The aim of the Journal of Asynchronous Learning Networks is to describe original work in asynchronous learning networks (ALN), including experimental results. Our mission is to provide practitioners in online education with knowledge about the very best research in online learning. Papers emphasizing results, backed by data are the norm. Occasionally, papers reviewing broad areas are published, including critical reviews of thematic areas. Entire issues are published from time-to-time around single topic or disciplinary areas. The Journal adheres to traditional standards of review and authors are encouraged to provide quantitative data. The original objective of the Journal was to establish ALN as a field by publishing articles from authoritative and reliable sources. The Journal is now a major resource for knowledge about online learning.

JALN

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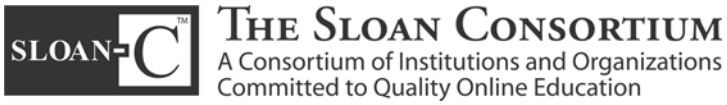


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# RE-EXAMINING & REPOSITIONING HIGHER EDUCATION: TWENTY ECONOMIC AND DEMOGRAPHIC FACTORS DRIVING ONLINE AND BLENDED PROGRAM ENROLLMENTS

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## ABSTRACT

Economic and demographic shifts in the United State are transforming higher education. With substantial reductions in state funding, increasing campus energy and operational costs, endowments generating reduced returns, and a national economic readjustment of unprecedented proportions, higher education must re-examine and reposition itself to meet new and emerging challenges. This paper identifies ten economic factors and ten demographic factors that are confronting colleges and universities and driving online and blended program enrollments. While traditional face-to-face programs will always play a critical role in higher education, online and blended programs provide new opportunities to expand current student markets by offering quality programming that supports the institutional mission, increases brand recognition, and expands an institution's alumni base.

**KEYWORDS**

Distance Education, Online Education, Blended (Hybrid) Education, Higher Education, Economics, Demographics, Enrollment, Endowment, Recruitment, Retention

## I. INTRODUCTION

"Severe economic pressures have created a defining moment for colleges and universities, which must fundamentally reinvent themselves to survive."
- E. Gordon Gee, Ohio State University [1]

Higher education is at a pivotal time. As with many nonprofit organizations and corporations, survival will depend upon achieving the elusive balance between flat or declining revenues and increasing expenses. As economic and demographic shifts continue to challenge higher education, and as financial constraints reset consumer preferences, institutions will have to redefine and reposition themselves as part of an increasingly competitive landscape. As Facione says, "It is time for some straight talk, starting with the realization that organizations that can't or won't adapt will fail" [2].

With severe cuts in state funding, increasing campus operational costs, reduced endowments, and a national economic crisis, the question that must be answered is: *How can higher education institutions increase revenue without sacrificing or damaging the quality of programming or brand?* For many

institutions, the answer will be offering online and blended (hybrid) programs. With the increasing technological facility of students and the ubiquity of electronic communications, online and blended education provide viable and sustainable long-term options. Students have become savvy consumers who seek high quality programming across all marketed educational delivery methods including on-campus (face-to-face), blended, and online. Recognizing that competing educational programs are now just *one click away*, quality is critical to retention and program sustainability. Because of online and blended programming, brand recognition now goes beyond local and regional markets enabling an institution to extend its brand nationally and even globally.

Traditional, on-campus face-to-face programs will always play a critical role in higher education. However, even on-campus students will continue demanding greater access to worldwide knowledge and faster-paced, technology-supported delivery. Entirely online programs and those that blend both in-person and online features provide new opportunities to expand education beyond the limitation of the physical campus and its geographic location. Online and blended programs also provide practical education options for the millions of individuals who are currently unemployed, displaced, or dislocated, as well as those who fear losing their jobs. For these individuals, online and blended programs provide the opportunity to pursue education necessary to their future while simultaneously maintaining or seeking employment. Additionally, for Traditionalists (1927–1945) and Baby Boomers (1946–1964) who are nearing retirement but cannot afford to retire, online education and blended education provide the ideal opportunity to earn a new credential while maintaining employment or transitioning to a new career. Those in Generation X (1965–1983) and Generation Y/Millennials (1984–2002) may not enroll in traditional on-campus programs due to family (parents as well as children) and work obligations or due to the additional expense of room and board.

Online and blended programs provide opportunities to reach new student markets across all generations by expanding the accessibility of educational programs to increase an institution's future alumni base. Additionally, online and blended programs provide opportunities to re-engage and reconnect alumni through expanded programming. Therefore, colleges and universities must consider quality and scale in terms of program development, sustainability, and meeting the needs of online students [3].

## II. REVIEW OF LITERATURE

Online education and blended education are not new to higher education. According to the National Center for Education Statistics (NCES), two-thirds (66%) of two-year and four-year Title IV degree granting higher education institutions offer online, hybrid/blended, or other distance education courses[4]. Allen and Seaman report in *Staying the Course: Online Education in the United States 2008* that online enrollment growth rates now exceed overall higher education enrollment growth rates. Between fall 2007 and fall 2008, the online enrollment growth rate increased 12% while the overall higher education enrollment growth rates increased only 1.2% [5].

In 2009, the United States Department of Education published a report entitled *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies.* This report included a meta-analysis and a systematic search for empirical studies of the effectiveness of online learning. According to the report, "The overall finding of the meta-analysis is that classes with online learning (whether taught completely online or blended) on average produce stronger student learning outcomes than do classes with solely face-to-face instruction" [6]. While the report does state that the "studies in the meta-analysis do not demonstrate that online learning is superior as a *medium*," it goes on to state that "online learning is much more conducive to the expansion of learning time than is face-to-face instruction" [6]. With data supporting the effectiveness of online and blended education and projections for increasing growth in online and blended enrollments, it is evident that online and blended education has now become an established part of higher education.

A myriad of single factors have led to increasing online and blended enrollments, including a weak economy, growing unemployment, and fluctuating gas prices [5, 7, 8, 9, 10]. However, administrators must look beyond single factors. While single factors may contribute to increasing online and blended enrollments, it is actually the convergence of multiple factors that is transforming, and will continue to transform, the landscape of higher education.

This paper presents twenty factors – ten economic and ten demographic – that are driving online and blended enrollments. Economic factors include: (1) tuition; (2) state funding; (3) credit crisis; (4) financial aid; (5) endowments; (6) fund raising; (7) construction, maintenance, and deferred maintenance; (8) energy; (9) room and board; and (10) technology. Demographic factors include: (1) national demographic shifts; (2) population shifts; (3) diversity; (4) decreases in high school graduates in parts of the United States; (5) surges in high school graduates in parts of the United States; (6) adult learners; (7) global competition; (8) employment expectations; (9) online program inventory; and (10) market acceptance.

# III. TEN ECONOMIC FACTORS

A description of ten key economic factors highlights the importance of single and multiple factors in relation to higher education. While some of the identified economic factors are cyclical and fluctuate, other factors will continue to increase annually. In reviewing each of the ten factors, it is important to consider how the increasing cost of each single economic factor as well the factors collectively affect institutional operating budgets and student affordability. Tuition has continued to increase annually at many institutions to cover increasing prices related to campus expenditures (such as construction, maintenance, energy, room and board, and technology). However, these escalating costs affect affordability and can affect a student's decision to enroll in either an on-campus program or an online program, particularly if the online program has fewer campus-related expenses for the student.

With decreasing state funds and reduced endowment returns, higher education institutions must closely examine all expenditures. Moreover, administrators must consider course and program options, such as online and blended delivery, that enable the institution to provide quality academic programming to an increasingly diverse student population that may be unable to physically come to campus due to professional or personal commitments. With advancements in technology, colleges and universities can readily bring the campus, including academic programs and student services, to students locally, regionally, nationally and globally.

## A. Tuition

> "The single most pressing public policy issue confronting American higher education in the 1990s was the *affordability* of a college education for individuals and for society" [11].
>
> "An independent report (*Measuring Up 2008*) on American higher education flunks all but one state when it comes to *affordability* — an embarrassing verdict that is unlikely to improve as the economy contracts" [12].

The affordability of higher education continues to be one of the most critical policy issues in the United States. Eighteen years after *Dollars, Distance, and Online Education* pinpointed affordability as a national "pressing issue," affordability has become an even greater issue [11]. In 2008, the National Center for Public Policy and Higher Education published *Measuring Up 2008 Report Card* that "handed out Fs for affordability to 49 states, up from 43 two years ago" [12].

Today, colleges and universities are seeking innovative strategies to cut costs while keeping tuition increases to a minimum and maintaining or increasing quality. However, as noted by Alan Caniglia,

Franklin & Marshall College's senior associate dean of faculty and vice president of planning and institutional research, "part of rising tuition costs are due to energy costs, large purchases such as laboratory equipment for classrooms, maintaining campus buildings and grounds, and salaries" [13]. Beyond this, technology is advancing at such a pace that universities are in danger of falling quickly behind and losing status if they do not keep current. With technologically savvy students and a consumer driven society, damage to an institution's reputation can be devastating and have profound long-term effects on enrollment and retention.

For many institutions, tuition is the primary source of annual revenue and can represent up to 80% or more on the operating budget. While the term *tuition dependent* was once associated primarily with private institutions, shrinking tax revenues are putting more pressure on public institutions to generate more "user fees" (tuition dollars). With a weak economy and drastic cuts in state budgets across many states, even the nation's largest public institutions are now finding increased dependency on tuition. Thus, Michael Crowe, president of Arizona State University, states "Luckily, we have tuition otherwise we'd be out of business" [14].

## B. State Funding

Decreases in state funding will continue to have a profound effect on higher education operating budgets. While some states are facing multi-million dollar deficits, other states are facing deficits in the billions. California is projecting a $7.5 billion deficit in 2010-11 [15]. New York is seeking solutions for the state's estimated $6.8 billion budget gap [16]. Ohio is expecting a $4 to $7 billion deficit in the state's 2010-11 operating budget [17]. Maryland struggled to close a $1.9 billion shortfall for the fiscal year [18]. The National Conference of State Legislatures reports that:

> The latest state budget update report by the National Conference of State Legislatures paints a bleak picture for FY 2010, FY 2011 and possibly beyond. States already have closed a monumental gap of more $102 billion for FY 2009. The outlook for FY 2010 is $121.2 billion based on projections by 42 states and Puerto Rico [19].

A survey conducted by the Association of Governing Boards indicated that approximately 80% of the governing boards of public universities say they are dealing with state budget cuts this year and 73% of the trustees predicted state budget cuts within the year. How are college and university leaders addressing the budget shortfalls? The AGB survey revealed:

- 80% are instituting hiring freezes or restrictions;
- 48% are postponing capital spending;
- 41% are cutting budgets across-the-board;
- 22% are laying off of part-time faculty members;
- 21% are reducing academic programs; and
- 6% are setting enrollment caps [1].

Unreported were any colleges and universities that might, confidentially, be considering other financial exigencies [20].

State and college and university officials are now carefully reviewing the key provisions for higher education in the economic stimulus plan, particularly since the words "permanent cuts" are becoming increasingly visible in the press relating to higher education operating budgets. Unfortunately, history offers no examples of governmental cuts being fully restored; and once cut, state funding will increase only modestly and slowly thereafter, if at all.

## C. Credit Crisis

For the first time in our nation's history, Moody's Investors Services assigned on April 7, 2009 a "negative outlook" to the creditworthiness of all local governments in the United States. The net result of this special "blanket report," as reported by the New York Times will be higher cost to states, towns, and local authorities to borrow money to finance their operations, including any new capital projects (e.g., building new residence halls and athletic facilities, upgrading energy inefficient or "technology-needy" buildings, etc.) [21]. Colleges which were able to borrow money in 2007-2008 to finance capital projects are finding the tightening credit market hurting their ability to pay. Recent examples include Brandeis University which financed a new $62-million science center and dormitory in 2007 with a variable interest rate and found its monthly payments had doubled in 2008 [9]. Georgetown University, the University of Pittsburgh Medical Center, and the University of Pennsylvania Health System have also been hit with substantially higher interest payments [9].

As a result of the credit crisis, some colleges have "quietly suspended employee-retirement contributions, frozen hiring, or as Simmons College did, cut 31 employees to reduce expenses so they could meet loan conditions set by their creditors or cover the cost of their existing debt" [22]. Likewise, the creditworthiness of parents and students is being challenged, and access to loans is restricted by banks and other lending organizations. Sallie Mae, the nation's largest student loan company, no longer provides private loans to students with below-prime credit scores and is now withholding service from colleges with poor graduation rates [23]. The bottom line is that institutions and individuals who have traditionally relied on bonds or private loans to meet their financial needs will increasingly need to identify alternative funding sources as a result of the current credit crisis and the ripples that will inevitably flow from it.

## D. Financial Aid

The number of students seeking financial aid is increasing as the cost of tuition continues to rise across the United States:

> For more than two decades, colleges and universities across the country have been jacking up tuition at a faster rate than costs have risen on any other major product or service—four times faster than the overall inflation rate and faster even than increases in the price of gasoline or health care. The result: After adjusting for financial aid, the amount families pay for college has skyrocketed 439% since 1982 [24].

Combined with the weak economy, it is, therefore, little wonder why the US Department of Education reports an increase of 20.8% in the number of Free Applications for Federal Student Aid (FAFSA) filed in the first quarter of 2009-2010, compared to the first quarter of the 2008-2009 [25]. The US Department of Education also reported that the percentage of students taking out private loans has almost tripled over the past five years from 5% to 14% [26].

According to a 2008 study by the National Association of Student Financial Aid Administrators (NASFAA), 66% of all undergraduates received some type of financial aid. About one-half (52%) of all undergraduates received grant aid, and more than one-third (38%) obtained student loans [27]. Approximately three-quarters (74%) of all graduate students received some type of financial aid [27]. The number of individuals receiving financial aid will most likely rise due to an increase in the numbers of individuals returning to higher education. A spring 2009 survey conducted by the College Board and Art & Science Group found that 41% of the respondents said, as a result of the tough economy, they were more seriously considering a public university or college close to home [28]. Some institutions are responding by increasing the financial aid budgets. However, the financial aid pot is only so deep, which means institutions, particularly private institutions, will likely need to draw more heavily on their endowments or substantially increase donor giving as major sources for financial aid dollars. Ursinus

College is just one of many colleges reporting more requests for review of financial-aid needs. Rick DiFeliciantonio, vice president for enrollment at Ursinus College, stated to the Philadelphia Inquirer:

> People are talking about losing 50 percent of their students' savings account [for college], or they've lost their jobs, or they're afraid of losing their jobs. All these themes we're seeing in the national news are playing themselves out in very explicit detail in these review letters we're reading. The college is trying to help families with more money. Obviously, there are limits to that," he said, asserting that about 10 to 15 percent of admitted students seemed to be struggling [29].

## E. Endowments

Endowments across the country have decreased substantially and quickly, often losing as much as one-third or more of the corpus in a year's time or less. Institutions renowned for having paid their endowment managers seemingly exorbitant fees for past successes have seen their endowments experience the largest fiscal decreases. Harvard University's endowment declined from $36.9 billion to $26 billion in the year ending June 30, 2009 [30]. Princeton University has also seen its endowment drop considerably: "The value of the University's endowment fell 22.7 percent in the last fiscal year." [31]. Approximately 48% of Princeton's operating budget comes from its endowment; therefore, fluctuations in the endowment can profoundly affect institutional planning [31].

With more attention being paid to transparency and accountability as a result of Sarbanes-Oxley [32], trustees with fiduciary duties to the institution may be required to change investment policies, and those responsible for investing the endowments may be required to make more conservative investments. While conservatism may be prudent given recent losses, it will not only reduce earnings but also minimize, if not eliminate, the opportunity for large gains if there is a market resurgence.

Colleges and universities with endowments less than $100 million are less dependent on investment proceeds to fund operating costs, simply because the amounts are smaller. The adverse impact can still be quite material, however, resulting in many instances in operating deficits for colleges and universities that were doing well to have break-even budgets. Deficits may violate university policy as well as prudent financial management. Since the drop in endowments will likely last several years, the gap between "what was" and "what is" has become a structural deficit for those institutions that had been dependent upon endowment proceeds to finance operations at a break-even level.

