# Internet Teaching Methods Across The Disciplines

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**Abstract**

*Issues in teaching various types of information through web-based instruction are explored. The questions of distinctions between content and process courses are evaluated. Some ways in which the resistance to web based learning as a medium of communication can be broken down are covered. Interdisciplinary thinking offers new solutions and hybrid approaches to emerging challenges of educating over the net. Pulling from the seemingly disparate fields of Accounting & Finance, Chemistry, and Rhetoric & Composition new vectors of thinking can be forged. The authors teach online courses in their disciplines. They have drawn on their experiences and the experiences of others to find solutions to problems encountered with distance education. The medium of education over the Internet blurs traditional distinctions of forms and methods of learning.*[1]

## Introduction

"Our current classroom paradigm for teaching and learning has many constraints. ...[The] principles of effective learning suggest that new environments are needed" (Boettcher and Conrad, 1999, pp. 15-16). The Internet "... provides an entirely new context for teaching and learning. It removes the physical and time constraints for *instructors* as well as learners" (Ibid. p.16). "Learning to think creatively in one discipline therefore opens the door to understanding creative thinking in all disciplines" (Root-Bernstein and Root-Bernstein, 1999, p. vii). Root-Bernstein and Root-Bernstein (1999) acknowledged that the "... curriculum, at every educational level from kindergarten to graduate school, is divided into disciplines defined by products rather than processes" (p. 12). They advocate "integrating the curriculum ... [because] the way we learned one subject or came to one insight might be the key to learning how to have insights in other fields" (Ibid. p.12). This paper supports this idea as it relates to Internet teaching across the disciplines. This paper begins with the character of content versus process-based courses considered from several perspectives beginning with numbers versus facts versus ideas as related to technique versus theory-based courses. It is followed by a comparison of the practices of memorization versus analysis. This leads to a conclusion that all Higher Education courses are process driven as related to Internet education. The need to assess information quality is addressed followed by a discussion of resistance to Web-based learning. Next is a discussion of resistance and methods of coping with resistance to the development of Internet modes of Higher Education. By understanding the commonalties across disciplines with regard to learning expectations and processes, one finds new solutions to overcoming

*Readers with comments or questions are encouraged to contact the authors via email.*

barriers in developing Internet educational environments. An actual example of a successfully designed and implemented online course concludes the paper as it illustrates the concepts and processes discussed throughout the paper. This leads to the conclusion that answers to the questions facing Internet education are emerging as cross-discipline perspectives merge to form new vectors of thinking and learning.

**Content versus Process Courses**

In discussions of content versus process courses, most discussants seem to claim to have process-based courses and seem to view content-based courses in a negative light. Content-based courses are viewed as existing in disciplines outside of the discussants' discipline. In listening and learning, it appears that college courses are process-based learning. The basic characteristics of process-based courses are discussed next.

No matter what the discipline, the process follows a familiar pattern. First, the student is expected to learn how to identify problems. Clearly distinguishing symptoms versus problems challenges even the most adept. With that limitation in mind, an isolated problem must be analyzed. The approach to analysis varies with the problem and the discipline. The goal is the same. At least one solution (and there may be many possible solutions) is developed and defended. The package is then articulated via written (or visual in the case of art and other disciplines) and/or oral (or auditory in the case of music and other disciplines) communication mediums.

The following table lists some variables that might be used to clarify the difference between so-called content versus process courses.

| | |
|---|---|
| *Analyze* | *Process* |
| *Theories* | *Process Primarily* |
| *Ideas* | *Content and Process* |
| *Facts* | *Content and Process* |
| *Numbers* | *Content and Process* |
| *Techniques* | *Content Primarily* |
| *Memorize* | *Content* |

**Numbers versus Facts versus Ideas:** Non-mathematicians might feel that numbers-based courses are merely content courses. Mathematicians see numbers as a higher form of language. Language of numbers is thought to more purely represent true relationships. Relationships between and among aspects of existence are the focus of educational efforts. Even fundamental numeric study relies on analyzing relationships and thereby is a process.

