

# IT Educational Challenges for the Internet Generation

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## INTRODUCTION

The Net (Internet) generation generally refers to those children born between 1986 and 2000. Although there are different opinions on the exact current age range of the Net generation, it is well accepted that the first waves of these youngsters are already on university campuses (Internet Generation, 2006). The Net generation is expected to trigger major challenges in the educational process, especially in IT education.

The Net generation has been brought up among edutainment, and expects learning to be fun. They are avid users of computer and Internet, and are much less tolerant of boredom than previous generations. They exhibit no fear for computers and feel no need for computer literacy training. They probably have experienced and even master technology that baffles many instructors of the current generation. They are accustomed to search information on their own and expect instant feedback. They learn just in time, and are less willing to memorize information as a necessary part of the leaning process. They will not hesitate to turn to powerful computational machines to complete tasks, and they are well aware of the limitation of textbooks. The Net generation will be less inclined to follow a curriculum, simply digest bundled knowledge, and equate hard work with learning (Hay, L.E. (2000).

## EDUCATIONAL CHALLENGES FOR THE NET GENERATIONS

The Net generation grew up with technology, and in certain ways more technically savvy than instructors who are slowly adapting to the “new” technology. They were accustomed to high-speed interactive communication, and quickly lose interest in the gradual dispensation of small doses of knowledge. The instructional method of sequential presentation of information embedded in traditional textbook could be ineffective for this generation.

Members of the Net Generation acquired keen ability to find resources on the Internet. They were equally at ease at the crafty assembly of freely adopted excerpts from the web toward the formation of research reports (Smith, 1999). Many perceived the web as the whole of Internet and the world of network computing. They also inclined to believe that the Web holds the entire knowledge depository. As such, they habitually based their learning experience outside of the traditional scope of academic knowledge domain, prompting challenges to instructor roles and relevancy of learning goals.

The Net Generation was accustomed to networked microcomputers with little appreciation for the professional computing technology in the world of mainframe and data communication. As end-users of powerful 4GLs, they would amplify the recent trend towards user-developed applications, posing risks in design, development, maintenance, and infrastructure supports for information resources (Barker, 2002). For this new generation, programming is neither desirable nor challenging. The knowledge gap posted threat to the support and usage of core information technology.

Being very comfortable with mobile communication and wireless services, with the broad availability of software and hardware, the Net Generation no long value a full service central computing facility. Many of this generation either own microcomputers, or have easy access to technology. A new challenge in academic computing support shifts to the orchestration of linking compatible technology rather than ensuring the accessibility of standardized technology.

## CHANGING IT EDUCATIONAL ENVIRONMENTS

The Net Generation grew up among technology long before they began formal education. Very often, the introductory IT training in school paled in comparison to the sophisticated technology penetrating households. The vigorous disciplining of IT training lost ground to multimedia e-learning. An overabundant supply of technology distorted the perceived needs for further information system development. The Net Generation was more interested in end-user IT issues, than business issues on IT management. A mass failure of IT ventures followed by off-shore outsourcing of technical positions erased the attractiveness of IT careers, draining potential talents from the IT fields.

The widespread availability of application software based on 4GLs drew great interests in end-user IT training. E-learning technology greatly promoted the training opportunity for non-IS professionals, and these end-users eventually assumed primary development responsibility for computer-based applications. Corporate training programs and private trainers filled the void of training needs unfulfilled by university IS programs, which were slow to retool to meet demands for end-user computing training.

On university campuses, multiple disciplines were eager to offer their versions of IT training, leading to the dilution of resources as well as student pool. Indeed, students unprepared for the more vigorous IS program would flee to other programs. The educational attention was shifted from the quality of IT education to the relevancy of IT training. Debates began to arise surrounding standards for technology, rather than the effectiveness of IT education. In many cases, group and department secured exclusive rights to selected areas of IT trainings, feuding and fighting over shrinking student interests.

The diversification of technology deployment in organizations also made it more difficult to train students to meet the expectation of recruiters. Increasingly, firms turned to internal training programs to inject the needed IT skills to the new recruits, thus decreasing the value of IT training from university programs. Changing funding and reward practices drove innovation out from university campuses to high technology industries, widening the technology gap.

New requirements on program assessment prompted IT curricula changes to align instructional activities with measurable student learning outcomes. An effective IT educational program must begin to build on top of the existing skills and knowledge of students. A new generation of technologically literate students challenged the educational effectiveness of existing IT courses.

