 2008). The bombings and large troop deployments in South Vietnam initiated marches and protests by draft-age Baby Boomers who did not want to "fight in an undeclared war over vague principles" (Gianoulis, 2002a, p. 3). Cold War tensions between groups of communist and non-communist nations kept this generation teetering on the end of World War III for decades (Kaufman, 2008). The Space Race, born from the Cold War, between the United States and the Soviet Union "became a measure of each country's leadership in science, engineering, and national defense" (Oberg, 2004, p. 2-3).

Along with these formative events came the people associated with them. Martin Luther King, Jr., a main leader of the civil rights movement, gained support from both blacks and whites

through his powerful speeches (Garrow, 2008). John F. Kennedy, thirty-fifth President of the United States, "took vigorous action in the cause of equal rights, calling for new civil rights legislation" (*John Kennedy*, n. d., para. 6). Both men were killed, King in 1968 and Kennedy in 1963, by assassin's bullet (Garrow; Wilentz, 2008). Gloria Steinem, writer and lead supporter of the women's liberation movement, campaigned for women's rights in three main areas: employment, politics, and social life (Epstein, 2008). Phyllis Lyon and Del Martin, founders of the Daughters of Bilitis lesbian rights organization, became the first same sex couple to be legally married in the United States (Gianoulis, 2004; Gordon, 2004). John Glenn, first American to orbit the Earth, and Neil Armstrong, first person to walk on the moon, alleviated concerns that the United States lagged behind the Soviet Union in the space race (Hansen, 2008; Kozloski, 2008a).

In addition to formative events and the people who were associated with them, there were a variety of new technologies and inventions that changed their lives. New toys such as the Frisbee, Mr. Potato Head, the hula hoop, and the Barbie doll all made debuts (Bellis, 2007a; Wygonik, 2008). McDonald's and diet soft drinks were introduced. Medical breakthroughs such as the internal pacemaker and oral contraceptives were developed. Time saving electronics such as the microwave oven, automatic washers and driers, dishwashers, and garbage disposals all made life easier for the Baby Boomer generation (Bellis; Einhorn & Schulman, 2008). In addition to time saving electronics, this generation also saw some firsts in the way of entertainment. This was the first generation to have videotape recorders (VTR), audio cassette tapes, and televisions (Bellis).

Formative events, historic people, and new inventions were not the only influences on the Baby Boomer generation. From a very early age, the Baby Boomer generation had been taught

the importance of work and the role it should play in their lives. Even the Dick and Jane series of early readers, the basis for reading curriculum at that time, illustrated in the book *We Work and Play* that work was of great importance (Coates, 2007; Gray, Monroe, Artley, & Arbuthnot, 2003). Through this early reader, children learned that everyone in the world of Dick and Jane works; father, mother, baby Sally, and dog Spot. The illustrations in this book also implied that adults do not play. Instead, as the children run, tumble, and play, the adults stand or sit by and merely watch.

By the time Baby Boomers were college aged, it became apparent to them that just the act of working itself was not enough. If they were to make it in the world, they would need to work hard. Therefore, hard work became synonymous with success. Baby Boomers quickly gained a competitive nature, a drive to work hard, and a desire to stand out in a crowd in order to attend over-crowded colleges and fill an under-abundant number of jobs. To secure their seat in college or obtain the elusive job, the Baby Boomer had to be the best of the best (Coates, 2007; Whitmore & Concelman, 2006a). This best of the best mentality also led to great admiration and acknowledgment for the accomplishments of others by the Baby Boomer generation (Zust, 2003).

Because of influences such as the Dick and Jane series, educational competition, and employment competition, Baby Boomers place work as a top priority in their lives. They are often referred to as workaholics (Coates, 2007; Whitmore & Concelman, 2006a). These workaholics do whatever it takes to get the job done such as working nights, weekends, or extra hours until the task is complete (Bernstein et al., n. d.). These long hours not only show a great drive to work hard, but a loyalty to the company and bosses they work for. Baby Boomers typically only have one career and often begin working at and retire from the same company

which further illustrates their loyalty to the workplace (Oblinger, 2005; Whitmore & Concelman). In addition, Baby Boomers have a high regard for a hierarchal form of leadership. Because of this leadership view, Baby Boomers tend to show great respect for people in power, which again demonstrates their loyalty to their bosses (Zust, 2003). Due to their dedication of time and loyalty to the company, family became secondary to work, allowing work to become the controlling force in their lives (Bernstein et al., n. d.; Whitmore & Concelman).

Although their work ethic is what Baby Boomers are most known for, this generation is often described by other general characteristics as well. Baby Boomers are viewed as a self-absorbed, optimistic, unconventional, success-oriented generation that is obsessed with health, wellness, personal growth, and self-worth (Coates, 2007; "Generational Characteristics Matrix," n. d.; Smith & Cluman, 1998). This obsession led to a boom in the self-help book industry in the areas of weight loss, conflict resolution, organization, stress management, and social behaviour. In addition, the Baby Boomer is seen as a service-oriented generation that believes it is important to give back to the community (Coates; "Generational Characteristics Matrix," n. d.). Baby Boomers see community involvement and volunteerism as a way to build personal and professional networks ("Generational Characteristics Matrix"). Finally, Baby Boomers are perceived as believing they should succeed because they were born, education is a birthright, and the future is less important than the here and now (Smith & Cluman).

In addition to these general characteristics, Baby Boomers have their own educational preferences and learning style. The Baby Boomer generation enjoys a collegiate atmosphere that allows for creativity and independence. This generation also brings to the classroom a wealth of knowledge and experience to share with their classmates. Because of this vast knowledge bank and their willingness to share, Baby Boomers can be perceived as requiring a lot of talk time

(Coates, 2007; "Teaching across generations," 2005). Baby Boomers also prefer course material that is well organized. Major headings should be highlighted and followed up by content information (Coates).

Because Baby Boomers have the ability to conceptualize abstract concepts, their learning style tends to be based on Kolb's theory of learning (Brown & Fritz, 2001). Kolb's theory of learning is based on a four process learning cycle, in which a learner may enter at any point that must occur for learning to take place (Clark, 2000; Learning Theories Knowledgebase, 2008). These four processes are concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE; Atherton 2005; Clark; Learning Theories Knowledgebase).

For this older generation of learner, the traditional tried and true methods of teaching can still be effective. Baby Boomers seem to respond well to a traditional teacher-centered lecture format with transparencies and notes written on the board. Because Baby Boomers communicate through body language, they prefer classroom activities that rely on face-to-face conversations such as course ice-breakers, class introductions, and group discussions (Brown & Fritz, 2001; Zust, 2003). In addition, this generation enjoys practical real-life examples, practical hands-on applications, and plenty of time to practice them (Brown & Fritz; Coates, 2007; "Teaching Across Generations," 2005). These practical hands-on applications provide them with immediate tools and information they can relate to or use on their jobs (Brown & Fritz).

For Baby Boomers or "digital immigrants" who grew up with overhead transparencies, televisions, and typewriters, the new age of technology is often intimidating (Brown & Fritz, 2001; Hendrick, 2005; Prensky, 2001, p. 1-2; Stencel & Hanson, 2005). High tech gadgets such as digital cameras, personal digital assistants (PDA), iPods, BlackBerrys, and computers can

make these Baby Boomers' "eyes glaze over like a window in winter" (Hendrick, para. 11). Even Baby Boomers who consider themselves comfortable with technology often get frustrated and annoyed by the ever-changing technology landscape they are trying to master. Technology such as the World Wide Web remains somewhat of a mystery to many in this generation (Oblinger, 2005). Baby Boomers typically see technology advancements such as these as a necessary evil needed for progress (Bernstein et al., n. d.).

*Generation X*

Some experts say Generation X had less defining moments than the Baby Boomer generation. In their opinion, this "lack of defining events" led to a perceived political apathy from Generation X (Wilson, 2008, para. 4). Although some experts see few defining moments, others have identified several events that could be considered defining. Major events such as the dissolution of the United Soviet Socialist Russia (USSR) and the dismantling of the Berlin Wall marked the fall of communism in Europe and parts of Asia, while the Watergate scandal marked a time of uncertainty about the United States democratic process (Croan, 2008; Lukas, 2008; Urban, 2008). The Generation X era was also marked by the energy crisis of the 1970's. Due to the increase in factories, homes, automobiles, and other energy consumables, the United States felt a crunch when it came to the availability of oil and gasoline (Einhorn & Schulman, 2008). By the 1980's, a new crisis had hit the United States. This new crisis was a life-threatening disease called AIDS (Drotman, 2008). In addition to dealing with this new disease, Generation X had to cope with the explosion of the Space Shuttle Challenger in 1986 (Oberg, 2008). In the early 1990's, many Generation Xers headed off to fight in Operation Desert Storm. This Persian Gulf War was the "first major international crisis after the end of the Cold War" (Deese, 2008, para. 5).

Many of these formative events had people who were associated with them. Soviet Union leader Mikhail Gorbachev is known world-wide for his efforts to change relations between his country and other nations, which later earned him a Nobel Peace prize (Goldman, 2008). Due to the illegal activities involved in the Watergate scandal, Richard Nixon became the first and only president to have resigned from office when impeached in 1974 (Small, 2008). Ryan White, a 13-year-old boy diagnosed with AIDS, fought for his right to stay in school. Although Ryan contacted the disease through a blood transfusion and not through the usual methods, he never "drew a line between him and other people living with HIV or AIDS" ("Ryan's Story," n. d, para. 9). Of the seven astronauts on the space shuttle Challenger, one of the best known was Christa McAuliffe. She was to be the first teacher in space, but tragically died with the other six crewmembers when the shuttle exploded shortly after take-off (Kozloski, 2008b). One of the most notable figured associated with the first Persian Gulf War was General Norman Schwarzkopf. Under his command, more than 540,000 men and women fought on the ground, in the air, and by sea to remove Iraqi invaders from Kuwait (Deese, 2008; Meyerson, 2008).

Much like the Baby Boomer generation, Generation X was not only affected by formative events and historic people, they were also shaped by new technologies and inventions. Toys such as Cabbage Patch Kids, hacky sacks, and roller blades were first introduced to Generation X children (Bellis, 2007a; Bellis, 2007b). Medical breakthroughs such as the artificial heart, magnetic resonance imaging (MRI), contact lenses, liposuction, and the Hepatitis-B vaccine were developed. New electronic gadgets and forms of entertainment such as video cassette recorders (VCRs), handheld calculators, cellular phones, the Walkman, and MTV made their debut.

Beyond the formative events, historic people, and new inventions, Generation X was influenced by household dynamics. In contrast to the Baby Boomer generation, Generation Xers value home and family more than work. Some believe this change was steered by their own home lives as children. Generation X was the first generation to have grown up in divorced, single parent, blended, and duel income households (Ritchie, 2002). This meant there were many more children than ever before who were left home alone for extended periods of time. These kids, often coined "latchkey kids" became more independent, resilient, and adaptable than previous generations (Coates, 2007, p. 98; "Generational Characteristics Matrix," n. d.; Thielfoldt & Scheef, 2004). Growing up, Generation Xers became great community builders who often had closer relationships with friends than family. For this generation, group dating and group trips to the mall became the norm. According to Coates, this community building with friends replaced absentee aunts, uncles, cousins, and parents. In addition, Generation Xers have been known to be protective of these communities (p. 103). According to Coopersmith (as cited in Coates), an extreme version of this protected community was the "rise of gangs among the most neglected groups of children" (p. 103). Sociologists say their childhood background of personal and political upheaval led Generation X to become homebodies. This in turn created more stay at home dads, home-based workers, part-time workers, and mothers "embracing traditional roles" (DeMarco, 2004, para. 5). In an effort to provide their children with a better upbringing than they had, Generation X parents are willing to make more personal, financial, and material sacrifices than their parents did in order to spend more time with the family.

Because Generation Xers place more value on family than work, they tend to have multiple careers throughout their lives and switch jobs often in order to gain higher wages, better benefits, advancement opportunities, and achieve the family/work balance they desire (Oblinger,

2005; Smith, 2001). Much as the Baby Boomer views technology as a necessary evil, Generation X views work as a necessary evil in order to make money to enjoy life (Codrington, 1998). Due to government scandals, big business layoffs, and their general view of work, Generation X does not hold authority figures in high regard and are skeptical of both government and corporate institutions. Generation Xers also view the rules established by these government and corporate institutions as guidelines, rather than directives, that are meant to be interpreted, revised, and manipulated to fit their needs (Bernstein et al., n. d.)

While the need for family/work balance is a key characteristic of Generation X, they can be identified by other general characteristics as well. Generation Xers are an independent, skeptical, informal, conservative, laid back, idealistic generation ("Generational Characteristics Matrix," n. d.). As one might expect, this generation's communication style also tends to be informal; primarily through e-mail. In addition, Generation Xers wants to get right to the point, receive information often, and expect to give and receive feedback often (Zust, 2003). These characteristics are often misinterpreted by older generations as negative, lazy, whining, uncooperative slackers with a poor work ethic (Coates, 2007).

In addition to general characteristics, Generation Xers have educational preferences and learning styles unique to them. Unlike the Baby Boomer generation, Generation Xers did not flock to college. Instead, Generation X saw a decrease in the number of students graduating from high school and college and an increase in underachievement, especially from males (Coates, 2007). According to Coates, this is due to the inability of a traditional classroom to engage this "intensely independent generation" (p. 94).

The traditional classroom consisted primarily of teacher-centered lectures, reading, writing, and testing. Because Generation X learned to read by "watching Kermit the Frog

dancing with the letter e" rather than reading books, this traditional format did not work for them (Coates, 2007 p. 107). This group of learners is much more visual than their predecessors (Coates; Brown & Fritz, 2001). People often associate reading with visual learning. Although the words are technically viewed, most people process the written information by hearing it in their heads. Because of this, researchers identify readers as auditory learners rather than visual learners ("Learning Styles," 2002). Visual learners are much more shape and form-oriented and think in terms of pictures rather than printed words. Because Generation X thinks in terms of pictures, they prefer information presented as short videos, images, diagrams, flipcharts, maps, charts, and interactive software (Brown & Fritz; "Learning Styles;" "Visual Learners," 2001). This generation also prefers traditional classroom lectures, when necessary, to be followed up by hand-outs and detailed notes so they have information to refer back to at a later time. Visual learners tend to be good at puzzles, comprehending graphs and charts, and interpreting visual metaphors and analogies ("Visual Learners"). Visual learners prefer seeing what they are learning.

Generation X or "digital pioneers" were the first adopters, creators, and visionaries of information technology (Browser, 2006; Musings, 2007, Sunfell, 2007). With the development of the personal computer in the mid 1970's, Generation X became the first generation to be introduced to computers at homes, schools, and work. This was also the first generation to have widespread use of commercial cellular telephones. Although fax machines had been around for quite some time, they did not become standard office equipment until the 1980's (Einhorn & Shulman, 2008). During the 1970's and 80's, the Advanced Research Policy Agency NETwork (ARPANET) became highly developed. The ARPANET was a computer network used by the Military during the Cold War as a backup communication source had there been a global nuclear

disaster. The ARPANET eventually became what is now known as the modern day Internet (Ferrell, 2008; Sunfell, 2007). The Internet revolutionized communication worldwide by providing a means of exchanging messages and information in many different formats (Einhorn & Shulman). According to Einhorn and Shulman, "the Internet and other technology marvels provided such a wealth of information that the period became known as the Information Age" (para. 326). For Generation X, technology such as the Internet has become viewed as a valuable tool (Bernstein et al., n. d.).

*Net Generation*

Much like each generation before them, the Net Generation had experienced many formative events. The Net Generation grew up in a world of homeland terrorism that no other generation had experienced. In 1995, the Alfred P. Murrah Federal Building in Oklahoma City was destroyed by a terrorist truck bomb killing 168 men, women, and children (Kelley, 2008). The hijacking of four commercial jetliners on September 11, 2001 killed nearly 3,000 people when they slammed into the twin towers of the World Trade Center, the Pentagon, and a Pennsylvania field (Einhorn & Schulman, 2008; Hirschkorn, 2003; Mockaitis, 2008). These terrorist attacks, now known simply as 9/11, were the "worst terrorist attacks ever carried out against the United States" (Mockaitis, para. 1). Even schools no longer provided a sense of safety. In 1999 two Columbine high school students went on a shooting rampage at their high school in Littleton, Colorado killing 13 people (Rosenberg, n.d.). School shootings not only affected K-12 schools, but found its way into college campuses as well. In 2007 a student at Virginia Polytechnic Institute and State University killed 32 people on campus in what is thought to be the "deadliest shooting massacre in U.S. history" (Montaldo, 2007, para. 1). Some experts say these events have led this generation to become desensitized to tragedy, while others say it

has provided them a strong desire to address societal issues such as violence, poverty, and the environment (World Book Online Reference Center, 2008g).

In addition to terrorism, the Net Generation grew up with corporate wrongdoings. Dishonest accounting practices by major corporations such as the Enron Corporation and WorldCom Inc. illustrated a time of distrust in the corporate world (Einhorn & Schulman, 2008). Natural disasters also struck hard worldwide. In 2004, a devastating tsunami hit Thailand, Indonesia, and other parts of Southeast Asia, South Asia, and East Africa killing over 238,000 people (World Book Online Reference Center, 2008i). In 2005, Hurricane Katrina, one of the most destructive storms to ever hit the United States, struck the Gulf Coast killing roughly 1800 people and leaving hundreds of thousands homeless (World Book Online Reference Center, 2008h). Although devastating, these events brought about great compassion, charity, volunteerism, and relief from the global community (World Book Online Reference Center, 2008h; World Book Online Reference Center, 2008i). Paparazzi, "freelance photographers who aggressively pursue celebrities for the purpose of taking candid photographs," have recently gotten as much media attention as the celebrities they photograph (Webster's Unabridged Dictionary, 1999, p. 1404). The tragic death of British royalty in 1997 brought worldwide attention to these media hounds (Carlson, 1997; Timms, 2008).

Often times a person or groups of people become forever linked to major events such as those just mentioned. Terrorist names like Timothy McVeigh and Terry Nichols (Oklahoma City bombing), al-Qa`ida (9/11 attacks), Dylan Klebold and Eric Harris (Columbine massacre), and Cho Seung-hui (Virginia Tech massacre) have been etched in the minds of many (Kelley, 2008; Mockaitis, 2008; Montaldo, 2007; Rosenberg, n. d.). Along with the now infamous terrorists came some incredible heroism. One of these heroes is Todd Beamer, whose last audible words

on September 11, 2001 from United Airlines Flight 93 were "Are you guys ready? Let's roll" ("Todd Beamer," 2001, para. 2). Beamer, along with other passengers of Flight 93, burst into the cockpit in an effort to regain control of the aircraft from the hijackers. Princess Diana, a global hero, died tragically in 1997 from a paparazzi instigated high-speed chase and crash (Carlson, 1997; Timms, 2008). Princess Diana was known worldwide for her support in AIDS research, banning landmines, children's causes, and her association with Mother Theresa (Christensen, 2000; Timms). Coincidental, Mother Theresa died just five days after Princess Diana (Christensen, 2000).

Besides the formative events, infamous people, and heroes, the Net Generation had been shaped by inventions and technological innovations. Teenage Mutant Ninja Turtle action figures, The Littlest Pet Shop, and Beanie Babies were popular toys for this generation (World Book Online Reference Center, 2008a; World Book Online Reference Center, 2008c; World Book Online Reference Center, 2008e). Sega Genesis, Power Rangers, and the reality TV show Survivor kept this generation entertained (World Book Online Reference Center, 2008b; World Book Online Reference Center, 2008d; Curtain, 2008). Medical breakthroughs such as the artificial liver, Viagra, and the cloning of Dolly the sheep made news headlines (Bellis, 2007c; World Book Online Reference Center, 2008f).

As a result of formative events, famous and infamous people, and technological advancements, the Net Generation has some general characteristics that distinguish them from other generations. While the Baby Boomers place more emphasis on work and the Generation Xers place more emphasis on family, the Net Generation believes family and work should blend together rather than be kept as two separate entities (Bernstein et al., n. d; Oblinger, 2005). Some of this desire to blend work and family may stem from their eagerness to please friends,

family, co-workers, and educators (Bernstein et al.). In an effort to achieve this blended life, the Net Generation sees flextime and flexible scheduling as essential components (Mighty 2006; "Generational Characteristics Matrix," n. d.). To further illustrate their desire for flexible scheduling, the Net Generation believes work is more about the actual deadline rather than the schedule. This generation believes it should not matter when each phase of the job is done, as long as the overall job is finished on time (Bernstein et al.).

Beyond the work and family characteristics, The Net Generation has other distinct general characteristics. One of the most notable is the need to always feel connected. To keep connected, the Net Generation utilizes tools such as instant messaging, cell phones, text messaging, chat rooms, e-mail, blogs, wikis, and social networking websites such as Myspace, Facebook, and Xanga (Jackson, 2006; May, 2005; Mighty, 2006; Wygonik, 2008). This always on, always connected mentality led them to become active information seekers (Skiba & Barton, 2006; Wygonik, 2008). Because of this, they value autonomy and often see themselves as experts on life (Skiba & Barton). In addition, the Net Generation is a sheltered, confident, achievement-oriented, and highly pressured generation (Mighty). Much of the pressure placed on this generation is self-imposed. What may outwardly appear as parental pressure actually stems from the kids themselves (Howe & Strauss, 2000). This generation is also the first generation in which the line between consumer and creator has blurred (Mighty).

Along with their general characteristics, the Net Generation also has preferences for learning and the educational experience. This generation tends to have a somewhat more traditional view of education than Generation Xers (Coates, 2007). One exception to these traditional views may be the classroom. Some experts are beginning to use the term "learning spaces" rather than classrooms to describe the Net Generation's learning environment (Brown,

2005, p. 12.1). According to Brown, the classroom is no longer the primary locus for learning in higher education. Other learning spaces such as libraries, faculty offices, and local cafés are as prevalent in learning as the classroom itself. Whether in traditional classrooms or non-traditional learning spaces, the Net Generation learner needs a learning environment that provides and encourages interaction amongst colleagues. Not only do they like group interaction, but they also are very willing to help instructors and other classmates whenever necessary (Coates).