Memorizing facts appears to be content rather than process driven. History studies often require memorizing facts (e.g., who did what to whom and when and how and where and why). The why requires analysis of relationships and results in process rather than merely content. Memorizing what to debit and what to credit in accounting seems like a content approach. Placement of amounts in debit or credit locations is essential to effective communication of the underlying economic events so that the reader of the reports can analyze the data to assure successful decision-making.

**Techniques versus Theories:** In finance, mathematical ratios and calculations are used extensively. They are techniques applied to accounting data. In English, various critical methodologies have been developed and expounded which provide frameworks for critical approaches to texts. In Composition, students are often taught rhetorical modes of writing such as comparison-contrast or definition in order to more easily categorize the information they wish to write about. "Bonk and his colleagues developed a taxonomy of conferencing and collaborative writing tools.... It is important to extend this investigation into how new instructional technologies such as the Web may impact student writing and thinking" (Bonk and Dennen, 1999, p. 4).

**Memorize versus Analyze:** Memorization appears to be a precursor to analysis. It assists in effective communication of analytical results. People using the same words within different

disciplines draw different conclusions. A recurring example exists between economics and managerial accounting. Concepts of capital have different meanings. People adapt to different environments (e.g., economics versus managerial accounting) to successfully communicate with one another.

Strict memorization without analysis seems appropriate at the most basic level and not appropriate at the college/university level.

**Process with Diverse Content:** The conclusion is that all university courses are process driven. The content is diverse, but the goals are the same. Students are to learn to isolate and identify the problem from the symptoms. With the problem highlighted, then variables with which it relates are designated for possible future study relative to the problem. Before trying to solve the problem, the student needs to learn how to effectively communicate the characteristics of the problem to other interested people. The dynamics and significance of the problem must be marketed. If no one agrees that the problem is significant and worthy of analysis, then the student has failed. It does not mean that the problem is not significant. It just means that the student needs to further develop the ability to "sell" ideas. Both oral and written communication effectiveness must be developed.

Teachers/guides/mentors assume the responsibility of developing the communication effectiveness of their students. To document the ability to teach communication and analytical skills, the teachers/mentors/guides are encouraged to acquired anonymous third-party documentation that they can themselves identify problems, analyze problems, provide creative solutions to problems and then communicate the process and results effectively. Whatever the medium or discipline of study, the process is the same.

**Internet Education and Process Learning:** In distance learning environments, the process approach to learning can be conveyed by several means. The challenge of the Internet as a learning environment is that it is so adept at finding and delivering information to the end user that that strength colors all interactions with the Internet. The physical environment of computer use lends to this atmosphere tremendously. The user is at a screen where search engines obediently bring the world's information to him or her. The user is able to manipulate and organize this information through the activities of a few keystrokes or mouseclicks. The physical enervation leads to an emphasis on the purely mental processes of learning. The mental skills that this process emphasizes are speedy ascertainment of relevance of the material and the further classification of information beyond the blunt efforts of search engines. Without proper guidance, however, Internet Learning may encourage through the proliferation of information a feeling of arbitrary abandon on the part of the user.

**Assessing Information Quality:** When an inquiry results in thousands of "hits," mental fatigue may encourage the user to simply choose the easiest information to access rather than taking the time to evaluate and choose the best. Internet-based learning, to be effective, must be an instructor-guided activity in which perimeters of information have initially been set up for students. Within Internet course environments, special care is given to direct students clearly from one stage of learning to another in order to combat the influence of Internet fatigue. The importance of process in learning must be maintained with Internet-based education in order to engage the whole person in the learning that is taking place. Interactive assignments, group work, research projects that include time away from the computer, and writing assignments with ample feedback help to create an interactive and multidimensional learning experience.

Whatever the learning environment, on-line courses provide opportunities for people. In learning the process with the associated content, the student follows a competency-based model of education. Part of distance education relies on a

"competency-based model of education that allows students to earn substantial amounts of credit by passing standardized tests or completing independent projects" (Carr, 2000, p. A49).