With an increasing recognition of IT as an essential communication skill, a new influx of demand arose from non-IS students, who were less motivated, and less prepared for vigorous IT training. IS programs encountered new challenges to retool to meet the demands for cross disciplinary IT training.

## IT AND KEY EDUCATIONAL OUTCOMES

The Association of American Colleges and Universities specifies five key educational outcomes (Ehrmann, 2004):

1. Strong analytical, communication, quantitative, and information skills
2. Deep understanding and hands-on experience
3. Intercultural knowledge and collaborative problem-solving skills
4. Sense of responsibility
5. Thinking mind and knowledge transfer skills

Information technology assumes a critical role providing tools to facilitate information gathering, analysis, aggregation and finally sharing information with others through various communication channels. It is no longer a specialized tool reserved for the IS professionals, but an essential component in supporting the primary educational outcomes.

IT enhanced problem visualization represents efforts to promoting deep learning in many disciplines. Simulation provides realistic environment for training, and for complex skills development. Digital e-learning tools increase opportunity for hands-on experience at affordable costs. IT tools allow students to be in charge of exploratory learning experience, rather than being constraint to pre-defined, instructor-led, exposure to a limited domain of knowledge.

Powerful networks and conversion tools bring the world to students through their communication devices. IT helps to overcome geographical barriers, national boundaries and cultural presuppositions, supporting free exchanges of ideas and knowledge across the world in matters of seconds. Knowledge and technology transfers enhance a growing trend towards multicultural collaboration.

IT promotes free speech and free communication. New forms of communication channel expose social challenges; increase awareness, thus enhancing informed choices. It is much easier to keep informed about world events, and participate in social activities. Electronic forums and messages are leveling the playing field to allow easy access to a global audience, bypassing intermediaries and filters, providing a far richer communicative environment.

IT ties groups and disciplines together through common tools and communicative habits. Knowledge sharing enhances multidisciplinary approaches to problem solving. The continuous growing deposits of knowledge bases enhance just in time learning, bridging knowledge gaps resulting from specialization and fragmentation of organizations and societies. At the same time, it is challenging for the IS professionals to morph from being IS service providers to become members of learning communities.

## IT EDUCATIONAL CHALLENGES

There is a need for IT educators to reexamine the current environment, and refresh IT educational goals. The emerging roles of IT educators can be roughly divided into three areas.

1. Preparing future IS professionals as effective IT providers
2. Nurturing the next generation of IT innovators
3. Training technically savvy IT end-users

Different programs, depending on their available faculty resources, institutional resources, industrial relationships, and ability to attract student talents, may have to make hard choices and begin retooling the IS programs for the Net Generation and future generations of students. For many institutions, the emerging demands for IT training may gradually shift to the last category of training IT end-users.

### Preparing the Net Generation for IS Professions

Many IS curricula have been designed to train IS students to develop and construct information systems. The Net Generation will face a world with an over abundant of information systems. There is a great need for skillful workers to adapt existing information systems to support the integration of functional applications. It will be challenging to support training for the large variety of programming languages, especially those for maintaining open source systems. In the future, IS professionals will need to be resourceful besides mastering basic computer skills. On the other hand, the Net Generation, while resourceful, is more inclined to use 4GLs, ignoring the role of basic programming skills and efficient coding. The new generation will be impatient with research methods, and problem solving methodology, quickly turning to powerful information searching tools, and experiential problem solving – trail and error approach.

Many IS programs have invested substantial resources in constructing computer labs and training facility. However the Net Generation is a highly mobile group. The plummeting of computer prices allows many of the new generation to haul around their laptop computer and mobile devices. They have a strong preference for using their own personal computing device for learning and rebel against the restrictive time and location of centralized computing facilities.

The Net Generation arrives college with substantial computing experience, thus shows little interest in the basic computing concepts. They are motivated by the sophisticated applications such as simulations and multimedia tools, which are seldom included in college level curricula. Their prior computing experience could create motivation problems and distort the assessment of learning outcomes.

The lack of knowledge and lack of interest about computing technology outside of the microcomputer based technology present a major challenge to prepare students for workplace where they have to work with those technology. There are limited opportunities for students to gain hands on experience with high-end systems such as ERP, SCM and CRM. The Net Generation could totally ignore the relevancy of these integrative information systems because of the vagueness of these concepts in comparison to attractive simulation and virtual reality gaming software. The knowledge gap limits the career options for the future generation of IS students, who at the same time are expected to spend an increasing portion of their college experience in non-technical studies.