Net Generation learners are active learners. According to Brown (2005), this generation does not ask what something means or how it works, but instead how to build it. To further illustrate this concept, this cohort of learners feels doing something is more important than knowing something (Mighty, 2006). This generation also tends to be doers rather than listeners and watchers. Because the Net Generation would rather do than listen, they prefer learning activities that allow them to explore, discover, and experiment. In addition, the Net Generation enjoys activities that involve social interaction such as debates, class discussions, and other collaborative activities (Brown). This highly social generation prefers group activities over individual assignments and tends to thrive on activities that involve team-work (Bernstein et al., n. d.).

The Net Generation is often thought of as "digital natives" because they have never known a world without computers and information technology (Prensky, 2001, p. 1). The Net Generation was the first generation to grow up with widespread computer access at home, school, and work. Unlike the Baby Boomer and Generation Xers, this generation does not consider computers to be new technology. This generation has not only grown up with computers, but videogames, instant messenger, and cell phones as well. Because of this, Prensky referred to them as "native speakers" (p. 1). For this generation, "Ctrl + Alt + Del is as basic as

ABC, computers have always fit in their backpacks, and the Internet is better than TV" (Mighty, 2006, p. 7). In contrast to other generations, the Net Generation does not see technology as necessary for advancement or as a useful tool, but instead as a way of life (Wygonik, 2008).

*Longitudinal Case Study*

Since 2004, Educause Center for Applied Research (ECAR) has been conducting a longitudinal study to identify the technology experiences and skill levels of higher education students (Kvavik, Caruso, & Morgan, 2004). The first of these studies was the ECAR Study of Students and Information Technology, 2004: Convenience, Connection, and Control. In this research, 4374 students responded to a quantitative survey. These respondents were made up of freshman and senior students at 13 higher education institutions. In addition to the survey, 132 students from six different institutions participated in focus groups and 23 technology advocate administrators were interviewed. Through the survey and interviews, the researchers were able to identify the information technology experiences and skill levels of both the freshmen and seniors at the 13 institutions.

Several key findings regarding technology ownership, use, skill level, and educational value were identified in this study (Kvavik et al., 2004). With regard to ownership, most study participants owned a computer; freshmen owning more laptops and seniors owning more desktops. The vast majority also reported having access to broadband Internet service. Freshmen, who typically live on campus, accessed the Internet primarily through campus resources, while seniors accessed it through commercial Internet service providers.

When it came to technology use, participants reported using technology primarily for education, secondarily for communication, and lastly for presentations (Kvavik et al., 2004). Nearly all of the respondents used technology to create or edit documents, send e-mails, surf the

Internet, and complete classroom activities. Participants also reported doing many of these tasks at the same time.

As far as skill level, participants rated themselves as highly skilled in the areas of electronic communication, word processing, and the Internet (Kvavik et al., 2004). Senior respondents identified a higher level of skill with presentation and spreadsheet software than freshman respondents. The participants' major was also determined to be a factor in perceived skill level. Those majoring in business, engineering, and life sciences rated themselves higher than those in other majors.

When educational use and educational value were reviewed, it was determined that more participants preferred taking classes that used a moderate amount of technology than classes that used too much or too little technology (Kvavik et al., 2004). The second highest preference was for classes that used extensive use of technology. Finally, with an equal percentage of responses, participants preferred classes with either exclusive use or no use of technology. The greatest value of technology in the classroom was identified as convenience and time savings. Although not the greatest value, improved learning was also identified as a benefit. In addition, respondents felt there were several barriers to the use of technology in the classroom: feels like extra work, applications do not run on my computer, lack of access to printers, and lack of technical support.

Kvavik et al.'s 2004 study also discussed six future trends that would likely lead the way in revolutionizing students' use of and skill level with information technology and higher education's embracing of instructional use of information technology to improve learning. These six future trends include the following:

1. Mining and analysis of student course activity data, leading to programs and effective practices.
2. Increased student and faculty information literacy, including the emergence of academic standards of research and evidence in web-dominated information environments.
3. Ongoing improvement in the quality and usability of course delivery systems.
4. Continued proliferation of networked scholarly information.
5. Exploration and integration of new capabilities and practices as they emerge from the arenas of video gaming, virtual reality, simulation, and modeling.
6. Greater emphasis by institutions on planning and creating comprehensive and integrated work plans for the implementation of technology in support of learning (p. 16-17).

The second of the ECAR longitudinal studies entitled Students and Information Technology, 2005 Convenience, Connection, Control, and Learning was conducted in 2005 (Kvavik, Caruso, & Morgan, 2005). This study was completed on a much broader scope and included 18,039 freshman and senior web survey respondents representing 63 higher education institutions in 24 states, interviews of 82 students at seven higher education institutions, and interviews of 20 instructional support staff.

Much like the 2004 study, this study identified several key findings in the areas of ownership, use, skill level, and educational value (Kvavik et al., 2005). Ownership of cell phones, laptop computers, and personal digital assistants (PDAs) had shown an increase over the one-year timeframe. On the other hand, ownership of desktop computers decreased over that

same timeframe. Almost all respondents said they had Internet access with broadband being the primary method.

In the 2005 study, participants said they used computers and cell phones daily for activities such as studying, social interaction, and entertainment (Kvavik et al., 2005). Technologies such as these were primarily used for education, secondarily for connectedness, and lastly for entertainment. Respondents also reported spending an average of 11-15 hours a week on technology-related activities. In addition, almost all respondents utilized computers for core activities such as creating documents and e-mails, while only about one quarter utilized them for specialized activities such as video editing and web page creation.

Participants identified their skill level with core activities such as creating documents and e-mails as skilled and stated they felt no need for additional training (Kvavik et al., 2005). Other more specialized activities such as video editing and web page creation received a lower skill level rating. They also identified a need to receive additional training in these specialized activities if they were going to be required to use them.

Nearly half of the participants preferred classes that utilized a moderate amount of technology and expected instructors to be proficient at utilizing it (Kvavik et al., 2005). Almost one quarter of the participants preferred either extensive use or limited use of technology, followed by a minimal percentage preferring either exclusive use or no use of technology. Researchers also determined that technology in courses was viewed as supplemental rather than transformational in the classroom. The majority of participants perceived technology use in courses as improving their learning, while about one quarter perceived no difference one way or the other, and a small percentage perceived no improved learning. Participants believed the

biggest benefit of using technology in the classroom was convenience, followed by connectedness, course activity management, and learning.

The 2005 study also identified six areas that institutions need to pay attention to (Kvavik et al., 2005). First, technology needs to be integrated into the curriculum. Second, a clear definition of information technology needs to be identified so students know what skills are required to complete the coursework. Third, both students and faculty need to be trained to ensure students are fully engaged. Fourth, students need more consistent use of technology from class to class. Fifth, students need information technology services that are fast, easy to use, and reliable. Finally, student and faculty competencies, attitudes toward, and use of technology needs to be monitored to ensure the curriculum is effective.

A comparison of the results from the 2004 and 2005 studies was also identified (Kvavik et al., 2005). A total of 11 higher education institutions participated in both the 2004 and 2005 studies. In that one year, the researchers saw an increase in laptop computer and cellular phone ownership. In addition, the use of media intensive technologies such as creating and edition audio and video files, PowerPoint presentations, and web pages increased from 2004 to 2005. Finally, both the 2004 and 2005 participants showed a preference for moderate technology use in their classes.

In 2006, ECAR conducted the third of its longitudinal studies (Salaway, Katz, Caruso, Kvavik, & Nelson, 2006). This study was entitled The ECAR Study of Undergraduate Students and Information Technology, 2006. Once again, the scope of the study was increased. The 2006 study included 28,724 freshman, senior, and community college survey respondents representing 96 higher education institutions and interviews of 71 students at 5 higher education institutions.

Several key findings dealing with technology ownership, use and skill with technology, and technology in education were discovered. Nearly all respondents own a computer, of which about two-thirds were laptops (Salaway et al., 2006). The 2006 data suggested that owning a computer had become a prerequisite to attending college or university. In addition to computers, respondents identified using and owning other electronic gadgets such as PDAs, smart phones, and music or video devices.

Besides technology ownership, the 2006 study identified technology use habits of the respondents (Salaway et al., 2006). The majority of participants were heavy communicators, with almost all of them creating, reading, and sending e-mail and 8 out of 10 sending instant messages. Other technology use habits included web and institutional library searches, PowerPoint creation, course management access, music and video downloading, social networking, and online gaming. Roughly one quarter of the participants also created and edited video files, audio files, and web pages.

In addition to technology ownership and use, the study determined respondent's perceived skill level with information technology (Salaway et al., 2006). In general, respondents felt confident in their use of technology. Older students felt more confident with academic major specific technologies and tended to use more advanced features of presentation, spreadsheet, course management, and library resource software than younger students. In addition, presentation and spreadsheet software were typically learned because of specific coursework, while graphic and video editing software were typically learned because of personal interest.

The final focus of this study was the perceived educational benefits of technology use in the classroom (Salaway et al., 2006). Although the survey data suggested most students were avid users and supporters of technology, they tended to prefer only moderate use of technology

in the classroom. Academic major and level of advanced information technology skills also seemed to be factors in preferences for educational use. Nearly two-thirds of the respondents indicated that using technology in their courses had improved their learning. The majority of respondents also stated that the use of technology resulted in prompt feedback from instructors, provided better communication and collaboration with classmates, and allowed for greater control over their course activities. Once again, respondents identified convenience as the number one benefit of technology in education.

The researchers of this study identified several findings that may be pressing for university administrators responsible for making investment and service decisions. First, undergraduate students utilize information technology for social, recreational, business, and educational activities (Salaway et al., 2006). Second, it is important to understand the needs of both the leading-edge (Net Generation) and trailing-edge (Baby Boomer) information technology users. Third, educational institutions are a "place where people mature as IT users" (p. 14). Although confident with personal and recreational use of technology, the respondents were not as confident with "instrumentally useful technologies" (p. 14). Finally, survey participants of all demographic groups believed technology was helping them "communicate, collaborate, learn, engage, conduct research, gain academic feedback, and control their course activities" (p. 14).

The most recent of the ECAR longitudinal studies, The ECAR Study of Undergraduate Students and Information Technology, 2007, was conducted in the spring of 2007 (Salaway, Caruso, & Nelson, 2007). The 2007 study included 27, 864 web survey respondents representing 103 higher education institutions. In addition to the web survey, focus groups with 50 students from 4 universities were conducted.

Once again the ECAR study looked at technology ownership, use, skill level, and educational use (Salaway et al., 2007). Through this study, researchers identified an increase in the number of laptop computer and smartphone ownership from the 2006 study while desktop computer and PDA ownership decreased. Of the 27,864 survey respondents, only 457 did not own a computer of any kind. Even though these participants did not own computers, they did say they utilized technology, although not as frequently, for activities such as sending e-mail, creating documents for class, and accessing institutional web pages. Respondents also identified an increase in electronics used for leisure activities such as music devices, video devices, and gaming devices.

When the researchers looked at technology use, they found that participants spent an average of 18 hours a week online for school, work, and recreation (Salaway et al., 2007). The study also showed that almost all respondents used e-mail, presentation, document, and library resource software. Most respondents used spreadsheet, course management, and graphic editing software. In addition, most respondents shopped and played games online. Some respondents also said they created and/or used wikis, blogs, audio files, video files, and web pages. Online activities such as instant messaging and social networking (Facebook, MySpace, etc.) were used mostly by respondents 18-19 years of age.

As far as skill level with the use of technology, respondents said they were most confident with content management systems and presentation software (Salaway et al., 2007). Next they felt most comfortable with spreadsheet software, library resource software, and computer maintenance. Academic major also seemed to influence comfort level with certain technologies. Fine arts majors tended to be more skillful with graphic, audio, and video editing software. Engineering majors were more skillful with spreadsheet software and computer

maintenance. Social sciences and humanities majors felt more skilled with library resource software. According to Salaway et al., students who rated their technology skills stronger also tended to own more computers and other electronic devices. In addition, they spent more time on online activities.

Over the past four years participants have been pretty consistent in their desire to use a moderate amount of technology in their classes (Salaway et al., 2007). Respondents identified e-mail, content management systems, course websites, spreadsheet software, and presentation software as basic course technologies. Participants also identified several technologies they would like to use in their educational experience to increase their learning. These technologies included Internet searches, simulations, e-mail, instant messaging, text messaging, course websites, blogs, and wikis. The 2007 study showed once again that students felt the use of technology in education resulted in prompt instructor feedback, better research, better communication, better collaboration, greater control over their course activities, and improved learning. Although they identified improved learning as a benefit of technology use, the biggest benefit of technology use was still convenience, followed by better communication.

In the 2007 study, participants linked technology and learning in one of three categories: enabler of learning, barrier to learning, and balancing technology use with instructor interaction (Salaway et al., 2007). When it came to enabling learning, respondents felt technology facilitated organization, encouraged communication, and provided accessibility of materials. They also thought technology was most valuable when instructors used it effectively and it could be applied to future employment. As far as barriers to learning, respondents felt there were problems with some of the actual technologies and how they were implemented and supported by the institution. They also felt the learning environment had become more complex due to the

increase in the amount of technologies being used. Finally, they identified poor faculty use and overestimation of student comfort levels as being barriers to learning. Respondents also felt strongly that technology should not replace face-to-face interaction with instructors. Participants felt a balance between technology use and face-to-face contact with faculty would provide the most effective learning environment.

As a means of addressing the three categories identified by study participants, the researchers have suggested several areas of focus. First, institutions need to develop a standard technology skill set that all instructors must possess (Salaway et al., 2007). Second, instructors should have professional development training on how to integrate technology effectively with the theory of pedagogy. Third, speed, reliability, support of network and academic applications needs to be improved. Finally, instructors and administrators need to be made aware of student differences in technology use, skill levels, and access.

Since the inception of this longitudinal study, the researchers identified several trends. Laptop and smartphone ownership has steadily increased each year (Salaway et al., 2007). Wireless as the primary Internet connection has increased, while dial-up Internet connections has decreased. The use of social networking sites such as Facebook and MySpace have increased dramatically over the past two years. The number of students using course management systems has steadily increased throughout the study. The biggest benefit of using technology in education has been and continues to be convenience. Using technology has improved student learning. Finally, learners predominately prefer courses that utilize a moderate amount of technology balanced with face-to-face instructor interaction.

# Chapter III: Methodology

## *Introduction*

This chapter will discuss how the subjects were selected, a description of the sample, and the survey instrument that was used. In addition, the data collection process and data analysis procedures will be reviewed. Finally, the methodological limitations of the study will be identified.

## *Subject Selection and Description*

All students, 18 years of age or older, from the University of Wisconsin-Stout (UW-Stout) were sent an e-mail informing them of the intent of the study and were asked to participate. The e-mail also contained a link to the web survey for them to respond to. There were 8029 students, 18 years and older, enrolled at UW-Stout for the Spring 2008 term. Both male and female students were asked to participate in the survey. Both graduate and undergraduate students were asked to participate in this study.

## *Instrumentation*

A survey was developed as an online instrument that could be completed and submitted electronically. The survey consisted of three categories: demographics, learning style, and use of technology. Within each category there was one or more of the following response formats: single answer multiple choice, multiple answer multiple choice, or Likert scale style items. The survey questions were constructed based on surveys of prior studies conducted by ECAR in 2004, 2005, 2006, and 2007 on a similar topic (See Appendix A). Because the surveys used by ECAR were too lengthy for this research project, an original survey was created. Since the survey was created specifically for this research project by the researcher, there are no measures of validity or reliability for the instrument.

*Data Collection Procedures*

Permission to survey UW-Stout students was requested from UW-Stout Institutional Review Board (IRB) in April 2008. Final approval to conduct this study was granted on April 29, 2008 (See Appendix B). Upon approval, e-mail addresses were obtained for all graduate and undergraduate students, 18 years of age and older, attending the UW-Stout during the spring semester of the 2007-2008 school year. An e-mail was then sent to each student informing them of the intent of the study, a request to participate, and a link to the 23 question web-based survey (See Appendix C). Participants were given 4 days in which to complete the survey. At that time, a second e-mail was sent to them as a reminder to complete the survey if they had not yet done so (See Appendix D). Participants were given an additional 3 days to respond to the survey. At the end of the 7 day period, the survey was closed in order to allow for data analysis.

*Data Analysis*

Once the survey was closed the raw data was exported from the survey program into two formats: Statistical Program for Social Sciences (SPSS) and individual responses. Depending on the type of data analyzed, quantitative analysis was completed using Chi-Square, one-way Analysis of Variance (ANOVA) test, or Kruskal-Wallis one-way ANOVA. The analysis was then reviewed to determine two things: if there was a statistically significant difference and where the differences existed.

*Limitations*

Because the survey was developed by the researcher for the purpose of this study, there were no measures of validity or reliability documented. In addition, the research only addressed the students at one university and therefore reliable inferences cannot be made to other universities. Another limitation to this study is the population. The study addressed three

different generations of learners: Baby Boomers, Generation X, and Net Generation. The ratio of learners in the Net Generation group may be disproportionate to the other two groups.

*Summary*

UW-Stout students were surveyed to determine their attitude toward the use of technology in education. Upon collection of the data it was analyzed using several different quantitative methods. Several limitations existed in this study such as a researcher-created survey, limited population, and ratio of participants.

# Chapter IV: Results

## *Introduction*

In this chapter, the results of this study will be discussed. In addition, demographic information will be identified, listed, and illustrated. The chapter will conclude with the statistical findings of the research.

## *Demographics*

A population of 8029 students was initially contacted via e-mail to participate in the study. As shown in Table 1 and illustrated in Figure 1, the population consisted of 399 (4.97%) students who were born between 1946 and 1964 (identified as Baby Boomer), 1145 (14.26%) students who were born between 1965 and 1981 (identified as Generation X), and 6485 (80.77%) students who were at least 18 years of age and born in or after 1982 (identified as Net Generation). Of the 8029 population, a sample of 613 students agreed to participate and completed the online survey. Also shown in Table 1 and illustrated in Figure 1, the sample consisted of 46 (7.50%) Baby Boomer, 131 (21.37%) Generation X, and 437 (71.13%) Net Generation participants.

Table 1

*Population and Sample*

| Generation | | Population | Sample |
|---|---|---|---|
| Baby Boomer | Count | 399 | 46 |
| | % within Generation | 4.97% | 7.50% |
| Generation X | Count | 1145 | 131 |
| | % within Generation | 14.26% | 21.37% |
| Net Generation | Count | 6485 | 436 |
| | % within Generation | 80.77% | 71.13% |
| Total | Count | 8029 | 613 |
| | % | 100.00% | 100.00% |

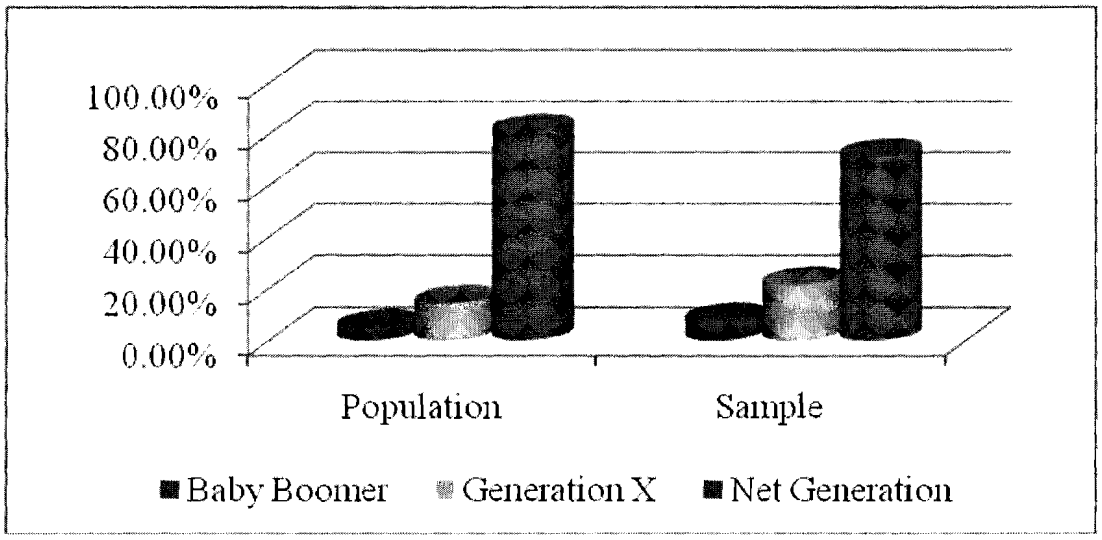


Figure 1. *Population and sample percentages*

Of the 613 participants, 46 (7.49%) identified they were born within the Baby Boomer range. Within the Baby Boomer sample, 16 males participated and 30 females participated. As shown in Table 2 and illustrated in Figure 2, males with full-time enrollment status took most of their classes on campus while the males with part-time enrollment status took most of their classes through distance education. Unlike the male respondents, there were almost as many full-time female distance education learners as there were full-time female on campus learners. Conversely, there were nearly as many female part-time on campus learners as there were part-time female distance education learners.