## F. Fund Raising

The substantial decline in the national economy and a widespread lack of confidence in the future will continue to have a materially adverse impact on fund raising: "After years of growth and predictions that fund raising for higher education would escape the brunt of the economic crash, the recession has started to affect colleges' efforts to raise money" [33]. Major gifts have been the hardest hit as large gifts may be linked to the stock market where donors may have lost significant wealth as a result of the recession [33]. Declines in market value of personal investments may cause donors to postpone making gifts because they might feel the need to maintain assets for personal use, or simply because the value of the gift has materially declined with the corresponding tax deduction. As discretionary income has been reduced, so have contributions to annual fund solicitations. Many institutions have had to extend, suspend, or defer capital campaigns, some having staffed up in anticipation for donations that now are unlikely to come. Even those institutions that have experienced increases in giving have done so for specific reasons (e.g., to preserve need-blind admissions or to fund scholarships), rendering the funds "restricted" and not available for general institutional operations.

Decreases in fund raising (and failures to achieve planned increases) across the nation have led to development offices to re-examine the way in which they operate. As indicated by in the article "Making Tough Choices in the Fund-Raising Office," "Administrators need to take a tough look at their operations and decide what is essential to fulfill the primary mission of the institution" [34]. Additionally, as indicated in an Eduventures survey of 48 colleges, the recession has led many fund-raising operations to cut costs, including eliminating nonessential travel (63%); freezing hiring or not filling vacant positions (58%); canceling/scaling back events (56%); reducing print publications (52%); layoffs (13%); and combining departments or positions (13%) [35]. Only 8% of the intuitions surveyed reported no changes at all. As development officers continue to build long-term relationships with donors, "it's all hands on deck," says Edith H. Falk, chief executive of Campbell & Company, as the nation moves through the recession to a stronger economy [33].

## G. Construction, Maintenance and Deferred Maintenance

> "Space is a serious, expensive business on college campuses. There is a saying: *Academics will fight over money and kill over space*" [36].

Costs relating to campus expansion, maintenance, and deferred maintenance have increased significantly over the past five years. For colleges and universities, Carlson [36] indicates that "facilities are second only to personnel in campus expenditures" and "maintenance, utilities, and renewal costs can compose about 70 percent of the lifetime costs of a building." These costs were substantially increasing even before the demand for sustainability and reduction in greenhouse gasses put new capital projects on institutions' *must-do* lists.

According to Ken Simonson, chief economist for the Associated General Contractors of America (AGC), "Surging prices for diesel fuel, asphalt, steel, and other materials are clobbering construction budgets" [37]. Construction costs including materials like aluminum have set record highs while natural gas doubled in price from 2007. These increases have triggered spikes in the cost of construction plastics (e.g., polyvinyl chloride pipe, insulation, etc.) and petroleum-based products (e.g., asphalt, roofing shingles, flooring materials, etc.) [37]. Construction increases also include concrete. Simonson predicts "Overall, construction materials prices will jump about 7% a year for the next several years" [37]. Furthermore, Simonson notes that worldwide demand from countries such as China and India will continue to keep up costs pressure on construction materials.

Maintenance and deferred maintenance are closely linked to the cost of construction materials and inflation. In Ohio, public universities and colleges now face a multibillion-dollar backlog of construction needs [38]. According to the Ohio Board of Regents, "close to half of all educationally-related buildings (in Ohio) were built between 1965 and 1985. It is that large block of buildings … that now need major renovation and maintenance" [38]. The simultaneous aging of the buildings is referred to as "block obsolescence" by the Ohio Regents. The cost for rehabbing or rebuilding for the estimated 37.2 million square feet of education-related space is $3.9 billion to $5 billion [38]. Deferred in the past and now demanding action, these capital projects will pull budget dollars from other university priorities.

## H. Energy

The Energy Information Administration (EIA) provides official energy statistics from the U.S. Government and Department of Energy. The EIA lists energy sources as including petroleum (e.g., crude oil, gasoline, heating oil, diesel, petroleum products, etc.), natural gas, electricity, coal, renewable and alternative fuels (e.g., hydropower, solar, biomass, ethanol, etc.), and nuclear. Few college and university campuses generate a portion, much less a majority, of their own power; therefore, fluctuations in energy costs can greatly impact institutional budgets. Reduced energy supplies and increased demand, as from countries becoming increasingly industrialized, are not the only sources of rising prices. Impending utility

deregulation and the proposed tax on carbon will also force prices to catapult. Roger Bruszewski, vice president for finance and administration at Millersville University (MU) has stated the deregulation of utility companies will increase MU's expenses. According to Bruszewski "the college is projecting that MU's energy bills will increase from $2 million to $3 million [due to deregulation]. That could contribute to even higher tuition bills" [13].

Energy prices have fluctuated greatly, particularly gasoline. The cost of gasoline went as high as $4.11 in July 2008 to as low as $1.66 in December 2008 and then up to $2.64 in November 2009 [39]. Higher education institutions, students, faculty (full-time and part-time), and staff are greatly affected by these fluctuating costs. Energy use has become a matter of investment strategy, as institutions decide whether to commit to volume purchases in advance to fix the price. Articles during summer 2008 highlight the impact that energy costs can have on higher education: "High Gas Prices Hit Campus Hard" [8], "$4-a-Gallon Gas Drives More Students to Online Courses" [40], and "Price of Fuels Tough Choices for Adjuncts" [41]. Academia has seen this before, as these titles are similar to 2006 articles: "Fluctuating Gas Prices Brake Students Who Commute" [42] and "High Gas Prices Taking Toll on Student Drivers" [43]. Costs of gasoline as well as other energy sources will continue to fluctuate. Therefore, higher education leaders need to closely examine how energy-related costs affect campuses, students, faculty, and staff so they can develop strategies or programming that best maximizes expenditures on behalf of all stakeholders.

## I. Room and Board

Room and board is typically the second largest component of educational costs. Across the United States, colleges and universities have varying room and board (residency) requirements. While some institutions may require all freshmen to live on campus other institutions may have a four-year residency requirement where students must live on campus from matriculation until graduation. Costs related to room and board also vary from one campus to another. However, "room and board and other living costs have increased faster than inflation over time, and for most students, grant aid doesn't stretch far enough to cover these expenses" [44]. Rising costs can be attributed to the increasing costs that institutions incur as a result of previously discussed economic factors such as maintenance, deferred maintenance, construction, and energy. For the 2009-2010 school year, room and board increased 5.4% at public colleges and 4.2% at private colleges to an average price of $8,193 and $9,363, respectively" [45].

Food prices, much like energy costs, can fluctuate greatly and affect higher education institutions. In 2008, retail food prices jumped 6% which is triple the normal rate of inflation. "Food prices tend to go up pretty quickly and they tend to stick on the way down" according to Jim Sartwelle, an economist with the American Farm Bureau [46]. Increases in food prices affect college and university dining services and tuition. As a result, many dining halls are reducing portions as well as eliminating popular dishes to try and offset projected deficits due to rising food costs [46]. As indicated by Hermes [46] "Because meal-plan prices are usually set once a year, dining operations have been absorbing any excessive price increases, which can surpass hundreds of thousands of dollars at larger institutions." To help offset food service costs, colleges and universities are trying to be creative with menu options, renegotiating contracts with food suppliers, and "shelving the trays in hopes of conserving water, cutting food waste, softening the ambience and saving money" [46, 47].

Recognizing that affordability is often a key factor when students are selecting a college or university, it is important that administrators examine, identify, and implement all cost saving sustainable strategies that affect the enrollment price tag. The cumulative cost of tuition, room and board coupled with fees, books, and supplies continues to increase on an annual basis. According to the College Board, "This year the average total charges for tuition, fees, room and board are $14,333 for in-state students, $25,200 out of state. The average total at private campuses is $34,132" [48]. With increasing numbers of non-

traditional students seeking degree programs, at what point does affordability drive students to seek online or blended programs that do not include traditional residency-related costs, particularly if they can graduate with the same degree?

## J. Technology

The results of the *2008 Current Issues Survey*, administered annually since 2003 by EDUCAUSE, reveal that the top-three issues in terms of strategic importance to institutions are (1) Security, (2) Administrative/Enterprise Resource Planning (ERP)/Information Systems, and (3) Funding Information Technology (IT) [49]. Funding IT was ranked the number one issue for three straight years, 2003-2005, until 2006 when Security and Identity Management emerged as number one. In 2007, IT Funding moved back to the top spot, with Security as number two. In 2008, Security was number one. With both Security and IT Funding, the common element is cost, and insufficient budgetary allocations threaten an institution's strategic infrastructure. The *2007 Survey of Technology Spending*, conducted annually by the Professional Media Group LLC, found that 51% of all respondents reported an increase in IT budgets [50]. More and more students are expecting a wireless campus environment, multimedia classrooms, web enhanced courses, optional online courses, electronic resources, access to the library's digital collection and administrative records, and 24/7 tech support. Therefore, it is imperative that institutions stay current with the purchase and deployment of technology from administrative, student, and instructional perspectives.

# IV. TEN DEMOGRAPHIC FACTORS

Demographics have always had profound effects on higher education, and the impending shifts will undoubtedly change higher education in many significant ways. There are ten factors that must be proactively addressed if a college or university is to remain competitive and sustainable. In reviewing each of the ten factors, it is important to consider how population shifts both on national and state levels will affect higher education. In states with decreasing populations and decreasing high school graduates, competition within states for students will increasingly force colleges and universities to reach out to attract students. In states with surging populations, higher education administrators must develop strategies to optimize the campus infrastructure to meet the needs of increasing high school graduates. However, in both cases, competition for state funding will continue to increase as a result of population decreases and increases.

The demand for higher education degrees by employers is greater today than ever. As indicated by Spellings [51], an undergraduate degree is now considered a prerequisite in many fields, with advanced degrees preferred for entry-level employment. For the increasing non-traditional student population, online and blended education have become viable options, particularly for those who are (a) working full-time, (b) unemployed and seeking employment, (c) displaced or dislocated, (d) have family responsibilities, or (e) are unable to afford additional costs related to enrollment in traditional residential campuses. With increasing online degree acceptance by employers and a growing national inventory of online courses and programs, online and blended education are now a part of the higher education landscape.

## A. National Demographic Shifts

The United States will experience shifts in national demographics over the next twenty-five to forty years. It is projected that the US population will rise from 296 million in 2005 to 438 million in 2050 with 82% of this increase representing immigrants arriving during this time as well as their US born descendents [52].

Currently, 34% of the US population is minority. According to the US Census Bureau, the US population

will increase to 54% minority by 2050 with the term minority as defined by the US Census Bureau as anyone *who indicated that they were either Hispanic or a race other than white alone* [53]. By 2050, 62% of the nation's children will be minority, with almost two thirds of them Hispanic [53]. The challenges presented by immigrants are multiplied when they are undocumented, because for them, as the National Conference for States Legislatures noted, there is no federal financing:

> Since 2001, more than 20 states have introduced bills addressing in-state tuition for undocumented immigrants. Seven states have established new residency standards allowing unauthorized immigrant students to receive in-state tuition under certain conditions. Students without legal immigrant status continue to be ineligible for federal financial aid, although states are required to provide K-12 public education as a result of a 1982 Supreme Court decision [54].

As the US population continues to grow, there is a projected decline in the percentage of the population in the *working ages*. The US Census Bureau projects that the population between eighteen and sixty-four years old will decrease from 63% in 2008 to 57% in 2050. Projections also indicate that as the minority population grows, over half (55%) of the *working-age* population will be minority by 2050 [53].

Projected demographic shifts will require that resources be devoted to addressing cultural differences as well as the gap in language skills. With already strapped budgets, states will be challenged in terms of annual resource allocation, increasing competition for higher education funding.

## B. Population Shifts

Florida, California, and Texas will sustain the largest population growth between 2000 and 2030. According to the US Census Bureau, these three states will account for approximately half of the United States population growth between 2000 and 2030 [55]. Projections by the US Census Bureau indicate that the "top five fastest-growing states between 2000 and 2030 will be Nevada (114%), Arizona (109%), Florida (80%), Texas (60%), and Utah (56%)" [55].

While many states will see increases in population growth, other states will see minimal increases and even decreases. For example, there are five states that will see less than a 6% increase in population growth by 2015, including Wyoming (+5.9%), Pennsylvania (+4.0%), New York (+2.6%), Ohio (+1.7%), and Iowa (+1.0%). Two states will actually see decreases in population growth: West Virginia (-4.9%) and North Dakota (-5.5%) [55]. Of these seven states, four are projected to have more people sixty-five and older than under eighteen by 2030 (Wyoming, Pennsylvania, West Virginia, and North Dakota) [55].

As state populations increase and decrease, there will be increasing fiscal competition for state funding. In states with increasing populations, there will be increased demand on state funding for healthcare, social security, and education. For states with decreasing populations, the smaller tax base will influence overall funding that affects K-12 and higher education systems.

## C. Diversity

As previously indicated, the US Census Bureau projects the US population to be 54% minority by 2050 [52]. For many states, there will be extensive population growth ranging between 50% to over 100% with a large percentage representing minority population growth [52]. In a 2008 report entitled *Knocking at the College Door*, the Western Interstate Commission for Higher Education (WICHE) examines race/ethnicity and educational attainment. In the forward of the report, WICHE President David Longanecker writes:

> Gaps in educational attainment based on race/ethnicity – gaps that translate into huge differences in individual opportunity – have long existed, and eliminating these gaps has been the target of many public policy efforts. Such efforts generally have sought first and foremost to assure an

> equal playing field for all students, one in which hard work and ingenuity determine success. Certainly, providing for equal educational opportunity for all individuals is as vital as ever and the right thing to do morally. Today, however, we have a second, equally critical motivation to "do the right thing": our nation's future prosperity and security depend on it. The urgency of reducing educational attainment gaps is intensifying, due to the changing demographics of our student population. Failure to more fully address the educational needs of our rapidly growing minority populations threatens our nation's future [56].

According to Longanecker, higher education leaders must work collaboratively to address gaps in educational attainment based on race/ethnicity in the United States that translate into increased individual opportunity. It is imperative that leaders identify ways to provide equal educational opportunities for all individuals, particularly since minorities will represent 62% of the nation's population of children and 55% of the working-age population by 2050 [53].

Projections indicate that some states will experience much larger population growth, particularly minority growth, than other states. However, as indicated by Longanecker, addressing gaps in educational attainment based on race/ethnicity is a national issue. It is also an issue that affects resource allocations for K-12 and higher education.

## D. Decreases in High School Graduates in Parts of the United States

The number of high school graduates nationwide is expected to have peaked in 2008 at 3.34 million and then to decline until 2015 [57], after which it will begin to grow again. By 2015, 54% of states will face decreasing numbers of high school graduates, greatly impacting enrollment in higher education. *Knocking at the College Door* indicates that many Midwestern and Northeastern states will see the total number of high school graduates decrease by 10% or more by 2015 [56]. According to the *2008 Chronicle of Higher Education Almanac*, states expecting some of the largest decreases include Vermont (-23%) and North Dakota (-18%) [58].

For states expecting decreases in the number of high school graduates, competition between in-state colleges and universities will increase as institutions vie to enroll and retain eligible students. Therefore, higher education institutions within these states will need to develop innovative enrollment strategies to reach new student markets including online and blended program delivery options.

## E. Surges in High School Graduates in Parts of the United States

National demographic shifts will greatly challenge some states to meet the extensive population growth and significant increases in the number of high school graduates. According to the *2008 Chronicle of Higher Education Almanac*, states that will be leading growth in the number of high school graduates between 2008-09 to 2018-19 include Nevada (+33%), Arizona (+29%), Utah (+20%), Idaho (+20%), Georgia (+20%), and Texas (+19%) [58]. These numbers will put increasing pressure on states to provide adequate educational opportunity for their residents.

California is a prime example of a state in which there have been large increases in the number of qualified students who are eligible to enroll in higher education, but there are limited slots for enrollment. "Between 2003 and 2007, the number of public high school seniors eligible for the University of California or California State University [the two state-funded systems of higher education] increased by 11%" [59]. However, both of these systems have announced plans to "to cut their budgets and shrink enrollments in the face of reduced state funding" [59]. As revealed in the December 2008 article "More Eligible Students, Fewer College Slots," although California high schools are graduating more students who are qualified and eligible to enroll in a public university system than in past years, particularly Latinos, not all students will have the opportunity to enroll [59]. "The message to the universities is that they can no longer accommodate growth by building new campuses and increasing financial aid" [59].