**Resistance to Web Based Learning**

"Change just keeps going on and on. And, like the apocryphal frog enjoying the growing warmth of the water on the stovetop, we don't notice that the marketplace is gradually getting hotter and hotter until, before we know it, we've been boiled in our own apathy. We find ourselves behind the curve—out of touch with the needs of our clients and students, and out of touch with the tools that competitors are using to outperform us. When the cumulative impact of our inattention comes home to roost, we express shock at what we say has suddenly become an intensely competitive marketplace" (Moore and Diamond, 1995, p. 5).

Identifying the source of resistance is the first step. It may be a process of elimination rather than identification. The resistance is not from the so-called "traditional" students who are 18 to 25 years old. They are arriving to the university with computer skills that are often far more developed than the majority of university professors' computer skills. Many of the students arriving to campus have taken distance-learning courses while in the pre-university learning environment. They certainly have learned via computer games and educational packages. They are not afraid or reluctant to learn with the untiring aid of the computer.

"Non-traditional" students, who are over the age of 25, are embracing change. They are optimistically returning to colleges and universities to change themselves and/or document changes they have made on their own. While they may not have the computer experience or skills of the traditional students, they have other motivations. They often have family and work commitments that make a classroom-based course very challenging to physically attend at specific times on specific days.

Traditional and non-traditional students show flexibility in learning the mechanics of Internet education. The care that is needed to construct a hypertext educational environment that is easy for the students to navigate is a more likely source of resistance to the development and implementation of Internet education. "Academic computing administrators say their biggest challenge still is getting faculty members to work with technology" (Olsen, 1999, p. A65). As Barnes (1996) has noted, "Producing marketable educational multimedia products is similar to both print publishing and video production. Both rely heavily on electronic tools: computers for word processing, graphics, page makeup and typesetting; paintboxes for video image manipulation and computers for generating, processing, and mixing sound" (p. 19). Generating and maintaining Internet education environments requires a production crew as well as the knowledge expert who is designing content for the given field of study. This type of commitment reaches across traditional disciplinary and administrative boundaries of the modern university.

A source of possible misunderstanding on the part of faculty in regard to Internet education is its role along side that of independent study. Independent study can meet the learners' need for flexibility in time and place of the educational process. However, most students need and want guidance. The written word, even when accompanied by audio and/or videotapes or CDs, can be difficult to interpret and/or put in perspective by the student.

The professor knows "the rest of the story" (or how the current concepts or techniques fit with what will be learned/taught in the rest of the current and subsequent courses. The professor knows how the current ideas and processes fit with what was learned/taught earlier in the course and courses prerequisite to the current course. The professor helps clarify and guide the student to more efficient and effective mastery.

Independent study [like some Continuing Professional Education (CPE), such as for Certified Public Accountants (CPA)] merely provides one point of feedback. That is a pass or fail report regarding a multiple-choice exam taken when the student feels it is time to come to closure on the learning process. With CPE offered by the American Institute of CPAs, if the candidate does not earn a passing grade on the first multiple-choice exam, then a second exam is sent for the candidate to try again. No feedback is given as to which questions were missed. Some independent study courses have more than one point of feedback. Maybe a midterm and some quizzes and a project and a final exam are offered. Still the interaction with a mentor/guide/professor is at best limited.

Once faculty misconceptions about Internet education (i.e., Internet education is the same as independent study) are overcome, the hard work of major curriculum revision must be undertaken. This shifting of traditional modes of learning to Internet modes is a labor-intensive process.

Diamond (1994) identified what he called four common syndromes that impede curriculum revision efforts (p. 6). They reflect feelings and are summarized as follows: (1) you can't do that because... (2) I never agreed to that; (3) Not to my course you don't; and (4) this isn't fun anymore (Ibid. p. 6).