Table 2

*Baby Boomer Participants by Delivery Mode and Enrollment Status Cross Tabulation*

| Gender | Delivery Method | | Enrollment Status Full-time | Part-Time | Total |
|---|---|---|---|---|---|
| Male | On Campus | Count | 3 | 2 | 5 |
| | | % within Method | 60.00% | 40.00% | 100.00% |
| | Distance Education | Count | 2 | 9 | 11 |
| | | % within Method | 18.18% | 81.82% | 100.00% |
| | Total | Count | 5 | 11 | 16 |
| | | % within Method | 31.25% | 68.75% | 100.00% |
| Female | On Campus | Count | 3 | 6 | 9 |
| | | % within Method | 33.33% | 66.67% | 100.00% |
| | Distance Education | Count | 6 | 15 | 21 |
| | | % within Method | 28.57% | 71.43% | 100.00% |
| | Total | Count | 9 | 21 | 30 |
| | | % | 30.00% | 70.00% | 100.00% |

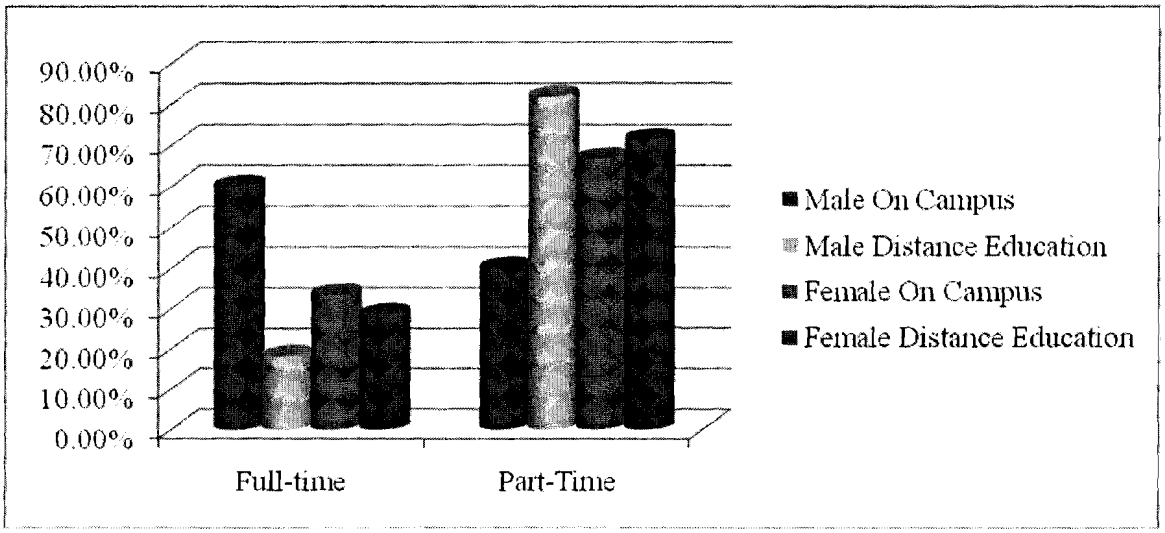


Figure 2. *Baby Boomer participants by delivery mode and enrollment status percentages*

Of the 613 participants, 131 (21.33%) identified they were born within the Generation X range. As shown in Table 3 and illustrated in Figure 3, regardless of gender, those with full-time

enrollment status took most of their classes on campus while those with part-time enrollment status took most of their classes through distance education.

Table 3

*Generation X Participants by Delivery Mode and Enrollment Status Cross Tabulation*

| Gender | Delivery Method | | Enrollment Status Full-time | Part-Time | Total |
|---|---|---|---|---|---|
| Male | On Campus | Count | 23 | 4 | 27 |
| | | % within Method | 85.19% | 14.81% | 100.00% |
| | Distance Education | Count | 5 | 27 | 32 |
| | | % within Method | 15.63% | 84.38% | 100.00% |
| | Total | Count | 28 | 31 | 59 |
| | | % within Method | 47.46% | 52.54% | 100.00% |
| Female | On Campus | Count | 28 | 10 | 38 |
| | | % within Method | 73.68% | 26.32% | 100.00% |
| | Distance Education | Count | 3 | 31 | 34 |
| | | % within Method | 8.82% | 91.18% | 100.00% |
| | Total | Count | 9 | 21 | 72 |
| | | % | 12.50% | 29.17% | 100.00% |

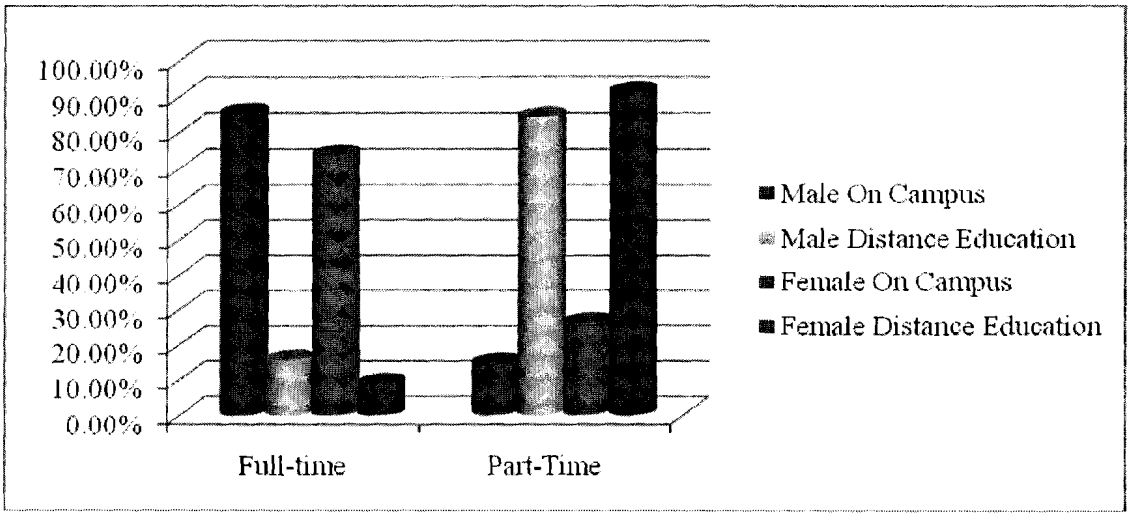


Figure 3. *Generation X participants by delivery mode and enrollment status percentages*

Of the 613 participants, 437 (71.17%) identified they were born within the Net Generation range. As shown in Table 4 and illustrated in Figure 4, regardless of gender, those with full-time enrollment status took most of their classes on campus. Males with part-time enrollment status took most of their classes on campus while the one part-time female learner took primarily distance education courses.

Table 4

*Net Generation Participants by Delivery Mode and Enrollment Status Cross Tabulation*

| Gender | Delivery Method | | Enrollment Status | | |
|---|---|---|---|---|---|
| | | | Full-time | Part-Time | Total |
| Male | On Campus | Count | 23 | 4 | 27 |
| | | % within Method | 85.19% | 14.81% | 100.00% |
| | Distance Education | Count | 5 | 27 | 32 |
| | | % within Method | 15.63% | 84.38% | 100.00% |
| | Total | Count | 28 | 31 | 59 |
| | | % within Method | 47.46% | 52.54% | 100.00% |
| Female | On Campus | Count | 28 | 10 | 38 |
| | | % within Method | 73.68% | 26.32% | 100.00% |
| | Distance Education | Count | 3 | 31 | 34 |
| | | % within Method | 8.82% | 91.18% | 100.00% |
| | Total | Count | 9 | 21 | 72 |
| | | % | 12.50% | 29.17% | 100.00% |

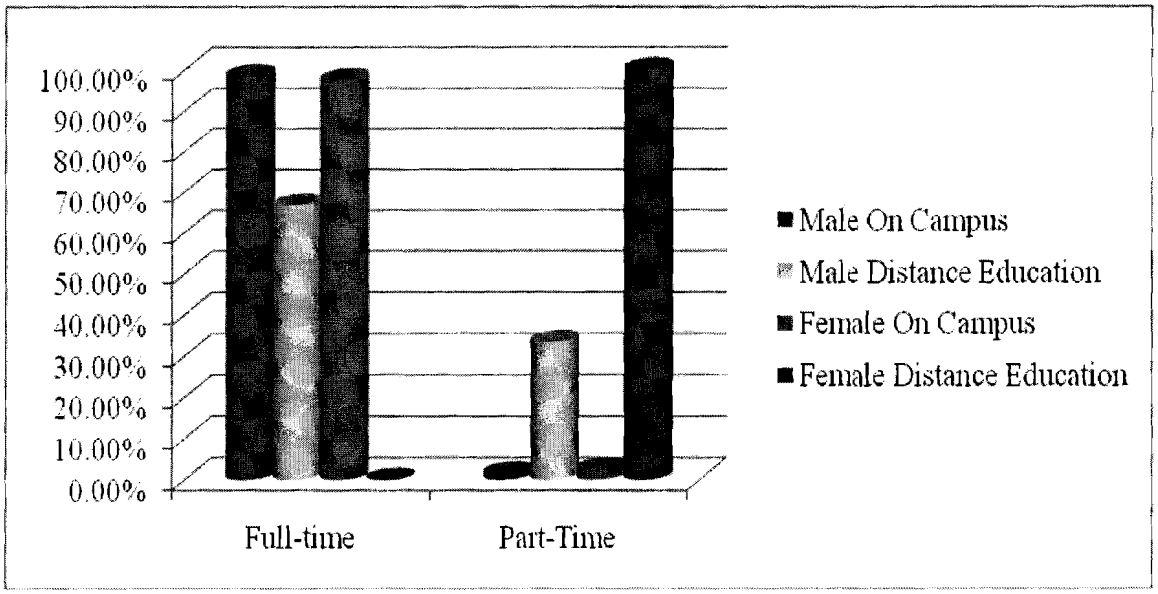


Figure 4. *Net Generation participants by delivery mode and enrollment status percentages*

*Data Analysis*

Once the survey data was collected, it was coded and organized so it could be analyzed. The analysis of the data provided a foundation upon which the researcher formed conclusions about the Net Generation learner's attitude toward the use of technology in education compared to that of the Baby Boomer and Generation X learners. The following findings are a summary of the research conducted.

The data collected from questions 7-11 and 14-18 was nominal. To analyze this data a test using cross tabulations and Pearson's chi-square was performed. Chi-square tests are nonparametric tests that look for differences between expected results and observed results. To begin the analysis, a null hypothesis was established for each question 7-11 and 14-18. A Chi-square test was then conducted on the expected and observed data to see if there were any differences. For the expected data and observed data to have a statistically significant difference, the probability (Asymp. Sig. [2-sided]) must be less than or equal to .05.

Survey question 7 asked if the participant learned best by doing something, hearing something, or seeing something. The null hypothesis for this question stated there was no

difference in the distribution of responses of how students learn best by generation type. Table 5 shows a .048 probability from the Chi-square test. Because .048 is less than .05 there is a statistically significant difference in the distribution of responses by generation. Table 6 and Figure 5 illustrates that each generation preferred doing something over hearing or seeing something. Two differences were determined with question 7. First, none of the Baby Boomer generation identified hearing something as the way they learn best while 6.90% of Generation X and 8.50% of Net Generation identified hearing as the way they learn best. Second, only 25.50% of the Net Generation said they learn best by seeing something while 32.60% of the Baby Boomer generation and 35.90% of Generation X learn best by seeing something.

Table 5

*How Students Learn Best Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 9.586(*) | 4 | .048 |
| Likelihood Ratio | 12.861 | 4 | .012 |
| N of Valid Cases | 613 | | |

*1 cells (11.1%) have expected count less than 5. The minimum expected count is 3.45.

Table 6

*How Students Learn Best Cross Tabulation*

| | | Learn best by ... | | | |
|---|---|---|---|---|---|
| Generation | | Doing Something | Hearing Something | Seeing Something | Total |
| Baby Boomer | Count | 31 | 0 | 15 | 46 |
| | % within Generation | 67.40% | 0.00% | 32.60% | 100.00% |
| Generation X | Count | 75 | 9 | 47 | 131 |
| | % within Generation | 57.30% | 6.90% | 35.90% | 100.00% |
| Net Generation | Count | 288 | 37 | 111 | 436 |
| | % within Generation | 66.10% | 8.50% | 25.50% | 100.00% |
| Total | Count | 394 | 46 | 173 | 613 |
| | % | 64.30% | 7.50% | 28.20% | 100.00% |

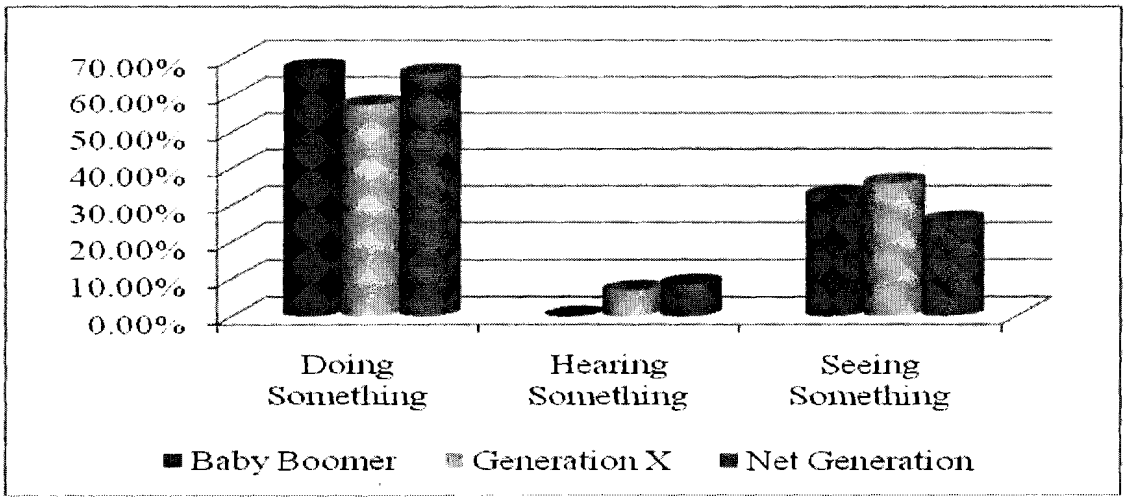


Figure 5. *How students learn best percentages*

Survey question 8 asked if the participants learn best when working, thinking through concepts, and completing assignments alone, collaboratively, or no preference. The null hypothesis for this question stated there was no difference in the distribution of responses of when students learn best by generation type. Table 7 shows a .774 probability from the Chi-square test. Because .774 is greater than .05 there is no statistically significant difference in the distribution of responses by generation. As shown in Table 8 and illustrated in Figure 6, over 50.00% of respondents, regardless of generation, preferred working, thinking through concepts, and completing assignments alone. This was followed by roughly 25.00% to 32.00% that had no preference either way and approximately 21.00% that preferred collaborative groups.

Table 7

*When Students Learn Best Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 1.791(*) | 4 | .774 |
| Likelihood Ratio | 1.755 | 4 | .781 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 9.68.

Table 8

*When Students Learn Best Cross Tabulation*

| Generation | | Learn best when ... Alone | In collaborative group | No preference | Total |
|---|---|---|---|---|---|
| Baby Boomer | Count | 21 | 10 | 15 | 46 |
| | % within Generation | 45.65% | 21.74% | 32.61% | 100.00% |
| Generation X | Count | 67 | 29 | 35 | 131 |
| | % within Generation | 51.15% | 22.14% | 26.72% | 100.00% |
| Net Generation | Count | 237 | 90 | 109 | 436 |
| | % within Generation | 54.36% | 20.64% | 25.00% | 100.00% |
| Total | Count | 325 | 129 | 159 | 613 |
| | % | 53.02% | 21.04% | 25.94% | 100.00% |

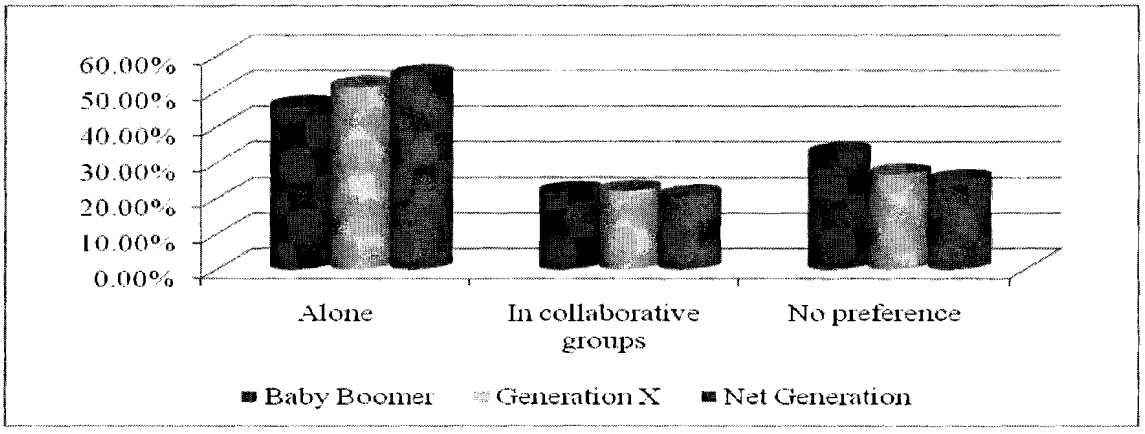


Figure 6. *When students learn best percentages*

Survey question 9 asked if the participants preferred classes that use no, limited, moderate, extensive, or exclusive technology. The null hypothesis for this question stated there was no difference in the distribution of responses of technology-in-class preferences by generation type. Table 9 shows a .127 probability from the Chi-square test. Because .127 is greater than .05 there is no statistically significant difference in the distribution of responses by generation. As shown in Table 10 and illustrated in Figure 7, almost half of the respondents,

regardless of generation, preferred classes that used a moderate amount of technology. This was followed by extensive use, limited use, exclusive use, and no use in that order.

Table 9

*Technology Use in Class Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 12.595(*) | 8 | .127 |
| Likelihood Ratio | 12.625 | 8 | .125 |
| N of Valid Cases | 613 | | |

*6 cells (40.0%) have expected count less than 5. The minimum expected count is .23.

Table 10

*Technology Use in Class Preferences Cross Tabulation*

| | | Prefer classes with ... technology | | | | | |
|---|---|---|---|---|---|---|---|
| Generation | | Exclusive | Extensive | Limited | Moderate | No | Total |
| Baby Boomer | Count | 2 | 17 | 6 | 21 | 0 | 46 |
| | % within Generation | 4.35% | 36.96% | 13.04% | 45.65% | 0.00 % | 100.00% |
| Generation X | Count | 8 | 47 | 9 | 67 | 0 | 131 |
| | % within Generation | 6.11% | 35.88% | 6.87% | 51.15% | 0.00 % | 100.00% |
| Net Generation | Count | 13 | 125 | 26 | 269 | 3 | 436 |
| | % within Generation | 2.98% | 28.67% | 5.96% | 61.70% | 0.69 % | 100.00% |
| Total | Count | 23 | 189 | 41 | 357 | 3 | 613 |
| | % | 3.75% | 30.83% | 6.69% | 58.24% | 0.49 % | 100.00% |

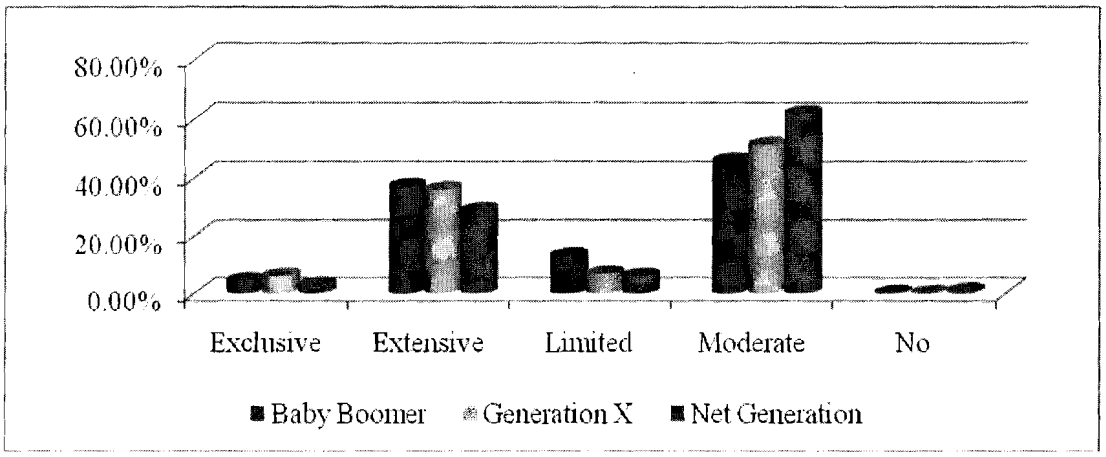


Figure 7. *Technology use in class percentages*

Survey question 10 asked if the participants preferred taking mostly online, blended (part online and part face-to-face), or face-to-face classes. The null hypothesis for this question stated there was no difference in the distribution of responses of what type of classes students prefer by generation type. Table 11 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. Table 12 and Figure 8 illustrates where the differences exist. Each generation had a preference for a different delivery method. The Baby Boomer Generation preferred online classes, Generation X preferred blended classes, and the Net Generation preferred face-to-face classes. Two distinct differences were determined with question 10. First, 68.64% of Net Generation respondents said they preferred face-to-face classes while only 30.43% of Baby Boomer respondents and 35.88% of Generation X respondents said they preferred face-to-face classes. Second, 43.38% of the Baby Boomer respondents said they prefer online classes while 22.90% of Generation X respondents and only 1.38% of Net Generation prefer online classes.

Table 11

*Preferred Delivery Method Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 138.653(*) | 4 | .000 |
| Likelihood Ratio | 120.383 | 4 | .000 |
| N of Valid Cases | 613 | | |

*1 cells (11.1%) have expected count less than 5. The minimum expected count is 4.20.

