_____

Facing the Challenges of IS Education
for the Net Generation

Wai K. Law, Ph.D
wlaw@uguam.uog.edu
School of Business and Public Administration
University of Guam

Abstract

Problem-based Learning (PBL) and Learner-Centered education (LCE) approaches were deployed to address the challenges of delivering IS education to the Net Generation, especially for non-IS majors. The main benefits has been making the educational experience more relevant to the students, with students positively responded to the class interaction, active learning experience. The paper also reported a solution to scale PBL and LCE with wiki for large enrollment.

Keywords: Net Generation, PBL, LCE, relevancy, wiki, IS education

1. The Net Generation

The Net (Internet) generation generally refers to children born beyond 1986, and these youngsters are already on university campuses (Internet Generation, 2006), triggering major challenges in the educational process, especially in IS education. 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 formal computer training. They probably have experienced and even mastered technology that baffles the current generation of instructors. They are accustomed to search for information on their own and expect instant feedback. They are crafty at the assembly of information reports from web excerpts (Smith, 1999). 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. They are keen at locating and learning software and hardware for task completion, with preference for web-based tools and services. The Net generation will be less inclined to follow a curriculum, simply digest bundled knowledge; neither will they equate hard work with learning (Hay, L.E. 2000).

The Net Generation is also characterized by traits such as curious, independent, contrarian, intelligent, adaptable, confident, focused and globally conscious (Net Generation, 2000). Some effective pedagogical tools for the Net Generation include interaction, exploration, relevancy, multimedia, instruction (Windham, 2005). Peer interaction is highly valued by the Net Generation, and they love learning by exploration, and expect relevancy in their learning experience. Net Generation students love expressing their ideas through multimedia, and they need explicit guidance facing the overwhelming wealth of information.

2. New Educational Challenges

There were at least three challenges in the delivery of IS education to the Net Generation. It has been challenging to allocate limited instructional time and resources to cover a rapidly expanding list of IS topics, IT tools and web services that were of interest to the Net Generation. Motivating students to invest time to learn the selected materials, tools and IS practices proved to be equally challenging. Lastly, there has been an widening gap between the popular IT that were of interest to the Net Generation, and the increasingly complex, specialized and

_____

_____

diversified organizational IT, that organizations rely on for IS supports.

The dilemma was, for every IT tool and IS topic selected for IS instruction, the students could identify several competing and even better tools, web services and topics of interest. Valuable class time consumed in the instruction of limited tools and IS topics failed to generate meaning for the majority of the students that held different mindsets on the value of IS study. Students also began to challenge the relevancy and value of textbook materials and contents of IS courses, when they failed to connect their learning experience to IT application in their personal life. Frequently, groups of students would have access to advance IT not available to IS instructors!

The rapidly changing technology platforms washed away efforts to upgrade educational IT infrastructure. The diversification of student interests spreading IS educational resources to the point of breaking, and still falling short of stakeholder expectations. A highly mobile generation of students demanded the availability of technology at their choice of time, location and communication channel, erasing the value of centralized training supports.

The Net Generation was accustomed to learning by exploration, especially with the help of powerful Internet Search Engines. They were accustomed to an ever-changing bag of software tools and web services, and became bored with lengthy academic treatment of IS topics. Their strong desire for relevancy and immediacy blinded them from IS design and organizational issues, as they impatiently search for something that they could experiment with their bags of tools.

Motivating Net Generation students to read has been particularly challenging. This created severe problem with the traditional approach of designing a course around a textbook. It has been reported that the Net Generation would devote 1/10 of their time to reading comparing to time spent on other media (Bonamici, et.al. 2005). For the same reason, mandating students to work on assignments and projects would result in students spending minimal efforts to fulfill the expectation of the instructor. In another word, students were performing the learning activities for the instructor, with very little interest in real learning!

A leading challenge in IS education has been in the selection of the correct mix of learning experience for students. The rapidly changing technological platform, and the readiness for IT outsourcing made it surmounting difficult to anticipate the market demand for IT skills, two to three years down the road. Additional obstacles included the institutional imposed inflexibility in program and course changes, and extremely limited resources for IT retooling and faculty development.

3. Facing the IS Educational Challenges

For several years, a problem-based learning (PBL) approach was experimented for IS instruction for a core MIS course. The need to modify pedagogical approach was prompted by the increasing diversified IT backgrounds and interests of students, their access to IT not provided by the educational institution, and the new mentality of the Net Generation. The instructional focus was shifted from a short list of software and computer system to learning methods and problem solving, and student were allowed to use any accessible software, computer and facility for learning. Many students elected to complete their assignment outside of the university computer lab facility, and used class time to extend their learning experience. At the same time, a slow transition was made to use Learner-Centered Education (LCE) approach to allow students to select their own educational experience, and learning pace.

