

**THE CONCEPT OF IMPLEMENTING EFFECTIVE CRITERIA FOR LEARNING
ASSESSMENTS IN A VIRTUAL ENVIRONMENT**

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ABSTRACT

How can educators incorporate the discoveries of cognitive science and its multifaceted exploration of how the mind works, of brain-based learning, and of the concepts of connectivity of mind, body, and soul into virtual learning in a virtual environment? Can professors implant the excitement of learning through virtual means? Students and professors make no eye-to-eye contact, have no face-to-face communication; nevertheless, good people skills and good communication are essential characteristics in today's global business world.

How can professors develop an e-learning assessment model for learning experiences in a virtual world? In some ways, e-learning assessments might be more honest because they do not incorporate gender, race, nationality, or class constructs. They do not assess attitude or socioeconomic climate. They assess ability, communication, and complex multidimensional participation of students. They allow students to share and learn without reservation (Tham & Werner, 2005). Let us explore the concept of implementing effective learning assessment criteria for a virtual environment and set forth a framework for assessment.

INTRODUCTION

Virtual learning in a virtual environment did not occur spontaneously, but grew over time out of traditional education; therefore, past educational practices hamper it from developing fully. University students today in the Western world are technologically advanced, having used computers since elementary school. They are used to the fast pace of video games, text messaging friends between or during conversations, and listening to their iPods—all at the same time. Students walk, talk, listen, process, analyze, store, and use all parts of their brain and body in multiple capacities in most life experiences. Educators must capture that vibrancy and provide virtual learning in a virtual environment.

We know from the writings of Alan S. Blinder (2006), who is the Gordon S. Rentschler memorial professor of economics and public affairs at Princeton University, that the future

...will require vast and unsettling adjustments in the way Americans and residents of other developed countries work, live, and educate their children. (p. 117)

Education will break down into face-to-face contact for elementary through high school classes and tradable [moving offshore] for university level classes. (p. 119)

Simply providing more education is probably a good thing on balance, especially if a more educated labor force is a more flexible labor force that can cope more readily with non-routine tasks and occupational change. (p. 125)

According to Friedman (2006), for most corporations in this new millennium, the most important ability of students is to learn how to learn, to be able to constantly absorb and teach themselves new ways of living. In this day of global competition and as more and more work is digitized or automated, most jobs (or at least part of them) are going to be outsourced or offshored; therefore, industry will need a flexible workforce.

Garten (1997), then dean of the School of Management at Yale University, spoke of giving graduating students a card for life so they could return every year to update their education because education is no longer complete at graduation. What one learns at university will quickly become old and obsolete. One must continuously expand one's knowledge. The Internet affords that opportunity.

All of these leaders state the same message, the need for flexibility in this ever-changing world. Because we no longer know what tomorrow will bring and, if we will educate students for the future and not the past, we educators must open our eyes and ears, and absorb what is happening in the world. Our students will be thrown into the world with billions of graduates from China and India. They must measure up to a larger-than-ever workforce and to educational facilities of the new millennium, not historical archives. This new age of education will have no eye-to-eye contact, no face-to-face communication except via telecommuting. Virtual learning in a virtual world must be developed outside of traditional educational techniques. It must be fresh and new, taking the best of today's competencies and incorporating them into vibrant new ways of learning. The excitement of learning is what professors can implant in students. Educational opportunities must be limitless. An educator must instill curiosity and passion for learning.

According to Pink, "In a world upended by outsourcing, deluged with data, and choked with choices, the abilities that matter most are now closer in spirit to the specialties of the right hemisphere – artistry, empathy, seeing the big picture, and pursuing the transcendent" (in Friedman, 2006, p. 306–307). Virtual learning must incorporate brain-based learning and the experiences and patterns of life.