Table 12

*Preferred Delivery Method Cross Tabulation*

| | | Prefer online/blend/FtoF | | | |
|---|---|---|---|---|---|
| Generation | | Blended | Face-to-Face | Online | Total |
| Baby Boomer | Count | 12 | 14 | 20 | 46 |
| | % within Generation | 26.09% | 30.43% | 43.48% | 100.00% |
| Generation | Count | 54 | 47 | 30 | 131 |
| X | % within Generation | 41.22% | 35.88% | 22.90% | 100.00% |
| Net | Count | 148 | 282 | 6 | 436 |
| Generation | % within Generation | 33.94% | 64.68% | 1.38% | 100.00% |
| Total | Count | 214 | 343 | 56 | 613 |
| | % | 34.91% | 55.95% | 9.14% | 100.00% |

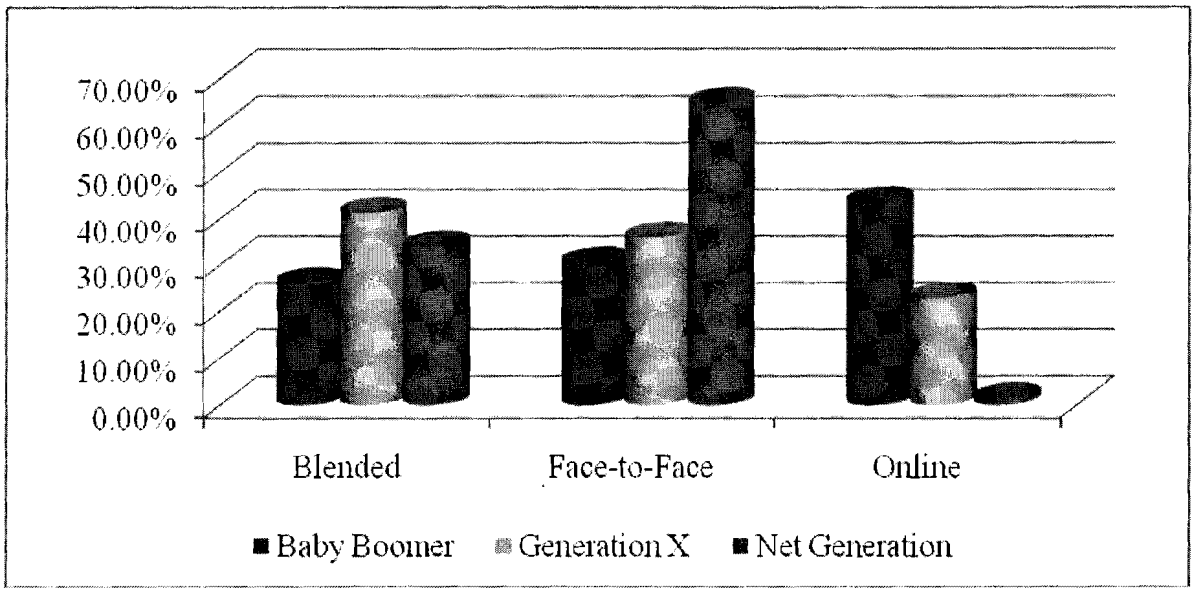


Figure 8. *Preferred delivery method percentages*

Survey question 11 asked the participants what additional activities they might do while they study. The options they had to choose from included doing nothing, talking on the phone, surfing the Internet, sending/receiving instant messages or text messages, listening to music, and watching TV. Figure 9 provides an overview of what activities each generation does while studying. This data shows the Net Generation does technology related multi-tasking while studying much more than either the Baby Boomer or Generation X. At least 50.00% of the Net Generation participants stated they surf the Internet, send instant or text messages, listen to music, and/or watch TV while they study. Since participants were allowed to pick as many activities as they wanted to, each activity will be examined separately in further detail.

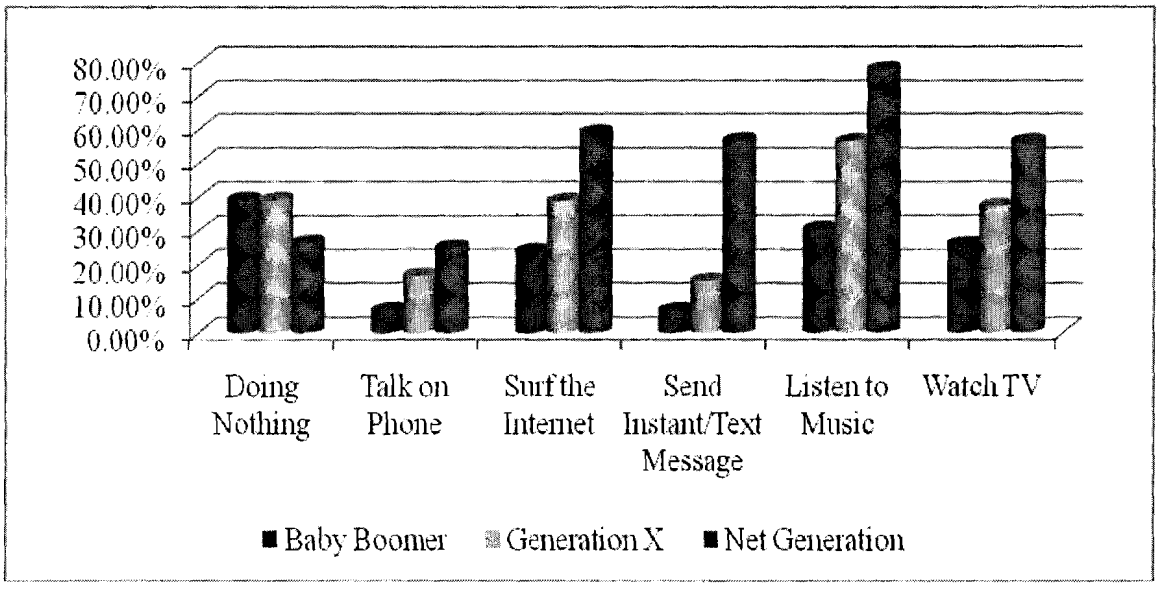


Figure 9. *Activities completed while studying percentages*

The first option was doing nothing while studying. The null hypothesis for this part of question 11 stated there was no difference in the frequency of responses for doing nothing when studying by generation type. Table 13 shows a .078 probability from the Chi-square test. Because .078 is greater than .05 there is no statistically significant difference in the distribution of responses by generation. As shown in Table 14, 39.13% of Baby Boomers, 33.59% of Generation X and 26.38% of the Net Generation reported doing nothing else while they study.

Table 13

*Doing Nothing While Studying Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 5.098(*) | 2 | .078 |
| Likelihood Ratio | 4.947 | 2 | .084 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 13.28.

Table 14

*Doing Nothing While Studying Cross Tabulation*

| Generation | | Do while Studying: Does Something | Do while Studying: Does Nothing | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 28 | 18 | 46 |
| | % within Generation | 60.87% | 39.13% | 100.00% |
| Generation X | Count | 87 | 44 | 131 |
| | % within Generation | 66.41% | 33.59% | 100.00% |
| Net Generation | Count | 321 | 115 | 436 |
| | % within Generation | 73.62% | 26.38% | 100.00% |
| Total | Count | 436 | 177 | 613 |
| | % | 71.13% | 28.87% | 100.00% |

The second option was talking on the phone while studying. The null hypothesis for this part of question 11 stated there was no difference in the frequency of responses for talking on the phone when studying by generation type. Table 15 shows a .004 probability from the Chi-square test. Because .004 is less than .05 there is a statistically significant difference in the distribution of responses by generation. As shown in Table 16, only 6.52% of Baby Boomer respondents said they talk on the phone while they study compared to 16.79% of Generation X respondents and 25.00% of Net Generation respondents.

Table 15

*Talking on the Phone While Studying Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 10.821(*) | 2 | .004 |
| Likelihood Ratio | 12.687 | 2 | .002 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 10.06.

Table 16

*Talking on the Phone While Studying Cross Tabulation*

| Generation | | Do while Studying: Does not talk on phone | Do while Studying: Talks on phone | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 43 | 3 | 46 |
| | % within Generation | 93.48% | 6.52% | 100.00% |
| Generation X | Count | 109 | 22 | 131 |
| | % within Generation | 83.21% | 16.79% | 100.00% |
| Net Generation | Count | 327 | 109 | 436 |
| | % within Generation | 75.00% | 25.00% | 100.00% |
| Total | Count | 479 | 134 | 613 |
| | % | 78.14% | 21.86% | 100.00% |

The third option was surfing the Internet while studying. The null hypothesis for this part of question 11 stated there was no difference in the frequency of responses for surfing the Internet when studying by generation type. Table 17 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. As shown in Table 18, while 58.94% of Net Generation said they surf the Internet while they study, only 38.93% of Generation X participants and 23.91% of Baby Boomer participants said they surf the Internet while studying.

Table 17

*Surfing the Internet While Studying Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 31.929(*) | 2 | .000 |
| Likelihood Ratio | 32.646 | 2 | .000 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 22.06.

Table 18

*Surfing the Internet While Studying Cross Tabulation*

| Generation | | Do while Studying: Doesn't Surf the Internet | Do while Studying: Surfs the Internet | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 35 | 11 | 46 |
| | % within Generation | 76.09% | 23.91% | 100.00% |
| Generation X | Count | 80 | 51 | 131 |
| | % within Generation | 61.07% | 38.93% | 100.00% |
| Net Generation | Count | 179 | 257 | 436 |
| | % within Generation | 41.06% | 58.94% | 100.00% |
| Total | Count | 294 | 319 | 613 |
| | % | 47.96% | 52.04% | 100.00% |

The fourth option was sending instant messages or text messages while studying. The null hypothesis for this part of question 11 stated there was no difference in the frequency of responses for sending instant messages or text messages when studying by generation type. Table 19 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. Table 20 shows 56.65% of the Net Generation respondents indentified sending instant message or text message as something they do while they study. In comparison, 15.27% of Generation X respondents and only 6.52% of Baby Boomer respondents said they send instant message or text message while study.

Table 19

*Sending Instant or Text Messages While Studying Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 98.414(*) | 2 | .000 |
| Likelihood Ratio | 110.262 | 2 | .000 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 20.26.

Table 20

*Sending Instant or Text Messages While Studying Cross Tabulation*

| Generation | | Do while Studying: Doesn't send messages | Do while Studying: Sends messages | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 43 | 3 | 46 |
| | % within Generation | 93.48% | 6.52% | 100.00% |
| Generation X | Count | 111 | 20 | 131 |
| | % within Generation | 84.73% | 15.27% | 100.00% |
| Net Generation | Count | 189 | 247 | 436 |
| | % within Generation | 43.35% | 56.65% | 100.00% |
| Total | Count | 343 | 270 | 613 |
| | % | 55.95% | 44.05% | 100.00% |

The fifth option was listening to music while studying. The null hypothesis for this part of question 11 stated there was no difference in the frequency of responses for listening to music when studying by generation type. Table 21 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. As shown in Table 22, 77.75% of the Net Generation respondents said they listen to music while they study. In comparison, 56.49% of Generation X respondents and only 30.43% of Baby Boomer respondents said they listen to music while studying.

Table 21

*Listening to Music While Studying Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 57.748(*) | 2 | .000 |
| Likelihood Ratio | 54.336 | 2 | .000 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 13.96.

Table 22

*Listening to Music While Studying Cross Tabulation*

| Generation | | Do while Studying: Doesn't Listen to Music | Do while Studying: Listens to Music | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 32 | 14 | 46 |
| | % within Generation | 69.57% | 30.43% | 100.00% |
| Generation X | Count | 57 | 74 | 131 |
| | % within Generation | 43.51% | 56.49% | 100.00% |
| Net Generation | Count | 97 | 339 | 436 |
| | % within Generation | 22.25% | 77.75% | 100.00% |
| Total | Count | 186 | 427 | 613 |
| | % | 30.34% | 69.66% | 100.00% |

The sixth and final option was watching television while studying. The null hypothesis for this part of question 11 stated there was no difference in the frequency of responses for watching TV when studying by generation type. Table 23 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. Table 24 shows 56.42% of the Net Generation respondents watch TV while they study. In comparison, 37.40% of Generation X respondents and 26.09% of Baby Boomer respondents said they watch TV while studying.

Table 23

*Watching TV While Studying Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 26.026(*) | 2 | .000 |
| Likelihood Ratio | 26.579 | 2 | .000 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 22.96.

Table 24

*Watching TV While Studying Cross Tabulation*

| Generation | | Do while Studying: Doesn't Watch Television | Do while Studying: Watches Television | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 34 | 12 | 46 |
| | % within Generation | 73.91% | 26.09% | 100.00% |
| Generation X | Count | 82 | 49 | 131 |
| | % within Generation | 62.60% | 37.40% | 100.00% |
| Net Generation | Count | 190 | 246 | 436 |
| | % within Generation | 43.58% | 56.42% | 100.00% |
| Total | Count | 306 | 307 | 613 |
| | % | 49.92% | 50.08% | 100.00% |

Survey question 14 asked participants how old their computer was. The options provided to the respondents were 0-2 years, 3-5 years, 6-8 years, 9+ years, and I do not own a computer. The null hypothesis for this question stated there was no difference in the distribution of responses of age of computer by generation type. Table 25 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. As shown in Table 26 and illustrated in Figure 10, almost 93% of the Net Generation reported having a computer that is 0-2 years old while approximately 61% of Baby Boomer and 67% of Generation X participants own computer 0-2 years old. This data also showed that less than 5%, regardless of generation, either owned a computer that was 6 or more years old or did not own a computer at all.

Table 25

*Age of Computer Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 89.711(*) | 8 | .000 |
| Likelihood Ratio | 80.568 | 8 | .000 |
| N of Valid Cases | 613 | | |

*7 cells (46.7%) have expected count less than 5. The minimum expected count is .15.

Table 26

*Age of Computer Cross Tabulation*

| | | Age of Computer | | | | | |
|---|---|---|---|---|---|---|---|
| Generation | | 0-2 years | 3-5 years | 6-8 years | 9+ years | Doesn't Own | Total |
| Baby Boomer | Count | 28 | 16 | 2 | 0 | 0 | 46 |
| | % within Generation | 60.87% | 34.78% | 4.35% | 0.00% | 0.00% | 100.00% |
| Generation X | Count | 88 | 35 | 6 | 1 | 1 | 131 |
| | % within Generation | 67.18% | 26.72% | 4.58% | 0.76% | 0.76% | 100.00% |
| Net Generation | Count | 405 | 19 | 4 | 1 | 7 | 436 |
| | % within Generation | 92.89% | 4.36% | 0.92% | 0.23% | 1.61% | 100.00% |
| Total | Count | 521 | 70 | 12 | 2 | 8 | 613 |
| | % | 84.99% | 11.42% | 1.96% | 0.33% | 1.31% | 100.00% |

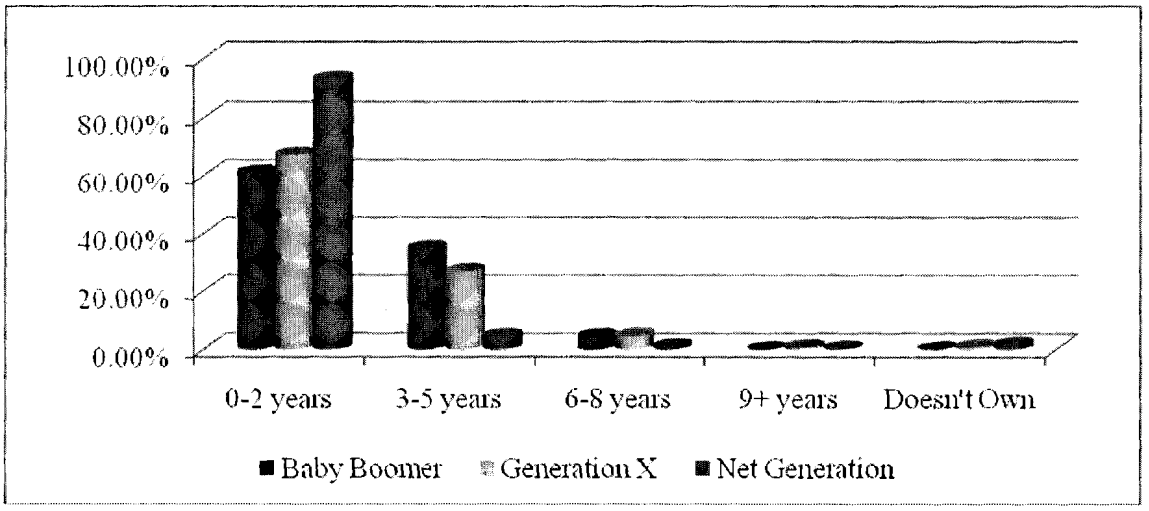


Figure 10. *Age of computer percentages*

Survey question 15 asked participants the primary type of computer they owned. The options provided to the respondents were desktop, laptop, tablet PC, and other. In order to obtain statistical information for this question the data had to be collapsed into two categories: desktop and laptop/tablet PC. One person said they used their desktop and laptop computers equally. Because of this, the response was removed from the analysis. The null hypothesis for this question stated there was no difference in the distribution of responses of primary computer type by generation type. Table 27 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. As shown in Table 28 and Figure 11 at least 32% of Baby Boomer and Generation X respondents said their primary computer was a desktop computer while almost 91% of Net Generation respondents said their primary computer was a laptop or tablet PC.

Table 27

*Type of Primary Computer Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 71.514(*) | 2 | .000 |
| Likelihood Ratio | 63.298 | 2 | .000 |
| N of Valid Cases | 612 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 7.82.

Table 28

*Type of Primary Computer Cross Tabulation*

| Generation | | Primary Type of Computer Desktop | Laptop | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 22 | 24 | 46 |
| | % within Generation | 47.83% | 52.17% | 100.00% |
| Generation X | Count | 42 | 88 | 130 |
| | % within Generation | 32.31% | 67.69% | 100.00% |
| Net Generation | Count | 40 | 396 | 436 |
| | % within Generation | 9.17% | 90.83% | 100.00% |
| Total | Count | 104 | 508 | 612 |
| | % | 16.99% | 83.01% | 100.00% |

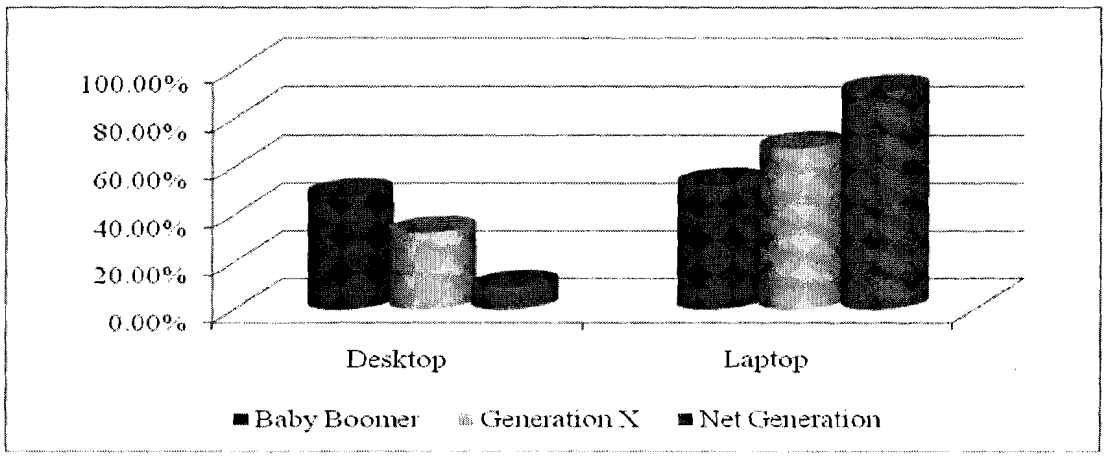


Figure 11. *Type of primary computer percentages*

Survey question 16 asked participants what type of operating system was installed on their primary computer. The options provided to the respondents were Windows, Macintosh, Linux, and other. In order to complete statistical analysis the categories had to be collapsed into two groups: Windows and other. The null hypothesis for this question stated there was no difference in the distribution of responses of primary operating system by generation type. Table 29 shows a .006 probability from the Chi-square test. Because .006 is less than .05 there is a statistically significant difference in the distribution of responses by generation. Table 30 and

Figure 12 show that regardless of generation, most respondents have Windows as their primary operating system. The statistical difference can be found when comparing Generation X to the Baby Boomer. Almost 94.00% of Generation X participants use Windows while roughly 78.00% of the Baby Boomer participants use Windows.

Table 29

*Type of Primary Operating System Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 10.314(*) | 2 | .006 |
| Likelihood Ratio | 11.746 | 2 | .003 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 6.60.

Table 30

*Type of Primary Operating System Cross Tabulation*

| | | Primary Type of Operating System | | |
|---|---|---|---|---|
| Generation | | Windows | Other | Total |
| Baby Boomer | Count | 36 | 10 | 46 |
| | % within Generation | 78.30% | 21.70% | 100.00% |
| Generation X | Count | 123 | 8 | 131 |
| | % within Generation | 93.90% | 6.10% | 100.00% |
| Net Generation | Count | 366 | 70 | 436 |
| | % within Generation | 83.90% | 16.10% | 100.00% |
| Total | Count | 525 | 88 | 613 |
| | % | 85.60% | 14.40% | 100.00% |

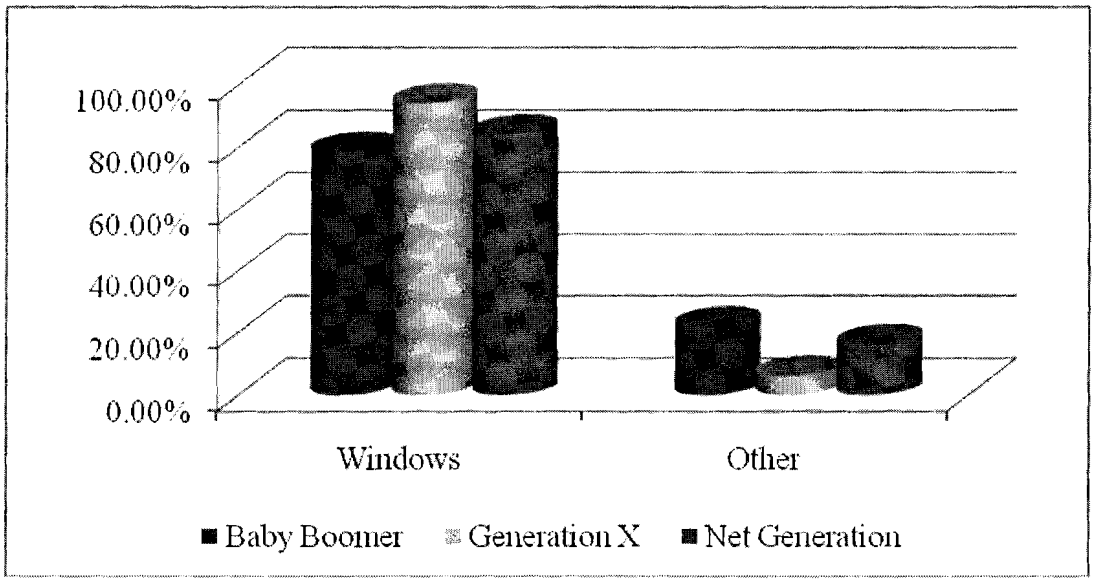


Figure 12. *Type of primary operating system percentages*

Survey question 17 asked participants what type of Internet connection they had at their residence. The options provided to the respondents were dial-up, DSL/cable, no service, and other. The null hypothesis for this question stated there was no difference in the distribution of responses of home internet connection by generation type. Because there were too many small values returned for this question, statistical analysis could not be completed. Table 31 and Figure 13 show that the majority of respondents have either DSL, cable, or satellite Internet connectivity at their residence. Interestingly, 12 participants said they did not have Internet access at their residence.

