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Technologies to Support Effective Learning and Teaching in the 21st Century

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Introduction

The challenges for education in the 21st century are to discover and develop tools that add value to both teaching and learning. The evolving landscape of higher education is significantly affected by new technologies and changes in student demographics. To help learners achieve these elevating expectations, institutions are competing to provide support that fit the needs of these diverse groups.

Today's learner demographics are fragmented by age groups, locations, areas of study and learning preferences. These groups demand customized teaching modalities to optimize educational effectiveness. Education today is no longer restricted to the traditional classroom lecture. Learning preferences differ among adults due to a number of factors, which include comfort level with new technologies, attention span, and the ability to multi-task.

Because of emerging technologies, knowledge is available exponentially. Younger generations, native to digital media, accept new learning methods with little problem since they are introduced to sophisticated technology earlier and in elementary education. Tomorrow's students will be required to adapt to new learning styles and technologies at an even faster and earlier rate.

This chapter will discuss how institutions of higher education must be responsive to the needs of both today's and tomorrow's learners. The first part of the chapter outlines how the various teaching modalities may be suitable for different generations of learners. Both current and future technologies related to learning are discussed and contrasted. Commonalities of learner preferences and technological literacy are summarized. The authors also establish relationships between learner generations and preferred technologies.

The second part of the chapter illustrates how each technology may benefit student learning within major disciplines. The quality of education can be measured against expected learning outcomes. To promote student success, universities and colleges must optimize their resources to prepare graduates for the expectations required by their chosen disciplines. Though technology has helped improve learning across disciplines, inevitably limitations exist. Although online education has helped facilitate learning in some disciplines, it could be a deterrent in others. The authors discuss specific examples where

technologies help advance the learning process. Depending upon the discipline involved, resources play significant roles for both the learner and the institution.

Innovations in teaching

Dede (1998) in *Six Challenges for Educational Technology*, makes the following statements: "Many exciting applications of information technology in schools validate that new technology-based models of teaching and learning have the power to dramatically improve educational outcomes. As a result, many people are asking how to scale-up the scattered, successful 'islands of innovation.' Instructional technology has empowered into universal improvements in schooling enabled by major shifts in standard educational practices" (p. 1). He continues, "without undercutting their power, change strategies effective when pioneered by leaders in educational innovation must be modified to be implemented by typical educators. Technology-based innovations offer special challenges and opportunities in this 'scaling-up' process. I believe that systemic reform is not possible without utilizing the full power of high performance computing and communications to enhance the reshaping of education design in schools. Yet the cost of technology, its rapid evolution, and the special knowledge and skills required of its users pose substantial barriers to effective utilization"(p.1). According to Schank and Jones, (1991), "Substantial research documents that helping students make sense out of something they have assimilated, but do not yet understand is crucial for inducing learning that is retained and generalized (as cited in Dede, 1998, p.3). According to (1998), Edelson, Pea and Gomez (1996), states, "Reflective discussion of shared experiences from multiple perspectives is essential in learners' converting information into knowledge, as well as in students mastering the collaborative creation of meaning and purpose (Edelson et al, 1996) "Some of these interpretative and expressive activities are enhanced by educational devices, but many are best conducted via face-to-face interaction, without the intervening filter and mask of computer-mediated communication "(Brown and Campione, 1994).

Dede (1998) poses the following question, "How can many educators disinterested or phobic about computers and communications {may} be induced to adopt new technology-based models of teaching and learning?"(p.6). Thus far, most educators who use technology to implement the alternative types of pedagogy and curriculum are "pioneers": people who see continuous change and growth as an integral part of their profession and who are willing to swim against the tide of conventional operating procedures—often at considerable personal cost. However, to achieve large-scale shifts in standard educational practices, many more educators must alter their pedagogical approaches; and schools' management, institutional structure, and relationship to the community must change in fundamental ways. This requires that 'settlers' (people who appreciate stability and do not want heroic efforts to become an everyday requirement) must be convinced to make the leap to a different mode of professional activity—with the understanding that, once they have mastered these new approaches, their daily work will be sustainable without extraordinary exertion. How can a critical mass of educators in a district be induced simultaneously to make such a shift? "(p. 6)

Dede, (1998) also stated "research documents that new, technology-based pedagogical strategies result in at least four kinds of improvements in educational outcomes. Some of these gains are easy to communicate to the community; others are difficult—but together

they constitute a body of evidence that can convince most people. These four types of improvements are listed below, in sequence from the most readily documented to the hardest to demonstrate:

- o Increased learner motivation
- o Advanced topics mastered.
- o Students acting as experts do.

Developing in learners the ability to use problem solving processes similar to those of experts is challenging, but provides powerful evidence that students are gaining the skills they will need to succeed in the 21st century" (p. 8).

In order to identify the generations, discuss their lifestyles with respect to communication and technology and explore the application to teaching methods, the United States, China, Japan and the United Kingdom will be reviewed with analysis for application to online learning and teaching.

Information on generations

From the preliminary research it is apparent that most first world countries may be segregated into four cohorts, groups of individuals who have common characteristics, such as age, include experience, location or generation. The most typical type of cohort in developmental psychology is referred to as a an *age* cohort, birth cohort and may include a span of years such as the "Baby Boomer" or "Generation X". These age or birth cohorts are likely to share common cultural, historical and social influences. (Robinson, 2006) In this paper we will refer to the generations as cohorts and identify them as follows :

- o Silent generation/Veterans
- o Baby Boomers
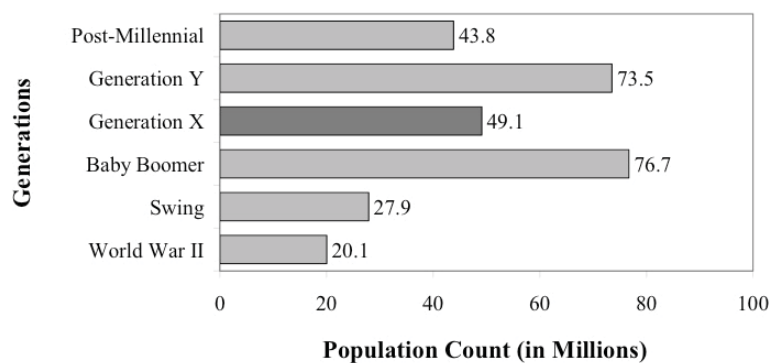- o Generation X
- o Generation Y/ Millenials

Fig. 1. Population by Generation - Source: 2005 US Census

The Silent Generation (Smith, 2009) is the generation of people born in the United States between roughly 1923 and the early 1940s. Members of this generation experienced vast cultural shifts in the United States, and many of them struggled with conflicted morals, ideas, and desires. Some members of the Silent Generation claim that they are one of the least understood generations from the 20th century, perhaps because of the relatively small

size of this generation.

According to Smith (2009), "describing this generation as the 'Silent Generation' is a bit of a misnomer. In fact, many revolutionary leaders in the civil rights movement came from the Silent Generation, along with a wide assortment of artists and writers who fundamentally changed the arts in America. This generation is comparatively small when compared to the surrounding generations because people had fewer children in the 1920s and 1930s, in response to financial and global insecurity. As a result, members of the Silent Generation were uniquely poised to take advantage of economic opportunities, thanks to the reduced competition. Many of them went on to harness the scientific and technological advances of the Second World War, developing innovative inventions, which laid the groundwork for even more technological progress in the late 20th century. However, the term 'Silent Generation' is not wholly inappropriate. While some members of the Silent Generation did become outspoken activists, many were also quiet, hardworking people who focused on getting things done and advancing their careers, even as they struggled with what to do with their lives. Members of the Silent Generation were encouraged to conform to social norms, and many did so, but as later became evident this generation seethed on the inside as people coped with the growing civil rights movement, the women's liberation movement, and the explosion of the Baby Boomers. Internal conflict plagued many individuals in the Silent Generation."