INCORPORATING BRAIN-BASED LEARNING INTO VIRTUAL LEARNING

Hart (1983) stated, "The future of teaching and learning lies in the study of the brain. Only in this strange world of nerve cell and synapse will we someday untangle the mysteries of how people learn" (p. ix). A core principle of brain-based learning is that learning should engage the whole physiology, that the brain is physiologically different every morning because it has assimilated one's experiences from the day before. Bennett, Diamond, Krech, and Rosenzweig (1964) state that the brain actually grows physiologically if stimulated through interaction with its environment. The brain can process many things well simultaneously, in whole and in parts.

The brain searches for common patterns and relationships in the moment-to-moment experiences of everyday life to make sense of them. According to how this natural knowledge is acquired, the number and quality of interconnections in the brain increases; therefore, as one increases one's level of knowledge, one builds and adds to this natural category of knowledge. Knowledge is then stored in a knowledge base and can be called upon at will. As knowledge increases, one expands and builds whole categories of patterns that are perceived and mapped by the brain in locale memory, in turn becoming perceptions of one's innate knowledge.

Caine and Caine (1997) found that

Brain-based learning...rests on the fact that the various disciplines relate to each other and share common information that the brain can recognize and organize....Because the learner is constantly searching for connections on many levels, educators need to *orchestrate the experiences* from which learners extract understanding. (p. 4–5)

Educators must use this information to create virtual learning environments that immerse students in an educational experience.

VIRTUAL TEAMS IN BUSINESS

Virtual teams are small groups of people who collaboratively work together by electronic communication rather than face-to-face. E-mail, Instant Messaging (IM), and groupware are ways to conduct electronic communication and meetings without the necessity of team members being present in the same location. Using groupware, several members of a team can edit a document at the same time or in sequence. Videoconferencing is another technology that facilitates virtual team meetings. Cisco's TelePresence combines rich audio, hi-definition video and interactive elements to deliver unique in-person experience over the global Internet Protocol (IP) network.

Electronic brainstorming is another way for virtual teams to enter spontaneous suggestions simultaneously for a tentative solution to a problem without discouragement or control. Although group members are not present to talk to one another, each member is allowed to build his or her idea or to combine it with others on the team. A company might also have a project Web site that is dedicated to a shared project. Members can update each other or post messages daily regarding the status of the project to the virtual workspace. According to Majchrzak, Malhotra, Stamps, & Lipnack (2004), the virtual workspace at Shell Chemicals was shown to be more effective than sending hundreds of emails back and forth between the team members.

Cross-cultural teams from geographically dispersed units of a firm increase the need for various applications of virtual teams. Strategic alliances with geographically dispersed companies working closely with one another depend on virtual teams to work hand in hand to communicate a cohesive whole to clients. Electronic meetings can be held with counterparts in South Africa, China, India, Mexico, and the United States all virtually present, greatly reducing the expense of bringing all team members together in one physical location. Companies, like IBM, have taken advantage of this new form of business by creating information technology systems that allow team members to interact easily with each other.

Virtual teams are also an answer to possible hiring situations where essential skills of workers are necessary, but workers do not want to relocate to a new area. Virtual teams can be created with members interacting with each other from various locations in the same virtual workspace. This technique is also prevalent after mergers. One of the crucial components of virtual teams is trust; the trust of managers that people under their management are working without direct supervision, and the trust of team members in coworkers who they do not meet on a face-to-face basis. Managers must assemble self-managed work teams of self-reliant and talented employees albeit not having the opportunity to meet team members personally. Getting team members to feel that they are a part of a team is another challenge of virtual teams that can sometimes be remedied by one or two in-person meetings in the course of a year.