Table 31

*Type of Internet Connection Cross Tabulation*

| Generation | | Type of Internet Connection | | | |
|---|---|---|---|---|---|
| | | Dial-up | DSL/ Cable/ Satellite/ Wireless | No Service | Total |
| Baby Boomer | Count | 4 | 42 | 0 | 46 |
| | % within Generation | 8.70% | 91.30% | 0.00% | 100.00% |
| Generation X | Count | 6 | 122 | 3 | 131 |
| | % within Generation | 4.58% | 93.13% | 2.29% | 100.00% |
| Net Generation | Count | 33 | 394 | 9 | 436 |
| | % within Generation | 7.57% | 90.37% | 2.06% | 100.00% |
| Total | Count | 43 | 558 | 12 | 613 |
| | % | 7.01% | 91.03% | 1.96% | 100.00% |

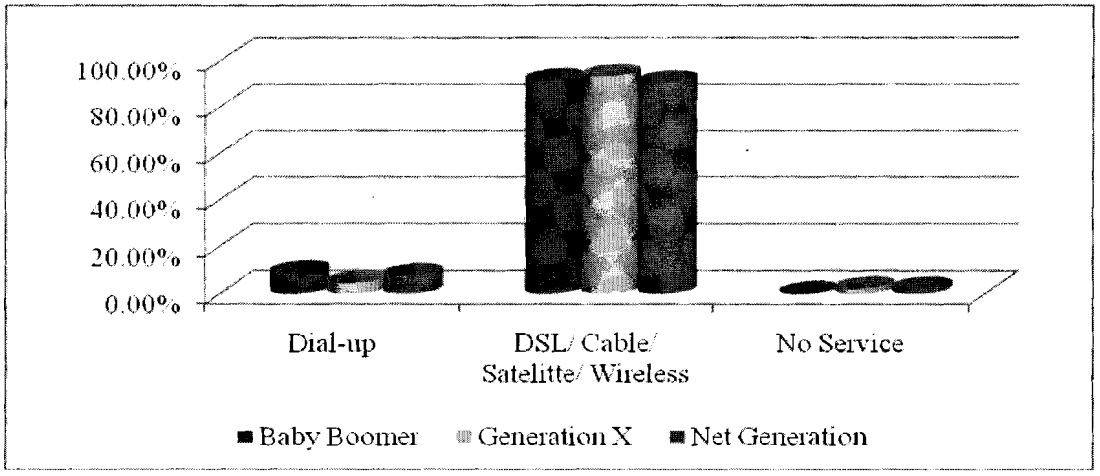


Figure 13. *Type of Internet connection percentages*

Survey question 18 asked participants what Internet activities they regularly use the computer for. The options they had to choose from included registration, banking, studying, collaborating, shopping, completing coursework, and entertainment. Figure 14 provides an overview of the Internet activities each generation does on the computer. The data shows at least 50.00% of respondents, regardless of generation, use the computer for each of the Internet activities. At least 80.00% of respondents, regardless of generation, utilize the computer for

school related activities such as registration, studying, and coursework. Because multiple activities could be selected, each activity will be addressed separately in further detail.

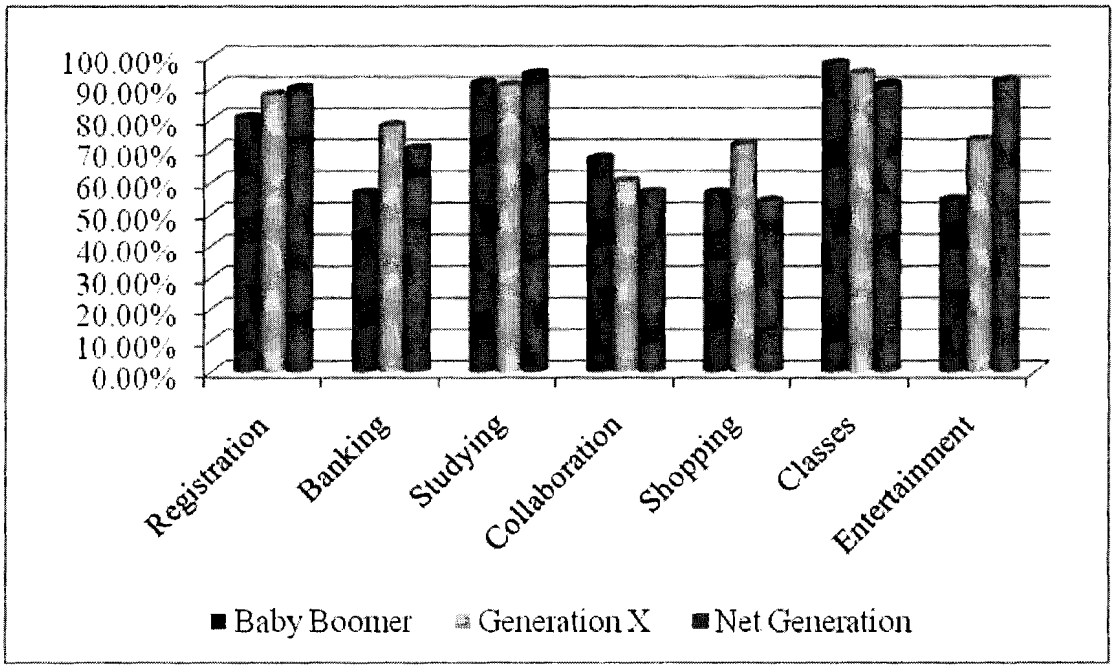


Figure 14. *Internet activities on the computer percentages*

The first option was using the computer for registration. The null hypothesis for this part of question 18 stated there was no difference in the frequency of responses for using the computer for online registration by generation type. Table 32 shows a .143 probability from the Chi-square test. Because .143 is greater than .05 there is no statistically significant difference in the distribution of responses by generation. As shown in Table 33, At least 80% of each generation utilizes their computer to register for classes online.

Table 32

*Using a Computer for Online Registration Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 3.891(*) | 2 | .143 |
| Likelihood Ratio | 3.404 | 2 | .182 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 5.18.

Table 33

*Using a Computer for Online Registration Cross Tabulation*

| Generation | | Internet Activity: No Online Registration | Internet Activity: Online Registration | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 9 | 37 | 46 |
| | % within Generation | 19.57% | 80.43% | 100.00% |
| Generation X | Count | 16 | 115 | 131 |
| | % within Generation | 12.21% | 87.79% | 100.00% |
| Net Generation | Count | 44 | 392 | 436 |
| | % within Generation | 10.09% | 89.91% | 100.00% |
| Total | Count | 69 | 544 | 613 |
| | % | 11.26% | 88.74% | 100.00% |

The second option was using the computer for banking. The null hypothesis for this part of question 18 stated there was no difference in the frequency of responses for using the computer for online banking by generation type. Table 34 shows a .021 probability from the Chi-square test. Because .021 is less than .05 there is a statistically significant difference in the distribution of responses by generation. As shown in Table 35, more than 70.00% of Generation X and Net Generation participants said they use the computer for online banking, while roughly 56.00% of Baby Boomer participants use the computer for online banking.

Table 34

*Using a Computer for Online Banking Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 7.722(*) | 2 | .021 |
| Likelihood Ratio | 7.523 | 2 | .023 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 13.28.

Table 35

*Using a Computer for Online Banking Cross Tabulation*

| Generation | | Internet Activity: No Online Banking | Internet Activity: Online Banking | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 20 | 26 | 46 |
| | % within Generation | 43.48% | 56.52% | 100.00% |
| Generation X | Count | 29 | 102 | 131 |
| | % within Generation | 22.14% | 77.86% | 100.00% |
| Net Generation | Count | 128 | 308 | 436 |
| | % within Generation | 29.36% | 70.64% | 100.00% |
| Total | Count | 177 | 436 | 613 |
| | % | 28.87% | 71.13% | 100.00% |

The third option was using the computer for studying. The null hypothesis for this part of question 18 stated there was no difference in the frequency of responses for using the computer for online studying by generation type. Table 36 shows a .274 probability from the Chi-square test. Because .274 is greater than .05 there is no statistically significant difference in the distribution of responses by generation. As shown in Table 37, over 90.00% of all generations utilize their computer to study online.

Table 36

*Using a Computer for Online Studying Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 2.591(*) | 2 | .274 |
| Likelihood Ratio | 2.443 | 2 | .295 |
| N of Valid Cases | 613 | | |

*1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.00.

Table 37

*Using a Computer for Online Studying Cross Tabulation*

| Generation | | Internet Activity: No Online Studying | Internet Activity: Online Studying | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 4 | 42 | 46 |
| | % within Generation | 8.70% | 91.30% | 100.00% |
| Generation X | Count | 12 | 119 | 131 |
| | % within Generation | 9.16% | 90.84% | 100.00% |
| Net Generation | Count | 24 | 412 | 436 |
| | % within Generation | 5.50% | 94.50% | 100.00% |
| Total | Count | 40 | 573 | 613 |
| | % | 6.53% | 93.47% | 100.00% |

The fourth option was using the computer for collaboration. The null hypothesis for this part of question 18 stated there was no difference in the frequency of responses for using the computer for online collaboration by generation type. Table 38 shows a .322 probability from the Chi-square test. Because .322 is greater than .05 there is no statistically significant difference in the distribution of responses by generation. As shown in Table 39, more than 56.00% of all generations utilize their computer to collaborate online.

Table 38

*Using a Computer for Online Collaboration Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 2.266(*) | 2 | .322 |
| Likelihood Ratio | 2.309 | 2 | .315 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 19.21.

Table 39

*Using a Computer for Online Collaboration Cross Tabulation*

| Generation | | Internet Activity: No Online Studying | Internet Activity: Online Studying | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 15 | 31 | 46 |
| | % within Generation | 32.61% | 67.39% | 100.00% |
| Generation X | Count | 52 | 79 | 131 |
| | % within Generation | 39.69% | 60.31% | 100.00% |
| Net Generation | Count | 189 | 247 | 436 |
| | % within Generation | 43.35% | 56.65% | 100.00% |
| Total | Count | 256 | 357 | 613 |
| | % | 41.76% | 58.24% | 100.00% |

The fifth option was using the computer for shopping. The null hypothesis for this part of question 18 stated there was no difference in the frequency of responses for using the computer for online shopping by generation type. Table 40 shows a .001 probability from the Chi-square test. Because .001 is less than .05, there is a statistically significant difference in the distribution of responses by generation. As shown in Table 41, nearly 72.00% of Generation X respondents said they utilize the computer to shop online, while just over 50.00% of both Baby Boomer and Net Generation respondents said they shop online.

Table 40

*Using a Computer for Online Shopping Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 13.217(*) | 2 | .001 |
| Likelihood Ratio | 13.675 | 2 | .001 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 19.36.

Table 41

*Using a Computer for Online Shopping Cross Tabulation*

| Generation | | Internet Activity: No Online Shopping | Internet Activity: Online Shopping | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 20 | 26 | 46 |
| | % within Generation | 43.48% | 56.52% | 100.00% |
| Generation X | Count | 37 | 94 | 131 |
| | % within Generation | 28.24% | 71.76% | 100.00% |
| Net Generation | Count | 201 | 235 | 436 |
| | % within Generation | 46.10% | 53.90% | 100.00% |
| Total | Count | 258 | 355 | 613 |
| | % | 42.09% | 57.91% | 100.00% |

The sixth option was using the computer for coursework. The null hypothesis for this part of question 18 stated there was no difference in the frequency of responses for using the computer for online coursework by generation type. Table 42 shows a .138 probability from the Chi-square test. Because .138 is greater than .05, there is no statistically significant difference in the distribution of responses by generation. As shown in Table 43, at least 91.00% of all generations utilize their computer for online coursework.

Table 42

*Using a Computer for Online Coursework Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 3.965(*) | 2 | .138 |
| Likelihood Ratio | 4.748 | 2 | .093 |
| N of Valid Cases | 613 | | |

*1 cells (16.7%) have expected count less than 5. The minimum expected count is 3.53.

Table 43

*Using a Computer for Online Coursework Cross Tabulation*

| Generation | | Internet Activity: No Online Coursework | Internet Activity: Online Coursework | Total |
|---|---|---|---|---|
| Baby Boomer | Count | 1 | 45 | 46 |
| | % within Generation | 2.17% | 97.83% | 100.00% |
| Generation X | Count | 7 | 124 | 131 |
| | % within Generation | 5.34% | 94.66% | 100.00% |
| Net Generation | Count | 39 | 397 | 436 |
| | % within Generation | 8.94% | 91.06% | 100.00% |
| Total | Count | 47 | 566 | 613 |
| | % | 7.67% | 92.33% | 100.00% |

The seventh and final option was using the computer for entertainment. The null hypothesis for this part of question 18 stated there was no difference in the frequency of responses for using the computer for online entertainment by generation type. Table 44 shows a .000 probability from the Chi-square test. Because .000 is less than .05 there is a statistically significant difference in the distribution of responses by generation. As shown in Table 45, 92.20% of Net Generation respondents said they utilized the computer for online entertainment, while 73.28% of Generation X and 54.35% of Baby Boomer respondents said they utilized computers for online entertainment.

Table 44

*Using a Computer for Online Entertainment Chi-square Test*

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 66.865(*) | 2 | .000 |
| Likelihood Ratio | 57.170 | 2 | .000 |
| N of Valid Cases | 613 | | |

*0 cells (.0%) have expected count less than 5. The minimum expected count is 6.75.

Table 45

*Using a Computer for Online Entertainment Cross Tabulation*

| Generation | | Internet Activity: No Online Entertainment | Internet Activity: Online Entertainment | Total |
|---|---|---|---|---|
| Baby | Count | 21 | 25 | 46 |
| Boomer | % within Generation | 45.65% | 54.35% | 100.00% |
| Generation | Count | 35 | 96 | 131 |
| X | % within Generation | 26.72% | 73.28% | 100.00% |
| Net | Count | 34 | 402 | 436 |
| Generation | % within Generation | 7.80% | 92.20% | 100.00% |
| Total | Count | 90 | 523 | 613 |
| | % | 14.68% | 85.32% | 100.00% |

The data collected from questions 12 and 13 was ordinal data. To analyze this data, a Kruskal-Wallis one way ANOVA was performed. The Kruskal-Wallis test is a two stage nonparametric test that looks for differences among 3 or more groups. The first stage determines if there is a statistically significant difference. If there is no statistically significant difference, the analysis stops. If there is a statistically significant difference, the second stage of the analysis is conducted. The second stage, which is used to determine where the differences are, is called a post-hoc test. This post-hoc analysis used the Skeskin method. In this method, if the mean rank difference is greater than the critical value, then there is a statistically significant difference between the two groups. The Skeskin post-hoc test looked at three different groups: Baby Boomers vs. Generation X, Baby Boomers vs. Net Generation, and Generation X vs. Net Generation.

Survey question 12 asked the participants to rank their preferred method of communication from 1 (most liked) to 6 (least liked). In an effort to simplify data analysis, the scale and corresponding responses were re-coded so that a rating of 1 became least liked and a rating of 6 became most liked. The communication methods included face-to-face, mail, email,

phone, text message, and instant message. The null hypothesis for this question stated there was no difference in the mean rating for communication method by generation type. Table 46 shows the probability (Asymp. Sig.) from the Chi-square test for face-to-face (.472), mail (.000), email (.000), phone (.810), text messaging (.001), and instant messaging (.000). Since face-to-face and phone communication probabilities were greater than .05 these communications do not have statistically significant differences in the distribution of responses by generation. Interestingly, approximately 71.00% of all participants ranked face-to-face communication as a 6, indicating it was their most preferred method of communication. Because the probability for mail, email, text messaging, and instant messaging is less than .05, each of these communication methods has statistically significant differences in the distribution of responses by generation.

Table 46

*Preferred Communication Method Chi-Square Test (a,b)*

| Communication Method | Chi-Square | df | Asymp. Sig. |
|---|---|---|---|
| Face-to-face | 1.503 | 2 | .472 |
| Mail | 39.386 | 2 | .000 |
| Email | 16.081 | 2 | .000 |
| Phone | .422 | 2 | .810 |
| Text Message | 14.806 | 2 | .001 |
| Instant Message | 23.950 | 2 | .000 |

a Kruskal Wallis Test
b Grouping Variable: DOB Numeric

Since mail, email, text messaging, and instant messaging had differences, the Kruskal-Wallis post-hoc analysis was completed. Table 47 shows the mean (average) rank for each communication method while Table 48 and Figure 15 show the decision made based on the post-hoc analysis. The Net Generation's mean rank (280.84) for communicating via mail was statistically different from that of the Baby Boomer (393.41) and Generation X (363.71). This indicated that the Net Generation disliked communicating via mail more than either of the other

generations. There was also a statistically significant difference found between the mean rank of Generation X (358.91) and the Net Generation (290.43) when it came to communicating via email. This difference indicated that Generation X liked email communication more than the Net Generation. In addition, the results indicated a difference in text messaging rankings when comparing the Net Generation mean rank (323.84) to both the Baby Boomer mean rank (252.55) and Generation X mean rank (270.06). The final difference was found when comparing the mean rank of the Net Generation (328.80) to that of the Baby Boomer (247.95) and Generation X (247.95) in the instant message category. The results for both the text messaging and instant messaging indicate the Net Generation likes those forms of communication more than either of the other generations.

Table 47

*Preferred Communication Method Mean Rank*

| Communication Method | Generation | N | Mean Rank |
|---|---|---|---|
| Face to Face | Baby Boomer | 46 | 318.04 |
| | Generation X | 131 | 294.34 |
| | Net Generation | 436 | 309.64 |
| | Total | 613 | |
| Mail | Baby Boomer | 46 | 393.41 |
| | Generation X | 131 | 363.71 |
| | Net Generation | 436 | 280.84 |
| | Total | 613 | |
| Email | Baby Boomer | 46 | 316.26 |
| | Generation X | 131 | 358.91 |
| | Net Generation | 436 | 290.43 |
| | Total | 613 | |
| Phone | Baby Boomer | 46 | 319.47 |
| | Generation X | 131 | 311.14 |
| | Net Generation | 436 | 304.44 |
| | Total | 613 | |
| Text Message | Baby Boomer | 46 | 252.55 |
| | Generation X | 131 | 270.06 |
| | Net Generation | 436 | 323.84 |
| | Total | 613 | |
| Instant Message | Baby Boomer | 46 | 247.95 |
| | Generation X | 131 | 255.18 |
| | Net Generation | 436 | 328.80 |
| | Total | 613 | |

Table 48

*Kruskal-Wallis Post-hoc Analysis of Preferred Communication Method*

| Communication Method | Generational Groups | Sheskin Critcial Value | Mean Rank Difference | Decision |
|---|---|---|---|---|
| Face–to-Face | | | | Stopped after stage 1 |
| Mail | Baby Boomer vs Generation X | 59.49 | 29.7 | Not Different |
| | Baby Boomer vs Net Generation | 53.81 | 112.57 | Different |
| | Generation X vs Net Generation | 34.59 | 82.87 | Different |
| Email | Baby Boomer vs Generation X | 59.49 | 42.65 | Not Different |
| | Baby Boomer vs Net Generation | 53.81 | 25.83 | Not Different |
| | Generation X vs Net Generation | 34.59 | 68.48 | Different |
| Phone | | | | Stopped after stage 1 |
| Text Messages | Baby Boomer vs Generation X | 59.49 | 17.51 | Not Different |
| | Baby Boomer vs Net Generation | 53.81 | 71.29 | Different |
| | Generation X vs Net Generation | 34.59 | 53.78 | Different |
| Instant Messages | Baby Boomer vs Generation X | 59.49 | 7.23 | Not Different |
| | Baby Boomer vs Net Generation | 53.81 | 80.85 | Different |
| | Generation X vs Net Generation | 34.59 | 73.62 | Different |

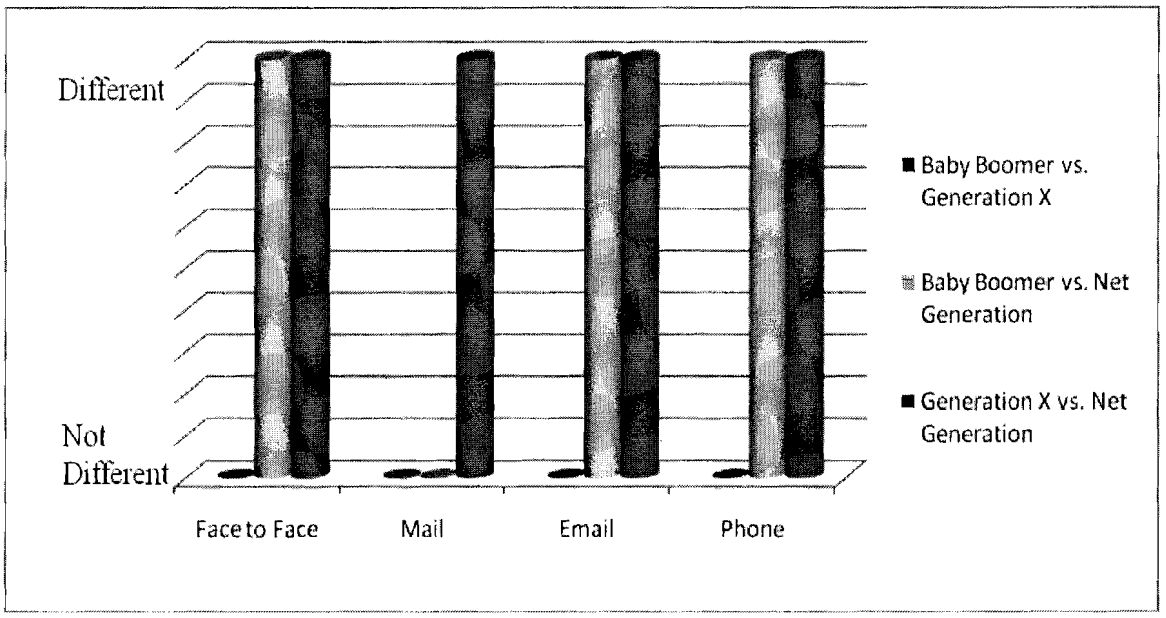


Figure 15. *Preferred communication methods Kruskal-Wallis post-hoc decision*

Survey question 13 asked the participants to rank their preferred learning activity from 1 (most liked) to 9 (least liked). In an effort to simplify data analysis, the scale and corresponding responses were re-coded so that a rating of 1 became least liked and a rating of 9 became most liked. The learning activities included lecture, hand-outs, group projects, individual projects, group discussion, role playing, simulations, debates, and oral presentations. The null hypothesis for this question stated there was no difference in the mean rating for learning activity by generation type. Table 49 shows the probability (Asymp. Sig.) from the Chi-square test for lectures (.215), hand-outs (.898), group projects (.000), individual projects (.269), group discussions (.706), role playing (.545), simulations (.596), debates (.026), and oral presentations (.086). Since lectures, hand-outs, individual projects, group discussions, role playing, simulations, and oral presentations probabilities were greater than .05 these learning activities do not have statistically significant differences in the distribution of responses by generation.