Baby Boomers born in the years from 1946 to 1964, have a unique set of beliefs and characteristics, vastly different from previous generations. According to Primo and Wedeven (1998), (This encompasses all aspects of life, affecting their beliefs about self, career, home, and leisure. (Strategic Solutions, 1998) (http://www.thestrategicedge.com/). Baby boomers are more optimistic economically, largely since they did not experience the Great Depression. They are better educated; men continued in college to avoid the Vietnam War and more women, seeking equality, sought a college education. Women of this generation worked outside the home in greater numbers, even while raising young children. Baby boomers, especially the latter group, are more comfortable with technology, growing up within the age of computers. They are an individualistic generation, with a focus on self and a tendency to reject authority. Hectic lifestyles are common for Baby Boomers, with their leisure time infringed upon by the various demands of life.

As the Baby Boomers enter mid-life, they face normal emotional and physical transitions, yet some unusual financial and employment concerns. As Boomers age, they will face some of the standard chronic health problems and face their own mortality. Many Baby Boomers are facing layoffs as corporations downsize, rather than entering a period of economic certainty, job security, and one's peak earning years. Their financial status is even more uncertain because Baby Boomers are a spending - not a saving - generation, who liberally use credit to finance purchases. This collective tenuous financial status is compounded by the fact that there is greater uncertainty of the availability and reliability of Social Security. With many subsidizing their own aging parents, this uncertainty is compounded even more for this generation.

The highly educated Baby Boomer should support the continued growth of bookstores and high technology products, stores, and services. People are typically in their peak reading years in this age period anyway. This generation, especially those in the later years of the baby boom, is comfortable with computers. Baby boomers will buy computers and hi-tech products for themselves, their children and grandchildren. High technology can be used to

sell other products and services which will then be perceived as more fun and entertaining, to themselves.

Generation X

According to Generation X a term used to describe generations in many countries around the world born from the 1960s and 1970s to 1982. The term has become used in demography, the social sciences, and marketing, though it is most often used in popular culture. (http://www.nasrecruitment.com/TalentTips/NASinsights/GettingtoKnowGenerationX.pdf)

In the United States, Generation X or Gen X for short was originally referred as the "baby bust" generation because of the small number of births following the baby boom. In the United Kingdom (UK) the term was first used in a 1964 study of British youth by Jane Deverson and Charles Hamblett in their book *Generation X.* The term was first used in popular culture in the late 1970's by United Kingdom punk rock band Generation X led by Billy Idol. It was later expanded on by Canadian novelist Coupland (1991) who describes the angst of those born between roughly 1960 and 1965, who felt no connection to the cultural icons of the Baby Boom generation.

According to the Encyclopedia of the Social Sciences, in continental Europe, the generation is often known as Generation E, or simply known as the Nineties Generation, along the lines of such other European generation names as "Generation of 1968" and "Generation of 1914." In France, the term Génération Bof is in use, with "bof" being a French word for "whatever," considered by some French people to be the defining Generation-X saying. In Iran, they are called the Burnt Generation. In some Latin American countries the name "Crisis Generation" is sometimes used due to the recurring financial crisis in the region during those years. In the Communist bloc, these Generation-Xers are often known to show a deeper dislike of the Communist system than their parents because they grew up in an era of political and economic stagnation, and were among the first to embrace the ideals of Glasnost and Perestroika, which is why they tend to be called the Glasnost-Perestroika Generation. In Russia (former USSR), in particular, they were often called "a generation of stokers and watchmen", referring to their tendency to take non-challenging jobs leaving them with plenty of free time, similar to Coupland's Xers. In Finland, the X-sukupolvi is sometimes derogatorily called pullamössösukupolvi (bun mash generation) by the older Baby Boomers, saying "those whiners have never experienced any difficulties in their lives" (the recession of the early 1990's hit the Xers hardest--it hit just when they were about to join the work force), while the Xers call the Boomers kolesterolisukupolvi (cholesterol generation) due to their often unhealthy dietary habits. Japan has a generation with characteristics similar to those of Generation X, shin jin rui.

Other common international influences defining Generation X across the world include: increasingly flexible and varied gender roles for women contrasted with even more rigid gender roles for men, the unprecedented socio-economic impact of an ever increasing number of women entering the non-agrarian economic workforce, and the sweeping cultural-religious impact of the Iranian revolution towards the end of the 1970's in 1979.

Generation X in the United States was generally marked early on by its lack of optimism for the future; nihilism, cynicism, skepticism, political apathy, alienation and distrust in traditional values and institutions. For some of this generation, Generation X thinking has

significant overtones of cynicism against things held dear to the previous generations, mainly the Baby Boomers. Some of those in Generation X tend to be very "consumer" driven and media savvy according to some. Generation X is volatile. Many found themselves overeducated and underemployed, leaving a deep sense of insecurity in Generation Xers, whose usual attitude to work is *take the money and run*. Generation X no longer take any employment for granted, as their Baby Boomer counterparts did, nor do they consider unemployment a stigmatizing catastrophe.

Generation Y

This generation makes up over 70 million people in the U.S. With those born between 1977 and 1994 included, they make up over 20% of today's population. The largest generation since the Baby-Boomers, the Millennials are defined by their numbers. They have a huge social and economic impact.
(http://www.nasrecruitment.com/talenttips/NASinsights/GenerationY.pdf)
 There are three major characteristics of the Millennial group:

> 1) They are racially and ethnically diverse,
> 2) They are extremely independent because of divorce, day care, single parents, latchkey parenting, and the technological revolution that they are growing up alongside, and
> 3) They feel empowered; thanks to overindulgent parents, they have a sense of security and are optimistic about the future. Family cohesion is alive and well in the 21st century. Generation Y is being raised in the age of the "active parent." Defined by the views of child psychology that predominate and the parental education available, this is the decade of the child.
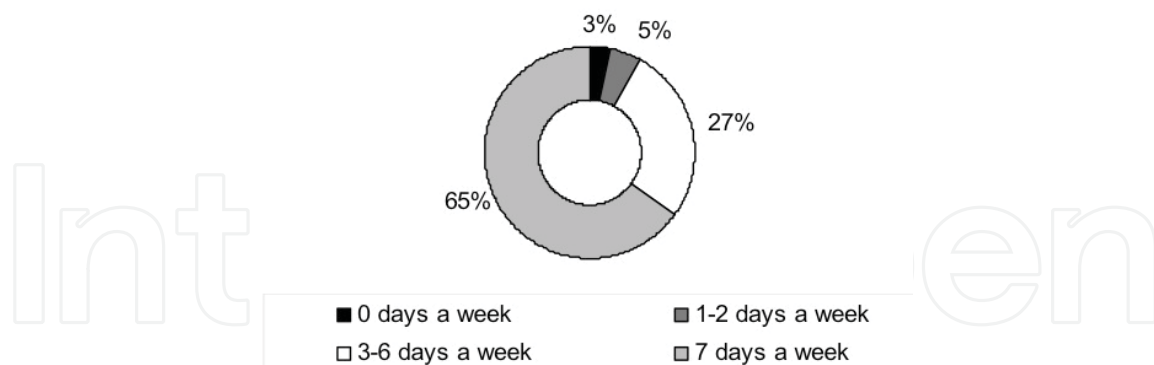> (EmploymentReview.com)

Fig. 2. Majority of Children Eat Dinner with Parents Daily – Source: the Millennials: American Born 1977 to 1994; US Census 2000

According to Giordani (2005) "Fathers have entered the child rearing equation and companies realize that time away from the job to spend with the family is very important. Unlike Generation X that came before them, these children are not left to make key decisions on their own; the parents of Generation Y are very hands-on. Parents are involved in the daily lives and decisions of Gen Y. Their parents helped them plan their achievements, took

part in their activities, and showed strong beliefs in their child's worth. The secure feeling attained by strong parental involvement makes the members of the Y Generation believe they can accomplish most anything, and if they don't, they can always go back home and get help and support" (Giordani, 2005).