Like California, many other states will be challenged by increasing numbers of eligible students and limited college slots. Therefore, higher education leaders need to consider the development of educational delivery options, such as online and blended, that enable colleges and universities to accommodate the growing, qualified student population while keeping costs at a minimum.

## F. Adult Learners

In 2005, James Gorman, president of the Global Private Client Group of Merrill Lynch, stated "Baby boomers fundamentally will reinvent retirement, and this has profound implications for how we at Merrill Lynch need to advise this generation of clients — individuals as well as retirement plan sponsors" [60]. The *2006 Merrill Lynch New Retirement Study* revealed 71% of Americans between the ages of 25 and 70 hopes to continue working past the expected retirement age and not necessarily in the same line of work [60]. In fact, the study indicated that over half of those between 51 and 70 years old were already taking steps to prepare for a new career by talking to others, attending classes or researching opportunities.

In 2007, the American Council for Education (ACE) published *Framing New Terrain: Older Adults and Higher Education*. This report further substantiated Gorman's notion of reinventing retirement. According to *Framing New Terrain,*

> As the population of older adults not only expands, but also changes, so does the language used to describe it. *Retirees* and *seniors* are now *rebounders, prime timers,* or *recareerers.* In short, the term *retirement* is being retired, or at least redefined. Instead, increasing numbers of adults aged 55 to 79 are entering the *third age* of life—a stage in recent years defined by personal achievement and learning for self-development—with new plans for their later years in mind [61].

As highlighted in the ACE report, there are extensive current and future opportunities for colleges and universities to expand their outreach to this population through online and blended education.

In an interview with the *GreenTree Gazette*, Craig McGuinn discusses with how Ward Media is reaching out to the adult higher education market. McGuinn identifies three key segments in today's adult higher education market:

> (1) Adults who need a trade or specific occupational skill to insure employability or make a career shift. (2) Working adults who believe their long-term career or pension opportunities will be enhanced by an Associate or Bachelors degree. (3) Bachelor degree holders who want a higher degree that can be obtained while employed full-time [62].

## G. Global Competition

> There are few things as fundamental to the American Dream or as essential for America's success as a good education. This has never been more true than it is today. At a time when our children are competing with kids in China and India, the best job qualification you can have is a college degree or advanced training. If you do have that kind of education, then you're well prepared for the future because half of the fastest growing jobs in America require a Bachelor's degree or more. And if you don't have a college degree, you're more than twice as likely to be unemployed as somebody who does. So the stakes could not be higher for young people [63]. ~ President Barak Obama

> By ensuring that higher education is affordable and accessible for all our young people, we will make certain that our nation is prepared to compete in an information-age economy [64]. ~ US Secretary of Education, Arne Duncan

President Obama has clearly articulated the need for a higher education degree. His administration, while still in its first year, has submitted an unprecedented number of proposals to reshape and redirect Title IV funding, as well as a willingness to use the US tax code to help certain individuals and families pay for college. As indicated by Cavanaugh,

> The recent debate over the inclusion of colleges in the stimulus package put two aspects of higher education in the spotlight: the importance of attending college, and the role of higher education as an enormous economic driver. Affordability and accessibility to higher education are critical in making "certain that our nation is prepared to compete in an information-age economy" [65].

However, as revealed in *Global Higher Education Rankings,* while the United States ranks fourth for accessibility to higher education when compared globally to 13 countries, it ranks thirteenth for affordability when compared to 15 countries [66].

According to the US Census Bureau, just 29% of adults twenty-five and older in the United States have a bachelor's degree or higher and 87% has completed high school [64]. Research indicates several benefits related to earning a bachelor's degree. For example, the US Census Bureau reported in 2009 that workers with a high school degree earned an average of $31,286 in 2007 and workers with a bachelor's degree earned an average of $57,181 [67]. Moreover, the US Department of Labor reports "the unemployment rate for workers who dropped out of high school is nearly four times the rate for college graduates" [67]. Additionally, the College Board reports in *Education Pays: The Benefits of Higher Education for Individuals and Society* "a positive correlation between higher levels of education and higher earnings for all racial/ethnic groups and for both men and women" [68]. In addition to higher earnings, the College Board states that college graduates are more likely to have employer-provided health insurance and pension benefits, better health, greater opportunities for the next generation, and higher levels of civic participation [68]. Therefore, administrators need to consider delivery methods that extend educational opportunities beyond the campus to the larger population.

## H. Employment Expectations

"The labor market demands greater skills than ever before as a precondition for higher earnings," according to Hozler [69]. In fact, increasing numbers of professions are requiring some level of postsecondary education. The Career Voyage website developed by the US Departments of Labor and Education reveals that the top fifty in-demand occupations require a college degree [70]. With increasing unemployment rates over the past year, competition for jobs has also increased putting more demand on the need for a higher education degree.

With advances in technology and telecommunications, the labor market will continue to need employees with skills and knowledge to lead innovation. As the nation continues to struggle globally in a weak economy, it will be the US workforce that leads the country toward sustainability. President Barak Obama has clearly articulated to the nation the need for higher education [63]. Therefore, it is imperative that government, corporate, higher education, and civic leaders work collaboratively to identify strategies to provide higher education opportunities through cost-effective and quality programming that will enable the nation to again lead on a global front and provide increased professional and personal benefits to workers [68].

## I. Increasing Online Inventory

The exact number of colleges and universities in the United States that offer online education degrees is difficult to determine because new online programs are launched on an ongoing basis. According to *Newsweek Showcase*, "The sheer number of distance learning and online degrees available is enormous and is growing daily. Similarly the number of schools and institutions that offer learning online is also expanding rapidly" [71].

Over the past two decades, online education has transitioned from an emerging sector to a multi-billion dollar market [72]. According to MediaTech Publishing, eLearning is predicted to exceed $52.6 billion dollars worldwide [73]. As stated in a press release showcasing National Distance Learning Week, an initiative by the United States Distance Learning Association (USDLA):

> Distance learning is a multi-billion dollar enterprise and the fastest growing segment of the education market. Commercial and government markets around the world recognize how distance learning, education and training makes a strategic contribution to achieving organizational performance objectives, leveraging talent and resources, and implementing and preserving institutional knowledge [74].

The state of Minnesota is taking a very proactive position with online education and expanding its educational outreach through its public colleges and universities. In November 2008, the Governor of Minnesota and the Chairman of the Minnesota State Colleges and Universities (MnSCU) Board of Trustees Chair announced a goal to have 25% of all MnSCU credits earned through online courses by 2015 [75]. With Minnesota expecting a 2% decrease in the number of high school graduates between 2008-09 and 2018-19 as well as statewide budget cuts, online education is providing alternative educational delivery methods to reach extended student populations.

It is clear that through the proliferation of online programs that online education is now a part of the higher education landscape. As other states begin to face similar challenges as Minnesota, college and university systems may also begin migrating courses or programs to become part of their online inventory as a viable, sustainable, and cost-effective option for increasing and decreasing state populations.

## J. Online Degree Acceptance

Since 2001, higher education institutions have experienced amazing growth in the number of college students taking online courses. According to the Sloan Consortium:

- almost 3.9 million students were talking at least one online course during the fall 2007 fall term (a 12% increase over the number reported the previous year);
- the 12.9% growth rate for online enrollments between fall 2006 and fall 2007 far exceeded the 1.2% growth of the overall higher education student population; and
- over 20% of all US higher education students were taking at least one online course in the fall of 2007 [5].

The high acceptance rate of online degree programs in higher education as indicated by the extensive growth reported by the Sloan Consortium should come as no surprise to educators. Today's students, often referred to as the *Millennial Generation*, have been raised in a digital environment, where so-called smartphones, laptop computers, and high speed-wireless Internet access are a normal part of their daily lives.

The United States military has been one of the greatest leaders in distance education. According to the Journal of Higher Learning for Today's Servicemember,

> Since the mid-1970s, the number of servicemembers taking online college courses has increased from 5 percent to more than 70 percent last year. Currently, more than two-thirds of the military's tuition assistance funding is used for distance learning courses [76].

In August 2009, the new GI Bill (called the "Post 9/11" GI Bill or Chapter 33 GI Bill) began providing millions of military personnel (veterans, active duty, reserves, National Guard) the opportunity to attend college at little to no cost [77]. While national data is not currently available, it will be interesting to follow future enrollment trends highlighting the types of educational programs with delivery options for which military personnel enroll. Information regarding the educational benefits of the GI Bill is available through the United States Department of Veterans Affairs' website at http://www.gibill.va.gov/GI_Bill_Info/benefits.htm [77].

## IV. IMPLICATIONS OF ECONOMIC AND DEMOGRAPHIC FACTORS

American higher education has clearly reached another crossroads in its development, but one unlike anything else it has faced in its nearly four hundred-year history. Never before have so many factors come together simultaneously to challenge how education is delivered. At the same time, the vicissitudes of the economy have caused the demands of the technological revolution to collide with financial shortages. The identified twenty economic and demographic factors are clearly not the only places where costs are rising beyond the control of colleges and universities. However, each factor directly or indirectly affects costs and affordability, consequently influencing educational delivery and enrollment.

An additional factor to be considered is the cost of employee benefits, particularly healthcare. The results of a 2009 employee health-care benefits survey conducted by the College and University Professional Association for Human Resources revealed that "the total cost of the plans' premiums grew 3.7 percent for employee-only coverage and 5.7 percent for employee-and -family coverage" [78] The results further revealed that the increases over the past two years amounted to about 11% and 14%, with institutions absorbing most of the increase [78]. Factors such as healthcare may become more of an economic issue in higher education with new government policies and an aging faculty population. This leads to a poignant question: Will increasing costs related to employee benefits lead to increased development of online and blended programs as administrators seek strategies to decrease instructional expenditures by hiring part-time faculty with fewer benefits?

Institutions of higher education must be able to provide education to more students in the same (limited) amount of space. Building new buildings and renovating existing ones are options that economic factors will continue to make less likely. Education must also be accessible to people of increasing diversity whose lives have become significantly more complicated because of work and family demands, and for whom the costs of transportation to and from campus will be of increasing concern. Information is no longer defined by what is in the university library (or through inter-library loan), but what is "accessible virtually and instantaneously" over the internet by students who have been using technology most of their lives.

Any one, two or even three of the twenty identified factors could probably be handled by tightening belts and deferring some "wants" in favor of "needs." Taken together, however, these factors make re-examination and repositioning imperative. These economic and demographic factors are changing the landscape of higher education and driving current and future online and blended program enrollments.

Times have changed and higher education institutions must change with them. The push-and-pull of economic and demographic forces require that colleges and universities integrate and utilize technology

as much as possible while maintaining academic excellence and concurrently freeing up physical space, expanding the number of students, and teaching in ways that current learners are accustomed to learning.

## V. CONCLUSIONS

Why should colleges and universities of all sizes, both two-year and four-year, public as well as private, consider offering or increasing online and blended courses and degree programs?

Higher education will continue to provide hope and new opportunities for those seeking careers, and re-entry into the employment market. Today, online and blended education are an integral part of higher education. Through balancing academic quality and accountability with flexible scheduling, online and blended education provide long-term sustainable programming opportunities for colleges and universities. Online and blended programs also enable institutions to expand student markets nationally and internationally, moving beyond traditional local, regional and state markets. These expanded student markets provide opportunities for new institutional revenue and the expanding of an institution's alumni base.

In "A Straight-Talk Survival Guide for Colleges," Facione shares two messages with higher education institutions: (1) "competition is going to become fierce;" and (2) "there will be casualties, just as commercial businesses will fail and other worthy nonprofit organizations will go broke" [2]. For institutions that are not proactively exploring new student markets or new programming options, financial crisis or exigency may come as an unplanned reality. Face-to-face courses and programs will always play a critical role in higher education in the United States. However, economic and demographic factors are requiring higher education institutions to re-examine and reposition themselves. These factors will continue to drive current and future online and blended program enrollments.

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# IS THE WHOLE GREATER THAN THE SUM OF ITS PARTS? A COMPARISON OF SMALL GROUP AND WHOLE CLASS DISCUSSION BOARD ACTIVITY IN ONLINE COURSES

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**ABSTRACT**

Methods for characterizing asynchronous text-based discussions have received significant attention in the literature. In this study, we examine student and instructor posts made in seventeen undergraduate mathematics courses over the duration of a fifteen-week semester (n=6964 posts). We apply our previously developed multifactor discussion board metric to compare differences in student participation, quantities of student posts, quality of posts, extent of threading, and instructor presence in small group and whole class discussion board activities. Results from this study indicate that small group discussions contained greater levels of student participation, greater quantities of posts per student and greater numbers of educationally valuable (content-related) posts per student as compared to whole class discussions within these courses. Interestingly, small group discussions contained a greater proportion of less educationally valuable posts as compared to whole class discussions.

**KEYWORDS**

Distance Learning, Discussion Board, Asynchronous Learning, Cooperative Learning, Collaboration, Educationally Valuable Talk, Metric, Mathematics, Online Learning

## I. BACKGROUND

Despite the body of literature that endorses cooperative learning strategies, particularly for face-to-face instruction in K-12 settings, the results from higher education and online courses are less conclusive. Most of these concerns have been raised from case study based research. Therefore, we sought to characterize trends on a larger scale by examining differences in participation, quantity of student posts, quality of posts and instructor presence in all online mathematics courses offered by Empire State College that contained both small group and whole class discussion formats. By examining differences within each course section, we observed how each group of students and their instructors differed in their posting behavior in the small group and whole class context.

Cooperative learning is a task that is often split into subtasks performed independently by team members and later assembled into a conjoined product. Collaborative learning is a process of mutual and shared concept building through socially mediated processes [1]. Collaborative approaches to learning and instruction have roots in constructivist theory and Vygotsky's theory of socially constructed knowledge. If we consider that a class discussion is a social exchange in which an understanding and framework for course concepts is negotiated, all discussion board activity may be considered a collaborative activity. In

this study we consider all types of discussions (small group and whole class) to be collaborative in nature, and note that small group activities are structured according to cooperative principles which are a subset of collaborative skills. Cooperative learning is considered to be a specialized subset of collaboration. It is characterized by small groups that work according to principles of positive interdependence, and, ultimately, receive a group evaluation which is equal to, if not more important than, an individual evaluation [2]. Positive interdependence is the perception that group members "succeed if and only if all learners succeed so that they must coordinate their efforts" [3, p. 56]. Interdependence may be facilitated by course design features and instructional practices that require groups to deliver a common product, perform interdependent tasks (division of labor), utilize shared resources, assume specific interdependent roles within the group, and receive individual rewards based on group performance [3,4].

The benefits of cooperative learning approaches that have been cited by education researchers include increased achievement, increased exposure to diverse perspectives, increased student participation in the educational process, and increased peer exchanges. A full review of cooperative learning theory is beyond the scope of this paper. Interested readers may wish to refer to works by Johnson and Johnson or Slavin for a comprehensive overview of theory in this area [5, 6,].

One of the greatest benefits of working in small groups is that students can engage in active learning modalities that allow for problem solving beyond the scope of any one individual [7]. Intuitively, it would seem that asynchronous discussion forums would enhance small group interaction. Such forums offer groups more flexibility and extended thinking time between contributions. In theory, this benefits the quality of exchanges [3]. In practice, however, many groups fall short of these aims, particularly in the online environment. Several researchers report barriers to cooperative learning in online environments, such as non-participating students [8, 9, 10], off-topic posts [1, 4, 8, 11, 12] and students' negative attitudes toward group work [13, 14]. Some researchers have found the addition of structure and guidelines improves students' perceptions of group work [14, 15, 16], while other researchers advocate heterogeneous groups [7], establishing individual and group accountability [17], and creating positive interdependence through roles or rewards [4].