These common reactions by faculty to changes in course structure and content reflect a strong sense of ownership for the design and process of courses. These fundamental facts, that faculty who develop curricula feel ownership over this material will evaporate as education shifts online. These typical responses to change must be allotted for at all levels of the academy, including the students.

Diamond (1994) identified four commonly asked questions by accounting students who face curriculum changes. The questions are as follows: (1) if the program is so good why are you changing? (2) Why are you making the change now or why are you doing this to me? (3) How will these changes affect my ability to pass the CPA examination? and (4) How will these changes affect my ability to find a job or get into a quality graduate program? (p. 5)

While these observations pertain to accounting students, similar responses across the disciplines may be noted. Internet education allows students to participate more directly in the learning process by allowing them a measure of autonomy in how they encounter course content. This new interface with curriculum delivery will reduce the tendency of students to feel acted upon by administrative changes in programs.

Diamond (1994) developed a list of critical factors for curriculum revision success and they are as follows: (1) Timing is everything; (2) Curriculum revision must fit into your academic mission; (3) Support of your constituents is essential; (4) some financial support is essential; (5) A systems planning approach should be adopted; and (6) luck (p. 2). He states that pressure from constituents (e.g., alumni, recruiters, students) can be used as pressure to get the support of faculty to launch the changes (Ibid. pp. 2-3). Clearly, with regard to Internet education the time has come for adoption. Many colleges and universities are implementing technology in the existing curriculum and building distance programs using Internet and digital media to reach the growing number of their constituents that demand this flexibility. Many programs are investing in this direction. Diamond pointed out that a systems planning approach is essential. It constitutes a weak link in many developing online programs. A systems approach would assess the vectors of interest in online course development and marshal the resources to promote such development by faculty and staff.

The chief virtue and drawback of Internet media is its rapid evolution from one stage to the next. As Barnes (1996) pointed out, "Computer

technology is constantly changing and faculty members have difficulty maintaining their computer literacy. The process of relearning computer skills and the time required to upgrade teaching materials can be overwhelming" (p. 21). Add to this the necessary tasks of project management needed to coordinate the required efforts of auxiliary personnel and one finds another major inhibitor to faculty pioneering in this area.

Another major resistance to Internet education rests with the issue of money/power/control. Who will govern the process? Who will get the recognition? Who will get the "profits"? The *Chronicle of Higher Education* has had one or more articles regarding this topic in nearly every issue for at least the last year. A few recent examples include Carnevale, and Young, December 17, 1999, A45, A46; Carr, December 10, 1999, A49; Chambers, November 19, 1999. B8, B9; McMurthrie, and Mangan. December 17, 1999. A36. One way to obviate these potential conflicts of interest is to privilege the following maxim: a "main goal for distance learning has always been to expand access to education, not to make money" (Young, 2000, p. A48).

**Methods of Breaking Down Resistance**

As noted earlier, the development of Internet educational tools in any discipline requires cross-disciplinary and trans-administrative thinking, which is counter to the ways in which educators are traditionally trained. As Moore and Diamond (1995) pointed out, " ... The largest constraint has to do with the lack of openness by many faculty to shift from their individual interests and priorities to priorities that reflect the shared purposes, shared values, and shared focus that must comprise the mission of the..." university (p. 7). At least at the beginning and intermediate stages of the enterprise of Internet education, there must be a concerted and organized effort on the part of the entire University to allow for the successful launching of such programs.