"From a young age, Generation Y is told, through both the media and home, that they can have it all. This generation has a strong sense of entitlement. Striving for a quality of life only known by the rich and famous, wanting the best and thinking they deserve it, makes Generation Y driven and ambitious, with high expectations (Giordani, 2005).
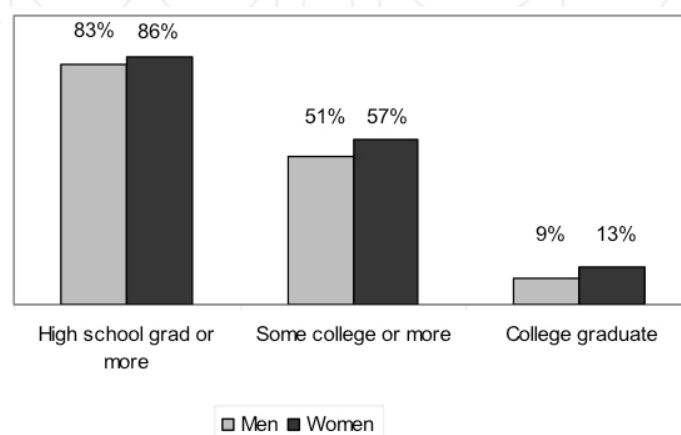

Fig. 3. Women are Better Educated than Men – Source: the Millennials: American Born 1977 to 1994; US Census 2002

According to the Board of Census, "The Millennials are one of the most educated generations yet, and they love to learn. Going to college is no longer reserved for the elite, it is the norm. Today, 64% of women and 60% of men go to college after graduating high school and 85% attend full-time. There are also many choices in higher education today because of the commonality of attending colleges. There are many alternatives beyond public and private schools, from on-line learning to the traditional classroom. Most parents want their children to graduate from college. 58% want their children to graduate from college and 28% want them to obtain an advanced degree. Only 14% of parents do not want their children to receive a college education. (Bureau of Census: 2000) More affluent families have more children that are attending college. The majority of families with children ages 18 to 24 and incomes of $50,000 or more have at least one child in college.

Growing up in the age of technology has put a computer in the hands of almost every child. They have understanding and knowledge of technology and keep up quite well with its advances. Three out of four teenagers are on-line, and 93% of those ages 15-17 are computer users. The majority of time spent on the Internet is for entertainment purposes. Emailing, instant messaging and gaming is done by the majority of children eight and older who are on-line (National Center for Health Statistics, 2000).
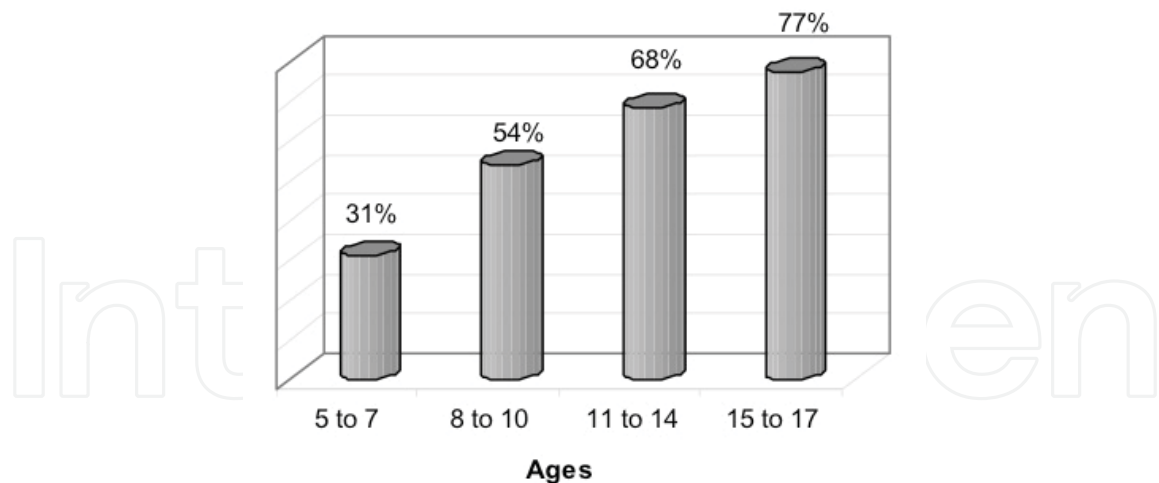
Fig. 4. Most Children are On-Line – Source: the Millennials: American Born 1977 to 1994; National Center for Health Statistics: Computer & Internet Used by Children and Adolescents in 2001.

According to NAS, "Unlike past generations, the technological advances in the past decade have put a multitude of choices at the fingertips of Generation Y. The wealth of information available in seconds from the Internet, hundreds of television stations to choose from and a different shopping center every ten miles has given Gen Y members the notion that if they do not get what they want from one source, they can immediately go to another. This relates to employment because Generation Y will question workplace regulations, such as uniform requirements and schedules, and know that there are other options out there if they are not satisfied with the answers. (Allen, 2005) Similar research findings in the UK confirm these characteristics for all four generational cohorts."

Euromonitor International, (2008) has determined that "China has undergone tumultuous changes in the last few decades, many of which have come together to completely transform China's age demographics and family composition. Increasing life expectancies and much-improved health conditions have led to rapidly increasing numbers of older people in China, who numbered a staggering 170 million in 2007 and are projected to reach over 230 million by 2015. The traditional Chinese family is largely becoming a relic of the past. The habit of family caring for elders is cultural, and will not disappear overnight. Rather, it will take the form of a continued propensity to save, and an increased demand for private healthcare, homecare and nursing.

In December 1977, one year after the end of the Cultural Revolution, 5.7 million Chinese participated in national university entrance exams. Over the three decades since, millions of students have graduated from colleges and universities throughout China and become part of a highly skilled workforce. According to official Ministry of Education figures, the country's higher educational institutions enrolled around 54 million students out of the 128 million national college entrance examinees since 1977. Education spending is growing at levels never before seen in China. Over RMB550 billion made its way out of government coffers and into academic institutions in 2007 alone. The introduction by the government of a compulsory nine-year education program funded by the state is part of a package of reform and higher standards for all Chinese educational institutions, from pre-primary through to higher education. It is at the level of higher education where the government's

own ambition is met by an equally ambitious Chinese consumer. Spending on higher education has seen huge growth over the past decade, with the numbers in higher education boasting 30% growth every year over the past five years. These students are also increasingly looking towards doctoral and masters' courses, and not just undergraduate studies, to differentiate themselves from the ever fiercer domestic competition.

The impact of increasing numbers of educated Chinese is immense as illiteracy has been largely wiped out and skilled workers are available to fill the roles required of a rapidly developing economy. China is looking to develop its industries from those based in manufacturing to also include more high-tech and 'idea' industries such as information technology, automotive, bio- technology and robotics. Research and development in China will continue to increase into the future as it builds on its massive 80% growth in the number of researchers since 1995. China hopes to vastly improve the quality of its workforce in order to compete globally in more than just the manufacturing industries which have been integral to its growth thus far. The growth rate of skilled labor through these changes in higher education will, over the forecast period, have implications for global trade, both directly in ideas as well as in idea-driven products, which China sees as key to continued prosperity.

There are, though, concerns amongst the huge influx of recent graduates about the increasing problem of finding employment in the ever more saturated job markets in China's first-tier cities. The number of job hunters from this group entering the market in 2009 is expected to exceed six million nationwide, an increase of 7% from 2008, according to official figures. Unfortunately the number of skilled workers has risen faster than the economy has grown. But the continued and rapid development of China's interior should slowly foster job creation to match required levels and allay fears of a population of unemployed.