Non-participating group members have been reported to pose significant challenges to small group activities in the online context. In a case study of twenty-five students in online courses in education, students reported that collaboration was problematic [10]. Students rarely communicated with each other via email, and in small group assignments teamwork was difficult due to uncooperative students. While simply participating in a discussion is not a sufficient condition for learning to occur, broad participation is certainly a necessary condition for the discussion to be of value [8]. Students who do not participate or do not participate fully lead to groups with partial knowledge exchange, in contrast to groups who exhibit a more distributed knowledge exchange [9].

A second area of concern relates to the content of students' posts in small group discussions. Theoretically, students and instructors can socially construct knowledge through asynchronous discussion. Students may confirm or modify pre-existing cognitive schema through interacting in their Zone of Proximal Development [18]. Scaffolding provides a means by which existing schema may be connected to new ideas related to course content. Problematically, several researchers have found that small group discussions tend to contain a significant portion of posts that are not related to the academic content. A discussion in which the majority of posts are not related to course content or cognitive process may have limited potential for the social construction of knowledge. In a cross-case study of nine online courses, students in collaborative writing activities spent significantly more time discussing division of labor instead of academic content, as compared to other discussion formats [11]. In other case studies, a similar pattern emerges with off-topic or logistical/planning posts often accounting for up to 50% of the

discussion board contributions [1, 4, 8, 12].

Therefore, it is not surprising that students report negative attitudes toward small group work in the online environment. In a large survey of the State University of New York's online course consortium (SUNY SLN), students' perceived learning was negatively correlated with the portion of course grades associated with group or cooperative assignments [13]. "Students' comments indicate that it was difficult to get group members to work together on projects in the few courses in which collaborative learning was tried" [13 p. 516]. This finding is also supported by the work of other researchers who report negative student reactions to small group cooperative learning activities [10, 14].

Several factors can influence the success or failure of a group's effectiveness for the social creation of knowledge, such as group characteristics (i.e. size, composition), group interactions and individual characteristics [7]. Factors such as the type of task, individual vs. group accountability and individual differences may influence the relative success of online collaboration [17]. Some researchers suggest that individual characteristics play a role in group cooperation insomuch as they assume that an individual's desire to be part of a group, to be valued by others, and to desire communication account for intrinsic motivation for group affiliation [4]. Problematically, these factors may not be at work in an online adult learning setting. Adults are often busy and value a direct path to learning. Thus, the task of group learning may be viewed as inefficient. Concerns over the impact of the group project on individual grades may also create anxiety. Similarly, instructional style may also play a role in how classes of students interact through discussion forums [11, 22]. We also acknowledge that course content may play a role in how students collaborate in online discussions. Results obtained from teacher education or language learning courses may or may not apply to more problem-based courses such as mathematics. Lastly, we also acknowledge that features of online learning management systems may also influence interaction patterns.

The problem with many studies is that a single case study or cross-case study approach is often used [1, 4, 7, 9, 10, 12, 14]. Thus, it is difficult to determine whether observations are specific to a group of learners, course content, instructional style, and/or learning management system. In this study, we used a paired measures design in which small group and whole class participation were paired in each course. In this manner, we measured the difference in participation in small group and whole class discussion in each of the seventeen courses we observed. Similarly, we also used a paired measures design to examine student quantity of posts. This allowed us to determine how talkative students were once they decided to participate in small group and whole class discussions. Thirdly, we sought to characterize the extent to which students discussed rather than reported on their learning. A key assumption of cooperative learning theory is that students in such activities will experience a greater number of exchanges and opportunities for discussion. We wondered, however, whether this assumption holds true in the online environment. In both whole class and small group asynchronous text-based discussion, there is no limit to the number of exchanges. The extent to which students may discuss material in the whole class setting may not be as limited in the online environment as it is in the face-to-face environment.

## II. QUANTIFYING DISCUSSION BOARD ACTIVITY

Characterizing asynchronous text-based discussions has received significant attention in the literature. Although several strategies have been proposed [11, 19–23], they are not suitable for use with large data sets and often confound factors (student participation with student quantity of posts or instructor presence with class size).

In Bliss and Lawrence [24], we developed and applied a multi-factor discussion board metric that is suitable for comparative studies. This metric allows for comparison between classes with different enrollment sizes and allows for a quantitative description of student participation, quantities of student posts, quality of posts, extent of threading, instructor presence, presence of expectations and guidelines for feedback, and presence of feedback.

In this study, we examine 17 online mathematics courses that contained both whole class and small group discussions. We define small group discussions as those in which groups of two to five students participate in an asynchronous text-based discussion to which only they and the instructor have access. In contrast, we define whole class discussions as asynchronous text-based discussions that are open to the entire class and for which participation is expected. We did not include optional discussions, such as the "Ask a Question" board. By basing our comparisons within each class, we are able to hold the following factors constant: course content, and individual student and instructor differences. Thus, we are able to examine the effect of discussion fragmentation on discussion board activity patterns.

## A. Student Participation

In our previous research [24], we argue that while we might hope that all enrolled students will engage in all learning activities (including discussions), this is often not the case in practice. We defined participation as the proportion of enrolled students who decide to post to a discussion board. This definition allowed for comparisons to be made between course sections of different sizes. Student participation is an important item to quantify and is not synonymous with the quantity of posts. Participation describes the proportion of enrolled students who post to a discussion board whereas quantity of posts describes how talkative students are once they decide to participate.

## B. Quantity of Student Postings

Several strategies for measuring the quantity of student posts have been proposed. One approach is to divide the number of total posts made in a course by the number of discussion forums [11]. This measure does not allow for accurate comparisons between classes of different sizes and also does not reveal trends between different discussion board types within the same course (i.e. small group vs. whole class). A measure that accounts for this is advantageous for comparative studies. Another common measure in the literature is to report the number of student posts per discussion forum divided by the number of students enrolled in the course [22, 25–28]. The problem with this approach is that not all students who are enrolled in a course participate in every discussion. To adjust for this, we define quantity of student postings as the number of student responses divided by the number of active students in a discussion. This measure provides us with a glimpse of how talkative our students are once they have decided to participate.

## C. Quality of Student Postings

Several strategies for measuring quality of posts have been provided in the literature. Most of these are either too detailed or too general to provide sufficient data for quantitative comparisons. For an analysis of a small number of courses, a highly detailed rubric for content analysis can be an appropriate tool for fine-grain analyses of message content [3, 20, 28, 29, 30, 31]. Using this type of analysis on a large data set (i.e. an entire department's online course offerings) would most likely require two researchers working full-time (40 hours/week) for several months. Most academic units who wish to review discussion board interaction patterns do not have the human resources for such analysis. At the other end of the spectrum, more generalized approaches do not often yield quantifiable and tractable data [19, 21]. One general definition of 'quality' of student posts is "the extent to which the message covers the topic that the course

experts have identified as significant and the depth (granularity) to which the topics have been explored" [19, p. 266]. Problematically, this definition is highly subjective and difficult to quantify. Another attempt defines quality as clear or unclear [21]. Problematically, a post may be clear, but clearly off-topic. In our previously developed discussion board metric, we therefore proposed the inclusion of a new paradigm for measuring the quality of student postings.

Uzuner has proposed a dichotomous categorization of educational talk: Educationally Valuable Talk and Educationally Less Valuable Talk [32]. Educationally valuable talk (EVT) is "a particular interaction pattern in online discussion threads characterized as dialogic exchanges whereby participants collaboratively display construction, and at times, critical engagement with the ideas or key concepts that make up the topic of an online discussion, and build knowledge through reasoning, articulations, creativity and reflection" [32 p. 402]. Educationally less valuable talk (ELVT) may be defined as "talk that lacks substance in regard to critical and meaningful engagement with the formal content or ideas that are discussed in the posts of others in an online discussion" [32 p. 404]. ELVT posts are typically short posts that do not add new content related to the academic discussion. It is worth noting that although such posts are termed educationally less valuable, they are still valuable in terms of developing social presence and a community of learners.

Using the dichotomous categorization (EVT vs. ELVT) allows for a clear, intuitive and efficient manner by which to classify posts as being related to course versus posts which are off-topic or add little depth or breadth to the forum. Coding discussion board transcripts in this manner requires one researcher approximately one hour to code seventy-two posts. Depending on the length of the discussion, the coding time for one discussion board may range from thirty minutes to two hours. More authentic methods of measuring posts' perceived educational value exist (i.e. interviews, journaling), however, the EVT/ELVT method provides a metric by which one can measure the quantity (and proportion) of discussion posts which are related to the educational content of the course.

## D. Extent of Threading

Threading is defined as the level to which discussion has been generated in asynchronous text-based discussion boards. Previous studies have quantified the extent of threading by measuring the average thread length [11, 22, 27]. Since this is an average, this index tends to blur the distinction between posts which are unanswered, those which generated only a single reply and those which generated discussion. We characterize the extent of threading by three broad categories: unanswered posts, acknowledged posts (posts with only first level replies), and posts which lead to discussion (posts with two levels or more of replies). Knowing the relative number of posts in these distinct categories would provide useful information on the extent to which discussion and peer interactions occurred within a discussion.

## E. Instructor Presence

Significant debate exists in the literature over the role of instructors in online discussions [11, 27, 33, 34]. The debate is more fully discussed in the development of our multi-factor discussion board metric [24]. For a suite of courses taught by different instructors, techniques for quantifying instructor responsiveness to student posts on discussion boards become important tools for characterizing discussion board interaction patterns. We measure instructor participation as the raw count of instructor responses per participating students in the discussion forum. This is a particularly useful way to quantify instructor presence for discussion boards with unequal numbers of participating students. For example, this measure would report a low level of presence for an instructor who makes four posts on a message board of twenty students as compared to a message board of four students. We are primarily interested in whether

instructors are more or less present in small group discussions as compared to whole class discussions.

# III. METHODS

Seventeen online undergraduate mathematics courses offered by the Center for Distance Learning at Empire State College were observed for the entire duration of their delivery. Courses were delivered over a fifteen-week semester in an entirely online asynchronous format, beginning in January 2008. Discussion boards, course syllabi, private folders and grade books were observed during this time period. The result was an analysis of 6,964 posts made over 239 message boards. Only courses which contained small group and whole class discussions were included in this study. Not included in the analysis were the "Ask a Question" board, "Student Lounge" and the "Icebreaker" discussion. Discussion boards were observed and quantified two weeks after their due date to capture late posting students' contributions. Transcript analysis was performed by the principal investigator who developed the method described in our previous paper [24].

## A. Student Participation

Student participation was calculated by the number of students participating in a message board, divided by the number of students enrolled in the course at the time of the message board. For each course, we also recorded the number of students who participated in whole class discussions and the number of students who participated in small group discussions.

$$Student\ participation\ = \frac{\#\ of\ students\ participating\ in\ discussion}{\#\ of\ students\ enrolled\ in\ the\ course}$$

## B. Quantity of Student Postings

The quantity of student posts for each discussion board was calculated as the number of student posts on a message board divided by the number of students participating in the message board.

$$Quantity\ of\ student\ posts = \frac{\#\ of\ student\ posts}{\#\ Students\ participating\ in\ the\ discussion}$$

This formula indicates how many posts students were making on discussion boards and in the course overall when they chose to participate.

## C. Quality of Student Postings

Transcript analysis was conducted to assess the quality of posts. Student and instructor posts were coded as Educationally Valuable Talk (EVT) or Educationally Less Valuable Talk (ELVT) according to the definitions set forth by Uzuner [32]. The percent of EVT was calculated by dividing the number of EVT posts by the total number of posts.

$$Quality = \frac{\#\ of\ EVT\ posts}{Total\ \#\ of\ posts}$$

## D. Extent of Threading

For the purposes of this study, three conversation styles were defined (Fig. 1). The "speak" style was

defined by an original post to which there was no reply. The "speak-reply" style was defined by an original post which receives only one reply or several replies only one layer deep. The "discuss" style was defined by an original post, which contained replies at least two layers deep.

| Conversation Style | Example |
|---|---|
| Speak (Unanswered posts) | Math is Great…Posted by Mary |
| Speak-reply (Level 1 replies) | Math is Great…Posted by Mary<br>Re: Math is Great…Posted by Bob<br>Re: Math is Great…Posted by Cindy |
| Discuss (> Level 2 replies) | Math is Great…Posted by Mary<br>Re: Math is Great…Posted by Bob<br>Re: Math is Great…Posted by Mary<br>Re: Math is Great…Posted by Cindy |

**Figure 1. Conversation Style Categories**

## E. Instructor Presence

Instructor presence is calculated by dividing the quantity of posts to a discussion board made by an instructor by the number of active students. This was done in order to facilitate comparisons between classes with different enrollments. Using participating students in this calculation was a more accurate measure of how "responsive" instructors were to student posts.

$$Instructor\ presence = \frac{\#\ of\ instructor\ posts}{\#\ of\ students\ participating\ in\ discussion}$$

# IV. RESULTS

The results of this study indicate that there were significant differences in participation, quantity of posts, quantity of educationally valuable posts, and proportion of educationally valuable talk in small group as compared with whole class discussions.

## A. Student Participation

The proportion of students who participated in discussion boards varied between courses and between different sections of the same course (Fig. 2). Overall, we were interested in whether a larger or smaller number of students participated in whole class discussions or small group discussions. For each course, the number of students who participated in whole class discussions and small group discussions was recorded. The mean number of students who participated in whole class discussions was 6.68, compared to a mean of 13.99 students who participated in small group discussions. Using a paired t-test for sample means, student participation was found to be significantly greater in small groups than in whole class discussions ($t= -6.65626$, $p<.001$, $df=16$).

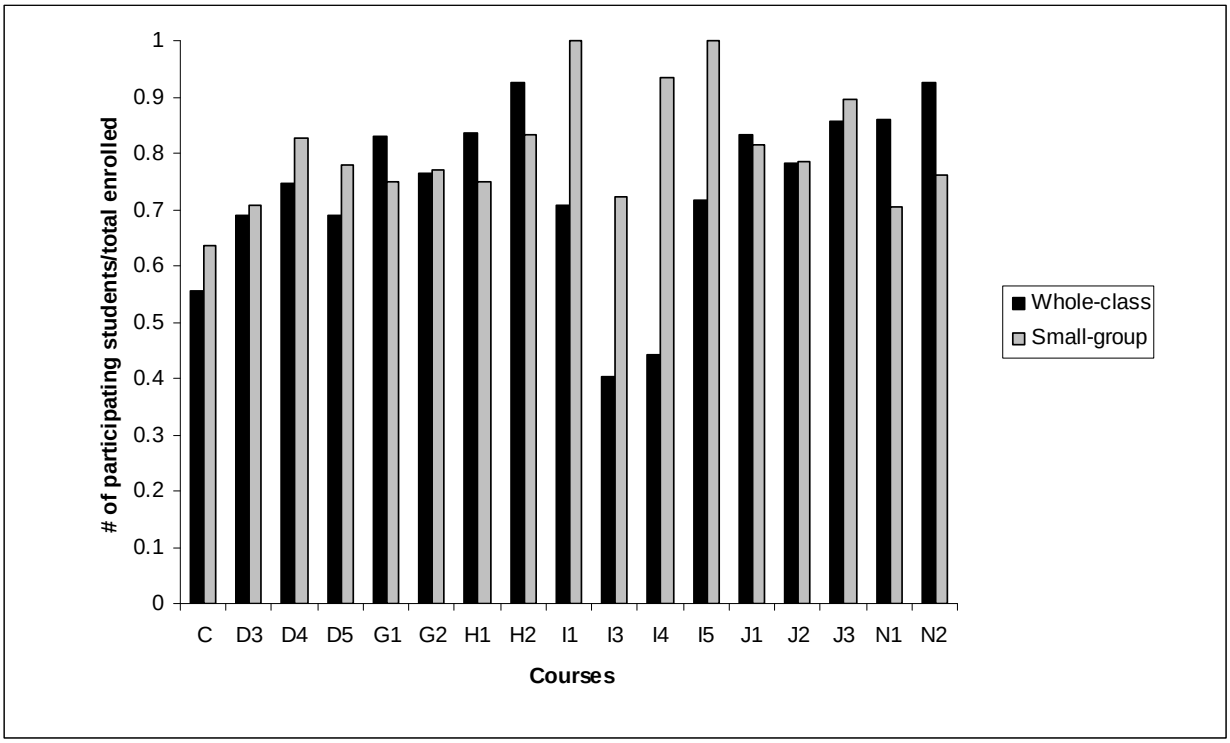


**Figure 2. The Proportion of Students Participating in Whole Class and Small Group Discussion Boards. Courses are designated by letters and course sections are designated by numbers. For example, G1 represents section 1 of course G. Course codes match course code presented in [24]. Since not all courses from the larger study contained small-group discussions, some courses (i.e. course sections A1 and A2) are omitted.**

## B. Quantity of Student Postings

A greater quantity of student posts was found in small group discussions as compared to whole class discussions (Fig. 3). The mean number of student posts in small groups was 7.28 posts per student per discussion board, while the mean quantity of student postings for whole class discussions was found to be 2.87 posts per student per discussion. Using a paired t-test for two sample means, this difference was found to be significant ($t = -10.14$, $p < .001$, $df = 16$).