Problem-based Education (PBL) for IS education

The traditional IS educational approach frequently utilized project-based instruction. Students were expected to follow elaborate procedures in the reconstruction of tasks with predefined features and outcomes. Students were evaluated on their ability to complete the projects with the correct solution in a give time frame. Instructors may found themselves competing with the students through the creation of increasingly difficult tasks that only a few students could completely resolve. However, students could be frustrated by the learning experience.

PBL emphasized student learning experience and learning outcomes. While still utilizing project-based instruction, PBL permitted deviations from a predefined list of task outcomes. PBL involved using a realistic problem-solving challenge to be

_____

_____

handled by either an individual student, or a team. Students were charged to determine and locate problem-solving resources, which were provided on-demand. Student teams could follow different paths of problem solving, and ending in a variety of solutions. Students learned through the solution process, and through comparing their solution methods with their peers, as well as through feedbacks from the instructor. As a result, students learned both feasible solution methods, as well as the relative effectiveness of different solution methods. The creative students were also able to invent solution methods to solve the problem.

The rich learning context of PBL supported a broad variety of individual learning goals. While the average students learned the core skills, the better-prepared students could fast forward to advance technical skills. Peers' learning was a significant factor in PBL, and allowed the instructor to focus on motivating and teaching the few highly motivated students, who in turn set the standards for other students to achieve. Peer competitions promoted the pace of learning, and many students took pride in tutoring their peers while reaffirming their newly acquired skills.

In a traditional instruction-by-subject approach, students would spend enormous amount of time learning a large array of concepts, replicating step-by-step practices. However, these students ending up forgetting a substantial portion of the knowledge, and ill-prepared to solve problems. PBL intended for students to learn on demand, taking the time to thoroughly examine alternative tools and solution methods. As a result, students often retained for personal usage, the tools and methods deemed useful and meaningful to each of them. The repeated application of the selected tools and methods reinforced learning. A precious "teachable moment" appeared when a student who exhausted solution methods for a problem requested assistance. At that moment, the student would be eager to acquire additional tools and knowledge to continue solving the problem. The recognition of achievable targets motivated students to complete problem solving on their own, refusing the intervention of the instructor. This was a favorable factor since IS students would be expected to independently solve a large variety of problems at work.

PBL approach to Website creation assignment

Learning web authoring has been a popular request from students. However, students immediately ruled out HTML editors as learning tools, including students who had prior training in HTML coding. The instruction of basic web authoring tool such as Expression Web was met with resistance. Students were reluctant to invest time to learn the rich features of one particular web authoring tool. For those willing to learn the software, substantial instructor attention was required to address technical issues, and most students were learning the bare minimum technical skills merely to satisfy the instructor!

The introduction of PBL approach modified the nature of the student assignments. Students were shown websites created by previous students. The demonstration websites included single page website with hyperlinks, to sophisticated website with animation effects and embedded video. A few of the websites were posted online for students to study in detail. The instructor prepared the students by introducing several commonly available software tools for website creation, including the use of Microsoft Word for creating simple linked web pages. The students were then instructed to use any available tools or web services to design and create their websites. The submitted works must be submitted in an optical disc, viewable use a web browser, included hyperlinks that work without Internet access (except for references). The total technical instructional time was less than 80 minutes.

Driven by the desire to match the accomplishment of the peers, the outcomes were impressive with students submitting web pages utilizing frames, animated graphics and embedded video. The tools students utilized included Word, Microsoft Publisher, iWeb, Dreamweaver, Flash, and other freely available shareware and freeware. Other students used online web templates, and some created websites online and downloaded the website. Many of the websites were highly creative with professional quality. Some students started the assignment with one tool, and switched to a different tool that their peers successfully deployed. Students responded positively to the learning experience; many admitted being challenged and reported investing enormous amount of time toward the completion of the assignments. Evidence of learning was further supported by requests from students for special tutorials on specific web-authoring tools.

_____

_____

The PBL approach addressed several challenges associated with educating the Net Generation. PBL promoted peer interaction, and students were encouraged to excel beyond a set goal. Relaxed requirements on solution methods provided freedom for students to learn by exploration, to learn from failure, and to select their own resources and to experiment with alternative solution approaches.