With education becoming central to so many young people's lives in China, there is some re-evaluation, especially amongst women, on how to plan their lives. Marriage and partners, children and a settled house and home are all pushed further back in a person's life plan in contemporary China. This is having an influence on consumption patterns. Increasingly, the consumer habits of the young are being taken up by an increasingly older demographic extending into the 30s. Consumption of food- service, expenditure on alcohol and shopping, and a generally more self-centered lifestyle is becoming the norm for a larger segment of the population. This is not to suggest that Chinese consumers are living completely for themselves – consumption of green and environmental products is on the rise amongst educated people. Global issues such as sustainability and global warming are very much factors in the spending choices of Chinese consumers. This is due in no small part to the increasing levels of education and information consumption in China today (National Statistics, Euromonitor International, 2008).

Growth rates of around 20% from 2007 until 2015 in this age segment look to partly reverse the fall in numbers of around 30% in the years 1995-2007. In absolute numbers this means a rise to 190 million by 2010 and then 210 million by 2015. What is interesting is the split between males and females in this age group over the forecast period. Figures of around half a million more females to males in 2005 begin to even out by 2010, and then slide heavily on the side of the males with 5 million more men than women in this age group forecast by 2015. This trend is important because most Chinese in their 20s look to be settling down with a partner. A proportion of this age group will, of course, be students in

higher education and so will follow trends as described in the section above. By the same token many will be former students with an income from their first job burning a hole in their pocket. This group will prove very exciting in terms of consumption potential as it is part of the second highest income group with its 25-29-year-old age range boasting a gross annual income of US $2,050.

People in Their 30s Source: National statistics, Euromonitor International

In stark contrast to the 20s demographic, China has seen the number of people in their 30s grow by around 30% over the period 1995-2007. However, they will face a decline 2007-2015 of over 20%. In absolute numbers this decline will bring the total 30s demographic down from 238 million in 2007 to 216 million by 2010. By 2015 the total number of people in their 30s will have dropped to 184 million. With the average income of 30-35 year olds being the highest in China at USD $2,105, it is this group that has the means to really drive Chinese consumption over the coming decade. This demographic traditionally has a broad choice in consumer spending options, from entertainment and leisure to household and financial goods and services. People in their 30s cannot be pigeon-holed as easily as can other demographics. Marriage, children and income are variables that have major implications for spending patterns and are all variables which affect this age group more so than any other (Euromonitor International 2008).

The middle-aged demographic will see growth of 25% between 2007-2015, pushing the total number of middle-aged Chinese up to a staggering 550 million. This will be a full 40% of the total population in 2015, up 10% from 2005. Growth in this demographic has been consistent since 1995. Approximately half of those earning over USD $40,000, and nearly 60% of earners in the highest bracket (over US$100,000), are in their 40s. A taste for high-end items and the resources to spend on themselves and their immediate and extended families – which may include grandchildren by this age – characterizes this segment. (Euromonitor International 2008) The average age of retirement in China is over a decade earlier than in most European countries. As a result, pensions are drawn by middle-aged adults as well as the older demographic discussed here.

The 'grey-consumer' is proving to be an integral part of the Chinese economy and a key source of consumer spending. The spending patterns of this demographic are likely to change dramatically as the sheer numbers of older Chinese mount every year of the forecast period. Pensioners in 2008 enjoy rather substantial incomes from the state but as the strain of mounting pension payments and healthcare costs takes its toll, Beijing will have to reduce state pensions to a fraction of what it provides today. Based on the statistics, it is forecast that there will be a 24% increase in the number of old-aged persons, bringing the total up from 118 million in 2007 to 146 million in 2015.

Impact

The waning spending power of this age group over the forecast period makes it irresponsible to summarize any long term impacts of this particular demographic that coincide with the short-term trends. Although it is true that the state should be able to provide for its retired population in the short-term, it is increasingly obvious that the system will collapse unless major cut- backs and policy changes are made soon. The spiraling medical and health costs alone will be unmanageable towards the end of the forecast period. The number of young adults in Japan declined over the review period. This is attributed to

the falling birth rate in the country. Young adults, aged under 17 years have less spending power and normally still live with their parents. At this age, however, consumers are becoming more independent and thus the taste and preferences of this consumer group has a significant influence the spending of families. Clothing, consumer electronics are very important to this age group and parents are not hesitant to purchase high-priced products for their children. Consumer electronics, especially those engage in introducing portable media players such as MP3, i-Pods, or other multimedia players are also trying to lure this consumer group. Young people tend to leave the family home around the age of 18 years and are in full-time employments, especially by the second half of their 20s. (Euromonitor International from 2008)

The number of middle-aged adults rose to almost 53.8 million in 2005. This age group is considered by trade sources to have more savings that the younger generations and as they grow older will not be averse to spending on themselves. They also constitute niche markets for a variety of goods and services. The number of middle-aged adults in Japan is expected to fluctuate over the forecast period, accounting for 41% of the population in 2015. Females became predominant in this age group since 2005 and they will continue to exceed males in number through to 2015.

The number of baby boomers showed decline in 2005 but it is expected to increase by 2015 reaching around 35.2 million or27% of the entire population of the country. Baby Boomers prefer staying home to cook, read, and watch television, rather than going out and spending money. They tend to be loyal to the products they like and mostly they try to be practical.

Pensioners : (Euromonitor International, 2008) (aged 60+) possess almost half of the country's ¥11.3 trillion in savings. Projections have them spending nearly ¥95 billion a year on new products, home care and home renovation. By 2015, there will be 38.3 million pensioners in Japan, representing 30% of the population with female pensioners outnumbering males. On the other hand, it is expected that sales to pensioners will increase resulting in companies diversifying their products to accommodate the needs of this sector.

One interesting way to distinguish the four generations in 20th Century American culture is by their attitude and use of technology. (Clift. C. 2009) http://www.helium.com/items/ 368338-the-names-and-characteristics-of-the-four-generations

- o The Mature Generation are afraid of and skeptical towards technology. Perhaps they are threatened by computers, because they provide shortcuts to so much of the honest work that their generation toiled over for so many years.
- o The Baby Boomers are forced with the dilemma of adapting to new technology out of necessity, while at the same time being old dogs learning new tricks.
- o Generation X were the early adopters to most new technologies. I believe that they were falsely labeled a slacker generation because the way they learned, worked, and played differed so much from previous generations, due to their use of technology.
- o Generation Y, the Net Gen, or the Millennials, are a unique group of American youth, as they have had access to computers and even the internet for most or all of their lives. This changes the way they learn and communicate, and is a huge diversion from the traditional print medium, with its linear, singular way of doing things. Millennials multi-task, they think in terms of multi-media as opposed to simply text, and they exchange and process information extremely fast. Unfortunately, and conversely, though, Millennials take these luxuries for granted.

They have lost something of the art of face to face conversation. Generation Y seems to favor quantity over quality in terms of communication. ubiquitousness of the technology of their grandchildren.

Jones (2009) states, "Contrary to the image of Generation Y as the 'Net Generation,' internet users in their twenties do not dominate every aspect of online life. Generation X is the most likely group to bank, shop and look for health information online. Boomers are just as likely as Generation Y to make travel reservations online. And even Silent Generation internet users are competitive when it comes to email" (p.1). Generations Explained, Pew Internet & American Life Project

Internet use and email

Jones (2009) continues, "The web continues to be populated largely by younger generations, as more than half of the adult internet population is between 18 and 44 years old. But larger percentages of older generations are online now than in the past and they are doing more activities online, according to the Pew Research Center's Internet & American Life Project surveys taken from 2006-2008."