Moore and Diamond (1995) looked ahead to the changing dynamics of education, which are indeed upon us: "Among the biggest drivers of new entrants and substitutes are the fast-moving changes in computers, communications and other technologies. To be sure, these technologies are finding their way slowly into otherwise traditional classrooms, libraries, and labs on campuses. But the big news may be in the possibilities opening up beyond the ivy walls: Portable education resources: on the desktop or on the home TV, on-call, just-in-time, when the student/learner needs it; Dialogue among faculty and student/learners on 24-hour-a-day voice and data networks: same-time, different places; different times, different places; Access to credit courses and degree programs from distant (well established and high quality) business schools; A pattern of "star" faculty moving even farther along the independent contractor continuum, by selling their services to multiple institutions, which not committing as a full-time faculty member of any one institution—eroding still further the relevance of tenure" (p. 8). Flexibility is clearly the key to success in this brave new world of learning-on-demand that the current generation of students is coming to expect. These technologies of learning will disrupt the institutions in which traditional faculty power structures are based. The nature of hypertext itself, as Gibson (1996) pointed out, "is non-linear . . .[it is text] where the user has some amount of control over where she travels in the text, and most discussions of hypertext cite non-linearity and interactivity as two of its most significant characteristics" (p. 13). This disruption in the ways in which information is stored, accessed, and classified has implications for how we organize the institutions that deliver the information through this mode.

It is the authors' opinion that current paradigms powered by trends in the larger culture necessitate a reconsideration of academic institutional structures.

**Solutions**

A survey of the advertising, which has appeared in the *Chronicle of Higher Education* in the last year, would establish that we are deeply into the marketing phase on the part of those who market the tools for Internet education. Marketers of Internet Learning Environments have the highest profiles among those advertising. However, their involvement alone does not secure in itself Internet Education's place within the academy.

Clearly, one threatening development of the de-centering of learning through Internet technologies is the perception of loss of control on the part of faculty. Faculty must either give up the perception of power or concessions must be made to promote the protection of ownership of ideas. One route is to allow the senior faculty and administrators the dignity of demanding and getting the illusion of control. The control should be as extensive and as limited as it is in traditional classroom environments. Academic freedom should continue whether the learning environment is the traditional classroom or the electronic (e)-classroom. Compensation to the Internet professor should be objectively and dependably determined similarly to compensation to the classroom professor. Excess revenues go to the university and are shared however the administrators decide. It is of no concern to the professor. Professors can concentrate on guiding students.

Developing online courses presents unprecedented situations with regard to intellectual property and the potential for independently marketing courseware materials developed within the normal routine of teaching. Previously, those academics that wished to publish their work did so through independent effort and developed publishable materials outside the routine duties of teaching courses. With the advent of Internet education, many course instructors will simultaneously be course authors who are recording their insights and techniques in an ambiguously controlled space. The discomfort of some faculty members to place their intellectual capital within a fixed framework would be reduced significantly by clear and equitable intellectual property guidelines.

*Learning to Share*

Most academic administrators were excellent students who earned the bachelors then masters and doctoral degree. They are comfortable working alone. The challenge persists on how to promote power, control, money associated with the development of Internet education media. They are comfortable with the traditional classroom environment where they experienced "higher" education. They are adept at doing what they are told according to established guidelines and then relying on an outside entity (e.g., accrediting agency) to determine acceptability or success of accomplishments. Given this personality profile, one might look to the accrediting agencies as a medium of facilitating change. Look to the pioneers in Internet education and their success at attaining and maintaining accreditation. Accrediting agencies could fuel both curricular and administrative reform from their position of authority.

*Strategy*

How to open the gate to the on-coming floodwaters of students demanding Internet education? Wait until the students vote with their feet and leave the university for flexible options offered elsewhere? Is fear of exposing ignorance a barrier to change? Possibly faculty need reassurance that they "... control the learning environment" (Crow, 1999, p. B6).

One powerful strategy for overcoming hesitation in making the digital transition is to enumerate the concrete advantages to this mode of education. Bonk and Dennen (1999) provided several potential benefits for teachers, administrators, and students from Internet education that include "... access to education, [the] pro-

mot[ion] of improved learning, or contain[ing] costs" (p. 6). Specific applications of these three Web benefits include: "Extend[ing] class discussion across days, weeks, and months; Allow[ing] for the completion of course requirements whenever and wherever students want; Increas[ing] student involvement and responsibility for their own learning; Creat[ing] opportunities for students to hear viewpoints beyond your classroom and university community; Force[ing] instructors and departments to rethink their pedagogical strategies and activities; Provid[ing] free resources for anyone with Internet access to use; Indirectly market[ing] your program, department, and university to people around the globe; Encourag[ing] more personalization of student work and requests for help; ...; Provid[ing] permanent accumulation of student work in personal portfolios; Archiv[ing] student work as a class legacy and model for future students; Allow[ing] for fast implementation of instructional ideas and sharing of research findings" (Bonk and Dennen, 1999, pp. 6, 7). These advantages extend to all groups involved in the production, implementation, and consumption of education.