E-learning in the corporate university is seen as one of the most significant business inventions in the past two decades. According to Nixon and Helms (2002), over 2,400 corporate and public organizations existed throughout the world in 2002. The figure was expected to increase to approximately 37,000 corporate and public universities by 2010. Because of the growing influence and respect that these universities have gleaned, the UK government is considering granting award-bearing powers to those that can demonstrate high standards in education (Prince, 2003). McDonald's was one of the earliest corporations to set up its own corporate university in 1961. It was to ensure operation of business at a consistent level to deliver consistent restaurants across the world (Dalton, 1999). The management values being taught were focused at the strategic management level in accordance with the culture of the organization, its focus on standards, and perpetuation of its business strategy (Macpherson, Homan, & Wilkinson, 2005). Motorola focused its corporate university as an agent of change. Management training programs provided "personnel with the skills and knowledge necessary to welcome, seek and implement change, and thus afford the organization a competitive advantage" (Macpherson et al., 2005, p. 34). The culture change attached to this training required senior management to accept education as an investment (Fulmer & Gibbs, 1998). Other corporations have formed links with formal educational institutions to provide career development programs. UK BAE Systems offers management and technical training with various universities and provides courses through their own "virtual university," which is open to all employees. "BAE Systems' stated objective is to provide leadership training for its future directors, and it is therefore looking to use the corporate university learning process to drive and shape the future organizational goals and structures" (Macpherson et al., 2005, p. 34).

Sora (2001) refers to e-learning as a force for "profit and efficiency." Although his comments were specific to traditional universities, the cost advantages in travel and time away from the job, and the ability of many people being able to learn in an e-learning situation worldwide with little additional cost (Schriver & Giles, 1999; Warner, 1999; Koprowski, 2000) has not been lost on corporate leaders. The downside of these new corporate universities is threefold: (a) using e-learning to deliver generic "off the shelf" solutions, (b) lack of assessment of learner's experience, and (c) corporate culture may play a significant part in acceptance or not of e-learning. According to Macpherson et al. (2005), "given that the aim of the sophisticated corporate university is to achieve a strategic and cultural contribution to competitiveness, evaluation of the adoption of e-learning needs to be more sophisticated and to attend to the learners' experience and behavioral outcomes" (p. 45).

VIRTUAL TEAMS IN EDUCATION

To form a cohesive team in education, many of the same components used to form virtual teams in virtual workspaces must be incorporated into virtual classrooms. E-mail and software packages such as WebCT, Vista, and Blackboard are used in place of groupware. While videoconferencing is available in the graduate courses at MIT and perhaps some other Ivy-league schools, at the present time these forms of conferencing between professor and student are not cost-effective enough to be readily available. Some universities are experimenting with visual overlays of professors orally communicating with students over case studies or videos that enhance the required textbook readings.

Electronic brainstorming is available in the form of a blog, where students can post messages and spontaneously respond to each other or carry on a “conversation” with the professor. If all share these blogs, they will be relevant to them; however, if the blogs are specific between student and professor, like discussion boards, they lose their effectiveness. Unlike spontaneous suggestions in an electronic brainstorming situation, blogs are not always without discouragement or control. In some situations, being anonymous allows people to say things that they would never say in person; therefore, their responses might be more race-specific or gender-specific than they otherwise might be in person.

A project Web site might actually make a virtual classroom work more effectively. Students can easily interact with each other; however, because no common thread holds all of the components together, the “team” is more individualistic to each student and each professor in the network. Virtual teams in a work situation are motivated by common goals and career advancement. The end game in education is different for each student, especially in pure online courses where the prevalence of online cheating and plagiarism was reported by faculty and administrators engaged in online instruction (McAlister, Rivera, & Hallam, 2001; Olt, 2002), the outcome or assessment becomes even more difficult. In online courses, new perspectives may have to be adapted when planning and administering evaluations for online courses.

Although at this point most universities are not promoting cross-cultural teams between universities, this might be a concept for future growth and integration of programs in a cognitive science type of format with university strengths complimenting each other worldwide. Because most university departments do not work together and interchange ideas even on the same campus, they could develop a growth model for future development. Currently, professors can take comfort in traditional formats in education and proprietary control of students.

The final point, trust of team members who do not meet on a face-to-face basis, is also similar to and different from education in the work place. It is important for students to trust that the professor will be available when they have questions, but they must realize that professors are not usually available 24/7. In addition, a level of trust must be built between the instructor, the university-provided technology, the student, and the university-supported technology. For both students and professors, it is extremely frustrating when they try to post to the college Web site only to find that the system is down or that they cannot download work in a timely manner. Students must trust professors to provide them with quality education online; professors must trust students not to plagiarize or cheat on papers and exams. Because professors do not know

whether the actual student taking the course is posting, a huge level of trust must be built between the players. Self-managed teams of self-reliant and talented students are as necessary in the work place as they are in education.