Generations Explained			
Generation Name*	Birth Years, Ages in 2009	% of total adult population	% of internet-using population
Gen Y (Millennials)	Born 1977-1990, Ages 18-32	26%	30%
Gen X	Born 1965-1976, Ages 33-44	20%	23%
Younger Boomers	Born 1955-1964, Ages 45-54	20%	22%
Older Boomers	Born 1946-1954, Ages 55-63	13%	13%
Silent Generation	Born 1937-1945, Ages 64-72	9%	7%
G.I. Generation	Born ~1936, Age 73+	9%	4%

Fig. 5. Generations Explained – Source: Pew Internet & American Life Project 2008 Survey, N=2,253
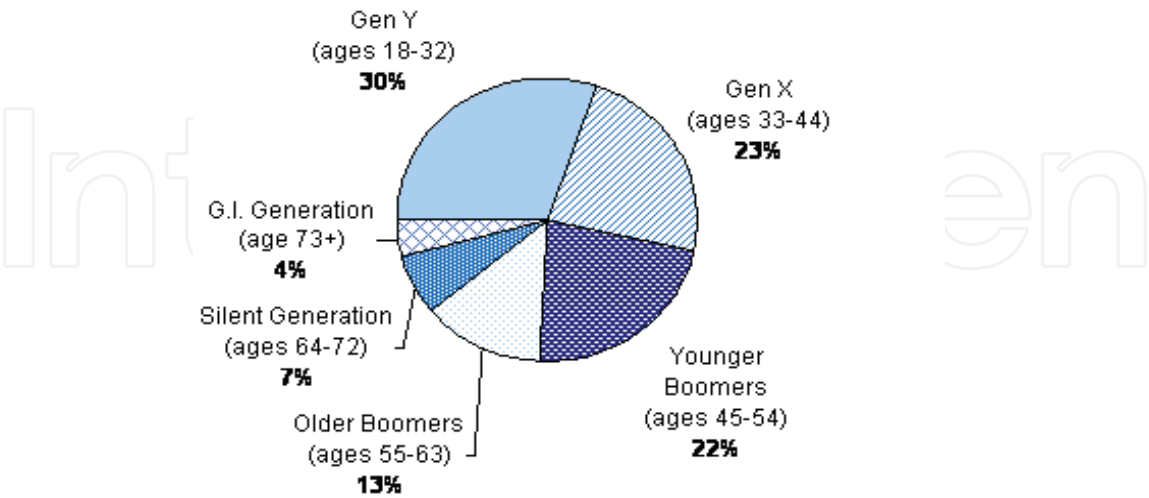

Fig. 6. Makeup of Adult Internet Population by Generation (excluding teens) – Source: Pew Internet & American Life Project 2006-2008

Adult Internet users by generation

According to Jones (2009) and the Pew Research Center, The biggest increase in internet use since 2005 can be seen in the 70-75 year-old age group. While just over one-fourth (26%) of 70-75 year olds were online in 2005, 45% of that age group is currently online. Much as we watch demographic and age groups move up in "degrees of access" on our "thermometers,"[1] we can probably expect to see these bars become more level as time goes on. For now, though, young people dominate the online population. Instant messaging, social networking, and "blogging" have gained ground as communications tools, but email remains the most popular online activity, particularly among older internet users. Fully 74% of internet users age 64 and older send and receive email, making email the most popular online activity for this age group. At the same time, email has lost some ground among teens; whereas 89% of teens said they used email in 2004, just 73% currently say they do.

Teens and Generation Y (internet users age 18-32) are the most likely groups to use the internet for entertainment and for communicating with friends and family. These younger generations are significantly more likely than their older counterparts to seek entertainment through online videos, online games and virtual worlds, and they are also more likely to download music to listen to later. Internet users ages 12-32 are more likely than older users to read other people's blogs and to write their own; they are also considerably more likely than older generations to use social networking sites and to create profiles on those sites.[2] Younger internet users often use personal blogs to update friends on their lives, and they use social networking sites to keep track of and communicate with friends.[3] Teen and Generation Y users are also significantly more likely than older generations to send instant messages to friends.
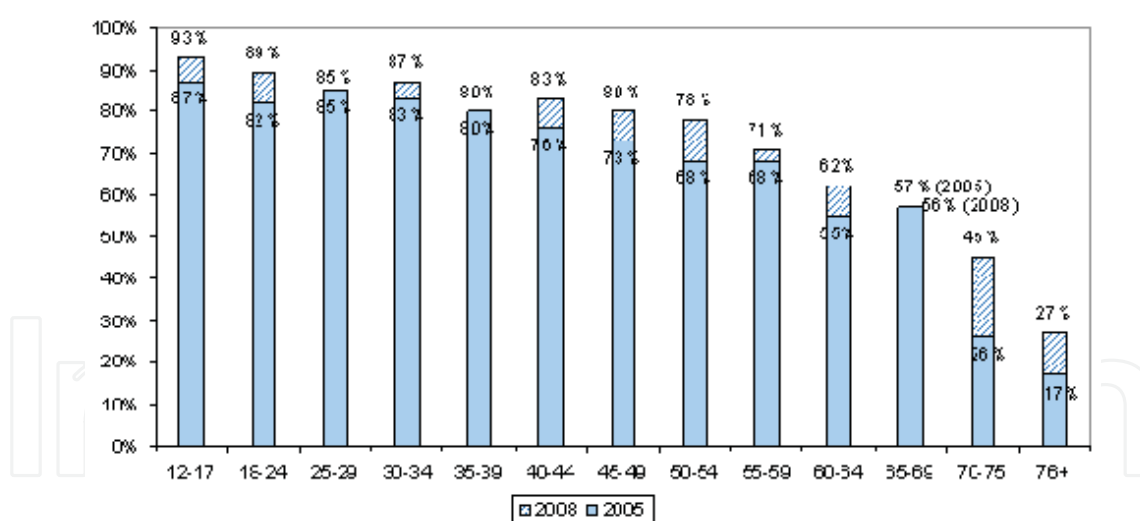

Fig. 7. Percentage of Americans online by age – Source: Pew Internet & American Life Project 2008 Survey, N=2,253

By a large margin, teen internet users' favorite online activity is game playing; 78% of 12-17 year-old internet users play games online,[4] compared with 73% of online teens who email, the second most popular activity for this age group. Online teens are also significantly more likely to play games than any other generation, including Generation Y, only half (50%) of whom play online games.
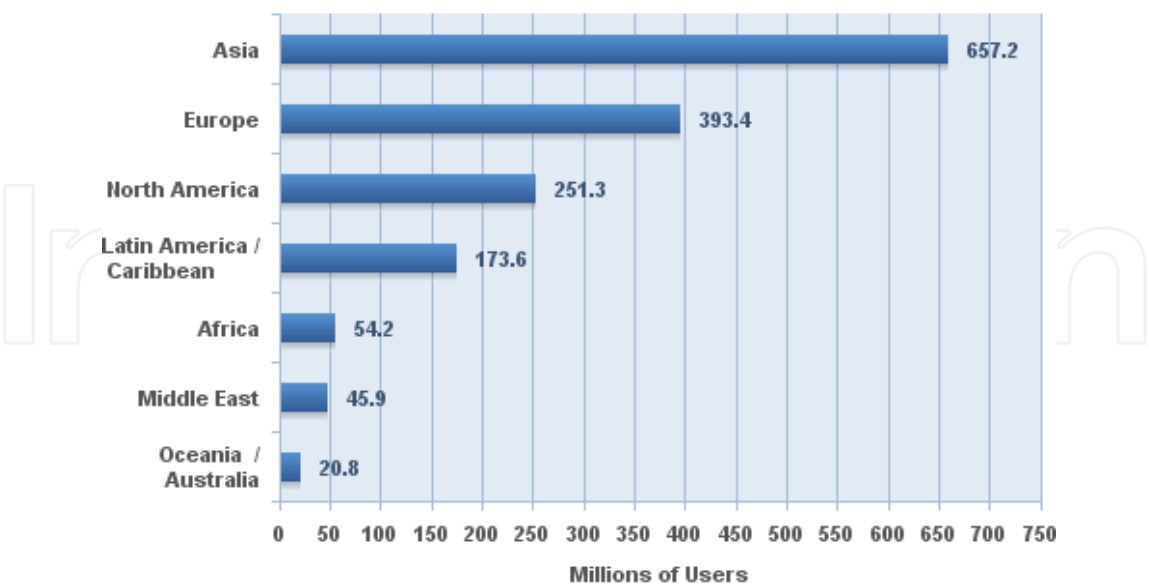
Fig. 8. Internet Users in the World by Geographic Regions – Source: Internet Research World Stats, 2009