**Forms and Methods of Learning**

Learning environments effect the assessment of outcomes in traditional as well as nontraditional modes of education. For example, the American Institute of Certified Public Accountants (AICPA), various State Societies of CPAs, and other organizations that offer Continuing Professional Education (CPE) use the options summarized in the table below. The first five options (i.e., all a type of distance education or independent study) require an examination to document completion of the CPE. The first five options do not have a teacher/guide/mentor in physical proximity to the learner. It is important to note that even within traditional and widespread education practices there are many options for learning which do not require the presence of the teacher/mentor/guide.

The last four options imply physical proximity of the learner to the teacher/guide/mentor. With the teacher and the student in the same location, it is assumed that the interaction/learning occurs. The teacher talks and the learner both listens and learns. This seems to be an assumption that higher education does not fully adopt. Colleges and universities typically require an exam or performance (e.g., artwork, dance or music, portfolio) in addition to classroom interaction between the teacher and student to verify the learning that has taken place.

Graduate education follows a similar model. However, many professions (e.g., medical, accounting, and finance) that require a minimum of a bachelor's degree offer CPE via seminars, conferences, and lectures where mere attendance documents learning. If the CPE is completed via independent study (e.g., at a distance) then physical documentation (e.g., exam) is required.

With the attendance model, the learner is typically required to sign in and out when enter-

| Learning Environment | Documentation |
|---|---|
| Book | Exam |
| Audio Tape | Exam |
| Video Tape | Exam |
| Book & Audio Tape | Exam |
| Audio Tape & Video Tape | Exam |
| Book & Audio Tape & Video Tape | Exam |
| Person & Audio Tape & Video Tape | Attendance |
| Person & Audio Tape | Attendance |
| Person & Video Tape | Attendance |
| Person | Attendance |

ing the classroom/seminar/conference session or leaving it. What is documented is the time that the learner was exposed to the opportunity to learn.

With the advances in computer technology it is now possible to document the amount of time that a learner spends in the computer-learning environment in addition to the investment of the students' time in various activities. For example, Internet learning environments records when the student logs on. They also record how long the student stays in the system and what portions of the program are accessed and processed (e.g., practice quiz taken, bulletin board posting by the student, reading of lecture notes). This technological development has dramatically increased the potential of tracking the ways in which students learn. Evaluation of student learning may expand to include assumptions about how much time or exposure to specific ideas a student must have before understanding a concept. The absence of a face-to-face learning situation between teacher and student in the distance learning environment is being partially supplanted by the technology interface which preserves the students' foot prints through the course content.

This brings us to the vital concern of the involvement of accreditation organizations in assessment. How do we assess whether learning has occurred? How do we assess the quality of the learning? Where does trust emerge? Trust seems to be a major factor in the approach where documentation is merely the practice of taking attendance. The documentation of learning is important because certain professions require that members have up-to-date information about current issues in the profession. To what extent will this model apply to undergraduate distance education? What use can we as teachers make of this new information about our students' learning styles, and how do we prevent the possibility that students will just "do time" within the learning environment in order to satisfy preconceived expectations that we bring to the virtual classroom?