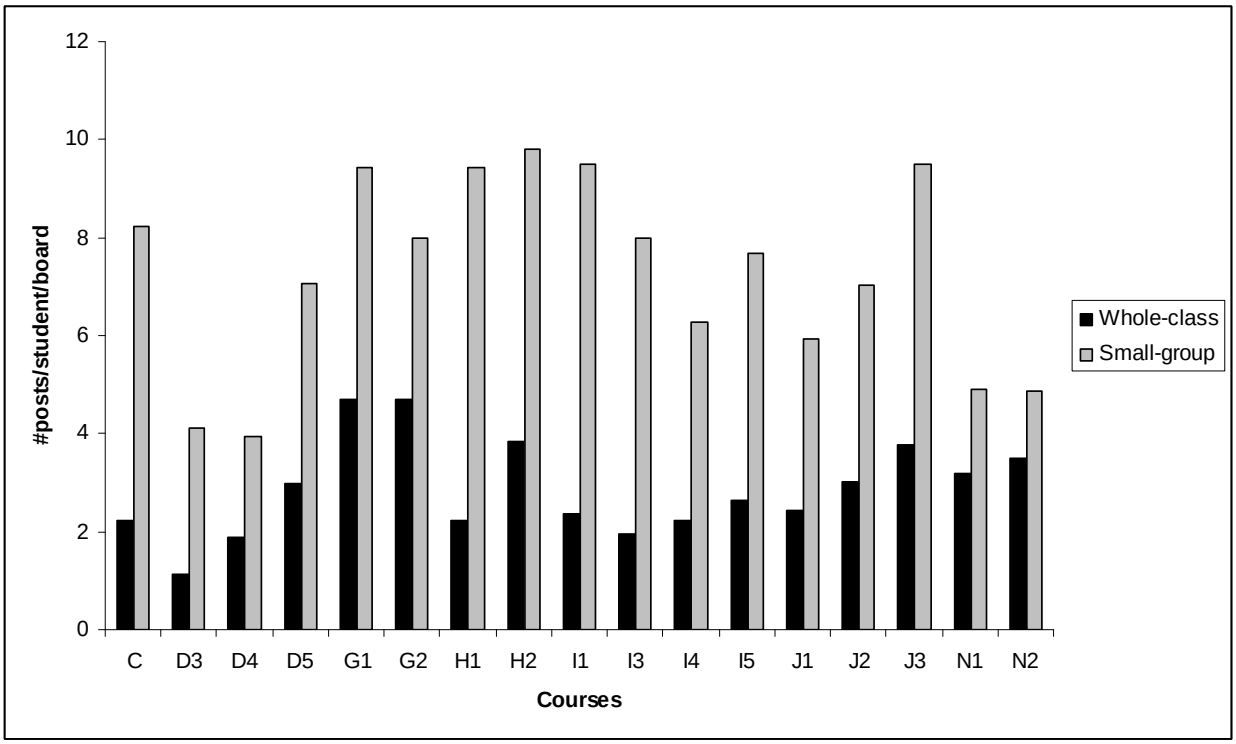


**Figure 3. The Mean Number of Posts Per Participating Student Per Discussion Board in Whole Class and Small Group Discussions.** Course codes match course code presented in [24]. Since not all courses from the larger study contained small-group discussions, some courses (i.e. course sections A1 and A2) are omitted.

## C. Quality of Student Postings

Small group discussions contained a lower proportion of total posts devoted to educationally valuable talk as compared to whole class discussions (Fig. 4a). Interestingly, this trend was not revealed when looking at the numbers of EVT posts per student per discussion (as compared to the proportion). The mean number of EVT posts per student per discussion was 1.77 for whole class discussions as compared to 2.46 for small groups (Fig. 4b). Using a paired t-test, the quantity of EVT posts was found to be significantly higher in small group discussions than in whole-class discussions ($t = -2.712$, $p < .05$, $df = 16$). This indicates that although students did post more EVT posts in small groups, the activity was accompanied by a disproportionate increase in the number of ELVT posts (i.e. posts related to group processes such as delegation of duties and procedural planning, brief statements of agreement and brief statements of appreciation to each other). The disproportionate increase in the number of ELVT posts resulted in a greater proportion of ELVT in small-group discussions, even though the quantity of EVT posts was significantly greater in small-group discussions.

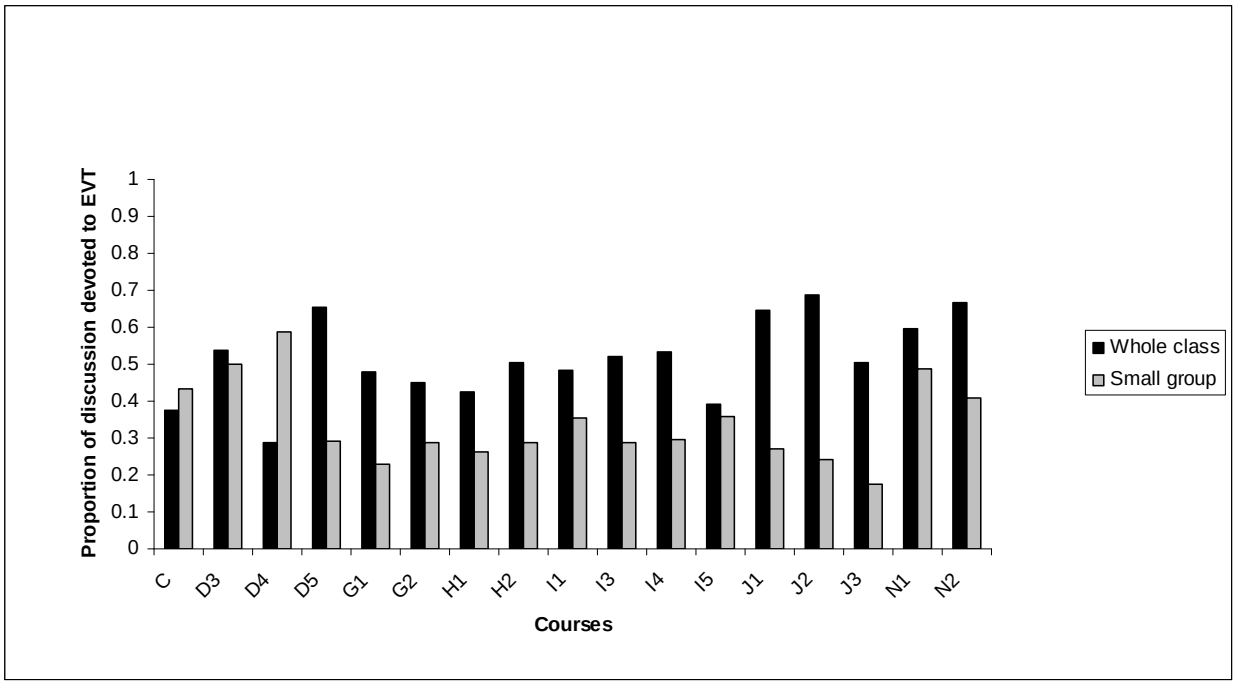


**Figure 4a. The Proportion of EVT Posts Made Per Participating Student Per Discussion Board in Whole Class and Small Group \Discussions.** Course codes match course code presented in [24]. Since not all courses from the larger study contained small-group discussions, some courses (i.e. course sections A1 and A2) are omitted.

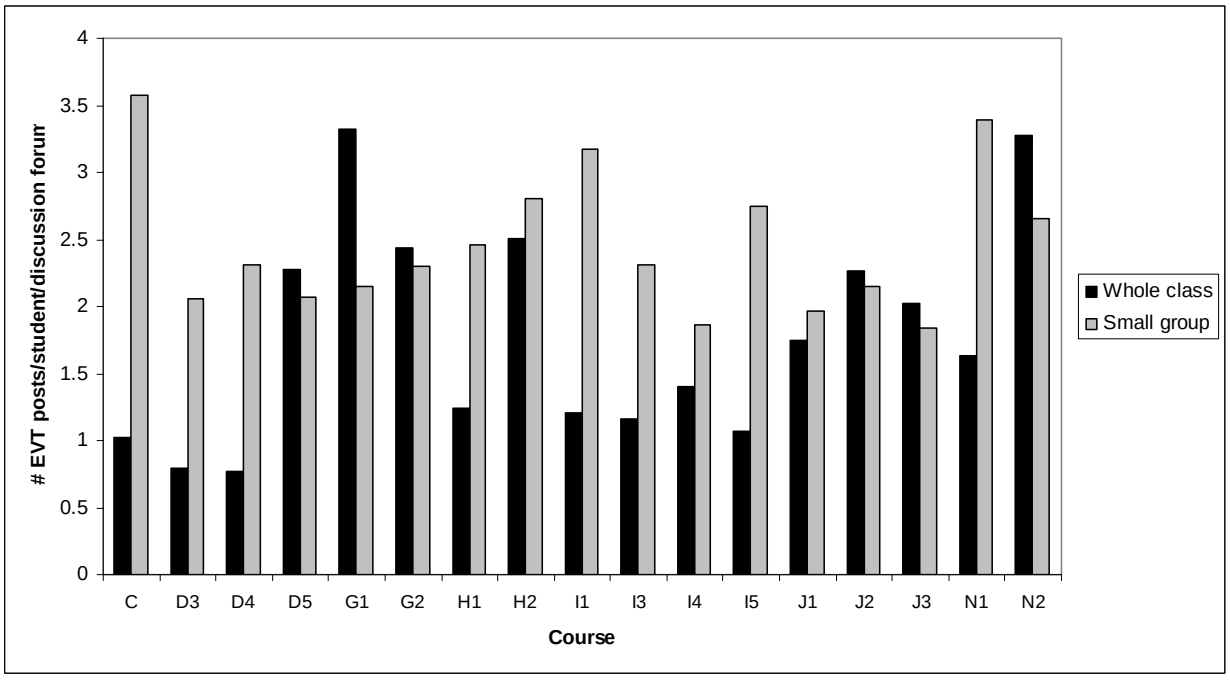


**Figure 4b. The Mean Number of EVT Posts Made Per Participating Student Per Discussion Board in Whole Class and Small Group Discussions.** Course codes match course code presented in [24]. Since not all courses from the larger study contained small-group discussions, some courses (i.e. course sections A1 and A2) are omitted.

## D. Extent of Threading

No significant difference was found in the number of original threads that led to discussion in small group as compared to whole group discussions.

## E. Instructor Presence

No significant difference was found in the number of instructor posts per student per discussion board in small groups as compared to whole class discussion.

# V. DISCUSSION

Our study measured student participation, quantity of posts, quality of posts, threading and instructor presence, and compared these measures between whole class and small group discussions within seventeen courses. Our intent was to hold constant individual and course content differences. Rather than look at small group and whole class discussions in different courses or single courses (as in a case study), we measured differences in the same learners grouped in whole class and small groups. The results of this study support some claims that small group activities afford such benefits as increased student participation, peer interactions and the development of socially constructed knowledge.

Theory suggests that cooperative learning activities will increase peer interactions and can lead to the development of socially constructed knowledge. Participation in discussions is a necessary requirement for discussion activities to serve their intended role in online courses. Similarly, a sufficient number of posts that are related to course content and generate student interaction must be made in order for the creation of socially constructed knowledge. Student posts and participation may be viewed as requisites for peer interaction. Likewise, posts which are related to the academic content (quality posts) and discussion style interactions can also be viewed as necessary, but not necessarily sufficient conditions for the development of socially constructed knowledge.

Work by other researchers suggested that student participation was problematic in small group discussions in online classes [8,9,10]. However, these studies were highly qualitative and not quantitative. Ad hoc evidence gathered at Empire State College also suggested that student participation in small group activities was waning. Both students and instructors reported that one of the biggest barriers to cooperative learning was non-participating students. For example, if a small group of four students is creating a group product, one missing student can stall the group's ability to move forward. Despite these comments, the results of our study indicate that student participation was actually higher in small group discussions than in whole class discussions. Therefore, one may conclude that a non-participating student is noticed more in the small group setting. The results of our study show that small group discussion boards contained greater quantities of student posts (as measured by posts per participating student per discussion board) as compared to whole class discussions. This indicates that students were more vocal in small group discussions, once the decision to participate was made. This supports the idea that small group settings may promote student participation and contributions.

We do not attempt to discern whether knowledge was created by learners through the process of posting and reflecting on message boards. We do claim, however, that quality posts (as defined by educationally valuable or 'content related' posts) are a requisite. Interestingly, small group discussions contained a significantly greater number of educationally valuable posts per student; however the proportion of the total conversation devoted to educationally valuable talk was lower in small groups compared to whole class discussions. This finding is in line with the findings of other researchers who also found a large

percentage of posts not related to academic content [1,4,8,9,11,12]. We note that even though greater numbers of EVT posts per student were made in the small group setting, this increase appears to have been surpassed by even greater numbers of ELVT posts per student in these small groups.

In reviewing the pattern of interaction, we became concerned with the type of posts made in small group discussions. We observed that students frequently divided a task among group members, completed this portion and then reported back to the group with their portion of the task completed. Significant numbers of ELVT posts at the beginning of the small group discussions were devoted to planning and task assignment. At the end of the small group discussions, significant numbers of ELVT posts were again devoted to planning details such as how to compile each member's piece into one document, who would be responsible for posting the final product, and the timeline by which this should be accomplished. If higher order cognitive processing were occurring, we would have expected to see a greater proportion of posts which contained evidence of reflection, heuristics, critical analysis, and argumentation. We did not see evidence of these types of posts.

Ideally, we would like to see small-groups engage primarily in content related discussion and have the opportunity to fully construct, critique and evaluate their conceptualization of course content. In reality, though, researchers have observed that a substantial proportion of small-group discussions are often devoted to group processes and group coordination [9]. One study found that small group discussions were composed of 26.72% planning, 25.86% contributing, 27.59% seeking input, 15.52% reflection/monitoring, and 4.31% social interactions [1]. Assigning roles or having students choose roles may be one strategy to help reduce frustration and increase efficiency in group process interactions. Some evidence suggests that groups with role assignments have a higher percentage of on-task communication not correlated with an effect on grades [16]. Other researchers found that out of students assigned to the roles of summarizer, moderator, theoretician, and source searcher, the students in summarizer roles exhibited higher levels of knowledge acquisition [15]. Interestingly, however, other work found that groups with no role structure and no reward (grading) contained significantly more cognitive interactions than the role group and significantly more cognitive interactions than the reward (grade) group [4]. Groups with reward and role structure had more interactions than other groups and significantly more group process interactions than other groups. Adding structure to groups, either through roles or rewards (i.e. grades), is correlated with additional posts about group processing. We encourage more work in this area, particularly in relation to small-group discourse in online mathematics courses.

A requisite for increased peer interaction is increased threading. While there were significantly more posts per student per message board in the small group setting, there was not significantly more threading. Thus, it is possible that students are making more contributions in the small groups, but not necessarily interacting with each other more.

The results of our work indicated no significant difference between instructors' participation in small group and whole class instruction. Instructors who maintained a presence in the group helped to encourage and restructure groups in the event of non-participating members and also helped to encourage groups to reach consensus. This led some groups to then explore and critically analyze the task at hand.

Interestingly, we found it difficult to measure expectations and guidelines for small group and whole class discussions. We found that guidelines, when present, were not different for small group discussions as compared to whole class discussions. This lack of information points to a need for increased guidelines and structure for small group work. If small groups are used to meet pedagogical objectives that are distinct from, if not complementary to, whole class discussion, then they should be structured as such and

students should be informed of the expected outcomes.