Fig. 9. Personal and Lifestyle Characteristics by Generation, Hammill G, 2005 Mixing and Managing Four Generations of Employees , FDU Magazine

The characteristics listed in the table above are but a very few of those that have been studied and reported by various authors. Not every person in a generation will share all of the various characteristics shown in this or the next table with others in the same generation. However, these examples are indicative of general patterns in the

An example, based on these traits, would be to think about how words are received differently. When a Boomer says to another Boomer, "We need to get the report done," it is generally interpreted by the Boomer as an order, it must be done and done now. However,

when a Boomer says to an Xer, "This needs to be done," the Xer hears an observation, not a command, and may or may not do it immediately.
http://www.fdu.edu/newspubs/magazine/05ws/generations.htm

Learning Online

Online education has both grown and changed significantly over the past decade. The term distance education http://www.ecollegefinder.org/blog/post/The-History-of-Online-Education- How-it-All-Began.aspx
dates back to the late 1800s? It was first used in a school catalog for the University of Wisconsin-Madison. Nowadays, this concept of "distance education" is associated with online education at your fingertips anytime, anywhere.
Since its inception, the online education industry has grown in popularity, and altered the definition of 'classroom' and has given brick and mortar educational institutions tough competition. It is no longer uncommon to know friends and family members who have earned their degrees, particularly advanced level degrees, from an online education portal. Though now fully functional and aesthetically pleasing to students, thriving online schools have come a long way. In the 60's some schools, including Stanford, began implementing the earliest versions of "online education" which enabled students to reach instructors via online notes and teachers to monitor their students' progress via data. In the 70s and 80s, computers began to appear in classrooms as early as in Kindergarten.
Lotus Notes version 1.0 was released in 1989, paving the way for the Internet to transform from "geek gadget" to a necessity. During the mid 1990s, Internet companies were by the thousands and gave way to the "dot-com" boom. Later that decade, schools began to explore internet and computer capabilities-beyond creating slideshows- into very basic, text-based online courses. In 1996, founders Glenn Jones and Bernard Luskin created the first accredited web-based university, Jones International University.
What once began as text-based courses with a smattering of pictures transformed into courses with streaming media, web access and the ability to work anytime, from anywhere. Online education has literally opened doors for many who thought they could not further their education. Whether you have two jobs, are a busy caretaker, or simply cannot afford to commute to a campus program, online education makes pursuing your dreams achievable-often at a lower price, too.

Discipline and Technology

The landscape of education has been constantly changing. It has been shaped by the multiple technologies that have been designed and utilized to enhance teaching and learning. During the past decade, distance learning has proliferated significantly. Universities and colleges, traditional or not for-profit institutions, have added distance learning programs or attempted to figure the best possible ways to deliver their education to learners and satisfy learner preferences
Growth of online education is prominent in the United States, particularly in the higher education section. According to EduVenture, an independent research organization with a focus on online education, in 2008 approximately 90 percent of students enrolled in college or university took at least one online class. This accounts for over 16 million students. Such a

phenomenon can be interpreted that online learning are utilized in most disciplines. However the level of popularity and acceptance of online education differ from one discipline to another. Factors contributing to the disparity, may include required learning environment, validation of faculty and student online authenticity, accessibility of information and modality of teaching,

Among major disciplines, business, liberal arts and heath profession rank the highest for their online penetration rates. The Sloan Report: *Staying the Course, Online Education in the United State (2008)* shows trends in online education in various disciplines. Another study conducted by EduVenture during the same period provides the consistent results.
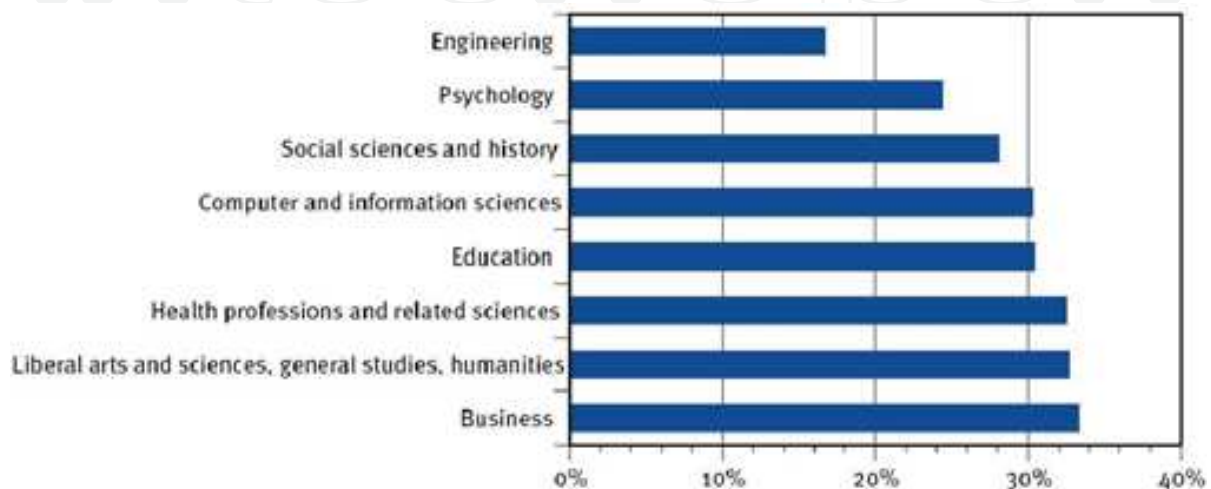

Fig. 10. Online Penetration Rate by Academic Discipline – Source: The Sloan Report - Staying the Course, Online Education in the United States, 2008

The level of popularity of online education in the various disciplines depends on various factors. They include:
- The availability of online classes,
- learning preferences and
- pedagogical reasons.

Today's learning management systems provide evidence on course behaviors. A fully developed system can track student activities and engagement in an online class. The richness of data is helpful for university and colleges to correlated student success with class component so that they can design classes suitable for each discipline.

In addition to the demand for technologies suitable for learners of various generations, different disciplines requires unique set of technologies assisted learning. The second part of this chapter discusses (1) how online education can enable student learning in different disciplines and (2) how online graduates are accepted in their professions.

Student Learning

Early studies suggested that there are no significant differences between student learning in online and traditional classes (Fox, 1998; McKinssack, 1997; Sonner, 1999 and Waschull, 2001). Learning results measured included test performance (Waschull, 2001) and student grades (Beare, 1989) is supported recent literature. More recent studies however suggest that

student success in online classes depend on organizational, technological, pedagogical, institutional and student factors including learning style preferences (Schrum and Hong, 2002). Finnegan, Morris and Lee' research (2008) suggested that a "one size fits all" approach in online education may be counterproductive to student success. Measures of student success are commonly established according to expected learning outcomes. Either because of their own inspiration or their accreditation requirements, higher education institutions craft their student learning outcomes to assess their educational effectiveness. It is not uncommon that accreditation agencies require institutions to measure outcomes of student learning through some common guidelines. Such common guidelines may include how technology be utilized in the student learning process. The new generation of research suggests that key factors contributing to student learning are technologies, student interaction and perceived learning.