Because the probability for group projects and debates is less than .05, both of these learning activities had statistically significant differences in the distribution of responses by generation.

Table 49

*Preferred Learning Activity Chi-Square Test (a,b)*

| Learning Activity | Chi-Square | df | Asymp. Sig. |
|---|---|---|---|
| Lecture | 3.071 | 2 | .215 |
| Hand-outs | .216 | 2 | .898 |
| Group Project | 15.307 | 2 | .000 |
| Individual Project | 2.624 | 2 | .269 |
| Group discuss | .697 | 2 | .706 |
| Role Play | 1.213 | 2 | .545 |
| Simulation | 1.036 | 2 | .596 |
| Debates | 7.318 | 2 | .026 |
| Oral Present | 4.918 | 2 | .086 |

a Kruskal Wallis Test
b Grouping Variable: DOB Numeric

Since group projects and debates had differences, the Kruskal-Wallis post-hoc analysis was completed. Table 50 shows the mean (average) rank for each learning activity while Table 51 and Figure 16 show the decision made based on the post-hoc analysis. Generation X's mean rank for group projects was 254.39 while the Baby Boomer's mean rank was 305.70 and the Net Generation's mean rank was 322.95 indicating Generation X disliked group projects more than either of the other two generations. As far as debate, the Baby Boomers gave it a mean rank of 244.90 while Generation X gave it a 325.81 and the Net Generation gave it a 307.90. This showed the Baby Boomer generation disliked debates more than either Generation X or the Net Generation.

Table 50

*Preferred Learning Activity Mean Rank*

| Learning Activity | Generational Group | N | Mean Rank |
|---|---|---|---|
| Lecture | Baby Boomer | 46 | 272.28 |
| | Generation X | 131 | 323.97 |
| | Net Generation | 436 | 305.56 |
| | Total | 613 | |
| Hand-outs | Baby Boomer | 46 | 296.05 |
| | Generation X | 131 | 305.89 |
| | Net Generation | 436 | 308.49 |
| | Total | 613 | |
| Group Project | Baby Boomer | 46 | 305.70 |
| | Generation X | 131 | 254.39 |
| | Net Generation | 436 | 322.95 |
| | Total | 613 | |
| Individual Project | Baby Boomer | 46 | 343.87 |
| | Generation X | 131 | 312.71 |
| | Net Generation | 436 | 301.39 |
| | Total | 613 | |
| Group Discuss | Baby Boomer | 46 | 320.03 |
| | Generation X | 131 | 314.67 |
| | Net Generation | 436 | 303.32 |
| | Total | 613 | |
| Role Play | Baby Boomer | 46 | 321.12 |
| | Generation X | 131 | 318.48 |
| | Net Generation | 436 | 302.06 |
| | Total | 613 | |
| Simulation | Baby Boomer | 46 | 320.12 |
| | Generation X | 131 | 294.21 |
| | Net Generation | 436 | 309.46 |
| | Total | 613 | |
| Debates | Baby Boomer | 46 | 244.90 |
| | Generation X | 131 | 325.81 |
| | Net Generation | 436 | 307.90 |
| | Total | 613 | |
| Oral Presentation | Baby Boomer | 46 | 354.97 |
| | Generation X | 131 | 317.60 |
| | Net Generation | 436 | 298.75 |
| | Total | 613 | |

Table 51

*Kruskal-Wallis Post-hoc Analysis of Preferred Learning Activity*

| Learning Activity | Generational Groups | Sheskin Critcial Value | Mean Rank Difference | Decision |
|---|---|---|---|---|
| Lecture | | | | Stopped after stage 1 |
| Hand-Outs | | | | Stopped after stage 1 |
| Group Projects | Baby Boomer vs Generation X | 59.49 | 51.31 | Not Different |
| | Baby Boomer vs Net Generation | 53.81 | 17.25 | Not Different |
| | Generation X vs Net Generation | 34.59 | 68.56 | Different |
| Individual Projects | | | | Stopped after stage 1 |
| Group Discussion | | | | Stopped after stage 1 |
| Role Play | | | | Stopped after stage 1 |
| Simulation | | | | Stopped after stage 1 |
| Debates | Baby Boomer vs Generation X | 59.49 | 80.90 | different |
| | Baby Boomer vs Net Generation | 53.81 | 63.00 | different |
| | Generation X vs Net Generation | 34.59 | 17.90 | Not different |
| Oral Presentation | | | | Stopped after stage 1 |

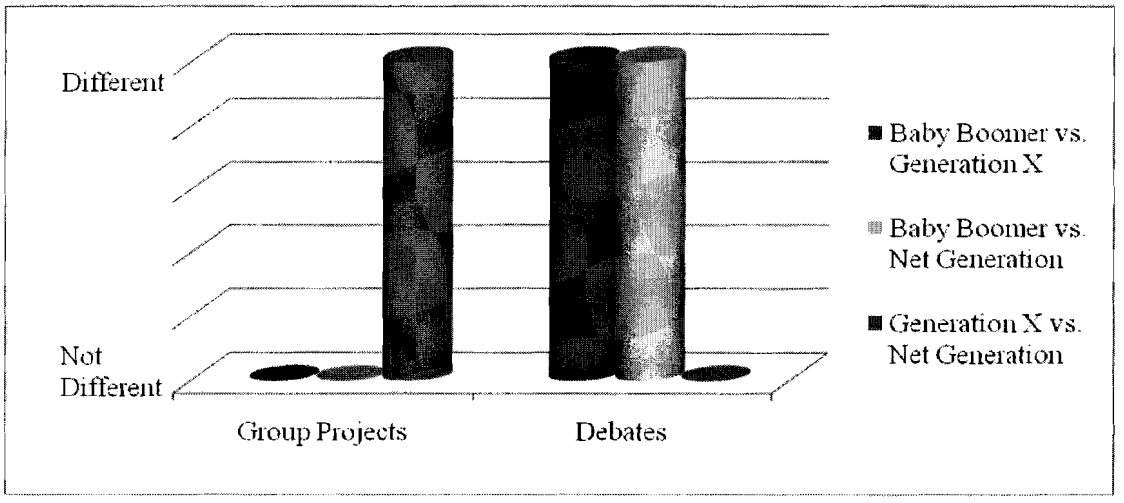


Figure 16. *Preferred learning sctivity Kruskal-Wallis post-hoc decision*

The data collected from questions 19 and 21-23 was ratio data collected using a Likert type scale. To analyze this data a one-way Analysis of Variance (ANOVA) was performed. The one-way ANOVA is a multi-stage parametric test used to compare the mean of the three groups based on one independent variable or factor. The first stage of the test was the general or omnibus test to see if any differences existed among the three generational groups. For this stage, the F-statistic and its significance value (sig.) were looked at to determine if there was a difference. If the Sig. was greater than or equal to .05, it was concluded that there was no difference and no further analysis was conducted. If the Sig. was less than .05 it was concluded that differences existed somewhere and the second stage of the analysis was completed. The second stage of the process was to check if the sample subgroups had the same or differing levels of variability. This was accomplished by conducting the Levene's test for homogeneity of variance. The results of the Levene's test determined which third and final stage was completed. If the Levene's test revealed homogeneity (same variance) then the Fisher's Least Significant Difference (LSD) test was conducted. If the Levene's test reveals heterogeneity (differing variance) then the Tamhane's 2 post hoc test was used. Regardless of the post-hoc test used in stage three, the statistically significant difference would be found in any group with a significance level $< .05$. The post-hoc test looked at three different groups: Baby Boomers vs Generation X, Baby Boomers vs. Net Generation, and Generation X vs Net Generation.

Question 19 asked how many hours a week participants spent using or creating a variety of files. These files included wikis, blogs, listservs, social networks, file swapping, podcasts, instant messaging, discussion forums, text messaging, emails, documents, spreadsheets, presentations, graphics, audio recordings, video recordings, and web pages. This question utilized a Likert type scale in which the participant could select one of five options: never heard

of it, less than 1 hour, 1-5 hours, 6-10 hours, and 11+ hours. Based on the ANOVA, Table 52 shows the analysis that did result in statistically significant differences while Table 53 shows the analysis that did not result in statistically significant differences. To have statistically significant differences, the F tests must have significance less than .05. The activities with F tests having significance of less than .05 included wikis (.007), blogs (.001), listservs (.000), social networks (.000), podcasts (.008), instant messaging (.000), discussion forums (.000), text messaging (.000), emails (.000), spreadsheets (.003), and webpages (.033). This indicated differences in the average hours of creation or usage of these activities exists somewhere among the three generations.

Table 52

*One-way ANOVA Resulting in Differences for the Average Hours of Technology Use or Creation*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Wikis | Between Groups | 4.111 | 2 | 2.055 | 5.002 | .007 |
| | Within Groups | 250.640 | 610 | .411 | | |
| | Total | 254.750 | 612 | | | |
| Blogs | Between Groups | 4.587 | 2 | 2.293 | 7.361 | .001 |
| | Within Groups | 190.066 | 610 | .312 | | |
| | Total | 194.653 | 612 | | | |
| Listservs | Between Groups | 16.230 | 2 | 8.115 | 25.253 | .000 |
| | Within Groups | 196.021 | 610 | .321 | | |
| | Total | 212.251 | 612 | | | |
| Social Networks | Between Groups | 99.329 | 2 | 49.665 | 47.664 | .000 |
| | Within Groups | 635.604 | 610 | 1.042 | | |
| | Total | 734.933 | 612 | | | |
| Podcasts | Between Groups | 4.096 | 2 | 2.048 | 4.857 | .008 |
| | Within Groups | 257.180 | 610 | .422 | | |
| | Total | 261.276 | 612 | | | |
| Instant | Between Groups | 120.016 | 2 | 60.008 | 55.331 | .000 |
| Messaging | Within Groups | 661.569 | 610 | 1.085 | | |
| | Total | 781.586 | 612 | | | |
| Discussion | Between Groups | 16.394 | 2 | 8.197 | 12.761 | .000 |
| Forums | Within Groups | 391.844 | 610 | .642 | | |
| | Total | 408.238 | 612 | | | |
| Text Messaging | Between Groups | 33.592 | 2 | 16.796 | 20.470 | .000 |
| | Within Groups | 500.513 | 610 | .821 | | |
| | Total | 534.104 | 612 | | | |
| Emails | Between Groups | 14.459 | 2 | 7.230 | 10.132 | .000 |
| | Within Groups | 435.273 | 610 | .714 | | |
| | Total | 449.732 | 612 | | | |
| Spreadsheets | Between Groups | 9.340 | 2 | 4.670 | 5.986 | .003 |
| | Within Groups | 475.906 | 610 | .780 | | |
| | Total | 485.246 | 612 | | | |
| Webpage | Between Groups | 10.236 | 2 | 5.118 | 3.432 | .033 |
| | Within Groups | 909.706 | 610 | 1.491 | | |
| | Total | 919.941 | 612 | | | |

Table 53

*One-way ANOVA Resulting in no Differences for the Average Hours of Technology Use or Creation*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| File swapping | Between Groups | 2.293 | 2 | 1.147 | 2.215 | .110 |
| | Within Groups | 315.713 | 610 | .518 | | |
| | Total | 318.007 | 612 | | | |
| Documents | Between Groups | 1.957 | 2 | .979 | 1.134 | .323 |
| | Within Groups | 526.607 | 610 | .863 | | |
| | Total | 528.564 | 612 | | | |
| Presentations | Between Groups | 2.657 | 2 | 1.329 | 2.101 | .123 |
| | Within Groups | 385.712 | 610 | .632 | | |
| | Total | 388.369 | 612 | | | |
| Graphics | Between Groups | .787 | 2 | .394 | .435 | .648 |
| | Within Groups | 552.430 | 610 | .906 | | |
| | Total | 553.217 | 612 | | | |
| Audio Recordings | Between Groups | .421 | 2 | .211 | .273 | .761 |
| | Within Groups | 469.749 | 610 | .770 | | |
| | Total | 470.170 | 612 | | | |
| Video Recordings | Between Groups | 3.972 | 2 | 1.986 | 2.588 | .076 |
| | Within Groups | 468.139 | 610 | .767 | | |
| | Total | 472.111 | 612 | | | |

To determine where the differences existed, a post-hoc analysis was completed using the Tanhame formula (see Appendix E). The analysis showed the Net Generation spent, on average, statistically less hours creating or using wikis, blogs, podcasts, and spreadsheets than Generation X. In addition, the analysis identified no statistically significant difference in the average number of hours spent using or creating wikis, blogs, podcasts, or spreadsheets between the Net Generation and the Baby Boomer or between Generation X and the Baby Boomer. The post-hoc analysis also showed the Net Generation spent statistically less time creating or using listservs, discussion forums, and email than either the Baby Boomer or Generation X while there was no statistically significant difference between the Baby Boomer and Generation X. In addition, the Net Generation spent more time using or creating instant messages, text messages, and social

networks than either the Baby Boomer or Generation X. Again, no statistically significant difference was found between the Baby Boomer and Generation X. Finally, the Net Generation spent more time using or creating web pages than the Baby Boomer while there was no statistically significant difference between the Net Generation and Generation X or between Generation X and the Baby Boomer. The remaining activities including file swapping (.110), documents (.323), presentations (.123), graphics (.648), audio recordings (.761), and video recordings (.076) resulted in no statistically significant differences among any of the three generations.

Question 21 asked what percent of the respondents' instructors used or expected them to use wikis, blogs, listservs, social networks, file swapping, podcasts, instant messaging, discussion forums, text messaging, emails, documents, spreadsheets, presentations, graphics, audio recordings, video recordings, and web pages. Based on the ANOVA, Table 54 shows the analysis that resulted in statistically significant differences while Table 55 shows the analysis that did not result in statistically significant differences. To have statistically significant differences the F tests must have significance less than .05. The activities with F tests having significance less than .05 included wikis (.000), blogs (.000), listservs (.000), podcasts (.000), discussion forums (.000), and web pages (.006). This indicated differences in the percentage of instructors that use or expect students to use technology in class exists somewhere among the three generations.

Table 54

*One-way ANOVA Resulting in Differences in Instructor Use or Expectation of Technology Use*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Wiki | Between Groups | 9.458 | 2 | 4.729 | 13.956 | .000 |
| | Within Groups | 206.711 | 610 | .339 | | |
| | Total | 216.170 | 612 | | | |
| Blog | Between Groups | 10.109 | 2 | 5.054 | 15.432 | .000 |
| | Within Groups | 199.790 | 610 | .328 | | |
| | Total | 209.899 | 612 | | | |
| Listserv | Between Groups | 3.816 | 2 | 1.908 | 10.513 | .000 |
| | Within Groups | 110.709 | 610 | .181 | | |
| | Total | 114.525 | 612 | | | |
| Podcast | Between Groups | 4.776 | 2 | 2.388 | 12.814 | .000 |
| | Within Groups | 113.681 | 610 | .186 | | |
| | Total | 118.457 | 612 | | | |
| Discussion | Between Groups | 95.040 | 2 | 47.520 | 33.123 | .000 |
| Forum | Within Groups | 875.149 | 610 | 1.435 | | |
| | Total | 970.189 | 612 | | | |
| Webpage | Between Groups | 21.847 | 2 | 10.923 | 5.218 | .006 |
| | Within Groups | 1276.904 | 610 | 2.093 | | |
| | Total | 1298.750 | 612 | | | |

Table 55

*One-Way ANOVA Resulting in no Differences in Instructor or Expectation of Technology Use*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Social Network | Between Groups | .474 | 2 | .237 | .466 | .628 |
| | Within Groups | 310.495 | 610 | .509 | | |
| | Total | 310.969 | 612 | | | |
| File swapping | Between Groups | .027 | 2 | .013 | .015 | .985 |
| | Within Groups | 530.779 | 610 | .870 | | |
| | Total | 530.806 | 612 | | | |
| Instant Message | Between Groups | .391 | 2 | .196 | .716 | .489 |
| | Within Groups | 166.500 | 610 | .273 | | |
| | Total | 166.891 | 612 | | | |
| Text Message | Between Groups | .160 | 2 | .080 | .456 | .634 |
| | Within Groups | 106.770 | 610 | .175 | | |
| | Total | 106.930 | 612 | | | |
| Email | Between Groups | 2.512 | 2 | 1.256 | .902 | .406 |
| | Within Groups | 849.253 | 610 | 1.392 | | |
| | Total | 851.765 | 612 | | | |
| Documents | Between Groups | 5.339 | 2 | 2.669 | 1.879 | .154 |
| | Within Groups | 866.603 | 610 | 1.421 | | |
| | Total | 871.941 | 612 | | | |
| Spreadsheet | Between Groups | 2.094 | 2 | 1.047 | .628 | .534 |
| | Within Groups | 1016.950 | 610 | 1.667 | | |
| | Total | 1019.044 | 612 | | | |
| Presentation | Between Groups | 6.569 | 2 | 3.285 | 2.083 | .125 |
| | Within Groups | 961.829 | 610 | 1.577 | | |
| | Total | 968.398 | 612 | | | |
| Graphics | Between Groups | 6.158 | 2 | 3.079 | 1.931 | .146 |
| | Within Groups | 972.619 | 610 | 1.594 | | |
| | Total | 978.777 | 612 | | | |
| Audio | Between Groups | 1.986 | 2 | .993 | 1.337 | .264 |
| | Within Groups | 453.091 | 610 | .743 | | |
| | Total | 455.077 | 612 | | | |
| Video | Between Groups | .100 | 2 | .050 | .057 | .944 |
| | Within Groups | 531.756 | 610 | .872 | | |
| | Total | 531.856 | 612 | | | |

To determine where the differences existed, a post-hoc analysis was completed using the Tanhame formula (see Appendix F). The analysis showed the Net Generation felt fewer instructors used or expected them to use wikis, blogs, podcasts, and discussion forums than Generation X. The post-hoc analysis also showed that Generation X felt more teachers used or expected them to use web pages than the Baby Boomer generation. In addition, there were differences in each of the groups for listservs. Baby Boomers said more teachers used or expected them to use listervs than either Generation X or the Net Generation. Of the three generations, the Net Generation said fewer teachers used or expected them to use listservs. The remaining technologies including social networks (.628), file swapping (.985), instant messaging (.489), text messaging (.634), email (.406), documents (.154), spreadsheets (.534), presentations (.125), graphics (.146), audio (.264), or video (.944) resulted in no statistically significant differences among any of the three generations.

Question 22 asked respondents if they would like more of their instructors to use or expect them to use wikis, blogs, listservs, social networks, file swapping, podcasts, instant messaging, discussion forums, text messaging, emails, documents, spreadsheets, presentations, graphics, audio recordings, video recordings, and web pages. Based on the ANOVA, Table 56 shows the analysis that resulted in statistically significant differences while Table 57 shows the analysis that did not result in statistically significant differences. To have statistically significant differences the F tests must have significance less than .05. The activities with F tests having significance less than .05 included wikis (.021), blogs (.000), listservs (.004), podcasts (.009), discussion forums (.008), audio recordings (.007), and video (.016). This indicated that differences in the desire to use these activities in class exists somewhere among the three generations.