The assessment issue has been formally addressed relative to a number of universities. The University of Phoenix (with 81 campuses) and Western Governors University both have online courses in addition to traditional courses held in classrooms. With their online programs, both of these universities have received accreditation by their regional accrediting bodies. The North Central Association of Colleges and Schools accredited Jones International University, which only offers online courses as a totally virtual university without a traditional campus. The "National Technological University that relies on satellite delivery and ... the College for Financial Planning that uses only correspondence methods" have also been accredited (Crow, 1999, p. B5). These accreditations indicate that agencies are moving forward to endorse quality programs in the new digital modes. To what extent these endorsements will power future change in policies at mainstream institutions remains to be seen.

A powerful reservation, which the accrediting organizations may bring to the table regarding virtual learning environments, is that they estrange the learner from the educator. Navarro and Shoemaker (1999) further pointed out that "... critics are concerned that cyberlearning may eliminate crucial personal interactions not only between professors and students but also between students as well, leading to a depersonalization of the learning process." (p. 30) These reservations are outweighed by the proponents' arguments for the new technology. "Proponents argue that cyberlearning provides students with far greater access to information and other educational resources. They see it as a cost-effective way to provide more individualized instruction and more accommodation for different learning styles. ... Proponents have claimed that using technology for teaching and learning can promote greater involvement in learning and more individual responsibility for learning—in short, that it supports a constructivist theory of education in which students actively construct an internal representation of knowledge by interacting

with the materials to be learned, usually in a collaborative setting" (Ibid.). The broadest implications of these observations are that educators, administrators, and students, (i.e., all members of the academic food chain) must realign practices and expectations to account for new ways of learning/thinking, and being which virtual learning environments are but a mere harbinger of.

**Working Example**

The following provides some detail about a successfully designed and implemented online course. Many of the issues raised in this article are illustrated by the process and techniques used in this course. The design of the course specifically directs the student through the content to tame the tendencies of hypertext to be experienced in a random fashion. At the same time, the student and the class enjoy the abilities of the computer environment to record and archive their progress through the course, and to become student-authors of their own educational experience. It is a chemistry course. The principles of design for the design of this course reflect the instructor's awareness of the potential pitfalls of hypertext as a form of learning. These concerns are revealed in the careful classification of material, the repeated iconic motifs used to represent types of information and activities within the learning environment, and the attention to the consistency of these elements.

The web address for this chemistry course is: *http://vclass.eng.morgan.edu: 8900/webct/public/show_courses.pl?930605641.*

The following description of an online course is presented as an example and the design principles can apply broadly across the curriculum. The discipline of chemistry provides a good example for illustrating design principles because of the special demands that laboratory component makes on students. Upon accessing the above site, one views the welcome page for the chemistry course. All of the design features are provided to guide the student successfully and reliably through the course material. Linking to the course welcome page, the student will find all of the information needed to register. It is especially important for features to be consistent during the beginning routines of the course. Essential to student success is a handbook with instructions on how to get started. The handbook is incorporated directly into the course welcome page.

Within the welcome page, the students can link to the web site of the publisher of the textbook. It has a recommendation regarding who is equipped to take distance-learning courses. Students can also "tune-up" their browser. This helps the students to use the textbook content more effectively.

At the bottom of the welcome page, the students link to a site where they create an individual password and user name. Students are able to create a password and log into the course homepage without help. Some of the user names and passwords created by the students included personal information, such as a social security number. These students were contacted and instructed to change their screen names. Some students could not remember their password. (Both the password and the user name are recorded in the professor's file within the learning environment, so that the professor can provide the students with the forgotten information.)

Once the student successfully "logs on," the course homepage appears on the screen. The course homepage controls how the student navigates an adventure into chemistry.

On the course homepage, the student is directed to the class calendar to find out what is assigned for a specific day. During the first day, the student is directed to the bulletin board area to introduce him/herself to both the professor and the class. In this way the students begin to create their classroom personae, which will characterize their contributions for the entirety of the course. The student also goes to the lecture

and homework area to create a password for the Archipelago section. This section constitutes the majority of the laboratory, as well as supplementary media materials.