Technology

Technology plays a crucial role in online learning and teaching. Compatibility between preferences of learning style and modes of instructional delivery may enhance student learning. Available educational technologies can be used to modify delivery of instruction so that it may enhance student learning. E-learning technologies inundate higher education with options such as e-book, online simulation, text messaging, video conferencing, wikis, podcasts, blogs, 2nd life and social networking. Pedagogical literature suggests that levels of information retrieval in an e-learning environment influence on student learning (Fernandez-Luna, Huete, MacFarlane and Efthimiadis, 2008).

Several studies suggest that some media is more effective than others or that they may enhance some learning activities. For example, advancements in voice over Internet Protocol (VOIP) allow synchronous communication (i.e., visual, verbal, and text) among a group students and the instructor. This technology helps with instant two-way communication. Studies have shown that drawback of technology may include inappropriate use of media. Reading online content generally takes longer than reading the paper copy of the same content. While educational technologies advance rapidly, new models of online teaching and learning are catching up with the technology in a much slower pace.

Although various learning technologies have helped improve learning, there is no single universal technology applicable across all disciplines. Different disciplines require different pedagogical logic and thus possible different technologies to support student learning. While experimental experience is critical to student learning in such fields of study as medicine and sciences, it may be secondary in other disciplines. For instance, students in medical school will need to learn surgical procedure through several hand-on practices before they can display the expected learning outcomes required by their discipline. However, students who study history may benefit greatly from online education where they can read relevant materials and interact with their peers and instructor virtually. Literature suggests that the learning of business students in an online environment may exceed that of traditional classroom in some areas.

Even within the same field, different professions require different levels of skills and knowledge as each role calls for a unique set of responsibilities. These differences translate to specific technology-support learning. While a pilot and a control tower staff must understand how to land an aircraft, "proof" of the pilot learning can typically be several

hours of simulations and real flight time and that of the control tower staff can be a few hours of simulation landing. Learning in the simulation environment for both pilot and the control tower stuff is equipped with similar technology. Though with the same knowledge of how to land an aircraft, pilot and the control tower staff are required to perform different job function and thus their learning and skill are measured differently.

Interaction

A typical online class contains three components (1) content, (2) interaction and (3) assessment. Each of these components may be adjusted to fit a specific discipline. The majority of online, online learning courses are structured around content management systems that employ text as the main medium for all communication. While the discipline dictates its content, level of student interaction must be designed to optimize student learning. The core of online classes is interaction, not content (Simmons, Jones, and Silver, 2004). Instructional design must consider interaction among students, and that between instructor and students.

Reflective learning is common in most business curriculum programs. In general, businesses curriculum requires students to internally examine and explore an issue of concern triggered by experience. A study conducted at the University of Wisconsin-Whitewater (2004) found a significantly higher percentage of reflective learning in their online MBA students. The same study showed online experience can surpass traditional learning and teaching. What the research showed is that students in an online business program want and seek deeper learning experience.

Even within the discipline of business, level interaction required for student leaning differs among types of courses or programs. Literature suggests that information is critical in the area of health professional. In this discipline, student teacher relationships in distance education are pivotal to student learning (Atack, 2003: Roberts, 1998). A major challenge in adopting the online learning mode is to improve human interaction in order to provide a facilitative environment for establishing peer support, developing communication for idea exchange, and guiding socialization (Sit et al 2005).

Thurmond (2003) concluded that interaction is a core element of an effective online environment and that faculty should be knowledgeable in interaction strategies to foster settings conducive to learning. Effective two-way communication is paramount to ease the fears, frustration, and anger that may be demonstrated throughout online learning (Kozlowski, 2004).

Frith and Kee (2003) studied online communication methods and concluded that the kind of communication affected course satisfaction. In addition to enhancing effective communication, issues related to privacy and intellectual property are critical in an online class. Assessments of student learning in different discipline vary. One discipline may require constant feedback or formative assessment more frequent than another. Online classes may limit opportunities for a close or in-person supervision in assessment process. Such limitation may discriminate the effectiveness of online learning.

Perceived Learning

In distance education, the roles of both the faculty and students change and diversify. Faculty assume the role of facilitator and must develop the goals of learning, conditions of

learning, and methods of instruction. (Atack, 2003; Billings et al., 2001; Huckstadt & Hayes, 2005; Seiler & Billings, 2004).

Even within the discipline of business, level interaction required for student leaning differs among types of courses or programs. A study of Argaugh and Rau (2007) suggested that participant interaction was significantly associated with perceived learning. The study shows that perceived learning among business subjects rank from (1) project management, (2) human resource management, (3) strategic management, (4) international business, (5) general management, (6) literature in business and (7) finance. Another finding from this study is that discipline and course structure characteristics were primarily associated with student satisfaction.

The nursing literature on distance education and professional socialization reveals positive outcomes in perceived learning. Cragg (1991) reported that student outcomes in the areas of issues in nursing and had attitudinal changes reflecting a more professional orientation are well developed at the completion of a nursing distance education course.

Acceptance of Online Graduates

One common objective of students pursuing an educational degree is to advance in their profession. Once the course work ends, acceptance of the credential earned from online and traditional program may post problem. This is despite of identical diploma given to graduate by the institution that offers both online and traditional programs.

In addition to the reputation of a university for academic rigor associating with acceptability, literature suggests that in part, the face-to-face contact in traditional classroom is perceived to offer something more. Many believe that instruction and mentoring are more effective in a traditional classroom set up and that that they are essential key to what many would consider a "quality" education. Literature also suggested that online programs, even those offered by reputable institutions with high academic standards, may always be regarded as "missing" key elements.

The perception of academic honesty, social presence, and the validity of degrees earned from an online program are of great interest in academia. Newer technologies or pedagogical models are needed help addressing such concern.

During the past few years, level of acceptance of online graduate in the job market has greatly improved and the trend will continue. Disparity occurs in some areas. Organizations or recruiters may be skeptical with quality of online degree in some disciplines. While academia has been more embrace of online graduates, it will take a longer time before a law firm accepts graduates from a fully online law program.

Despite its popularity and contribution to student learning, research on online education is limited. More research is needed in the area of distance learning and acceptability of online graduates by the public, most importantly by potential employers. Evolution of online learning will continue to change the higher education landscape. With proper adjustment, adoption of online learning will go across all disciplines and the expansion will be international. Acceptance of online degree will be to the new heights. Institutions offering online program must keep improving on their e-learning products and concepts, as they are wide and varying. Students will seek for premier support, convenience, and the most cutting-edge learning content available from the program of their choice.

Conclusion

Market trends have demonstrated that there has been, and there will continue to be significant growth in online education. It has become the preferred modality of a large proportion of Adult Learners. The Internet is the "WI-FI" generation medium of choice. In order for Higher education to remain competitive in the global marketplace more effort must be made in the Research and development of online classes. We must also encourage the educators to be open to this new format and apply and introduce new delivery modes in order to enhance the students' learning capabilities. Old established Universities are now introducing online programs and those who are already offering this format must continue to improve   their e-learning products and concepts. With constant adjustments for improvement, adoption of online learning can traverse across all disciplines, all nations, and become truly international.

References

Allen, R. (2005). [Online] Available: Managers Must Set Example for Gen Y Kidployees; Employee Recruitment and Molding;
http://www.nasrecruitment.com/talenttips/NASinsights/GenerationY.pgf

Arbaugh, J. B., Rau Barbara L.. (2007). A Study of Disciplinary, Structural, and Behavioral Effects on Course Outcomes in Online MBA Courses. Decision Sciences Journal of Innovative Education, 5(1), 65.