In business settings and educational settings, ground rules must be defined and strictly adhered to in virtual teams. Assessment and evaluation of outcomes is more difficult in education than in the workplace. The “bottom line” is different. The concepts and outcomes in education are more abstract and less delineated or provable. However, the online experience of a virtual student in a virtual classroom can prepare a student for a virtual team in a future business situation, or for future corporate university experiences. With corporate universities competing with traditional universities for competency training in the field of management, universities will have to form alliances to attract corporate sponsorship and endorsement of their e-learning programs.

ASSESSMENT VERSUS EVALUATION

Although sometimes used interchangeably, assessment and evaluation are two different concepts. Assessment determines a student’s knowledge and defines what a student can do. It effects student advancement, placement, and grades, and is useful in setting forth instructional strategies and curriculum (Dietel, Herman & Knuth, 1991). Evaluation determines the value of a course or program and oftentimes incorporates assessment data along with additional information to make decisions about revising or rejecting a course or program. Fisher and Twing (2006), point to the fact that no single definition of “value-added” exists in education. It sometimes “means monitoring individual student growth in academic skills from year to year. The gains are aggregated for individual schools and districts (and sometimes, by teacher) with the intent of determining which school or district (or teacher) is or is not producing gains in student achievement” (Hoover Institution, 2002, in Fisher and Twing, 2006, p. 3). Therefore, teachers, individual schools, and school districts hesitate to participate fully in the process of assessment and evaluation because repercussions can take place in the future. Therefore, the first step in improvising a process of assessment is to differentiate fully assessment and evaluation.

If the true definition of assessment were to determine a student’s knowledge and define what a student could do, there would be no repercussions for individual teachers, schools, or districts. There would be much more involvement of all the stakeholders to determine these parameters. Such a process could help to set forth instructional strategies and curriculums that benefit students and define “value-added” in education. However, before that can occur, clear delineations must be set in place to distinguish between assessment and evaluation with reprisals for poor performance, which must be removed from assessment and clearly placed within the scope of evaluation. Poor performance evaluations can set in place technological training and improved educational programs to bring educator performance up to the level of expectations. Fisher and Twing (2006) advocate a “growth-centric assessment model” that includes a standard measure of performance. The median score on a nationally normed achievement test, an overall average score on a statewide assessment test, or an average score in a district assessment test; however, these methods are not innovative brain-based concepts that incorporate connectivity of mind, body, and soul into virtual learning in a virtual environment. These traditional methods have failed repeatedly; in fact, they keep the confusion of assessment and evaluation criteria alive.

At Southern Connecticut State University (SCSU), where I am currently a professor, assessment standards are just now being set in place to come into compliance with the upcoming reaccreditation process. A similar assessment program has already been set in place at the International School of Management (ISM) in Paris, France, through pre-assessment and post-assessment papers. However, although professors at SCSU have been told that assessment is specifically being introduced to measure student learning outcomes, many professors believe that assessment of student outcomes today can turn into a witch hunt mentality. Many professors state that they have seen this happen in the past, where a process was instituted to improve student learning that later became a series of reprisals for professors who did not meet the criteria set for student outcome specifications. There is resistance. Again, it should be made clear that assessment and evaluation are differentiated by definition. The two should not be considered interchangeable.

FRAMEWORK FOR ASSESSMENT

True assessment must begin with the end in mind. To design a model for quality assessment, one must begin by outlining goals and objectives, then determine the type of learning outcomes that those goals and objectives represent. A university must analyze its own unique learning situation and student base and then devise tests based on the desired learning outcomes. The learning situation must be analyzed and broken down into the micro process of a specific course goal using instructional and prerequisite steps. The outcome of this process should be a well-defined set of objectives and expectations for students. The basis for creating assessment items should be the culminating objectives.