Key Success Factors for PBL deployment

PBL represents an entirely different approach to IS Education, and requires a change in educational philosophy. Table 1 illustrated some differences between PBL and the traditional instructional approach. Notice that PBL emphasizes the total learning experience, rather than the learning of specific procedure, method or definition.

Table 1. Comparison of Traditional and PBL Instructional Approaches

	Traditional	PBL
Task Completion	Replicate Outcome	Demonstrate key features
Problem soving approach	Predefined procedure	Learner selected approach
Peer Learning	Not encouraged	Encouraged
Primary Instructor role	Mentor	Coach
Expected student role	Master selected knowledge domain	Active learner
Learning Outcome	Predefined	Often exceeding predefined goal
Learning style	Sequential, unitized, single dimension	Spontaneous, muti-dimensional

First of all, PBL requires the relaxation of learning boundary, to recognize the individual differences in motivation, ability, preference, and achievement goal. A new set of assessment method must be developed to translate various learning outcomes into course grade. For example, students can be evaluated by accumulation of credit points, instead of percentage correct. The instructor should be willing to change from a mentor role to a coaching role. Instead of preparing learning resources, the instructor will be spending increasing effort identifying learning resources. To a certain degree, the instructor may be learning with students, and even learning from students. Instead of certifying student task completion against standard solutions, the instructor will be evaluating student learning outcomes and potential learning gap. PBL requires the shifting of instructional effort from explicit instruction to the maintenance of a continuous learning environment.

Learner-Centered Education (LCE) for IS Education

Although PBL has been useful in promoting learning, it was still challenging to motivate non-IS major students to study IS. In our experience, almost 99% of our expanding enrollment in our IS courses were not seeking a major in an IS or computer-related field. We confronted the pressure to make the IS educational experience relevant to students coming through with a broad array of career choices, other than IS.

This issue has been especially important to address now that it has been recognized that IS training is no longer limited to the Business discipline. The Learner-Centered Educational approach has been particularly useful in rethinking the delivery of IS education. In essence, the LCE approach emphasized the design and creation of a learning environment to allow individual learners to define their own learning experience. One of the greatest challenges of LCE is the development of appropriate measurement of learning experience.

LCE approach to IS research assignment

In depth study of IS practices has been a valuable tool to lead students beyond basic terminologies and core concepts. Case studies, term projects and research assignments represented some of the popular tools. However, repetitions and potential problems of plagiarism severely hampered the effectiveness of these tools.

The LCE approached suggested building learning experience on top of individual motivation and prior experience. This approach became especially useful for Net Generation non-IS major students.

A list of research topics was developed based on prior information on potential student career backgrounds, and IS practices in various disciplines and fields. Students were instructed to bid for research topics through a blog. The instructor was careful to prepare surplus topics. Students were also allowed to propose their special choice of topic for approval.

Each student was responsible to secure a minimum number of references. The Net Generation students would tend to quote mostly online references, even with the availability of electronic journals. Each student was then responsible to prepare a critical position report based on the references they quoted. A grading rubric was developed to evaluate student's learning outcome based on their research efforts, under-

_____

_____

standing of the IS practices, social, legal, economic, organizational, technical, and global concerns related to the IS practices.

The LCE approach addressed some of the traits of the Net Generation. It provide an opportunity for each student to satisfy their curiosity on developing IT trends, allowing them to work independently on an unique assignment, permitting them to express their personal perspectives as contrarian, and encouraging them to demonstrate their individual intelligence, adaptability, and confidence based on a collection of evidence. Lastly, it challenged their global consciousness to recognize unbalanced IT development in different global regions. Success, has been defined as the ability of a student to critically argue for the position expressed in the report, basing on the collected information and IS concept learned in class. The LCE approach has been successfully deployed to manage up to 45 unique research topics each semester.

Key Success Factors for LCE deployment

The philosophy behind LCE is to tailor learning experience to the individual learner. The choice of approved learning experience is an important starting point. It is critical to select research topics that can be connected to the prior experience of the students. The objective of the research effort should be controlled exploration, rather than new discovery. The expected learning outcome should be on the appropriate interpretation of collected information, rather than the ability to extend current knowledge domain. Explicit guidelines should be developed to assist the student to make meaningful interpretation of the collected information. Rewards should be planned for outstanding achievements.

Developing a LCE learning environment can be time consuming, and some research topics are more suitable for the short time frame student activities, and captivate the interests of students. The instructor must develop basic knowledge on a broad list of IS practices. The process becomes self-managing once the topic lists and guidelines have been fully developed for the targeted students.