Atack, L. (2003). Becoming a web-based learner: Registered nurses' experience. Journal of Advanced Nursing, 44, 289-297.

Baby Boomers Grow Up 1996 [Online} Available:
www.thestrategicedge.com/Articles/babyboom.html

Beare, P. L. (1989). The comparative effectiveness of videotape, audiotape, and telecture in delivering continuing teacher education. The American Journal of Distance Education, 3(2), 57–66.

Billings, D., Connors, H., & Skiba, D. (2001, March). Benchmarking Best Practices in Web-Based Nursing Courses. Advances in Nursing Science, 23(3), 41.

Brown, R.L & J.C. Campione, (1994). Guided discovery in a community of learners. In K.McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice* (pp.229-270). Cambridge, MA: MIT Press.

Clift C. (2009) {Online} available http://www.helium.com/items/368338-the-names-and-characteristics-of-the-four-generations. Blog

Consumer Lifestyles in China (2008) National statistics, Euromonitor International

Coupland,D. (1991) Generation X: Tales for an Accelerated Culture

Cragg, C.E. (1991). Professional resocialization of post-RN baccalaureate students by distance education. Journal of Nursing Education, 30, 256-260.

Dede, C. (1998). *Six Challenges for Educational Technology*. Available:
http://www.virtual.gmu.edu/pdf/ASCD.pdf

Edelson,D.C. R. D. Pea, & L.M Gomez, (1996). Constructivism in the collaboratory. In B. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design*. Englewood Cliffs, NJ: Educational Technology Publications.

Employment review [Online] Available: employmentreview.com

Euromonitor International.(2008, November). Consumer Lifestyles. People in their 20's http://www.euromonitor.com/default.aspx

Euromonitor International.(2008, October). Consumer Lifestyles. US, China and Japan. http://www.euromonitor.com/default.aspx

Fernández-Luna J. M., Huete J. F., MacFarlane A., Efthimiadis E. N. (2009). Teaching and learning in information retrieval. Information Retrieval, 12(2), 201-226.

Finnegan C., Morris L. V., Lee K. (2008). Differences by Course Discipline on Student Behavior, Persistence, and Achievement in Online Courses of Undergraduate General Education. Journal of College Student Retention, 10(1), 39-54.

Fox, J. (1998). Distance education: Is it good enough? The University Concourse, 3(4), 3–5.

Frith K. H, Kee C. C. (2003). The effect of communication on nursing student outcomes in a web-based course. Journal of Nursing Education, 42(8), 350-8.

Generation X (2008). International Encyclopedia of the Social Sciences, 3, 2nd edition. (2008) New York, McMillan Learning. http://www.gale.cengage.com/iess/content.htm

Generation Y the Millenials [Online]Available: www.nasrecruitment.com/talenttips/NASinsights/GenerationY.pdf

Getting To Know Gen X [Online] Available: www.nasrecruitment.com/TalentTips/ NASinsights/ Getting to KnowGenerationX.pdf

Giordani, P 2005.Y Recruiting [Online]Available: http://www.nasrecruitment.com/talenttips/NASinsights/GenerationY.pdf

Hamblett, C. & Deverson, J. (1964). Generation X: today's generation talking about itself. London, Tandem.

Health Statistics Welcome to GenXPedia [Online] Available: www.genxpedia.com

Huckstadt, A., & Hayes, K. (2005, March). Evaluation of interactive online courses for advanced practice nurses. Journal of the American Academy of Nurse Practitioners, 17(3), 85-89.

Jones & Fox, S Pew Internet & American Life Project January 28, 2009

Kozlowski, D. (2004). Factors for consideration in the development and implementation of an online RN-BSN course: Faculty and student perceptions. Computers, Informatics, Nursing, 22, 34-43.

McKissack, C. E. (1997). A comparative study of grade point average (GPA) between the students in the traditional classroom setting and the distance learning classroom setting in selected colleges and universities. Dissertation Abstracts International, 58(8), 3039A. (UMI No. ABA98–06343)

NAS Recruitment Communications, (2008). An agency of the McCann Worldgroup. Nasrecruitment.com http://www.nasrecruitment.com/TalentTips/NASinsights/ GettingtoKnowGenerationX.pdf; http://www.nasrecruitment.com/talenttips/NASinsights/GenerationY.pdf

People in Their 20s Source: (2008)National statistics, Euromonitor International People in Their 30s Source: (2008)National statistics, Euromonitor International.

Primo J. E. & J. A. Wedeven (1996). Baby Boomers Grow Up. The Strategic Solution, Newsletter of the Strategic Edge. http://www.thestrategicedge.com/Articles/babyboom.htm

Primo J. E. & J. A. Wedeven (1998). The Strategic Edge Inc. http://www.thestrategicedge.com/

Roberts, K.K. (1998). A naturalistic study of students' experiences in a computer-based nursing course (Doctoral dissertation, University of Kansas, 1998). Dissertation Abstracts International, 59 (12), 4352A. (UMI No. 9914105)

Robinson, K. (2006). Cohort. In N.J. Salkind (Ed.) Encyclopedia of Human Development, 1(pp.286). Thousand Oaks, Ca: Sage Reference Retreived February 10, 2009, from Gale Virtual Library. [Online]Available:

Schank,R.C & M.Y Jona, 1991). Empowering the student: New perspectives on the design of teaching systems.The Journal of Learning Sciences, 1, 7-35.

Schrum, L.,& Hong, S. (2002). Dimensions and strategies for online success: Voices from experienced educators. Journal of Asynchronous Learning Networks, 6(1), 57–67.

Seiler, K., & Billings, D.M. (2004). Student experiences in web-based nursing courses: Benchmarking best practices. International Journal of Nursing Education Scholarship, 1(1), Article 20.

Simmons, S., Jones Jr., W., & Silver, S. (2004, September). Making the Transition from Face-to-Face to Cyberspace. TechTrends: Linking Research & Practice to Improve Learning, 48(5), 50-85.

Sit, J.W., Chung, J.W., Chow, M.C., & Wong, T.K. (2005). Experiences of online learning: Students' perspective. Nurse Education Today, 25, 140-147.

Smith, S.E. (2009) Silent generation [Online} Available: http://www.wisegeek.com/what-is-the-silent-generation.htm

Sonner, B. (1999). Success in the capstone business course—Assessing the effectiveness of distance learning. Journal of Education for Business, 74, 243–248.

Strategic solutions (1998) newsletter of Strategic EdgeThe Millennials: Americans Born 1977 to 1994; Bureau of Census: A Child's Day, 2000)

Study: Web-Based Instruction Can Surpass F2F Courses in Critical Thinking. (2004, September). Online Classroom, Retrieved May 20, 2009, from Academic Search Premier database.

The Millennials: Americans Born 1977 to 1994; National Center for

Thurmond, V.A. (2003). Defining interaction and strategies to enhance interactions in web-based courses. Nurse Educator, 28, 237-241.

Waschull, S. B. (2001). The online delivery of psychology courses: Attrition, performance, and evaluation. Teaching of Psychology, 28, 143–146.

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This book, edited by the Intech committee, combines several hotly debated topics in science, engineering, medicine, information technology, environment, economics and management, and provides a scholarly contribution to its further development. In view of the topical importance of, and the great emphasis placed by the emerging needs of the changing world, it was decided to have this special book publication comprise thirty six chapters which focus on multi-disciplinary and inter-disciplinary topics. The inter-disciplinary works were limited in their capacity so a more coherent and constructive alternative was needed. Our expectation is that this book will help fill this gap because it has crossed the disciplinary divide to incorporate contributions from scientists and other specialists. The Intech committee hopes that its book chapters, journal articles, and other activities will help increase knowledge across disciplines and around the world. To that end the committee invites readers to contribute ideas on how best this objective could be accomplished.

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