Increasingly, an effective IS professional must be competent in interpersonal communication, organizational management, and the business processes. Numerous IS projects must support initiatives such as those in human resource development, organizational reengineering, and business process improvement. With the increasing integration of IT into the business process, there are increasing needs to address IT strategy and the design of IT architecture. Case studies, project management, system integration, collaboration, multi-cultural team, security and social issues, are examples of the numerous challenges for IS programs to recruit motivated students and produce IS graduates that can quickly fit into the work environment.

### Preparing the Net Generation to be IT Innovators

Historically, businesses are the leaders in IT adoption, and thus the driving forces behind IT innovation. IS curricula train students to support the numerous IT projects of business corporations, and maintain their IT assets. IS graduates contribute to centralized IS supporting services. The widespread available of web technologies and inexpensive, yet powerful computers decentralized IS services. Increasingly, businesses realize that it is insufficient to draw customers through powerful technology; they must also learn to accommodate customers who own sophisticated technology and expect businesses to support their IT applications. Many successful business ventures prove that non-technical innovations are just as important as basic IT innovation.

The Net Generation is well tuned in with the recent technology innovation. Early habits of self-reliance make them good candidates for problem-based learning, where they learn by exploration. The potentially richer learning environment can better prepare the Net Generation to be life-long learner, rather than swallowing down blocks of textbook based knowledge. There is the need to equip students with problem solving skills, beyond concepts of system designs.

It will be difficult for the typical IS program to find sufficient funding to provide the IT architecture and technical supports to nurture students to be IT innovators. Many IS programs will have to turn to alliances with businesses to gain access to the expensive IT infrastructure to properly train the next generation of IT innovators. Increasingly, instructors will become coaches or mentors, guiding the learning paths of students, instead of the actual dispensing of IS trainings to students. A new challenge will be for higher educational institution to recognize the new roles of faculty as facilitators. Even more challenging will be to find ways to document student accomplishments, much of which will be proprietary information due to corporate sponsorship.

The traditional assessment methods of testing and quizzing will lose effectiveness, since it will be difficult to find effective measurement for innovative ideas, which take long period of time to prove their value, or the lack of it. The sole assessment by course instructor will also be an incomplete measurement of student growth, especially when students start to work on projects outside of the campus environment. However, these challenges should not prevent the development of new curricula to better align academic and industrial resources to prepare the next generation of IT innovators.

### Preparing the Net Generation to be Savvy IT End Users

The widespread adoption of IT creates a new wave of demand for IT education. These are the end-users who do not plan to become providers of IS services, but

have strong interests in IT skills to open up career opportunities, or to prepare themselves for their career of choice. The traditional IS program must compete with other programs sharing the interests in providing IT education. However, IS program could benefit from its current availability of IT resources and IT staffs, supporting easy transition to meet the emerging IT educational needs.

It is challenging to design curricula for end-users. The end-users tend to be practically oriented, and demonstrated little interest in computational theory. A lot of end-users could have prior exposure to application software, and developed bad habits that must be undone through the training process. The end-users come from all backgrounds, and show limited interest in training materials that are designed for business applications. The end-users tend to learn at a slower pace, testing the patient of IS instructors. Lastly, the end-users arrive with different level of computing experience, and expectation, thus requiring flexibility in the curriculum design to accommodate the broader range of prior experience and capabilities. A lot of end-users have work experience, or currently working in an official environment with exposure to IT. The end-user experience challenges the adequacy and currency of IT contents in courses, and requires careful selection of IT architecture and technical supports. The Net Generation exhibits characteristics of end-users.

The Net Generation is intolerant of inferior technology, and antiquated software, which unfortunately remain as the core IT technology for many IS programs due to budgetary constraints. The Net Generation wants mobility, and prefers to center their learning and works around their personal computing devices. A new challenge involves placing software in the computers of the Net Generation at affordable costs. The rapid changing technology also prompts many institutions to take a serious look at refreshing the campus IT technology in short cycles, demanding close coordination between campus technology and academic programs.

The profuse availability of online resources and training opportunities poses another challenge for preparing IT education for the Net Generation. The Net Generation is resourceful enough to find resources superior to contents of most basic textbooks. The IT education of the Net Generation must incorporate Internet resources, and adopt pedagogical approach that takes advantage of the Internet skills of the Net Generation. At the same time, the challenge remains to prove to the Net Generation that core IS theories are necessary components in preparing them to become effective, and technically savvy end-users.