The study areas are organized so as to minimize the possibility that the student will get confused. Moving from left to right and top to bottom, the study areas follow the following order: (first row) the class calendar, course content, lists of topics, communication and utilities, (second row) lectures and homework, course lessons, question bank, your chemistry professor, (third row) laboratory and Archipelago teacher. A final examination review is added to the third row during the final week of the course.

The class calendar icon is in the shape of a small office desk calendar. When the icon is opened, the student can read the instructor's public (i.e., available to the entire class) comments. The student can also make private (i.e., accessible by the student only) comments. The instructor's comments include standard course information.

The icon for the "course content" area is a book open to the first page, which suggests the beginning of a program of study. This icon contains the syllabus. In a similar fashion, with similar supporting icons, course content lists and topics and tools and utilities are clearly demarcated and remain consistent for students throughout the course program.

In contrast to the utilities and tools, the many chatting sites were not used much during the pilot semester of this program, Fall 1999. Chat rooms seem to be more appealing for anonymous interaction rather than discussion among students within the same course.

The professor or student can check the student's progress. Most of the student's contact with the web site (i.e., "hits") should be in the tool pages section. The home page, content page, articles read and original post sections should hit on a regular basis. The pattern of hits in the "my progress" area can help the professor and the student understand the student's study patterns. A discussion of the students' study patterns and grades could be more effective with this information. This type of student data represents a new pedagogical level of evaluation.

The nature of online education, in its Internet forms, increases the planning and involvement in student progress that the faculty member is required to do. The students gain the convenience of being able to take the course from a remote location, and the faculty member benefits from an increased documentation of the students' involvement with the course material. As Bonk and Dennen (1999) have noted, "Though time consuming, teaching on the Web appears to offer more opportunities for student mentoring relationships than traditional classes. Electronic advice, encouragement, challenges, and feedback can be highly individualized and timely" (p. 5). The amount of one on one interaction between the student and the professor in fact increases when compared with the traditional classroom, and additionally "[m]any faculty members and students say on-line programs actually enhance interaction" (Crow, 1999, p. B6].

**Summary**

Internet education is changing the way instructors teach and students learn. It has the potential to revise our understanding of achievement and the way we organize and convey knowledge. "On-line instruction and distance education have swept through institutions of higher education with astounding speed." (Perley and Tanguary, 1999, p. B4), and these changes must be accompanied by unprecedented planning and thought in designing educational delivery. Even though, as Young (2000) pointed out, " two-thirds of every traditional college course is distance education.... For every hour that students spend in a traditional college classroom, ... they are usually expected to spend about two hours reading or writing papers out-

side of the classroom" (p. A52), we are still faced with a new situation that calls on us to marshal unprecedented resources and talents.

## Conclusions

The computer supports distance learning in a virtual classroom. Within the example provided, the computer chemistry techniques developed for online education can also ideally be used within the traditional classroom. For example, chemistry majors will continue to come to the laboratory to perform chemical reactions with traditional laboratory equipment while being supervised by an expert. With the computer, students can explore the vast library of ideas of other chemists. Whether it is chemistry or any other course that we are developing to be effective and interactive, we "will always need ... experts in various disciplines to create content and to be partners with those with technical expertise. We will always need mentors who work directly with students to stimulate the questioning, creativity, and critical thinking that we all value in higher education. We will always need trained individuals to develop a credible, fair system to evaluate learning" (Crow, 1999, p. B6). A grandfather once said, "If a task has once begun, then never leave it until it is done. Be the labor great or small, do it well or not at all." Learning (no matter what the discipline) involves tasks to be accomplished. The Internet has proven to be a highly effective medium for accomplishment. It allows for tremendous flexibility. This flexibility serves students with professional profiles. It is worth the effort institutionally and individually to reach out to this growing population of students who will be well served by the convenience. This is, however, a revolution that must occur at all levels in order to be successful. The revolution has arrived and brought with it a reconstitution of the academic landscape. A failure to take into account the new vectors taking force in the academe will result in the inability to teach effectively.

## Endnotes

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**Notes**