In summary, our results provide us with a mixed view of the benefits of cooperative learning activities in the courses that we examined. While there do appear to be some benefits in terms of student participation and quantities of student posts, there do not appear to be added benefits in terms of the level of threading of discussions. The extent to which knowledge may have been socially constructed in small group settings and whole class discussions remains our primary concern. We wonder, given the 'divide and conquer' approach of small group work evidenced by many of the groups in our study, whether the whole class discussions may foster deeper levels of cognitive processing. As a result of fragmentation, there may be a loss of synergy required to move discussions to greater depths of understanding, thus creating a 'whole is greater than the sum of its parts' phenomenon. Further research in this area, particularly within the realm of undergraduate mathematics courses would be particularly fruitful.

## VI. CONCLUSIONS

A multi-factor metric that was previously developed was applied to seventeen undergraduate mathematics courses. This work suggests that small group work may facilitate student participation, greater quantities of posts and greater quantities of educationally valuable posts. Concerns regarding the extent to which educational content is discussed, as opposed to presented and compiled, deserve attention and may be mediated by adequate structuring and facilitation strategies. This paper demonstrates how our previously developed metric [24] may be applied, and begins to establish parameters by which future comparisons may be made.

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# APPLICATION AND EVALUATION OF THE ECOLOGICAL PSYCHOLOGY APPROACH TO INSTRUCTIONAL DESIGN (EPAID)

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**ABSTRACT**
Teaching online can be particularly challenging when there is a need to immerse students located anywhere in the world in specific environmental contexts. We used the Ecological Psychology Approach to Instructional Design (EPAID) to design four courses in two concentration areas (Border Health, and Workforce and Healthcare Delivery Environments). In each case, we sought to provide students with a virtual first-hand understanding of contexts that they would not experience themselves. In this paper, we describe the major tenets of EPAID, the strategies we used to apply EPAID in the courses, and the results of our initial, formative evaluation.

**KEYWORDS**
Online Education; Instructional Design, Ecological Psychology, Instructional Theory, EPAID

## I. INTRODUCTION

Teaching online can be particularly challenging when there is a need to immerse students located anywhere in the world in specific environmental contexts. At our university, doctoral students are required to take three or more courses that comprise a cognate (minor emphasis area) in support of their major research emphasis area. Based on student requests and contemporary healthcare issues, we designed two new cognates (Border Health, and Workforce and Health Delivery). In contrast to other cognates, these two options required students to become very familiar with the relevant environmental context (either the U.S. and Mexico border or acute care hospital management). However, only a few of our doctoral students enrolled in our Border Health course actually live in the U.S. Mexico border region—and not all students enrolled in our Workforce and Health Delivery course are actively involved in nursing management. In this paper, we describe how we used the Ecological Psychology Approach to Instructional Design (EPAID) to bring these two contexts to students and share the results of our preliminary evaluation.

## II. EPAID'S THEORETICAL FOUNDATIONS

We adopted EPAID because it embeds learning in the complexity of real-life situations. EPAID is based on the ecological psychology of James J. Gibson [1, 2]. In a nutshell, Gibson's ecological psychology is a highly practical psychology of perception and action that focuses on how we get around in the world. It emphasizes the information that is available in the environment to support us in achieving our goals and the fit of the human to the environment. It also emphasizes the mutuality of perceiving and acting; that is, we perceive information in order to act in ways that achieve our goals; we also modify our actions in order to access available information. Thus, perception is not confined to the brain, but occurs in a brain in a head on a body that moves [3]. Goals are crucial to the perceiving-acting process because they set the boundaries on both the information that will be relevant and the actions that can be taken to realize the

goals.

Given these views, it is not surprising that the ecological view of learning places more emphasis on what there is in the environment to be learned than other learning theories do. Learning emerges dynamically from learner-environment interactions in which the "whole-body" of the learner is embedded in the lived-in world [4]. Learning is understood as an ongoing process of *differentiation* of available information that occurs through active exploration and selection of relevant information [5, 6]. The ecological view of learning is similar to the notion of learners as "embodied and embedded" in everyday cognition [7] and is consistent with "situated cognition" and "situated action," in which each is embedded within the relevant context—and triggered by selection of a goal [4]. Goals, or intentions, are crucial because they define the aspects of the environment that are relevant. For that reason, helping students adopt appropriate learning goals is a critical component of EPAID.

Students come into our programs with career goals, but also with more immediate goals of passing a course, getting a paper written, or getting dinner on the table. These goals define what information students judge to be important—and how they select, from the available learning activities, those in which they will invest energy. Understanding how individual and group goals define how students approach learning requires explicit attention to course design. Designers must focus, not only on the individual student, but also on the student as part of a group and the shared goals that emerge within the group

## III. THE ECOLOGICAL PSYCHOLOGY APPROACH TO INSTRUCTIONAL DESIGN (EPAID)

EPAID embeds learning in real-life situations [4, 8-10], which made it particularly appealing for our purposes. In its initial iterations, EPAID was used by John Bransford and his colleagues at Vanderbilt to improve mathematics and science education in the K-12 curriculum. For example, in the Jasper Woodbury series [11-13], students were presented with several different scenarios and required to use their knowledge of science and mathematics to help Jasper survive. In one vignette, Jasper purchases a new boat and now must decide whether he can safely get the boat home before dark or must stop for fuel and risk the fall of darkness. Students have to use several mathematical calculations that depend on speed, time, and fuel requirements to determine how to get Jasper home safely. Key data needed to solve problems are embedded in the scenarios. Examples and more details are available at: http://peabody.vanderbilt.edu/projects/funded/jasper/Jasperhome.html.

EPAID is similar to other learning theories in assuming that learners are self directed by their personal goals and that learning improves with practice and feedback, but it differs from other approaches because of its core tenets: a) Learning is the education of *intention* and *attention*, b) learning emerges within the *interaction* of student with course materials and c) *learning and assessment should be situated* in a rich, real-world context.

Educating *intention* requires helping students align their learning goals with those of the curriculum by engaging students through videos, stories of real-world problems that require curricular content to solve, thus inducing students to adopt goals for which the curriculum is relevant. Students can adopt new intentions as they work with others—or new intentions may emerge from their interaction in the learning environment [4]. "Ecological psychology describes the student as operating within an environmental niche co-created by the capabilities of the learner to act (effectivities) and properties of the physical and social environment that establish possibilities for action (affordances)" [14, p. 167]. In this view, knowledge is not simply for its own sake, but "for some purpose" that emerges from the coupling of student and learning environment. Any complete analysis of online learning "must acknowledge the complex nonlinear dynamics that unfold as an intentionally-driven learner interacts with a technology-based purposefully designed learning environment" [15, p. 48].

Educating *attention* means helping students learn to detect aspects of their environments that have functional value by presenting exemplars through which they can "tune" their detection skills. This attunement can develop vicariously through the scaffolding that occurs when students work with more experienced peers in a shared environment [9, 16]. Elsewhere we have referred to this attunement process as the biasing of an otherwise random walk process [8]. When learning begins, "diffuse control" predominates because students have not yet learned to differentiate the relevant from the irrelevant information so they weigh all data equally and sample the available information sources quite randomly. As learning continues, students begin to differentiate useful from not-so-useful information and actions, and become more likely to pursue information and actions that move them toward their goals. Their better-differentiated perception skills constrain the actions they take, which in turn constrain the information they detect. To facilitate this "biasing" process, however, the instructional environment needs to be designed to highlight important distinctions and provide timely feedback that helps students differentiate from course materials what is most important and goal-relevant. Sometimes facilitating this differentiation process using contrived problems may require that instructors also devise "red herrings" (information that is not relevant to the problem); however, when the problems are more reality based, the "red herrings" occur naturally.

*Learning emerges* from the interaction of learner and instructional environment. The ideal assessment system would provide both student and instructor with real-time information about students' progress, identify potential problem areas and perhaps even suggest interventions so that the instructor can provide appropriate scaffolding initially and remove it as the student progresses. With more and more learning provided asynchronously online, building some of the assessment expertise into the interface would be ideal so that "just-in-time" feedback can be provided effectively. Because so much learning occurs invisibly in students' heads, we continue to be challenged to make this "off-line" learning more transparent to instructors without being overly intrusive [16].

# IV. APPLYING EPAID TENETS TO COURSE DESIGN: THE FACULTY PERSPECTIVE

With external funding from the U.S. Department of Health and Human Services (HRSA), our team used EPAID to develop four courses as part of two minor cognates for our online nursing doctoral program. Because the courses were implemented sequentially, we were able to apply what we learned while developing the initial courses to those implemented later. Over the two-year development and implementation period, the team included six faculty, four teaching assistants, an instructional designer, programmers, media experts, illustrators, and a librarian.

## A. A Brief Overview of the Courses

The goal of the Border Health course was to help students develop a deep understanding of U.S. and Mexico border health issues. The course focused on increasing students' knowledge of border health systems, binational collaboration, policy and research so that students could help shape culturally competent research programs that respond to the complex issues influencing border health and border health care systems. Learning activities were organized into four modules, each extending over a 3 to 5 week period. Students demonstrated integration and synthesis of their new knowledge through a challenge posed at the end of each module. The challenges required students to analyze and synthesize the complex issues influencing border health and border health care systems in order to design a nursing research agenda for U.S. and Mexico border health.

The goal of the Technology for Expanding Healthcare Capacity course (hereafter referred to as the Technology course) was to help students learn to design and apply information technology to a specific clinical population (individuals with Diabetes) in a particular context (the U.S. and Mexico Border). The

course was part of the Border Health minor cognate, but was implemented first so that much of the contextual information that would ultimately be part of the Border Health course was included. The course was organized into 5 modules, each one culminating in a specific challenge.

The goal of the Workforce and Healthcare Delivery Environment course (hereafter referred to as the Workforce course) was to help students critically analyze contemporary research about the impact of the nursing workforce and healthcare delivery environments on quality and cost outcomes. To accomplish this in a 5-week intensive summer course, the course was organized into two modules, with one real-life challenge posed in each module.

The Translational Research course was the last of the four courses to be implemented and was part of the Workforce minor cognate. This course was designed to help students understand the meaning of translational research and the models and methods associated with translating evidence into a variety of healthcare settings. Unlike the previous courses, this course was organized into five modules with a challenge associated with the first, third, and fifth modules. In the second and fourth modules discussions were used to assist students to synthesize previous content and prepare for the next challenge.

In the following sections, we describe how we applied EPAID's core tenets, providing specific examples from the various courses.

## B. Immersing Students in Rich Environments

The four courses utilized different strategies to immerse students in rich learning experiences that create a virtual sense of place. In the Border Health course, we wanted students to experience life in the U.S. and Mexico Border region without being physically present at the border. To accomplish this, we created a collage of film, poetry, music, and text. As students explored the evidence on health outcomes on both sides of the border in four sister cities, they experienced first-hand the challenges imposed on providers, patients, and the healthcare system by two languages, two cultures, and frequently opposing governmental policies.

In the Workforce course, students were invited to serve as consultants to a Clinical Nurse Executive (CNE). The CNE asked the consultants for a research-based plan to improve the hospitals' quality outcomes without incurring too much cost. Narrated illustrations depicted the CNE welcoming the students, showing them around the hospital, giving them key information about her problem, and then asking them for help. Students had to discern, from the information she provided, what was most relevant and important.

In the Technology course, we used "Infographics" (Fig. 1) to establish a rich set of factors that students might need to consider related to each challenge they were given. Because the central challenge of the course was to explore the state of the science of informatics and determine what information technology might improve health outcomes for Diabetics individuals with diabetes in the U.S. and Mexico Border region, an array of resources was pulled together in the infographic. Students clicked on each object to explore materials. Students were expected to investigate widely, but were not required to explore each and every available resource.

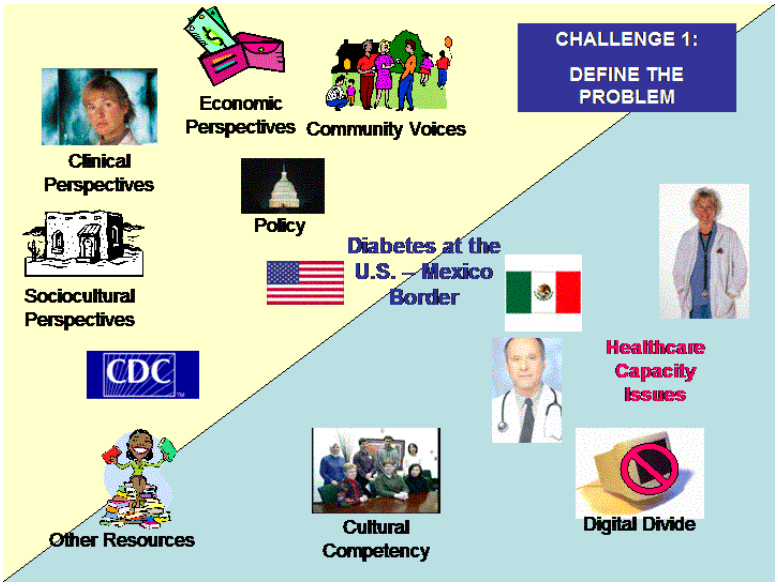


**Figure 1. Infographic Integrating Content for Challenge 1**

## C. Educating Intention

In addition to outlining course goals in syllabi and videotaping faculty course introductions, all courses incorporated a course map (Fig. 2). In some courses, the course map served as an additional guide to the course for students; but in the Technology and the Translational Research Courses, the course map was also the main navigational tool. Clicking on a node in the course map for those courses took students to the instructions and resources to accomplish the particular challenge for that module.

At the beginning of each class, we asked students to post a brief self introduction. We also asked them to tell us what they hoped to gain from each class and how they anticipated that they would use the knowledge in their future research.

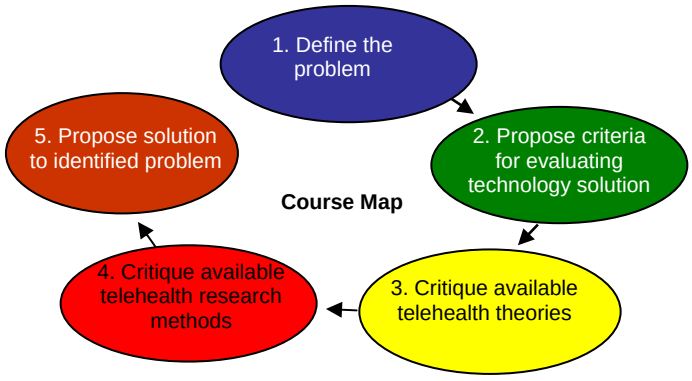


**Figure 2. Interactive Course Map**

### 1. The Border Health Exemplar

In the Border Health course, in addition to the introduction described above, we also asked students which borders were most relevant to them and their future research. Defining this explicitly helped them compare and contrast their own experience with the U.S. and Mexico Border exemplar that was used

throughout the course. We sought to educate students' intentions further through an elaborate process of cultural immersion via multimedia. For example, students were asked to critique Gloria Anzaldúa's poem, "To Live in the Borderlands Means You" [17, pp. 91-92]. Students also viewed PBS video clips that captured different dimensions of border life through interviews of persons living in the border region.

The students' asynchronous discussion postings demonstrated that they were making new discoveries about the border region. Students soon hypothesized that the geographic diversity they observed in the 2,000 miles of U.S. and Mexico border that stretches from California to Texas might impose very different issues in each of the border communities. Students also began to recognize how the diverse mechanisms now used for border control (e.g., walls in Arizona, the Rio Grande River in Texas, and the ocean and metal wall separating San Diego from Tijuana) disrupted and separated families living along the border. By the end of the first week, students' postings documented their rapid cultural immersion into the historical, socio-political, cultural and economic issues of the U.S. and Mexico border region. One student commented: "I feel I have had a crash course in border health already in just one week."

As the course progressed, students' postings told us that they were beginning to recognize the loss and confusion of cultural and national identity, forced assimilation, oppression, and the tension that underpins cultural duality. Some postings reflected students' personal experiences of being a minority in a majority world as they compared and contrasted U.S. and Mexico border issues with those of other borders (e.g., the U.S. - Canadian border).