Perhaps one of the greatest challenge yet is to demonstrate to the end-users that college level IS training is delivering additional value beyond the proliferation of IT training opportunities from self-learning tools, online programs, workshops, short courses, and on the job training. This is especially true when students enrolling in IS courses may arrive with expectation inconsistent with the learning objectives of the courses, thus evaluating their learning experience based on the perceived benefits of the course, rather than the achievement of course goals that they are least concern about. As a result, the learning assessment should measure value delivery as well as the relevancy of goals set by the faculty curriculum committee.

Although IS programs can choose not to service the end-user IT educational market, they risk the alienation of end-users who eventually will become the decision makers on IT adoption, and setting paths for the future development of IT. There is a need to bridge the knowledge gap between IT end-users and the IS professionals, so that a healthy collaborative relationship will be maintained, and the IS program can remain its influence on the proper approach to IT education for the future generations.

New challenges arise to position IS programs not merely to prepare providers of IS services, but also as agents to ensure the proper implementation of IT to support educational outcomes, to promote deeper understanding of natural and social phenomenon, to bridge cultural gaps, to expand the scope of learning experience, to enrich insight on relationships and social concerns through IT, and to stimulate thinking and expand knowledge through IT applications

## MEETING THE IT EDUCATIONAL CHALLENGES

After the selection of program goals and target student markets, each IT program must also tackle important challenges in five major areas:

- a. Curriculum design
- b. IT architecture for technical support
- c. Pedagogical approach
- d. Assessment method
- e. Bridging to Workplace competency expectation

A brief discussion of these challenges will follow, and the interested reader is referred to the abundance of literatures in these areas. IS programs is facing the challenge of embracing cross disciplinary IS curriculum design, recognizing that IS innovations could emerge from multiple disciplines. The core IT architecture needs to emphasize connectivity standards rather than maintenance of physical facilities. Learner-based pedagogical approaches will be desirable, and learning outcome assessment will be expected. Students and recruiters will demand relevancy of IT education, and the tight integration of theory with practical applications.

## CHALLENGES TO IS PROGRAM TRANSFORMATIONS

Embracing change is a difficult experience, but change is inevitable. There are numerous responses of IS programs to the IT educational challenges. Proposals on IT educational challenges are often reactive to emerging problems. The following discussion will address some of these efforts, and emerging new challenges.

### Expansion of Program Offerings

Some IS programs enrich their curricula with new courses, providing more tracks of specialized training for student pursuing different IS careers. However, waning student interests in the IS fields strain the resources of the programs with small enrollments. The increase in the assortment of courses may be insufficient to address a fundamental educational issue – The Net Generation is expecting learning to be fun, meaningful and with immediate success. Some programs turn to Distance Education to attract a broader student base, only to find out that they are attractive students with “Net expectations” – highly competitive costs, customized services, fast response, continuous interaction and sophisticated information supports. Many IS programs and their faculty members underestimate the “Net Challenges”.

### Merging of Academic Programs

Some institution merged IT related academic programs, consolidating the student pools. The merging of technical programs under one roof could reduce administrative overhead, and eliminate duplication. However, the reorganization may have little impact on promoting cross-disciplinary IT training. Students are merely allowed to select from a consolidated menu, but the Net Generation expects flexible and ubiquitous computing, prompting the reengineering of the educational process. In some cases, merging IS programs into other programs could limit innovation and growth of the IT educational curricula, further widening the gap of technology relevancy of these programs.

### Corporate Alliance

A newly rekindled interest in collaboration between academic institutions and business corporations could revive the support for IT education. However, the challenge remains on the acceptance of business sponsored training and research as legitimate academic exercises. Corporate alliance requires the diversion of valuable faculty resource to nurture the relationship, which may interfere with other academic missions, and requires a strong organizational infrastructure to support and sustain. On the other hand, corporate alliance could serve to draw student talents to the IS programs, but at the same time, requiring a shift in the role-play of the IS programs. A key issue is to find a delicate balance in the mix of knowledge versus relevant skills in an academic program.

## CONCLUSION

IT education is no longer merely for a small group of individuals seeking careers in IS professions. The omnipresence of IT creates great demand for IT education for people from all walks of life. The Net Generation represents the first wave of students who expects a richer and interesting learning experience. Thus the challenges in IT education are no longer about incremental adjustments of the IT curricula. A fundamental rethinking of IT educational goals, and bold reengineering of the educational process will prepare IS programs for emerging opportunities and new missions for IT education. The globalization process will hasten changes and create multiple missions for IT education for different regions of the world. The Net Generation will not hesitate to seek alternative channels to fulfill educational needs, including crossing the geographic boundaries of IT educational services.

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