Goal writing is the first step in the process. Unfortunately, goals are oftentimes vague and abstract. A vague goal could be clarified by listing indicator behaviors for the goal. For Management 460, International Business, the goal is for students to learn about foreign policy and international business. By listing indicator behaviors for the goal (e.g., the student will read the text and media articles and write 1–2 page papers weekly to support or dispute the readings; the student will present his or her 1–2 page paper weekly to become comfortable with critical thinking methods and presentation in front of a group), the goal can be clarified. By stating explicit behaviors, a more concrete goal could be written: Students will read multiple texts and articles, write and present comprehensive papers on foreign policy and international business, and become citizens who can take action and make responsible decisions.

The goal can now be placed within a domain of learning: psychomotor skills, attitudes, verbal information, intellectual skills (four subtypes: discriminations, concepts, rules, problem solving), and cognitive strategies (Dick & Carey, 1990). For international business, intellectual skills (e.g., concepts about cultural differences and similarities) and cognitive strategies (e.g., learning strategic processes to manage one's own learning processes) represent the cognitive learning outcomes that fit within the goal.

The next step in the process would be to list or diagram all of the steps required to achieve the goal (i.e., instructional analysis). For intellectual skills, a hierarchical analysis could be completed identifying the outcome and the prerequisite skills for each subtask. Within the cognitive strategies domain, students could complete an expert analysis by interviewing,

observing, or listening to experts in international business and foreign policy.

Once the prerequisite steps have been defined, the professor could compare what the students already know against the steps identified to complete the goal. This knowledge gap could be discerned by distribution of pretests or gathering background information through discussion. The hierarchical analysis could be delineated by a dotted line to dissect knowledge mastered by the students from knowledge that has to be disseminated. Everything below the line would be understood; everything above would need to be taught.

The final step in the process is writing specific behavioral objectives for each instructional step identified or for a related group of steps. For example, given information provided by Czinkota, Ronkainen, & Moffett (2004), *Fundamentals of International Business*, and *Great Decisions*, the student will be able to recognize the interdependency of international business and foreign policy.

This framework for assessment should remain applicable for e-learning and traditional classroom assessment if the basis for assessment begins with the end in mind and the basis for creating assessment items is the culminating objective.

E-LEARNING ASSESSMENT

Ridley and Husband (1998) compared grade point averages (GPAs) of students in traditional learning situations with those enrolled in online courses to delineate whether academic integrity was being maintained. The premise was that, if students were cheating in online courses, they would maintain higher GPAs; however, Ridley and Husband's findings indicated that students in online courses actually maintained lower GPAs than students in traditional courses; therefore, they surmised that educator concern over the academic integrity of students was either exaggerated or unfounded. Educators did not concur with this supposition because there were uncontrolled variables in the study. Instructors could base the GPA results on different courses taken by students, or different testing techniques. The higher GPA results could also be based on the superior quality of professorial instruction; therefore, the study was deemed unconvincing.

According to Ormrod (2003), in traditional classrooms, evaluation is used for promoting learning, guiding instructional decision-making, diagnosing learning and performance problems, and determining what students have learned. According to the definitions of assessment versus evaluation, these dictates of evaluation muddy the waters of what is evaluation and what is assessment. By definition, these should be listed as student assessment if they serve the function of determining what students have learned.

According to Tallent-Runnels, Cooper, Lan, Thomas, & Busby (2005), "The formats of assessment [used] in traditional instruction, such as term papers and multiple-choice questions, may not provide valid and comprehensive information on students' learning" (p. 24) in an online situation. By using software that tracks correspondence of instructors and students during the instruction and learning process of online courses, educators can analyze the depth of a student's cognitive process in learning and assess learning outcomes. Students' online discussions could be divided into two distinct categories: substantive (related to topics and contents) and

nonsubstantive (nonrelated to topics and contents) to determine whether student time was used effectively (Davidson-Shivers, Tanner, & Muilenburg, 2000). The depth of online interaction of students from the most shallow, sharing of information, to the deepest process of explicitly phrasing agreements, statements and applications of new knowledge make up five levels of online student assessment (Kanuka & Anderson, 1998). According to this body of research, most online students processed information at the shallow levels and online interactions did not help them to construct new knowledge. Clark (1983) states, “Media are mere vehicles that deliver instruction, but do not influence student achievement any more than a truck that delivers our groceries causes changes in our nutrition” (p. 445).