In Challenge I, students were informed that the U.S. and Mexico Border Health Commission requested that they conduct a focused assessment of two U.S. border counties—one in Arizona adjacent to the Mexican state of Sonora, and the other in Texas adjacent to the Mexican state of Chihuahua. Student teams were given two weeks to obtain a variety of data describing the U.S. counties and adjacent Mexican counties. Links to several data-rich websites were provided in the syllabus to facilitate student research. In addition, the librarian from the Arizona Hispanic Center of Excellence was available as a consultant. Each team reported their findings in an executive summary. Reviewing and discussing the reports enabled students to compare and contrast four U.S. and Mexico border communities, identify shared and unique border issues, and begin to generate potential solutions for complex binational health issues.

**2. The Technology Exemplar**

In this course, students were asked to design an information technology solution that could enhance care to the diabetic population at the U.S. and Mexico border. This required that they explore, not only the context for the problem (i.e., border and cultural issues), but also available research on technology solutions. Because students came into the course with a variety of backgrounds (some clinically focused; others informatics majors), we asked them to share their expertise. An interactive course map was developed to guide students through the course. Clicking on one of the modules in the course map defined each module and associated challenge then took students to the relevant infographic that brought together the specific resources for that module.

**3. The Workforce Exemplar**

In the Workforce course, we educated students' intentions by immersing them in both the science and the lived experience of workforce shortages and turbulent working conditions. We framed the course around an ongoing scenario in which students were engaged as consultants to a Chief Nursing Executive (CNE) at a fictitious hospital. Students were asked to develop a research-based plan to help the CNE solve staffing and quality of care issues. Before beginning the challenges, students reviewed current issues and trends in health care that had particular relevance to analyzing workforce and working condition concepts and interventions. To help them transition from the literature to the challenges, we asked students to develop a concept map based on their analysis of key constructs and concepts, the relationships among

them, and their relationships to relevant outcomes, including staff satisfaction, retention, and patient safety and quality. The lively class discussion of each student's concept map helped students focus on salient concepts and issues.

**4. The Translational Research Exemplar**

In the Translational Research course we asked students to design a template for conducting translational research regardless of setting or specific problem. To do this, students needed to immerse themselves in the literature to develop a definition of translational research and a protocol for assessing when evidence is ready to be translated into clinical practice. Many of the lessons we learned in developing previous courses were incorporated into this course. As in the technology course, students in this course had a variety of clinical and research experience and so were asked to share their expertise; and an interactive course map was developed to guide students through the course. In addition to the literature, we were able to include videos of a conference on translational research, and podcast interviews with leaders in the field.

## D. Educating Attention

We educated students' attentions through team assignments structured as real-world challenges. In general, students were asked to respond briefly to an initial question challenge posed by the instructor—without doing any research, although they could skim course materials if they wished. This allowed the class to identify various perspectives and expertise in the class that they might utilize later. Students were then expected to work in their assigned dyads (teams of two) to explore course materials in more detail and post an initial response to the challenge, and then respond to responses of others dyads. With this additional feedback from peers and faculty, students then honed their final response, which was posted in the group discussion and graded by the instructor.

**1. The Border Health Exemplar**

In the Border Health course, for two of the four challenges, students were divided into teams based on their previous experience and expertise with Spanish language, Mexican culture, and international borders to increase the likelihood that they would be "attuned" to, and therefore act on, the same information [4]. Combining students with Spanish language skills with students who had experience in interpreting population-level data sets facilitated detection of the information relevant to the community assessment challenge. Team discussions, sharing of work documents, and review of draft papers occurred in separate discussion forums. Faculty helped student teams differentiate goal-relevant resources as they monitored and participated in the discussions.

**2. The Workforce Exemplar**

In the Workforce course, to engage students, we created narrated illustrations in which a nurse executive discussed the problems facing her hospital and her own goals for addressing staffing shortages and improving quality of care. In the first scenario, students were presented with a wealth of detail about the hospital and the CNE's goals. Although much of the material was useful background information, not all of it was needed to develop a plan to improve quality of care. Students were required to differentiate relevant material from irrelevant material. Students became very engaged, to the point of creating fictitious names for their consulting firms.

In addition, the challenges required that students provide documentation to support their recommendations for both academic and administrative audiences. In the paper for the academic audience, students were expected to synthesize and integrate extant literature to support their assertions. For the administrative audience, students prepared an executive summary in which they presented their major findings, recommendations for implementing change, and their rationale for each recommendation. This forced the students to consider how the same information could be presented in ways that would be

meaningful to different groups, yet another way to educate attention. Dyad discussions, sharing of documents and drafts occurred in separate electronic forums. Because this was a small class, some whole-class discussions took place in real-time using Breeze. Each dyad presented their recommendations to the class using narrated Power Point presentations then answered questions during the real-time discussion period.

## E. Lessons Learned

Applying EPAID's tenets required that we explore a variety of strategies to educate students' intentions and attentions. Our consultant, Michael Young, both educated us and challenged us to explore, not only the affordances of a new learning theory, but also the advantages of new instructional strategies. Our instructional designer helped us actualize both the theory and strategies.

Selecting and integrating the rich materials into the course was time consuming. In addition, we found that too much richness can be overwhelming for students, so we subsequently cut back on some of the course materials. The Technology course used an interactive course map that was 3-4 layers deep, depending on the module, and presented materials linked to topics, rather than sequentially. Some students loved the novelty of the approach, but a few found this difficult to track, so later courses added an alternative sequential approach to listing course resources to meet both groups' preferences.

With each of the four courses, we experienced dyad issues that are consistent with face-to-face group dynamics. In some cases, students who were assigned to work together had done so unsuccessfully in another course and brought that negative experience with them. In other cases, the students had very different work habits, which made it difficult for them to work together. In one case, the students were so committed to their own goals that they could not agree on a final response to the challenge—and the instructor finally let them provide individual responses.

Still, we found this to be a particularly rewarding teaching experience and were delighted to see students so engaged in real-world problems. Working as a team on courses implemented over 4 semesters allowed us to learn from each other. In group meetings, we supported each other by brainstorming and sharing ideas that would keep us true to EPAID principles. When something worked well (e.g., when one student commented that "This is what an online course should be like!") we celebrated; when it didn't (e.g., when teams could not work effectively together) we developed new strategies. In the following section, we report the results of a preliminary, formative evaluation of the outcomes.

# V. FORMATIVE EVALUATION

As online learning has entered the mainstream of higher education, it has raised issues of quality [18], online teaching methods [19], and course design and delivery [20]. Consequently, there is a growing nationwide need for credible quality assurance in online learning [21]. Practical issues of increasing demand, sustaining cost-recovery, and meeting accreditation requirements have also driven the need for online course quality assurance methods that utilize different evaluation tools than those used in traditional face-to-face courses. We report here on three different formative evaluations we conducted. The first explored the degree to which our course designs incorporated national standards. The second evaluated the degree to which we had incorporated EPAID's tenets. The third assessed students' reactions to the courses.

## A. Did the courses meet national standards?

### 1. Method

As one of their teaching assignments for the project, two graduate teaching associates were asked to conduct a preliminary evaluation of the courses. Neither had participated in the design of the courses nor

taken the courses. Both reviewers had prior experience as nurse educators in face-to-face courses, and one had taught courses online for three years.

After conducting a literature review of available evaluation tools, the teaching associates adopted the *Quality Matters (QM) Evaluation Rubric* (http://www.qualitymatters.org/). The QM Rubric includes eight categories of standards with several standards within each category. We did not include the last two categories (Learner Support and Accessibility) because, in our program, these are addressed at the College/University level rather than at the course level. This left us with the following categories (number of standards for each category is shown in parentheses): Course Overview (6), Learning Objectives (5), Assessment & Measurement (5), Resources & Materials (5), Learner Interaction (5), and Course Technology (6). Although the QM Rubric does not assume that each standard must be met to have a quality course, for the purpose of this preliminary evaluation, we assumed that higher scores correlated with higher quality and adopted a binary choice metric (1 = present, 0 = absent). The resulting scale had a possible total of 32 points.

The reviewers initially explored the course materials as if they were actually taking the courses, and then rated each course using the QM Rubric. Independent reviews were conducted by each teaching associate and the results of the reviews were compared. When differences could not be resolved through consensus, the mean score was reported.

## 2. Results

Results of the evaluation are summarized in Table 1 (note that the number of possible points in each standard varied). All courses received maximum points for Course Technology and scored nearly as high on Resources and Materials. Two courses (Workforce and Technology) were rated relatively low on Course Overview; but all four courses had room to improve in this area. All courses also had room for improvement in the area of Assessment.

| Standard | Possible Points | Course | | | |
|---|---|---|---|---|---|
| | | Workforce | Technology | Border Health | Translation |
| Course Overview | 6 | 2.5 | 2.5 | 4.0 | 4.0 |
| Learning Objectives | 5 | 4.5 | 5.0 | 3.5 | 4.0 |
| Assessment & Measurement | 5 | 3.0 | 5.0 | 3.5 | 4.5 |
| Resources & Materials | 5 | 5.0 | 5.0 | 4.5 | 5.0 |
| Learner Interaction | 5 | 4.5 | 4.0 | 4.0 | 4.0 |
| Course Technology | 6 | 6.0 | 6.0 | 6.0 | 6.0 |
| Total | 32 | 25.5 | 27.5 | 25.5 | 27.5 |

**Table 1. Evaluation 1 Results by QM Standard and Course**

Reviewers felt that the course maps were useful for helping students better understand course goals and structure. Reviewers also highlighted the many learning opportunities and the challenging, but rich learning environments that facilitated students' interaction. Reviewers felt that the real world challenges around which the four courses were organized provided numerous opportunities for students to interact with each other and with faculty, as well as with the content. Reviewers noted that the Border Health course was particularly effective at integrating guest lecturers, websites, videos and readings. Reviewers commented on the visually creative design of the Technology course. For some courses, reviewers were concerned that the amount of content and resources provided might be overwhelming for students. Reviewers suggested adding site navigation instructions to all courses, even in the Technology course,

where an online tutorial helped students to effectively navigate the interactive course map. Reviewers also recommended adding grading rubrics in some areas, for example, discussion.

Reviewers reported that the courses, which creatively focused on situating the learner within real-life environments, easily met QM standards for Learner Interaction, Resources & Materials and Course Technology. Generally courses met the standards for Learning Objectives, but reviewers suggested that providing more objectives at the module/unit level might facilitate better education of students' intentions. The evaluation suggested that faculty pay additional attention to developing assessment strategies that would make grading policies more transparent and easier for students to understand. Finally, additional navigation instructions and instructor information were suggested for all courses at the beginning of the course.

## B. Mapping QM Standards to EPAID Tenets

### 1. Methods

To see whether the QM Standards also could be used to evaluate how well the courses met EPAID principles, four faculty and three graduate students together mapped individual QM standards onto EPAID tenets. Ultimately, the group agreed that 19 of the 32 QM standards within the six categories used for the first evaluation could be mapped onto EPAID tenets (Table 2).

| QM Standards | EI | EA | EL | SA |
|---|---|---|---|---|
| I. Course Overview & Introduction | | | | |
| 1.1 Navigational instructions make the organization of the course easy to understand. | x | | | |
| 1.2 A statement introduces the student to the course and to the structure of the student learning. | x | | | |
| II. Learning Objectives | | | | |
| 2.1 The learning objectives of the course describe outcomes that are measurable. | x | | | |
| 2.2 The learning objectives address content mastery, critical thinking skills, and core learning skills. | | | x | |
| 2.3 The learning objectives of the course are clearly stated and understandable to the student. | x | | | |
| 2.4 Instructions to students on how to meet the learning objectives are adequate and easy to understand. | x | | | |
| 2.5 The learning objectives of the course are articulated and specified on the module/unit level. | x | | | |
| III. Assessment & Measurement | | | | |
| 3.1 The types of assessments selected measure the stated learning objectives and are consistent with course activities and resources. | x | | | x |
| 3.3 Assessment and measurement strategies provide feedback to the student. | | | | x |
| 3.4 The types of assessments selected and the methods used for submitting assessments are appropriate to the distance learning environment. | | | | x |
| 3.5 "Self-check" or practice types of assignments are provided for quick student feedback. | | | | x |
| IV. Resources & Materials | | | | |
| 4.1 The instructional materials have sufficient breadth, depth, and currency for the student to learn the subject. | x | x | | |

| | | |
|---|---|---|
| V. Learner Interaction | | |
| 5.1 The learning activities promote the achievement of stated learning objectives and learning outcomes. | x | |
| 5.2 Learning activities foster instructor-student, content-student, and if appropriate to this course, student-student interaction. | | x |
| 5.5 The course design prompts the instructor to be active and engaged with the students. | | x |
| VI. Course Technology | | |
| 6.1 The tools and media support the learning objectives of the course and are integrated with texts and lesson assignment. | | x |
| 6.2 The tools and media enhance student interactivity and guide the student to become a more active learner. | | x |

**Table 2. QM Standards by Applicable EPAID Tenets**

(EI=educating intention, EA=educating attention, EL=emergent learning, SA=situated assessment)
We then used the mapped standards to evaluate the degree to which we had met specific EPAID tenets. Course evaluation summaries were adapted to include only the standards that were mapped to the EPAID tenets listed in Table 2. The mean scores for each EPAID tenet for all four courses were calculated. A total course mean score was calculated by averaging the two reviewers' scores.

### 2. Results

Results are summarized in Table 3. Overall, compliance with EPAID tenets was quite high. All courses received maximum points for Emergent Learning and Educating Attention and scored nearly as high on Situated Assessment. Two courses (Workforce and Border Health) had room to improve in Educating Intention.

| Standard | Possible Points | Course | | | |
|---|---|---|---|---|---|
| | | Workforce | Technology | Border Health | Translation |
| Educating Intention | 8 | 6.5 | 7.5 | 5.5 | 7 |
| Educating Attention | 2 | 2 | 2 | 2 | 2 |
| Emergent Learning | 5 | 5 | 5 | 5 | 5 |
| Situated Assessment | 4 | 3 | 4 | 3 | 4 |
| Total | 19 | 16.5 | 18.5 | 15.5 | 18 |

**Table 3. EPAID Evaluation Results Summarized by EPAID Tenet and Course**

In sum, our review found that the four courses fully met the seven QM standards corresponding to Educating Attention and Emergent Learning and Situated Assessment. Generally courses also met the QM standards relating to Educating Intention and Situated Assessment; although, as previously noted, providing more objectives at the module/unit level might facilitate better education of students' intentions.

## C. The Student Perspective

### 1. Methods

After obtaining approval from the University's institutional ethics review board, we conducted a survey of students who had participated in one or more of the courses. We designed a 10-item questionnaire that focused on evaluating how well the course goals matched the learner's own goals, to what degree the course facilitated the students' adoption of the course goals, navigation within the instructional environment, creation of a shared environment with other students, and perceptions of how the course fit

into the students' world. Items 1-4 used a 5-point Likert response scale ranging from "strongly agree" to "strongly disagree." Respondents were also asked to rate the feedback from faculty, other students, and course assignments using three different descriptors for each item (e.g., highly stimulating to highly boring, highly useful to highly useless, and almost always helpful to almost never helpful). Respondents also chose five descriptors that they felt best described the course from the following list: difficult, integrative, meaningful, routine, applicable, too much, confusing, stimulating, constraining, challenging, frustrating, fragmented, boring, clear, broadening, not enough, simplistic, meaningless, not applicable or innovative. Finally, the questionnaire included three open-ended questions about aligning their own goals with course goals, differences in these courses from other courses taken, and navigation issues. Respondents completed the questionnaire online. A computer program automatically compiled responses into a de-identified excel spreadsheet for analysis.