4. Scaling PBL and LCE

While PBL and LCE provided a favorable learning environment for the Net Generation, the individual attention could be a serious drain on instructor time. It may be necessary to modify the approach to handle large enrollment. One solution has been the use of wiki.

A class research project was assigned with the use of wiki. The wiki project was designed to handle up to 21 students in the project. Students were instructed to self-organize into 7 teams, each compose of 2 to 3 students. One team serves as the administration team, assuming the role of an editorial board for the entire project. The other teams were the research team. All the students together voted for a research topic, and each research team accepted a research role.

The research project was evaluated both on the scope of the research, research activities recorded in the wiki, and the final outcome presented in the wiki. Students were instructed to self-evaluate each other, dividing 100% among themselves. A lump sum of points was then awarded to the class by the instructor. In addition, the instructor would award bonus points according to wiki activities and research outcomes of individual and team. This provided a remedy to address the problem of slackers, who did little work but pressured other team members to share credits.

The wiki provided clear documentation of student activities and provided students an opportunity to manage project. As owner of the wiki, the instructor retained the option to interact with student through the wiki. The wiki turned out to be a very effective tool for the Net Generation, supporting interaction, exploration, relevancy, and multimedia. The easy to learn operating instruction of wiki eliminated most of the concern on detailed instruction for the online tool.

5. CONCLUSIONS

One of the greatest challenges of providing IS education to the Net Generation has been in providing a relevant learning experience. The challenge is even more intense in delivering IS education to non-IS majors. This paper reports a solution to face the challenge with the deployment of PBL and LCE instructional approaches. Students appreciate active learning experience, class interaction, and some consider the course fun and exciting. Further research will attempt to compare learning effectiveness with and without the application of PBL and LCE.

_____

_____

6. REFERENCES

Barker, S. K. (2002). Training Business Students to be End-User Developers: Are Case Studies the Best Option?, In Khosrow-Pour, M. ed. Issues & Trend of Information Technology Management in Contemporary Organizations, Hershey: Idea Group Publishing, 2002, pp. 62-65.

Barton, H. (n.d.) Information Literacy: Learning How to Learn. Retrieved September 25, 2004, from http://www.ri.net/RITTI_Fellows/Barton/infolit.html

Bonamici, A., Hutto, D., Smith D. , & Ward J. (2005). The "Net Generation": Implications for libraries and higher education. Retrieved June 12, 2011 from http://www.orbiscascade.org/council/c0510/Frye.ppt.

Bransford, J.D., Brown, A. L. & Cocking, R. R. (eds.) (1999) How People Learn: Brain, Mind, Experience, and School. The National Academy of Sciences. Retrieved September 25, 2004, from http://books.nap.edu/html/howpeoplel/

Denning, P. J. (ed.) (2002). "The Invisible Future: the seamless integration of technology into everyday life", New York: McGraw Hill. pp. 295-339

Ehrmann, S. C. (2004). Beyond Computer Literacy: Implications of Technology for the Content of a College Education, AAC&U. Retrieved September 18, 2006, from http://findarticles.com/p/articles/mi_m0NKR/is_4_90/ai_n1380100

Hay, L.E. (2000). Educating the Net Generation – educational planning for technology-knowledgeable students, American Association of School Administrators. Retrieved September 18, 2006, from http://findarticles.com/p/articles/mi_m0JSD/is_4_57/ai_77204709

Internet Generation. (2006). Retrieved September 18, 2006, from http://en.wikipedia.org/wiki/Internet_generation.

Karagiozov, V. (2003) Using Innovative Teaching Techniques in Transition from Teacher-Centered to Learner-Centered Education. In Khosrow-Pour, M. (ed.) Information Technology and Organizations: Trends, Issues, Challenges and Solutions (836-837). Hershey, PA: Idea Group Publishing.

Learner-Centered Classrooms, Problem-Based Learning, and the Construction of Understanding and Meaning by Students. (n.d.) Retrieved September 25, 2004, from http://www.ncrel.org/sdrs/areas/issues/content/cntareas/science/sc3learn.htm/.

Smith, C. & Phillips, C. (1999). Are Our Academic Libraries Ready for the Internet Generations?, CAUSE/EFFECT journal, 22(1), 1999.

The Net Generation. (2000) Retrieved June 13, 2011 from http://www.riverdeep.net/current/2000/10 /100400_netgen.jhtml.

Windham, C. (2005) The Student's Perspective, In Oblinger, D.G. & Oblinger J.L. (eds.), Educating the Net Generation, pp. 5.1-5.16, EDUCAUSE.

_____