Richards and Ridley (1997) researched learning outcomes in the affective domain: student attitudes, satisfaction, and perceptions of online courses. University students in this study showed positive perceptions of learning outcomes and environments. Bee and Usip (1998) and Mortensen and Young (2000) delved into how learning satisfaction related to learner characteristics and to features of online instruction. No actual assessment of learning outcomes was gathered from these studies.

Overall, determination of student learning online is not usually collected from tests, examinations, or homework assignments. Enriched information from questionnaires administered online and correspondences between students and instructors and students and students were most often used to capture not only what students learn, but also how they learn it. A unique format of assessing online courses is content analysis of students’ online correspondences (Kanuka & Anderson, 1998; Muilenberg, 2000).

CLASS SIZE ON EFFECTIVENESS OF ONLINE COURSES

Drago and Peltier (2004), studied the effect of class size on the evaluation of teaching effectiveness for on-line courses using a standard student evaluation survey instrument. Their study analyzed dependent variables of global course effectiveness and summated indices representing “building blocks” of on-line effectiveness that included: course content, instructor support, course structure, student-to-student interaction and instructor-to-student interaction. They determined that there was no significant relationship between class size and global course effectiveness. However, they do state that “more students are more work; more students require more organizing; more instructor-student interaction, more grading and...more time” (p. 37). Unfortunately, because the college in this study provides incentives for instructors to take on more students in their online courses, the study was biased from its inception and, therefore, was somewhat useless in determining factually whether class size did or did not hinder effectiveness of online courses. In addition, the authors pointed out that only 53.0% of online students returned usable questionnaires and that students who dropped the course were not observed or incorporated into the study, although they might have held strong opinions about the quality and effectiveness of the course.

Professors who teach on-line courses at universities in Connecticut support the fact that course content and course structure would not change with enlarged class size; however, they believe that student-to-student interactions would definitely change because so many postings would become unwieldy and time consuming for students and instructors. Currently, students posting to

on-line courses believe that professors will be at their disposal 24/7. Professors note that students who post at 7:00 a.m. wonder why there are no additional postings from other students at that time of the morning. Students who email professors at midnight expect a response immediately upon waking in the morning. Rather than being professors of multiple students in a multiple class forum, they have become individual tutors to as many students as the class size allows. However, even in this new online or hybrid forum, universities that teach undergraduate courses in the U.S. are still using the traditional set-up of having students working online courses within the traditional semester timeline. Because online courses have not yet fully developed a life of their own, traditional modes of education are still being applied to the new technologies restricting them from becoming multifaceted explorations or brain-based endeavors that incorporate mind, body, and soul. According to Drago and Peltier, "Online education is at its birth. We have much to learn to maximize this form of educational delivery" (2004: 38).

MODEL CHECKING

According to Sinharay, Almond, and Yan (2004),

Model checking is a crucial part of any statistical analysis. As educators tie models for testing to cognitive theory of the domains, there is a natural tendency to represent participant proficiencies with latent variables representing the presence or absence of the knowledge, skills, and proficiencies to be tested (Mislevy, Almond, Yan, & Steinberg, 2001). Model checking for these models is not straightforward, mainly because traditional χ^2 -type tests do not apply except for assessments with a small number of items. Williamson, Mislevy, & Almond (2000) note a lack of published diagnostic tools for these models. (p. 1)

In educational testing, model checking presents special challenges because a segment of the model that describes proficiency of students almost always consists of latent variables. Presently, the majority of the material is based on unidimensional item response theory (IRT) models with a single continuous latent trait (e.g. van der Linden & Hambleton, 1997).

