

# Using Technology to Teach a New Generation of Constructors: A Student Perspective

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Increasing use of technology and a new generation of students are two major factors that impacted the higher education system in the last decade. The new generation of students, the Net Generation or Millennials, use technology extensively as a part of their daily life and expect the same from the educational system. However, the diverse backgrounds and age of educators does not always respond to student expectations for a high-tech teaching and learning environment. This paper discusses the issues related to the generation gap between the educators and students when using instructional technology and teaching technology applications. Two of the authors of this paper are members of the Net Generation who recently graduated from a construction program. Their first hand experience and observations are included in this paper to explore the issues with technology in construction classrooms. The focus of the paper is to provide a student perspective on teaching technology including the current trends, expectations, issues and suggestions.

**Keywords:** Net Generation, Millennials, instructional technology, technology education

## Introduction and Background

Increasing use of technology and a new generation of students are two major factors that impacted the higher education system in the last decade. The colleges and universities are continuously trying to find new ways to recruit, connect and communicate with a new generation of students through various technologies [Oblinger, 2003]. Over the years, institutions have invested in information technology substantially and “Information and Communications Technology” (ICT) packages such as Courseweb, WebCT and Blackboard became standard applications on campuses [Nicol and Cohen, 2003]. Computers, projectors, and screens are expected to be in every classroom. The legal requirements also add to this equation. The implications of the Family Educational Rights and Privacy Act of 1974, which protects the privacy of student education records, makes it practically impossible to communicate students’ progress information or grades without a secure ICT system [FERPA, 1974].

The technology profile and expectations of the students also changed over the years. The Net Generation or Millennials do not consider technologies such as computers, Internet, instant messaging, or blogging as high-tech items [Frاند, 2000; Oblinger, 2003]. This technology-oriented profile changes the way that the information is delivered and assessed in an educational setting. In today’s higher education system, podcasting lectures and working with wikis for course assignments are not considered radical.

In professional degree curriculums, the technology component takes a different dimension with the requirements of teaching the technology itself. For example, the American Council for Construction Education (ACCE), the international accrediting body for construction higher

education, specifically requires computer applications to be included in construction graphics, estimating, planning and scheduling, and project management core categories [ACCE, 2000]. Some colleges and universities require their students to own a laptop as a part of their admission. With or without the laptop requirement, it is common to have students taking notes electronically or updating their Facebook account during lectures.

The construction industry is also demanding technology education for their future employees. Although, the construction industry is perceived as slow and reluctant in new technology adoption and implementation compared to other industries [Laborde and Sanvido, 1994; Becerik, 2006], companies are heavily investing in technology and computer applications. Recent data on the use of information technology (IT) by the contractors show an average \$ 334,241 of IT spending in construction companies with dedicated IT personnel and the IT investments on average can reach up to \$ 1,733,861 for companies with annual revenues exceeding 250 million dollars [CFMA, 2006]. This information suggests that the future employees of these companies must be able to handle the technology requirements of the industry.

The academic, legal and industry requirements of construction higher education put the educators under pressure to utilize instructional technology and teach construction industry applications. However, the diverse backgrounds and age of construction educators does not always allow for the high-tech teaching and learning environment. This is a common issue for the entire higher education system; however, the application-oriented nature of construction education makes technology a critical part of the curriculum.

This paper discusses the issues related to the generation gap between the educators and students when using instructional technology and teaching technology applications. Two of the authors of this paper are members of the Net Generation who recently graduated from an ACCE accredited construction program. Their first hand experience and observations are included in this paper to explore the issues with technology in construction classrooms. The focus of the paper is to provide a student perspective on teaching technology including the current trends, expectations, issues and suggestions.

### **Generation Gap in the Classroom**

In the related literature, several studies provide detailed profiles of the Net Generation students. However, to define the generation gap properly, it is important to profile educators as well as the students. The interaction between the educators and students is at the core of this relationship.

#### *New Generation of Students*

The majority of current college and university students are members of the Net Generation who were born between 1982 and 1991. The members of the Net Generation are described as hopeful and determined who like the latest technologies and dislike anything slow and negative [Oblinger and Oblinger, 2005]. The Net Generation does not consider computers as technology but a part of daily life because most of them did not know a life without computers or Internet [Oblinger, 2003]. “At one level, Net Geners are the beneficiaries of decades of technological

development that preceded them; at another level, as students they use these technologies in new ways, and in so doing are redefining the landscape in higher education and perhaps beyond. The behaviors of the Net Gen (multitasking, always-on communication, engagement with multimedia, and the like), as well as the capabilities of modern technologies (personal, multifunctional, wireless, multimedia, communication-centric), are in close harmony. To a great extent, the behaviors of the Net Gen are an enactment of the capabilities afforded by modern digital technologies.” [Hartman, Moskal, and Dziuban, 2005].