Table 56

*One-Way ANOVA resulting in Differences in Desire to Use Technologies in Class*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Wiki | Between Groups | 9.765 | 2 | 4.883 | 3.867 | .021 |
| | Within Groups | 770.131 | 610 | 1.263 | | |
| | Total | 779.896 | 612 | | | |
| Blog | Between Groups | 18.607 | 2 | 9.303 | 8.152 | .000 |
| | Within Groups | 696.118 | 610 | 1.141 | | |
| | Total | 714.724 | 612 | | | |
| Listserv | Between Groups | 12.124 | 2 | 6.062 | 5.686 | .004 |
| | Within Groups | 650.404 | 610 | 1.066 | | |
| | Total | 662.529 | 612 | | | |
| Podcast | Between Groups | 12.517 | 2 | 6.259 | 4.741 | .009 |
| | Within Groups | 805.336 | 610 | 1.320 | | |
| | Total | 817.853 | 612 | | | |
| Discussion | Between Groups | 14.393 | 2 | 7.197 | 4.873 | .008 |
| Forums | Within Groups | 900.830 | 610 | 1.477 | | |
| | Total | 915.223 | 612 | | | |
| Audio | Between Groups | 13.468 | 2 | 6.734 | 4.979 | .007 |
| | Within Groups | 824.937 | 610 | 1.352 | | |
| | Total | 838.405 | 612 | | | |
| Video | Between Groups | 12.231 | 2 | 6.116 | 4.191 | .016 |
| | Within Groups | 890.082 | 610 | 1.459 | | |
| | Total | 902.313 | 612 | | | |

Table 57

*One-Way ANOVA Resulting in no Differences in Desire to Use Technologies in Class*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Social Network | Between Groups | 4.280 | 2 | 2.140 | 1.607 | .201 |
| | Within Groups | 812.448 | 610 | 1.332 | | |
| | Total | 816.728 | 612 | | | |
| Fileswap | Between Groups | 2.923 | 2 | 1.461 | 1.056 | .348 |
| | Within Groups | 844.000 | 610 | 1.384 | | |
| | Total | 846.923 | 612 | | | |
| Instant Messaging | Between Groups | 5.657 | 2 | 2.828 | 2.055 | .129 |
| | Within Groups | 839.387 | 610 | 1.376 | | |
| | Total | 845.044 | 612 | | | |
| Text Messaging | Between Groups | 2.282 | 2 | 1.141 | .982 | .375 |
| | Within Groups | 708.746 | 610 | 1.162 | | |
| | Total | 711.028 | 612 | | | |
| Email | Between Groups | .231 | 2 | .116 | .091 | .913 |
| | Within Groups | 770.956 | 610 | 1.264 | | |
| | Total | 771.188 | 612 | | | |
| Document | Between Groups | 2.252 | 2 | 1.126 | .910 | .403 |
| | Within Groups | 754.890 | 610 | 1.238 | | |
| | Total | 757.142 | 612 | | | |
| Spreadsheet | Between Groups | 2.937 | 2 | 1.469 | 1.043 | .353 |
| | Within Groups | 858.782 | 610 | 1.408 | | |
| | Total | 861.719 | 612 | | | |
| Presentation | Between Groups | 6.019 | 2 | 3.010 | 2.321 | .099 |
| | Within Groups | 790.858 | 610 | 1.296 | | |
| | Total | 796.878 | 612 | | | |
| Graphics | Between Groups | 1.954 | 2 | .977 | .690 | .502 |
| | Within Groups | 863.968 | 610 | 1.416 | | |
| | Total | 865.922 | 612 | | | |
| Webpage | Between Groups | 9.583 | 2 | 4.791 | 2.940 | .054 |
| | Within Groups | 994.254 | 610 | 1.630 | | |
| | Total | 1003.837 | 612 | | | |

To determine where the differences existed, a post-hoc analysis was completed using either the Fisher's Least Significant Difference (LSD) or the Tanhame formula (see Appendix G). The analysis showed Generation X would like more instructors to use or expect them to use wikis, blogs, listservs, podcasts, discussion forums, videos and audio files. The remaining activities including social networks, file swapping, instant messaging, text messaging, email,

documents, spreadsheets, presentations, graphics, and web pages resulted in no statistically significant difference among any of the three generations.

Question 23 asked respondents if they thought using technology in their classes would result in better collaboration, better communication, prompt feedback, better grades, more flexibility, or improved learning. As shown in Table 57, the ANOVA resulted in just one statistically significant difference. To have statistically significant differences the F tests must have significance less than .05. The benefit with an F test having significance less than .05 was prompt feedback (.026). This indicated differences in the perceived benefit of using technology in the classroom.

Table 58

*One-Way ANOVA for Perceived Benefit of Technology in the Classroom*

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Better Collaborate | Between Groups | .179 | 2 | .090 | .103 | .902 |
| | Within Groups | 530.408 | 610 | .870 | | |
| | Total | 530.587 | 612 | | | |
| Better Communicate | Between Groups | .853 | 2 | .426 | .443 | .643 |
| | Within Groups | 587.565 | 610 | .963 | | |
| | Total | 588.418 | 612 | | | |
| Prompt Feedback | Between Groups | 5.786 | 2 | 2.893 | 3.662 | .026 |
| | Within Groups | 481.913 | 610 | .790 | | |
| | Total | 487.700 | 612 | | | |
| Better Grades | Between Groups | 2.418 | 2 | 1.209 | 1.165 | .313 |
| | Within Groups | 633.151 | 610 | 1.038 | | |
| | Total | 635.569 | 612 | | | |
| More Flexibility | Between Groups | .493 | 2 | .247 | .299 | .742 |
| | Within Groups | 502.854 | 610 | .824 | | |
| | Total | 503.347 | 612 | | | |
| Improved Learning | Between Groups | 1.390 | 2 | .695 | .678 | .508 |
| | Within Groups | 625.543 | 610 | 1.025 | | |
| | Total | 626.933 | 612 | | | |

To determine where the differences existed, a post-hoc analysis was completed using the Tanhame formula (see Appendix G). The analysis showed Baby Boomer generation felt the use of technology in the classroom was more likely to lead to prompt feedback than the Net Generation. The remaining benefits including better collaboration, better communication, better grades, more flexibility, and improved learning resulted in no statistically significant difference among any of the three generations.

# Chapter V: Discussion

## *Introduction*

In this chapter, the limitations of this study will be discussed. In addition, conclusions will be made. The chapter will conclude with the recommendations for future research.

## *Limitations*

Because the survey instrument was developed by the researcher for the purpose of this study, there were no measures of validity or reliability in the survey instrument. In addition, the research only addressed the students at one university and therefore reliable inferences cannot be made to other universities. Another limitation to this study is the population. The study addressed three different generations of learners: Baby Boomers, Generation X, and Net Generation. The ratio of learners in the Net Generation group may be disproportionate to the other two groups. Finally, the length, time of year, and distribution method of the survey may affected the response rate causing a less than ideal return.

## *Conclusions*

Research question one asked, "How do the learning styles differ among the Net Generation, Generation X and the Baby Boomer learners?" Based on the literature review from chapter 2, the Baby Boomer generation is said to prefer a more traditional teacher-centered environment with face-to-face communication and traditional teaching methods such as lectures. Generation X is thought to prefer a less traditional classroom consisting of highly visual content, videos, and interactive software. The Net Generation is considered to be multi-tasking, active learners who think doing something is more important that knowing something. It is also thought that the Net Generation prefers highly social activities such as debates, class discussions, and other collaborative and group activities.

Based on the results of this research, each of the three generations preferred hands-on activities over visual or audio activities. They also preferred working on assignments alone rather than in collaborative groups. All three generations tended to prefer classes that had moderate to extensive use of technology. Interestingly, each of the three generations preferred a different delivery method. The Baby Boomers, who are thought to like traditional lectures and face-to-face communication actually preferred taking mostly online classes. Generation Xers preferred blended classes (mix of online and face-to-face) while the Net Generation preferred face-to-face classes. Surprisingly, the digital immigrants prefer the highly technical delivery method while the digital natives prefer the less technical delivery method. The research also showed that the Net Generation does indeed multi-task when doing homework much more than either of the other generations. A high percentage of Net Generation learners surf the Internet, send instant or text messages, listen to music, and/or watch TV while they study. Some very unexpected findings immerged as far as learning activities. Contrary to the literature review, Baby Boomers ranked lectures as one of the least liked learning activities while Generation X ranked it as one of the most liked. Interestingly, the Net Generation did tend to rank very social activities higher than less social activities.

Research question two asked, "How does the utilization of technology differ among the Net Generation, Generation X, and the Baby Boomer learners?" Based on the literature review from chapter 2, Baby Boomers are often coined digital immigrants who may be intimidated by technology and view it as a necessary evil required for progress. Generation X, coined digital pioneers, is seen as first adopters, creators, and visionaries of technology who view technology as a useful tool. The Net Generation, coined digital natives, are said to be highly adept and adaptable to technology because they grew up in a world immersed in it.

Based on the results of the research, the Net Generation tends to have newer computers than either of the other generation. Although laptop computers running the Windows operating system seems to be the trend across the generations, it seems to be the most prevalent configuration for the Net Generation. The research also showed that while most participants, regardless of generation, have some form of high speed Internet service there were still some that had dial-up service and a small percentage that did not have any Internet service at all. Most participants across the generations use their computer for online school related activities such as registering for classes, completing coursework, and studying. Beyond school related activities, Baby Boomers tended to do more online collaboration, Generation X does more online banking and shopping, and the Net Generation used their computers more for entertainment.

Research question three asked, "How does the frequency of technology use differ among the Net Generation, Generation X, and Baby Boomer learners?" As discussed in the literature review from chapter 2, each generation entered the Information Age at a different point in their lives. The Baby Boomer entered the Information Age later in adulthood, making them perhaps the least technologically savvy. Generation X entered as teenagers, making them perhaps the first innovators of technological advancement. The Net Generation, on the other hand, entered the Information Age at birth. This generation has never known a world without technology. Because of these different entry points, each generation has different levels of experience with technology. Although there are different levels of experience, does that translate into the frequency with which each generation uses different technologies?

Based on the results of the research, the Net Generation spends more hours on socially-oriented activities such as social networking, and instant messaging. The Baby Boomer Generation and Generation X spend more hours on work related activities such as spreadsheets,

e-mail, and discussion forums. As a whole, as least 50% of respondents across the generations said they spend less than 1 hour using or creating blogs, file swapping, podcasts, text messaging, spreadsheets, graphics, audio recordings, and videos.

Research question four asked, "How does the desire of UW-Stout students to incorporate technology in education differ among the Net Generation, Generation X, and Baby Boomer learners?" As discussed in chapter 2, the longitudinal study conducted by ECAR identified several technologies that participants would like to use in their educational experience to increase their learning. These technologies included Internet searches, simulations, e-mail, instant messaging, text messaging, course websites, blogs, and wikis. In addition, the ECAR study showed students felt the use of technology in education resulted in prompt instructor feedback, better research, better communication, better collaboration, greater control over their course activities, and improved learning.

Based on the results of the research, at least 75% of respondents across the generations said none of their instructors used or expected them to use wikis, podcasts, blogs, listservs, social networks, instant messaging, or text messaging. Interestingly, 35% of Baby Boomers said all of their instructors used or expected them to use discussion forums, while 37% of Net Generation said only 25% of their instructors used or expected them to use discussion forums. When looking at whether or not UW-Stout students would like more of these technologies incorporated into their classes, the general consensus seemed to be that none of the generations would like to see more wikis, blogs, listservs, or podcasts in their courses. Conversely, they would like to see more discussion forums utilized in classes. Although none of the generations as a whole wanted these technologies incorporated, more Generation Xers than either of the other generations said they would like them used. The results of this study did coincide with the results of the ECAR

study in respect to the benefits of technology in the classroom. All three generations agreed that technology led to better collaboration, better communication, prompt feedback, more flexibility, and improved learning.

Research question five asked, "How do the selected demographics differ among the Net Generation, Generation X, and the Baby Boomer learners?" Based on the results of the research, the majority of Baby Boomers were distance education students. Generation X was split down the middle with half of them on campus and half of them distance education students. The Net Generation was almost all on campus students. This breakdown may be a result of work and family obligations or lack thereof.

Based on the observations developed from this research, it appears that the differences in use of technology may be a result of the delivery method rather than a generation gap. Distance education students, regardless of generation, tended to use more technologies in the classroom than those that were on campus students. This contradicts the initial thought that the Net Generation learner would be better engaged by technology than either the Baby Boomer or Generation X learner.

*Recommendations*

Based on this study, several recommendations are being made to UW-Stout. First, faculty may want to reevaluate what technologies they use based on delivery method rather than generation. Some technologies such as discussion boards and interactive software may be better suited for distance education than for on campus courses. Second, allowing learners to have input into the technologies used in their classes may allow them to feel more involved and in more control of their learning experience. Third, technologies should not be used just because

they are fun new toys. Technologies should be utilized only if it makes sense with the coursework being taught.

Recommendations for future research are also provided. First, a study could be done to determine if the delivery method had any impact on the differences in the types of technologies instructors used or expected learners to use. Second, a future study could look at whether or not the degree program had any impact on the differences in the types of technologies used by learners or faculty. Third, future studies could explore how increased training or exposure to new technologies may increase the desire to use them in the classroom. Finally, the instructors' perspective on the use of technology in the classroom could be explored.

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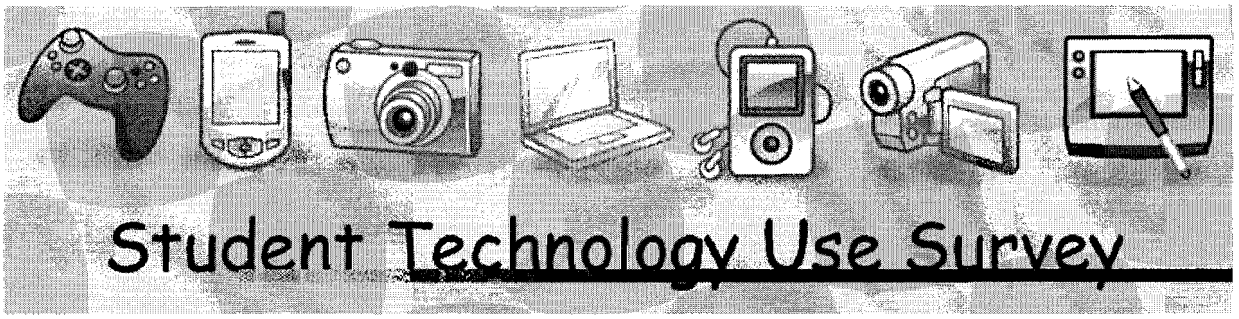
Appendix A: Student Technology Use Survey




Student Technology Use

This project has been reviewed by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46

Thank you for your willingness to answer this survey, which focuses on your experiences with and opinions about information technology. The information you and other UW-Stout students provide will be used as part of a graduate study. The primary goal of the study is to better understand student experiences with information technology and what role technology plays in your learning experience. This survey should take no more than 15 minutes to complete.

Your time and participation is appreciated. If you have any questions or concerns, please contact Jennifer Hendryx at hendryxj@uwstout.edu or (920) 361-2000 ext. 2519.

Once again, thank you for your assistance!

Statement of Consent:
By completing the following survey you are stating that you are at least 18 years of age and have agreed to participate in the project entitled, "Student Technology Use Survey."

**1.** I have read the above information and have had the opportunity to ask questions and receive answers. I consent to participate in the study.*

○ Yes ○ No

## Demographics

**2.** I was born between _____.*

○ 1946 - 1964 ○ 1965 - 1981 ○ After 1982

**3.** I am _____.*

○ Male ○ Female

**4.** I am enrolled _____.*

○ Full-time ○ Part-time

**5.** I am majoring in _____. (If more than one, select the primary major)*

-- Please Select --

**6.** I take most of my classes _____.*

○ on campus ○ through distance education

## Learning Style Preferences

**7.** I learn best by _____.*

○ hearing something ○ seeing something ○ doing something

**8.** I learn best when working, thinking through concepts, and completing assignments _____.*

○ alone ○ in collaborative groups ○ No preference

**9.** I prefer taking classes that use _____ technology.*

○ No ○ Limited ○ Moderate ○ Extensive ○ Exclusive

**10.** I prefer taking mostly _____ classes.*

○ Online ○ Blended (mix of online and face-to-face) ○ Face-to-face

**11.** Identify all the activities you might do while you study. (mark all that apply)*

nothing talk on the phone surf the internet instant/text message listen to music watch TV

Other, please specify

**12.** Using a rating scale of 1-6, rank the following means of communicating from most liked (1) to least liked (6).*
Rank the items below, using numeric values starting with 1.

face to face

mail

email

phone

text message

instant message

**13.** Using a rating scale of 1-9, rank the following learning activities from most liked (1) to least liked (9).*
Rank the items below, using numeric values starting with 1.

lecture

hand-outs

group projects

individual projects

group discussion

role playing

simulations

debates

oral presentations

## Use of Technology

**14.** How old is your computer? (if you own more than one, please indicate the age of your newest computer.)*

○ 0-2 years ○ 3-5 years ○ 6-8 years ○ 9+ years ○ I don't own one

**15.** My primary computer is a _____.*

○ laptop ○ tablet PC ○ desktop

○ Other, please specify

**16.** My primary operating system is _____.*

○ Windows ○ Macintosh ○ Linux

○ Other, please specify

**17.** My internet connection at home is _____.*

○ dial-up ○ DSL/cable ○ I do not have internet

○ Other, please specify

**18.** I regularly use the computer for the following online activities. (mark all that apply.)*

☐ registration ☐ banking ☐ studying ☐ collaboration ☐ shopping
☐ classes ☐ entertainment

☐ Other, please specify

**19.** I spend _____ hours each week using or creating the following.*

| | Never heard of it | Less than 1 hour | 1-5 hours | 6-10 hours | 11+ hours |
|---|---|---|---|---|---|
| wikis | ○ | ○ | ○ | ○ | ○ |
| blogs | ○ | ○ | ○ | ○ | ○ |
| listservs | ○ | ○ | ○ | ○ | ○ |
| social networks | ○ | ○ | ○ | ○ | ○ |
| file swapping | ○ | ○ | ○ | ○ | ○ |
| podcasts | ○ | ○ | ○ | ○ | ○ |
| instant messenger | ○ | ○ | ○ | ○ | ○ |
| discussion forums | ○ | ○ | ○ | ○ | ○ |
| text messaging | ○ | ○ | ○ | ○ | ○ |
| e-mails | ○ | ○ | ○ | ○ | ○ |
| documents | ○ | ○ | ○ | ○ | ○ |
| spreadsheets | ○ | ○ | ○ | ○ | ○ |
| presentations | ○ | ○ | ○ | ○ | ○ |
| graphics | ○ | ○ | ○ | ○ | ○ |
| audio recordings | ○ | ○ | ○ | ○ | ○ |
| videos | ○ | ○ | ○ | ○ | ○ |
| webpages | ○ | ○ | ○ | ○ | ○ |

**20.** Rate your skill level using, creating or editing the following.*

| | Do not use | Very unskilled | Unskilled | Skilled | Very Skilled | Could train others |
|---|---|---|---|---|---|---|
| wikis | ○ | ○ | ○ | ○ | ○ | ○ |
| blogs | ○ | ○ | ○ | ○ | ○ | ○ |
| listservs | ○ | ○ | ○ | ○ | ○ | ○ |
| social networks | ○ | ○ | ○ | ○ | ○ | ○ |
| file swapping | ○ | ○ | ○ | ○ | ○ | ○ |
| podcasts | ○ | ○ | ○ | ○ | ○ | ○ |
| instant messenger | ○ | ○ | ○ | ○ | ○ | ○ |
| discussion forums | ○ | ○ | ○ | ○ | ○ | ○ |
| text messaging | ○ | ○ | ○ | ○ | ○ | ○ |
| e-mails | ○ | ○ | ○ | ○ | ○ | ○ |
| documents | ○ | ○ | ○ | ○ | ○ | ○ |
| spreadsheets | ○ | ○ | ○ | ○ | ○ | ○ |
| presentations | ○ | ○ | ○ | ○ | ○ | ○ |
| graphics | ○ | ○ | ○ | ○ | ○ | ○ |
| audio recordings | ○ | ○ | ○ | ○ | ○ | ○ |
| videos | ○ | ○ | ○ | ○ | ○ | ○ |
| webpages | ○ | ○ | ○ | ○ | ○ | ○ |

**21.** Approximately _____ percent of my instructors use or expect me to use the following.*

| | 0% | 25% | 50% | 75% | 100% |
|---|---|---|---|---|---|
| wikis | ○ | ○ | ○ | ○ | ○ |
| blogs | ○ | ○ | ○ | ○ | ○ |
| listservs | ○ | ○ | ○ | ○ | ○ |
| social networks | ○ | ○ | ○ | ○ | ○ |
| file swapping | ○ | ○ | ○ | ○ | ○ |
| podcasts | ○ | ○ | ○ | ○ | ○ |
| instant messenger | ○ | ○ | ○ | ○ | ○ |
| discussion forums | ○ | ○ | ○ | ○ | ○ |
| text messaging | ○ | ○ | ○ | ○ | ○ |
| e-mails | ○ | ○ | ○ | ○ | ○ |
| documents | ○ | ○ | ○ | ○ | ○ |
| spreadsheets | ○ | ○ | ○ | ○ | ○ |
| presentations | ○ | ○ | ○ | ○ | ○ |
| graphics | ○ | ○ | ○ | ○ | ○ |
| audio recordings | ○ | ○ | ○ | ○ | ○ |
| videos | ○ | ○ | ○ | ○ | ○ |
| webpages | ○ | ○ | ○ | ○ | ○ |

**22.** I would like more of my instructors to use or expect me to use the following.*

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| wikis | ○ | ○ | ○ | ○ | ○ |
| blogs | ○ | ○ | ○ | ○ | ○ |
| listservs | ○ | ○ | ○ | ○ | ○ |
| social networks | ○ | ○ | ○ | ○ | ○ |
| file swapping | ○ | ○ | ○ | ○ | ○ |
| podcasts | ○ | ○ | ○ | ○ | ○ |
| instant messenger | ○ | ○ | ○ | ○ | ○ |
| discussion forums | ○ | ○ | ○ | ○ | ○ |
| text messaging | ○ | ○ | ○ | ○ | ○ |
| e-mails | ○ | ○ | ○ | ○ | ○ |
| documents | ○ | ○ | ○ | ○ | ○ |
| spreadsheets | ○ | ○ | ○ | ○ | ○ |
| presentations | ○ | ○ | ○ | ○ | ○ |
| graphics | ○ | ○ | ○ | ○ | ○ |
| audio recordings | ○ | ○ | ○ | ○ | ○ |
| videos | ○ | ○ | ○ | ○ | ○ |
| webpages | ○ | ○ | ○ | ○ | ○ |

**23.** I think using technology in my classes would result in _____.*

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| better collaboration | ○ | ○ | ○ | ○ | ○ |
| better communication | ○ | ○ | ○ | ○ | ○ |
| prompt feedback | ○ | ○ | ○ | ○ | ○ |
| better grades | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| more flexibility | ○ | ○ | ○ | ○ | ○ |
| improved learning | ○ | ○ | ○ | ○ | ○ |

# Appendix B: Institutional Review Board Approval Letter

Research Services
152 Voc Rehab Building

STOUT
UNIVERSITY OF WISCONSIN

University of Wisconsin-Stout
P.O. Box 790
Menomonie, WI 54751-0790

715/232-1126
715/232-1749 (fax)
http://www.uwstout.edu/rs/

**Date:** April 29, 2008

**To:** Jennifer Hendryx

**Cc:** Steve Schlough

**From:** Sue Foxwell, Research Administrator and Human Protections Administrator, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research (IRB)

**Subject:** **Protection of Human Subjects in Research**

Your project, "*Indentifying the Net Generation Learner's Attitude Toward the Use of Technology in Education by Indentifying and Comparing Selected Generational Variables at the University of Wisconsin-Stout*" is **Exempt** from review by the Institutional Review Board for the Protection of Human Subjects. The project is exempt under Category 1 of the Federal Exempt Guidelines and holds for 5 years.