Sinharay, Almond, and Yan's (2004) paper explored various approaches to assess the fit of models with student proficiency, which consisted of discrete variables; particularly in the distribution of the proficiency variables described using a Bayesian network. Sinharay et al., are using the basis of the identified problems with the model used by Mislevy (1995) to hypothesize an improved model with a better fit for assessing the feasibility of models with discrete proficiency variables in educational assessment. They observe that Bayesian residual plots and an analog of the item characteristic curve (ICC) plots, and an χ^2 -type statistics model based on the ICC plots show some promise; however, the authors concluded that more work would be required before assessment models could be proven.

This model for assessment and absence of model checking is specific to the traditional classroom setting even though communication is face-to-face and contact is eye-to-eye. Checking the validity of e-learning assessment models would be even more difficult albeit collection of data is somewhat easier.

TRIANGULATION

While investigating the qualitative versus quantitative research methodology, a third option was proposed, triangulation. Triangulation is the combination of both qualitative and quantitative research methods to form a third method that combines the best of each method into a new more complete methodology. According to Edwards and Fritz (1997),

Research over the past 70 years has generally concluded that there are no significant differences between learning delivered face-to-face and that delivered by alternative media.... Research to date has not shown complete support for either approach alone. Therefore, a reasonable optimum must be somewhere in the 'middle' or somewhere in combination of the new and the traditional approach. (p. 2)

According to this research, it is not a question of using mediated materials versus traditional human intervention, but how much of which will create the best learning situation.

De Chardin (1973) predicted that a web of communication technology would first grow up beside, then surround, and be organically assimilated into human consciousness (p. 36). Indeed, it has. O'Donnell (1995) states,

My experience these last years has been that the new technologies of networked information are indeed liberating, to real teachers and real students. It's not as though we couldn't use some help. There are plenty of frustrations for teachers, plenty of obstacles yet to surmount, plenty of barriers separating us from the students we want to reach. The best way to view information technology is to let it address the problems we already know we have. (p. 10)

CONCLUSION

Universities are challenged by the demands of students who need life-long learning and retraining to meet the new demands of business. They have responded by being open to new and alternative delivery systems for education. Hybrid classes that combine traditional classroom experience with alternating online classes seem to be most popular and successful. The most enthusiastic proponents of these new educational opportunities are students themselves. As consumers, they are demanding and willing to pay for education and learning experiences that are delivered at the time and place that is most convenient and relevant to their lifestyle (Edwards & Fritz, 1997).

Corporate universities are also looming on the horizon. For most of these new universities, e-learning is a way of flexibly delivering consistent learning experiences, independent of time and location, to their employees. These new universities are contributing to the competitive edge of an organization and raising expectations of return on investment (ROI) within a smaller pay back period. Eighty percent of *Fortune 500* companies are using, or intending to use e-learning, and expect a significant ROI (Hammond, 2001). If corporate universities want to receive award-bearing powers, assessment will become more important in order to prove high standards of education. Corporate universities will then become university competitors.

Overall, it appears that traditional and online education will be offered to students at universities worldwide. A quiet triangulation of teaching methodology has occurred. At some point, perhaps universities will follow in the footsteps of cognitive science and collaborate to make education even more beneficial and exciting for students and the education process itself will become stronger. As cognitive science delves further into the brain and the concept of how we learn, and brain-based learning techniques are incorporated into classrooms, traditional or virtual, education will evolve in ever new and exciting directions.

If assessment is discussed openly, within and among universities, iterative accounts gathered from measures of student learning can improve undergraduate education by making it more transparent (Bok, 2006). It can lead university administrations to examine features of its curriculum that might initiate change in students between matriculation and graduation, and within the assessment, a university might find a “value-added” effect.

Assessment will be difficult to delineate, although measures are being set in place and expanded. For the most part, educators seem to prefer assessment abstraction. True assessment will not be possible unless all stakeholders are willing to participate in the process without fear of reprisals.

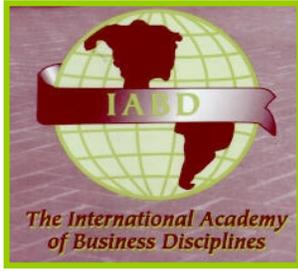
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