### *Mixed Generation of Educators*

Construction educators are unique among the academic community because of their diverse backgrounds and age. It is possible to have members of different generations as construction educators including Generation X (born between 1965-1982), Baby Boomers (born between 1946-1964) and even Matures (born between 1900 and 1945). A major portion of the educators have worked in the construction industry for several years and enter the academic field in later stages of their professional life. Some of them do not hold terminal degrees in their fields; however, because of the value of practical experience, they are among the preferred educators in construction higher education. Even in today’s high-tech environment, it is still possible to have construction educators that do not maintain an email address.

On the other hand, there are educators that have technology-oriented backgrounds, very likely to be members of Generation X, who have studied, used or taught technology applications in their professional life. Most of the Generation X members were educated in the development phases of today’s standard information technology items. However, having the development level knowledge may not be a practical tool when relating to the Net Generation students. For example, the knowledge of HTML coding may be one of the important technology items for the Generation X educator but it may mean very little to a Net Generation student because the student can easily find tools available to create a web page without the knowledge of HTML coding.

It is important to note here that the generation gap issue for the use of technology is not completely age-related. Exposure to the technology may be more important than the age difference. In other words, the majority of the educators use technology personally and professionally. “Generational issues are relevant to higher education because the faculty or administrator perspective may be considerably different from that of our students.” [Oblinger and Oblinger, 2005]

### **Teaching Technology vs. Using Technology as an Instructional Tool**

In the last decade, the use of technology for instruction and communication became a major factor in higher education. The available technologies range from the use of PowerPoint slides and simulation/animations for instruction to course websites and ICT systems. These tools are utilized by a majority of the educators at different levels. The level of technology use is directly related to the available resources, subject matter, and the style and knowledge of the instructor. The students expect to have these technologies implemented to enhance the learning

environment. The Net Generation students rate the following three items as important for successful learning [Roberts, 2005]:

1. The professor's experience and expertise.
2. The professor's ability to customize the class using the current technology available (for example, Courseweb, BlackBoard, and so forth).
3. The professor's ability to professionally convey lecture points using contemporary software (for example, PowerPoint).

The other aspect of technology in higher education is the teaching of the technology itself. Professional degree program curriculums include specific technologies as part of the student preparation for their professions. For the construction profession, core subject areas such as estimating and scheduling are prime examples for these applications. Although it is possible to teach these subjects successfully at a conceptual level with minimal technology applications, the technology side is usually included in these classes. The students may not develop an expertise at the end of the class but it prepares the student better for the industry's expectations. However, it is becoming increasingly difficult to accommodate and include the state-of-the-art technology applications. In addition to the physical limitations such as computer laboratories and instruction time, finding an instructor that can teach a wide variety of the technology applications is challenging.

Teaching technology in a professional degree program requires the combination of instructional technologies and the technology itself. For example, if the instructional approach for the scheduling subject is to include specific software applications (Primavera, MS Project, etc.), instructors are still expected to use ICT technologies to provide information and feedback to the students. The interesting aspect of this combination is that the instructors who are technology-oriented enough to teach the specific software applications are very likely to utilize ICT tools. It is logical to make the argument that the classes that focus on teaching technology itself are fully utilizing the available tools while the conceptual or theory based ones are more likely to lack the technological edge.

### **Student Perspective**

For over a decade, the use of technology to improve teaching and learning has been studied and discussed extensively. There are strong arguments that the traditional classroom teaching is no longer effective with the Net Generation student [Tapscott 1998; Frand, 2000; McNeely, 2005]. However, the willingness to integrate available technologies into the classroom and coursework varies among educators. It should be recognized that not all subject matter and classroom activities are suitable for high-tech applications. Nevertheless, it is important to include the student expectations and observations into this discussion.

### *Technology Trends and Expectations*

The Net Generation student has a different set of expectations than the students of previous generations. There is a general expectation among students that the educators embrace information technologies [Skiba and Barton, 2006]. While every educator structures their own

teaching style, there must be an established method to evaluate the effectiveness of the teaching methods. It can be argued that the Net Generation student is no longer satisfied with a simple lecture that utilizes only a lectern and a white board. "Today's faculty need to think how technology fits into their philosophy of teaching and learning. In particular, the way technology affects how and what people learn and its relationship to learning and teaching styles" [Grash and Yangarber-Hicks, 2000].

There is a need to bridge the generation gap and the larger portion of this responsibility is on the educators' shoulders. Integrating technology into courses may not always be a viable option, but understanding the benefit of using technology in facilitating the class is vital. Educators often fail to see the benefit of integrating technology into their lessons. The student's perception of this failure is that some educators see little benefit in adding technology to a method that has been previously effective in their teaching experience.