Please copy and paste the following message to the top of your survey form before dissemination:

> **This project has been reviewed by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46**

Please contact the IRB if the plan of your research changes. Thank you for your cooperation with the IRB and best wishes with your project.

***NOTE: This is the only notice you will receive – no paper copy will be sent.**

SF:kf

Appendix C: Student Survey Participation Request Letter

Dear Student,

A survey is being conducted to determine how you use technology and the role technology plays in your educational experience. Your response is greatly appreciated.

If you have any questions about this survey please feel free to contact me at (920) 361-2000 ext. 2519 or hendryxj@uwstout.edu

The link to the survey is:
http://www2.uwstout.edu/GeneralSurveys/TakeSurvey.asp?EID=52MB63K0Bm30B38917oB056B9K7B3LH

If you do not wish to respond to this survey, please click on the link below to decline:
http://www2.uwstout.edu/GeneralSurveys/DeclineSurvey.asp?EID=52MB63K0Bm30B38917oB056B9K7B3LH

Thanks in advance for responding to the survey,

Jennifer Hendryx

Appendix D: Student Survey Participation Request Reminder Letter

Dear Student,

A survey is being conducted to determine how you use technology and the role technology plays in your educational experience. Your response is greatly appreciated.

If you have already completed the survey I would like to express my sincere appreciation.

If you have not yet had a chance to complete the survey please click on the link below. The survey will remain open until Tuesday May 6, 2008.

The link to the survey is:

http://www2.uwstout.edu/GeneralSurveys/TakeSurvey.asp?EID=52MB63K0Bm30B38917oB056B9K7B3LH

If you have any questions about this survey please feel free to contact me at (920) 361-2000 ext. 2519 or hendryxj@uwstout.edu

Thank you for responding to the survey,

Jennifer

Appendix E: Post-hoc Tests of Hours Spent Using or Creating Technologies

| Dependent Variable | Generation (I) | Generation (J) | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Upper Bound | Lower Bound |
| Wikis | Baby Boomer | Generation X | -0.045 | 0.109 | 0.966 | -0.31 | 0.22 |
| | | Net Generation | 0.145 | 0.096 | 0.356 | -0.09 | 0.38 |
| | Generation X | Baby Boomer | 0.045 | 0.109 | 0.966 | -0.22 | 0.31 |
| | | Net Generation | .191(*) | 0.066 | 0.013 | 0.03 | 0.35 |
| | Net Generation | Baby Boomer | -0.145 | 0.096 | 0.356 | -0.38 | 0.09 |
| | | Generation X | -.191(*) | 0.066 | 0.013 | -0.35 | -0.03 |
| Blogs | Baby Boomer | Generation X | -0.175 | 0.098 | 0.214 | -0.41 | 0.06 |
| | | Net Generation | 0.038 | 0.092 | 0.967 | -0.19 | 0.26 |
| | Generation X | Baby Boomer | 0.175 | 0.098 | 0.214 | -0.06 | 0.41 |
| | | Net Generation | .213(*) | 0.051 | 0 | 0.09 | 0.34 |
| | Net Generation | Baby Boomer | -0.038 | 0.092 | 0.967 | -0.26 | 0.19 |
| | | Generation X | -.213(*) | 0.051 | 0 | -0.34 | -0.09 |
| Listserv | Baby Boomer | Generation X | 0.128 | 0.113 | 0.593 | -0.15 | 0.4 |
| | | Net Generation | .448(*) | 0.104 | 0 | 0.19 | 0.7 |
| | Generation X | Baby Boomer | -0.128 | 0.113 | 0.593 | -0.4 | 0.15 |
| | | Net Generation | .319(*) | 0.058 | 0 | 0.18 | 0.46 |
| | Net Generation | Baby Boomer | -.448(*) | 0.104 | 0 | -0.7 | -0.19 |
| | | Generation X | -.319(*) | 0.058 | 0 | -0.46 | -0.18 |
| Social Networking | Baby Boomer | Generation X | -0.294 | 0.131 | 0.08 | -0.61 | 0.03 |
| | | Net Generation | -1.093(*) | 0.126 | 0 | -1.4 | -0.79 |
| | Generation X | Baby Boomer | 0.294 | 0.131 | 0.08 | -0.03 | 0.61 |
| | | Net Generation | -.799(*) | 0.084 | 0 | -1 | -0.6 |
| | Net Generation | Baby Boomer | 1.093(*) | 0.126 | 0 | 0.79 | 1.4 |
| | | Generation X | .799(*) | 0.084 | 0 | 0.6 | 1 |
| Podcasts | Baby Boomer | Generation X | -0.03 | 0.106 | 0.989 | -0.29 | 0.23 |
| | | Net Generation | 0.157 | 0.098 | 0.308 | -0.08 | 0.4 |
| | Generation X | Baby Boomer | 0.03 | 0.106 | 0.989 | -0.23 | 0.29 |
| | | Net Generation | .187(*) | 0.06 | 0.006 | 0.04 | 0.33 |
| | Net Generation | Baby Boomer | -0.157 | 0.098 | 0.308 | -0.4 | 0.08 |
| | | Generation X | -.187(*) | 0.06 | 0.006 | -0.33 | -0.04 |
| Instant Message | Baby Boomer | Generation X | -0.059 | 0.135 | 0.961 | -0.39 | 0.27 |
| | | Net Generation | -1.020(*) | 0.129 | 0 | -1.34 | -0.7 |
| | Generation X | Baby Boomer | 0.059 | 0.135 | 0.961 | -0.27 | 0.39 |
| | | Net Generation | -.961(*) | 0.085 | 0 | -1.17 | -0.76 |
| | Net Generation | Baby Boomer | 1.020(*) | 0.129 | 0 | 0.7 | 1.34 |
| | | Generation X | .961(*) | 0.085 | 0 | 0.76 | 1.17 |
| Discussion Forums | Baby Boomer | Generation X | 0.305 | 0.157 | 0.159 | -0.08 | 0.69 |
| | | Net Generation | .550(*) | 0.146 | 0.001 | 0.19 | 0.91 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Generation X | Baby Boomer | -0.305 | 0.157 | 0.159 | -0.69 | 0.08 |
| | | Net Generation | .245(*) | 0.078 | 0.006 | 0.06 | 0.43 |
| | Net Generation | Baby Boomer | -.550(*) | 0.146 | 0.001 | -0.91 | -0.19 |
| | | Generation X | -.245(*) | 0.078 | 0.006 | -0.43 | -0.06 |
| Text Messaging | Baby Boomer | Generation X | -0.189 | 0.098 | 0.163 | -0.43 | 0.05 |
| | | Net Generation | -.647(*) | 0.089 | 0 | -0.86 | -0.43 |
| | Generation X | Baby Boomer | 0.189 | 0.098 | 0.163 | -0.05 | 0.43 |
| | | Net Generation | -.458(*) | 0.078 | 0 | -0.65 | -0.27 |
| | Net Generation | Baby Boomer | .647(*) | 0.089 | 0 | 0.43 | 0.86 |
| | | Generation X | .458(*) | 0.078 | 0 | 0.27 | 0.65 |
| Email | Baby Boomer | Generation X | 0.163 | 0.152 | 0.639 | -0.21 | 0.54 |
| | | Net Generation | .449(*) | 0.136 | 0.005 | 0.11 | 0.78 |
| | Generation X | Baby Boomer | -0.163 | 0.152 | 0.639 | -0.54 | 0.21 |
| | | Net Generation | .286(*) | 0.088 | 0.004 | 0.07 | 0.5 |
| | Net Generation | Baby Boomer | -.449(*) | 0.136 | 0.005 | -0.78 | -0.11 |
| | | Generation X | -.286(*) | 0.088 | 0.004 | -0.5 | -0.07 |
| Spreadsheets | Baby Boomer | Generation X | 0.06 | 0.172 | 0.98 | -0.36 | 0.48 |
| | | Net Generation | 0.315 | 0.156 | 0.139 | -0.07 | 0.7 |
| | Generation X | Baby Boomer | -0.06 | 0.172 | 0.98 | -0.48 | 0.36 |
| | | Net Generation | .255(*) | 0.092 | 0.018 | 0.03 | 0.48 |
| | Net Generation | Baby Boomer | -0.315 | 0.156 | 0.139 | -0.7 | 0.07 |
| | | Generation X | -.255(*) | 0.092 | 0.018 | -0.48 | -0.03 |
| Webpage | Baby Boomer | Generation X | -0.374 | 0.185 | 0.134 | -0.82 | 0.08 |
| | | Net Generation | -.485(*) | 0.169 | 0.017 | -0.9 | -0.07 |
| | Generation X | Baby Boomer | 0.374 | 0.185 | 0.134 | -0.08 | 0.82 |
| | | Net Generation | -0.112 | 0.115 | 0.702 | -0.39 | 0.16 |
| | Net Generation | Baby Boomer | .485(*) | 0.169 | 0.017 | 0.07 | 0.9 |
| | | Generation X | 0.112 | 0.115 | 0.702 | -0.16 | 0.39 |

* The mean difference is significant at the .05 level.

Appendix F: Post-hoc Tests of Teacher Use or Expectation of Student Use of Technology

| Dependent Variable | Generation (I) | Generation (J) | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Upper Bound | Lower Bound |
| Wiki | Baby Boomer | Generation X | 0.047 | 0.154 | 0.99 | -0.33 | 0.42 |
| | | Net Generation | 0.308 | 0.135 | 0.08 | -0.03 | 0.64 |
| | Generation X | Baby Boomer | -0.047 | 0.154 | 0.99 | -0.42 | 0.33 |
| | | Net Generation | .261(*) | 0.079 | 0 | 0.07 | 0.45 |
| | Net Generation | Baby Boomer | -0.308 | 0.135 | 0.08 | -0.64 | 0.03 |
| | | Generation X | -.261(*) | 0.079 | 0 | -0.45 | -0.07 |
| Blog | Baby Boomer | Generation X | 0.024 | 0.162 | 1 | -0.37 | 0.42 |
| | | Net Generation | 0.301 | 0.146 | 0.13 | -0.06 | 0.66 |
| | Generation X | Baby Boomer | -0.024 | 0.162 | 1 | -0.42 | 0.37 |
| | | Net Generation | .277(*) | 0.076 | 0 | 0.09 | 0.46 |
| | Net Generation | Baby Boomer | -0.301 | 0.146 | 0.13 | -0.66 | 0.06 |
| | | Generation X | -.277(*) | 0.076 | 0 | -0.46 | -0.09 |
| Listserv | Baby Boomer | Generation X | 0.195 | 0.146 | 0.46 | -0.16 | 0.55 |
| | | Net Generation | 0.286 | 0.141 | 0.14 | -0.06 | 0.63 |
| | Generation X | Baby Boomer | -0.195 | 0.146 | 0.46 | -0.55 | 0.16 |
| | | Net Generation | 0.091 | 0.044 | 0.12 | -0.01 | 0.2 |
| | Net Generation | Baby Boomer | -0.286 | 0.141 | 0.14 | -0.63 | 0.06 |
| | | Generation X | -0.091 | 0.044 | 0.12 | -0.2 | 0.01 |
| Podcast | Baby Boomer | Generation X | -0.042 | 0.122 | 0.98 | -0.34 | 0.26 |
| | | Net Generation | 0.162 | 0.108 | 0.36 | -0.11 | 0.43 |
| | Generation X | Baby Boomer | 0.042 | 0.122 | 0.98 | -0.26 | 0.34 |
| | | Net Generation | .204(*) | 0.06 | 0 | 0.06 | 0.35 |
| | Net Generation | Baby Boomer | -0.162 | 0.108 | 0.36 | -0.43 | 0.11 |
| | | Generation X | -.204(*) | 0.06 | 0 | -0.35 | -0.06 |
| Discussion Forum | Baby Boomer | Generation X | 0.357 | 0.259 | 0.43 | -0.28 | 0.99 |
| | | Net Generation | 1.113(*) | 0.23 | 0 | 0.54 | 1.68 |
| | Generation X | Baby Boomer | -0.357 | 0.259 | 0.43 | -0.99 | 0.28 |
| | | Net Generation | .756(*) | 0.139 | 0 | 0.42 | 1.09 |
| | Net Generation | Baby Boomer | -1.113(*) | 0.23 | 0 | -1.68 | -0.54 |
| | | Generation X | -.756(*) | 0.139 | 0 | -1.09 | -0.42 |
| Webpage | Baby Boomer | Generation X | -.749(*) | 0.24 | 0.01 | -1.33 | -0.17 |
| | | Net Generation | -0.407 | 0.209 | 0.16 | -0.92 | 0.11 |
| | Generation X | Baby Boomer | .749(*) | 0.24 | 0.01 | 0.17 | 1.33 |
| | | Net Generation | 0.342 | 0.151 | 0.07 | -0.02 | 0.71 |
| | Net Generation | Baby Boomer | 0.407 | 0.209 | 0.16 | -0.11 | 0.92 |
| | | Generation X | -0.342 | 0.151 | 0.07 | -0.71 | 0.02 |

* The mean difference is significant at the .05 level.

Appendix G: Post-hoc Tests of Desire for Teachers to Use or Expect Use of Technologies

| Dependent Variable | Generation (I) | Generation (J) | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Upper Bound | Lower Bound |
| Wiki (Tamhane) | Baby Boomer | Generation X | -0.316 | 0.208 | 0.346 | -0.82 | 0.19 |
| | | Net Generation | -0.009 | 0.186 | 1 | -0.47 | 0.45 |
| | Generation X | Baby Boomer | 0.316 | 0.208 | 0.346 | -0.19 | 0.82 |
| | | Net Generation | .307(*) | 0.118 | 0.031 | 0.02 | 0.59 |
| | Net Generation | Baby Boomer | 0.009 | 0.186 | 1 | -0.45 | 0.47 |
| | | Generation X | -.307(*) | 0.118 | 0.031 | -0.59 | -0.02 |
| Blog (Tamhane) | Baby Boomer | Generation X | -0.422 | 0.202 | 0.114 | -0.91 | 0.07 |
| | | Net Generation | 0.004 | 0.178 | 1 | -0.43 | 0.44 |
| | Generation X | Baby Boomer | 0.422 | 0.202 | 0.114 | -0.07 | 0.91 |
| | | Net Generation | .425(*) | 0.117 | 0.001 | 0.14 | 0.71 |
| | Net Generation | Baby Boomer | -0.004 | 0.178 | 1 | -0.44 | 0.43 |
| | | Generation X | -.425(*) | 0.117 | 0.001 | -0.71 | -0.14 |
| Listserv (Tamhane) | Baby Boomer | Generation X | -0.054 | 0.199 | 0.99 | -0.54 | 0.43 |
| | | Net Generation | 0.269 | 0.179 | 0.363 | -0.17 | 0.71 |
| | Generation X | Baby Boomer | 0.054 | 0.199 | 0.99 | -0.43 | 0.54 |
| | | Net Generation | .323(*) | 0.109 | 0.01 | 0.06 | 0.59 |
| | Net Generation | Baby Boomer | -0.269 | 0.179 | 0.363 | -0.71 | 0.17 |
| | | Generation X | -.323(*) | 0.109 | 0.01 | -0.59 | -0.06 |
| Podcast (Tamhane) | Baby Boomer | Generation X | -0.264 | 0.217 | 0.54 | -0.79 | 0.27 |
| | | Net Generation | 0.089 | 0.196 | 0.958 | -0.4 | 0.57 |
| | Generation X | Baby Boomer | 0.264 | 0.217 | 0.54 | -0.27 | 0.79 |
| | | Net Generation | .352(*) | 0.119 | 0.01 | 0.07 | 0.64 |
| | Net Generation | Baby Boomer | -0.089 | 0.196 | 0.958 | -0.57 | 0.4 |
| | | Generation X | -.352(*) | 0.119 | 0.01 | -0.64 | -0.07 |
| Discussion Forum (LSD) | Baby Boomer | Generation X | 0.044 | 0.208 | 0.834 | -0.37 | 0.45 |
| | | Net Generation | 0.37 | 0.188 | 0.05 | 0 | 0.74 |
| | Generation X | Baby Boomer | -0.044 | 0.208 | 0.834 | -0.45 | 0.37 |
| | | Net Generation | .326(*) | 0.121 | 0.007 | 0.09 | 0.56 |
| | Net Generation | Baby Boomer | -0.37 | 0.188 | 0.05 | -0.74 | 0 |
| | | Generation X | -.326(*) | 0.121 | 0.007 | -0.56 | -0.09 |
| Audio (LSD) | Baby Boomer | Generation X | -0.283 | 0.199 | 0.156 | -0.67 | 0.11 |
| | | Net Generation | 0.082 | 0.18 | 0.648 | -0.27 | 0.44 |
| | Generation X | Baby Boomer | 0.283 | 0.199 | 0.156 | -0.11 | 0.67 |
| | | Net Generation | .366(*) | 0.116 | 0.002 | 0.14 | 0.59 |
| | Net | Baby Boomer | -0.082 | 0.18 | 0.648 | -0.44 | 0.27 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Generation | Generation X | -.366(*) | 0.116 | 0.002 | -0.59 | -0.14 |
| Video (LSD) | Baby Boomer | Generation X | -.469(*) | 0.207 | 0.024 | -0.88 | -0.06 |
| | | Net Generation | -0.154 | 0.187 | 0.412 | -0.52 | 0.21 |
| | Generation X | Baby Boomer | .469(*) | 0.207 | 0.024 | 0.06 | 0.88 |
| | | Net Generation | .316(*) | 0.12 | 0.009 | 0.08 | 0.55 |
| | Net Generation | Baby Boomer | 0.154 | 0.187 | 0.412 | -0.21 | 0.52 |
| | | Generation X | -.316(*) | 0.12 | 0.009 | -0.55 | -0.08 |

* The mean difference is significant at the .05 level.

Appendix H: Post-hoc Tests of Benefits of Using Technology in Class

| Dependent Variable | Generation (I) | Generation (J) | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Upper Bound | Lower Bound |
| Better Collaboration | Baby Boomer | Generation X | -0.051 | 0.168 | 0.99 | -0.46 | 0.36 |
| | | Net Generation | -0.065 | 0.149 | 0.96 | -0.43 | 0.3 |
| | Generation X | Baby Boomer | 0.051 | 0.168 | 0.99 | -0.36 | 0.46 |
| | | Net Generation | -0.013 | 0.098 | 1 | -0.25 | 0.22 |
| | Net Generation | Baby Boomer | 0.065 | 0.149 | 0.96 | -0.3 | 0.43 |
| | | Generation X | 0.013 | 0.098 | 1 | -0.22 | 0.25 |
| Better Communication | Baby Boomer | Generation X | -0.141 | 0.174 | 0.8 | -0.56 | 0.28 |
| | | Net Generation | -0.142 | 0.159 | 0.76 | -0.53 | 0.25 |
| | Generation X | Baby Boomer | 0.141 | 0.174 | 0.8 | -0.28 | 0.56 |
| | | Net Generation | -0.001 | 0.096 | 1 | -0.23 | 0.23 |
| | Net Generation | Baby Boomer | 0.142 | 0.159 | 0.76 | -0.25 | 0.53 |
| | | Generation X | 0.001 | 0.096 | 1 | -0.23 | 0.23 |
| Prompt Feedback | Baby Boomer | Generation X | -0.137 | 0.188 | 0.85 | -0.6 | 0.32 |
| | | Net Generation | -.304(*) | 0.175 | 0.24 | -0.74 | 0.13 |
| | Generation X | Baby Boomer | 0.137 | 0.188 | 0.85 | -0.32 | 0.6 |
| | | Net Generation | -0.167 | 0.091 | 0.19 | -0.38 | 0.05 |
| | Net Generation | Baby Boomer | .304(*) | 0.175 | 0.24 | -0.13 | 0.74 |
| | | Generation X | 0.167 | 0.091 | 0.19 | -0.05 | 0.38 |
| Better Grades | Baby Boomer | Generation X | -0.098 | 0.177 | 0.93 | -0.53 | 0.33 |
| | | Net Generation | -0.202 | 0.158 | 0.5 | -0.59 | 0.19 |
| | Generation X | Baby Boomer | 0.098 | 0.177 | 0.93 | -0.33 | 0.53 |
| | | Net Generation | -0.103 | 0.104 | 0.69 | -0.35 | 0.15 |
| | Net Generation | Baby Boomer | 0.202 | 0.158 | 0.5 | -0.19 | 0.59 |
| | | Generation X | 0.103 | 0.104 | 0.69 | -0.15 | 0.35 |
| More Flexibility | Baby Boomer | Generation X | -0.096 | 0.172 | 0.93 | -0.52 | 0.33 |
| | | Net Generation | -0.109 | 0.159 | 0.87 | -0.5 | 0.28 |
| | Generation X | Baby Boomer | 0.096 | 0.172 | 0.93 | -0.33 | 0.52 |
| | | Net Generation | -0.013 | 0.089 | 1 | -0.23 | 0.2 |
| | Net Generation | Baby Boomer | 0.109 | 0.159 | 0.87 | -0.28 | 0.5 |
| | | Generation X | 0.013 | 0.089 | 1 | -0.2 | 0.23 |
| Improved Learning | Baby Boomer | Generation X | -0.202 | 0.191 | 0.65 | -0.67 | 0.26 |
| | | Net Generation | -0.143 | 0.175 | 0.8 | -0.57 | 0.29 |
| | Generation X | Baby Boomer | 0.202 | 0.191 | 0.65 | -0.26 | 0.67 |
| | | Net Generation | 0.059 | 0.101 | 0.92 | -0.18 | 0.3 |
| | Net Generation | Baby Boomer | 0.143 | 0.175 | 0.8 | -0.29 | 0.57 |
| | | Generation X | -0.059 | 0.101 | 0.92 | -0.3 | 0.18 |

* The mean difference is significant at the .05 level.