The Net Generation students are used to updates and information being streamed real time. They are also comfortable communicating solely over the Internet. The Net Generation has zero tolerance for delays because of the fact that they have been raised in a 24-7 world [Frاند, 2000]. With the ease of finding educational information on the Internet, students are more capable of teaching themselves and this needs consideration when creating technology enhanced lessons. Overall, there is very little benefit if an instructor creates web-based learning opportunities that, "Replicate didactic teaching methods or textbooks without offering any substantial advantages" [Cotton and Gresty, 2006]. Students are more responsive to an interactive experience which requires students to reach their own conclusions by utilizing the technology available to them. Instructors do not need to be completely technology savvy, but the mere adaptation to technology is appreciated by students [Carlson, 2004].

### *Issues and Suggestions*

Several observations and suggestions related to technology in construction classrooms are summarized in this section. The focus is to provide a Net Generation student's perspective. The observations and suggestions are grouped under three categories: general observations, using instructional technologies, and teaching technology applications.

#### *General Observations*

Relating to the students is at the core of the teacher-student relationship. Although this issue is not exclusively related to the use of technology, when used properly, technology may help establish the connection. Students tend to categorize their professors very quickly based on perceptions. There are several factors that help build the perception including personality/attitude, physical appearance, "being up-to-date", and first impressions in the classroom. It is important to keep in mind that the Net Generation establishes communication networks through technology platforms (Facebook, MySpace, etc.) and the perceptions of the students from previous years are passed on to the younger students. This does not mean that the students profile every professor individually but the extreme cases are well known. For example, professors that refuse to use any technology, personally and/or in classroom, are labeled as "old school" very quickly. On the other hand, professors, who are members of older generations, may

gain additional respect if their effort in using technology and keeping up-to-date is visible to the students.

Communication among students takes place instantaneously over the Internet or through the use of text messaging and students are often inclined to believe that this is a normal communication model. In this high-tech environment, professors, who refuse technology and expect students to chase them down on campus for questions, are not perceived as satisfactory.

### *Instructional Technologies*

The use of instructional technologies needs to be analyzed separately for delivering information and providing feedback to the students. Although the modern ICT systems can provide these functions together as a part of a comprehensive package, they can also be performed independently.

Delivering information to the students has two dimensions. The first dimension is using technology as an instructional tool in the classroom. PowerPoint slides are good examples of such technology. However, the use of technology must enhance the delivery of information. Converting old class notes to PowerPoint slides for the sake of using the computer is unlikely to enhance the instruction. Creating slides with extreme animations that push the students in an entertainment mode is also unlikely to provide any added value. The key is to find the balance that will create an interactive learning experience. The second dimension is using technology outside the classroom. Websites, ICT systems, and wikis can be utilized for this purpose to provide class related information. In addition to the class notes, list of available online sources on the subject, a digital library of related articles, podcasts, and/or case studies should be considered to provide a “self-learning” environment.

Providing feedback to the students is another area where technology can be used as an effective tool. It is vital to recognize the students’ desire for timely feedback. This does not mean monitoring email at all hours of the day but establishing a timeline for feedback and communicating that timeline to the students. Email, digital announcement boards, discussion boards, blogs and online gradebooks are examples of the tools that can facilitate the feedback cycle.

### *Teaching Technology Applications*

Including state-of-the-art technology applications into a class is one of the most valuable educational components. Teaching technology, especially computer applications, is one of the most difficult tasks for a professor because it requires working knowledge of the technology as well as troubleshooting ability.

Because of its practical and application oriented nature, teaching computer applications for construction students requires a well structured approach with relevant illustrations. For example, if spreadsheet applications are included as a part of an estimating class, teaching the functions and menus in the package is not going to be sufficient. It is important to emphasize and illustrate the spreadsheet as a tool that is used to prepare the estimate. It should be noted that

identifying the knowledge level of the students is very critical for computer applications. It is easy to lose the interest and focus of the students if the instructions cover the basic information that the students already have or advanced information that the students are unable to follow. Utilizing instructional technologies that creates an opportunity for “self-learning” may be very beneficial for leveling the playground for all students.

### **Conclusions and Discussion**

Technology has become a part of life for the Net Generation and they have high-tech expectations from the educational system. Institutions and educators are trying to adapt to this new environment by utilizing the available technologies. However, it is not always possible to create a technology-oriented and constantly-changing environment with educators from diverse backgrounds and different generation. While some educators are not willing to or capable of integrating proper technologies to their teaching methods, others utilize the available technologies without considering any interactive components.

Meeting and exceeding the needs and expectations of the students are critical for establishing a successful educational system. Using instructional technologies and teaching technology applications are an important part of this effort. Although it is not possible to introduce a high-tech method for every subject, exploring the available technologies might create the opportunity to connect to the Net Generation. The major problem in relating to the Net Generation seems to be their perception of technology. Perhaps the solution to this problem is also this perception. If the older generation educators demonstrate an effort to properly integrate and use technology in their classrooms, they may establish a connection with the Net Generation students and take the first step towards bridging the generation gap.

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