**2. Results**

Twenty-seven students had taken one or more of the classes. Twenty questionnaires were completed (a 74% response rate). The results for the first four questions are summarized in Table 4.

| Questions/Courses | Range | Mean (Standard Deviation) |
|---|---|---|
| 1. The way the course was designed helped me to achieve my own goal(s) for the course. | | |
| Workforce ($n$ = 4) | 4-5 | 4.75 (0.50) |
| Technology ($n$ = 7) | 2-5 | 4.00 (0.58) |
| Border Health ($n$ = 6) | 1-5 | 3.67 (0.82) |
| Translational Research ($n$ = 3) | 4-5 | 4.67 (0.58) |
| | Mean | 4.27 (0.62) |
| 2. By the end of this course, my goals had become more congruent with the stated course goals. | | |
| Workforce ($n$ = 4) | 4-5 | 4.50 (1.16) |
| Technology ($n$ = 7) | 2-5 | 4.00 (1.29) |
| Border Health ($n$ = 6) | 1-5 | 3.50 (1.00) |
| Translational Research ($n$ = 3) | 5-5 | 5.00 (1.46) |
| | Mean | 4.25 (1.23) |
| 3. Navigation within the course was intuitive. | | |
| Workforce ($n$ = 4) | 3-5 | 4.00 (1.75) |
| Technology ($n$ = 7) | 2-5 | 4.00 (1.98) |
| Border Health ($n$ = 6) | 1-5 | 3.33 (1.37) |
| Translational Research ($n$ = 3) | 4-5 | 4.67 (1.52) |
| | Mean | 4.00 (0.17) |
| 4. I wish other instructors would use this type of course design. | | |
| Workforce ($n$ = 4) | 3-4 | 3.50 (.58) |
| Technology ($n$ = 7) | 1-5 | 3.86 (.00) |
| Border Health ($n$ = 6) | 1-5 | 3.50 (.58) |
| Translational Research ($n$ = 3) | 4-5 | 4.33 (.58) |
| | Mean | 3.80 (.43) |
| | **Overall Mean** | **4.08 (.98)** |

**Table 4. Student Questionnaire Responses to Questions 1-4**

The last course that applied EPAID, Translational Research, had the highest survey ratings, probably benefiting from lessons learned in the development of earlier courses, although we cannot rule out that students who had experienced other EPAID courses and liked them chose this course as well. In the Border Health course, a number of students voiced their frustration with the Spanish-language links and readings—even though each dyad included a Spanish-speaking student. In a sense, these students simply

were experiencing the reality of the border setting in which English or Spanish-speaking individuals must struggle to access information in another language; but they had not anticipated this additional challenge and apparently were uncomfortable with depending on their peer for this information. Some students were Puerto Rican; we did not anticipate the degree to which cultural differences with Mexico would be problematic. Ultimately, the class split into two camps, never aligning around a single set of goals. Most respondents (85%) rated feedback from other students as somewhat or highly useful; 70% found it somewhat or highly stimulating; and 55% reported that it was often or almost always helpful. Most (85%) students rated course assignments as somewhat or highly stimulating; 90% found them somewhat or highly useful; and 60% rated assignments as somewhat or highly difficult.

The most frequently used descriptors for the enhanced courses were integrative (65%), challenging (60%), applicable (50%), stimulating (55%) and innovative (55%). Nearly all respondents (95%) reported that their own learning goals were consistent with at least one of the goals posted by the instructor in the course syllabus. Even though the evaluation survey was completed by students up to 1 ½ years after taking the courses, most respondents (85%) identified differences in these courses from others they had taken that were consistent with one of EPAID's goals. Half the respondents who described the group work viewed it as problematic. Most respondents (80%) reported no navigation problems, but noted that it "took a while" to learn.

# VI. CONCLUSION

EPAID, which incorporates a range of contemporary pedagogy, provides a parsimonious framework for addressing student online work as richly embodied and embedded perception and action. Applying the theoretical underpinnings of EPAID for course development required a shift in the way we taught. In some ways, EPAID is similar to other constructivist instructional theories (e.g., problem-based learning or anchored instruction) that treat learning as an active process that should take place in authentic contexts. However, it differs in several important ways: First, EPAID views learning as a matter of differentiating available, complex environmental information, rather than constructing it from smaller bits and pieces. Second, the focus of our instructional strategies were on educating students' intentions (goals) so that they aligned with those of the course and then helping them learn to detect relevant from irrelevant information (educating their attentions). Third, we sought to help students exploit, not only their own backgrounds, but also the various effectivities (capabilities, as well as prior knowledge and experience) of their peers to help them learn to detect the affordances of the materials needed for the challenges. Finally, we attempted to situate assessment within the context of the course, specifically within the challenges posed.

Our approach to instructional design is also consistent, albeit not intentionally so, with Garrison's Communities of Inquiry model [22] because of the attention we paid to teaching presence (aligning goals, educating attention, and timely, ongoing feedback), social presence (dyads, group discussions—both asynchronous and synchronous) and cognitive presence (the emphasis on engaging students in complex, real-world challenges).

We were fortunate that the development and implementation of the online courses were supported by a HRSA grant. This meant that we had resources to invite consultants with expertise in EPAID and to explore alternative online delivery formats. Our faculty team met bi-monthly during the development and implementation of the courses. We met with consultants either in face-to-face or virtual work groups. This supportive network was essential for stimulating ideas, as well as assuring that we remained true to the philosophical and theoretical underpinnings of EPAID. In addition, the meetings and workshops provided a forum in which faculty was able to share teaching strategies, resources, frustrations and accomplishments.

Designing these courses using EPAID has been exciting, renewing, and satisfying for faculty. Using

EPAID, we successfully aligned students' objectives with those of the course. In very rich contexts, the instructional strategies used to embed the challenges helped students identify what was most important. The intense group work with multiple opportunities for feedback and course correction helped focus students' attention on the most meaningful and relevant materials, given the goal. It was clear to faculty and students alike that considerable learning emerged; that is, there were many "aha" moments throughout the course, and the final submissions demonstrated higher levels of analysis, integration, and synthesis than initial postings. Situated assessment occurred as faculty followed the progress of groups and intervened if the group was getting off target. In addition, videoconferences provided yet another way for faculty to assess students' understanding of key concepts. In the future, we may incorporate asynchronous auditory feedback, which has been shown to be highly popular with students and increases perceived teaching presence because it is more effective at preserving nuances, demonstrating faculty interest and involvement, as well as faculty caring [23]. This kind of feedback could easily be situated within our courses.

Formative evaluations suggested that the courses largely met the Quality Matters standards and had successfully implemented EPAID tenets. Student evaluations were largely positive; as we anticipated, group issues were the most serious problem. Students also felt that some courses had too much content. That this was the case in the Border Health course was validated by an external reviewer and that content has been reduced dramatically. Navigation was difficult for a few students. We are currently using the results of the evaluations to refine the courses. Content is being reduced in those courses where it was a problem and navigation issues have been clarified. In addition, we are building in activities throughout that will improve group dynamics (things we would have done automatically in face-to-face group work but forgot in the design of these courses). For example, we have built into the courses group development and evaluation activities. In addition, the challenges in the Technology course have been refined so that each builds on the other more directly. In future iterations, we anticipate moving some aspects of the courses into *Second Life*, which should allow us to create an even richer environment for learning. At the time we developed the courses, *Second Life* was totally text-based and the University did not own an island for education. These constraints no longer exist, so we are moving rapidly to explore this environment.

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# THE EMOTIONAL IN E-LEARNING

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**ABSTRACT**
This study investigates perceived ease of use and overall computer/internet experience as emotional factors that affect e-learning. Results suggest that online learning systems design should address typical software interfaces so that students feel more comfortable using them.

**KEY WORDS**
Online Learning, Emotion, Conation, Affect, Affective Learning, Mediators, Technology Acceptance Model, Perceived Ease of Use

## I. INTRODUCTION

Learners seek educational opportunities in formats that meet their lifestyles today, and online learning promises to meet student's learning needs. Positive perceptions and emotions and higher computer self-efficacy are conducive to learning. However, our understanding of the effectiveness of new delivery modes and the appropriate pedagogy is still in its infancy [1].

Despite the increased robustness of the technology and the appeal of the different delivery mechanisms, several challenges remain unresolved. In recent years, many e-learning studies have been published with emphases on web-based learning [2], evaluation of online learning, measurement of student perceptions of online learning [3, 4] and various methods of delivery [5, 6]. A sub-group of these studies aims at better understanding emotions in online learning. This study contributes to the research by investigating the role of affect in the relationship between computer experience and perceived ease of use of a system. Before we discuss our methodology and results, we present a review of relevant literature related to computer/internet experience; learning and emotion; affect; and perceived ease of use.

### A. Computer/Internet Experiences

Experience is one factor that influences a user's formation of beliefs about using a system; and experience is one of the most important determinants of self-efficacy. In most cases, experience gained through direct use positively affects the user's perception, attitude, and use of the system.
In past computer usage studies, one of the common threads linking computers to the users is the amount of experience users have had with computers. In general, findings tend to support the proposition that a positive attitude toward computers is associated with greater computer experience. However, researchers have also pointed out that the type of computer experience is important in forming the user's computer attitude [7, 8]. Prior research in end-user computing found that individuals with more computer experience had higher levels of computer skill [9], and computer experience has been shown to have a positive effect on computer attitudes [10, 7, 11, 8]. However, other research has had mixed results [12, 13, 14, 15, 8].

In one study, the influence of various variables on usage was reported to be significantly different among experienced and inexperienced users. For experienced users, there was a stronger link between intentions and usage [16]. The results of Taylor and Todd's study of inexperienced and experienced users confirmed

that there is a stronger correlation between behavioral intention and actual usage for experienced users. Venkatesh and Morris [17] found that as direct experience with technology increases over time, individuals have a better assessment of the benefits and costs associated with using technology. Igbaria and Iivary [18] found that computer experience directly and indirectly affects usage, and that individual skills and expertise were related to user beliefs and usage. Igbaria et al. [19] found that the use of computer technology depends on the technology itself and the level of skill or expertise of the individual using it. The relationship between experience and usage, expressed as skills or expertise, is empirically supported [20, 21].

Venkatesh and Davis [22] found that the perceived ease of use (PEU) of a system measured after hands-on experience is system-specific and hence, significantly different from measures taken before hands-on experience. Bajaj and Nidumoli [23] showed that past usage (prior experience) influences ease of using the system, a key factor in determining future usage. Based on these findings on computer experience and its relationship with PEU, we hypothesize the following: Students who believe in the usefulness of the learning tool also believe their performance in the course will improve by using it.

Past experience is a determinant of behavior [24]. Thus, the Technology Acceptance Model (TAM) identifies the relationships between PEU, perceived usefulness (PU), attitude (ATT), and behavioral intention (BI) towards a target system [25]. In the present study, perceived ease of use (PEU) refers to the degree to which the user expects the target system to be free from effort [25]. Thus, students that perceive the system to be useful develop better attitudes towards the learning tool [26, 27, 28]. Moreover, empirical evidence indicates that computer/internet experience leads to the formation of positive attitudes toward computer and internet usage, [10, 7, 11, 8], tending to reduce computer anxiety and help temper individual's anxiety levels in further computer use [29], [30], [31].

## B. Learning and Emotion

According to Huitt [32], psychology examines three components of mind: cognition, affect, and conation. Generally cognition refers to the process of coming to know and understand by encoding, storing, processing, and retrieving information. Conation refers to the connection of knowledge and affect to behavior. Conation is the personal, intentional, deliberate, goal-oriented component of motivation [33, 34, 35].

Affect refers to the emotional interpretation of perceptions, information, or knowledge. It is generally associated with one's attachment (positive or negative) to people, objects, and ideas.
There has been little exploration of the extent to which emotion is associated with learning online. O'Regan, [36] points out that twenty years ago Martin and Briggs [37] proposed the integration of the two domains, affective and cognitive, into a more holistic and realistic framework for instructional design. Although separating emotion and cognition contributes to the difficulty of defining perspectives and emotions [38, 39, 40], it is clear that factors such as motivation [41, 42], self-efficacy [43], learning styles [44], and emotional intelligence, [45] play increasingly important roles in educational research as we seek to define affective and conative variables that impact the learning process.

We need to consider the vast range of variables and constructs that support learner diversity and complexity [46]. Affective and conative factors help us understand how to teach and support the whole learner.

## C. Affect

Affect has four dimensions: cognitive, affective, behavioral and perceived control. The cognitive component focuses on belief, including whether or not a person believes that computers can significantly increase the quality of learning. The affective component is the emotion or feeling concerned with how much the user likes the computer, and the behavioral component relates to what the user actually does or intends to do with the technology. The fourth dimension considers the perceived control components of computer attitudes, that is, ‘‘the perceived ease or difficulty of performing a particular behavior’’ [47]. By taking affect into account we should be able to explain more variance in users’ intention and behavior [48]. The affective component refers to an individual’s feelings of joy, elation, pleasure, depression, distaste, discontentment, or hatred with respect to a particular behavior [49]. Positive affect towards a learning tool leads to gaining experience, knowledge, and self-efficacy regarding usage. Negative affect causes students to avoid the learning tool, thereby not developing perceived control [50, 51].

Recent findings in learning support new advances in understanding the human brain not as a purely cognitive information processing system, but as a system in which affective functions and cognitive ones are inextricably integrated with one another [52, 53, 54, 55]. A number of educators and educational researchers have recognized that active participations are important factors in the learning process [56, 57, 58]. However, acceptance of these affect-related ideas is too often based on intuition and generalized references to constructivist theorists [59].

Computers have served as tools to aid learning in a wide range of domains and contexts: from the classroom where computers are used to enhance the learning experience via online activities and learning tools, to the research lab where computers help researchers develop and reshape the ways we think about learning. The field of artificial intelligence (with emphasis on ideas such as knowledge representation, modeling of logical processes, and other kinds of important cognitive activities) has prompted thinking about parallel concepts in human learning, and facilitated the development of theories where thinking and learning are viewed as information processing [60].

“The extent to which emotional upsets can interfere with mental life is no news to teachers. Students who are anxious, angry, or depressed don’t learn; people who are caught in these states do not take in information efficiently or deal with it well” [44]. We need to increase efforts to understand the role of affect in e-learning. We believe that new technologies can play a particularly important role in these efforts, helping us to measure, model, study, and support the affective dimension of learning in ways that were not previously possible.

## D. Perceived Ease of Use

Many theoretical frameworks have been used to measure technology usage satisfaction; however, few have been used in the online learning context. The Technology Acceptance Model (TAM), the model most widely applied to technology adoption, is useful for studying the acceptance of computer-assisted applications [21, 4]. The goal of TAM is “to provide an explanation of the determinants of computer acceptance that is in general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified” [61, and see also 25, 62]. In general, the TAM theorizes that perceived usefulness (PU) influences attitudes (ATT) towards technology usage and is an important determinant of individuals’ intentions to use the technology.

According to TAM, a person’s intention to use a specific system is jointly determined by one’s attitude toward using the system and PU. This implies that the easier the system is to use, the greater the user’s

perceived self efficacy regarding capacity to use the system comfortably will be. External variables represented in TAM provide the bridge between the internal beliefs, perceived usefulness and perceived ease of use (PEU), attitude and intentions as well as individual differences, situational constraints, organizational characteristics and system characteristics impacting on behavior. Both constructs, PU and PEU, were reported to correlate with self reported usage and self predicted future usage, although PU tends to have a greater effect on usage behavior than PEU when users have used the system for a longer time. This is primarily due to how users process PEU. It seems that users perceive ease-of-use early in exposure to the system. Moreover users are more concerned with the likelihood of succeeding in learning to use the system at the early stages of usage [63, 31].

TAM emphasizes the importance of how external variables can affect the individuals' internal decision process when it comes to using a system within organizations. External variables affect PU directly or indirectly through PEU since it influences the user's near-term perception of usefulness and, to a lesser extent, long-term perception [64]. Interaction among systems, direct experience with a system, system characteristics [65], prior experience with similar systems, and domain knowledge determine the user's perception of ease of use of a system [66]. According to previous studies, efficacy, intrinsic motivation, cognitive absorption, and computer anxiety were all determinants of PEU [67, 68, 69, 28, 70]. In addition, researchers have observed that PEU and PU, to some extent, are influenced by external variables, observations leading to the extension of the technology acceptance model [22, 67, 68, 17]. Extensions to the theory proposed that control, intrinsic motivation (such as playfulness), and emotion (such as anxiety) are anchors that influence users' early perceptions about the PEU of a system. These extensions were strongly supported by the empirical results that indicate up to 60% of the variability of PEU is explained by the model [17].

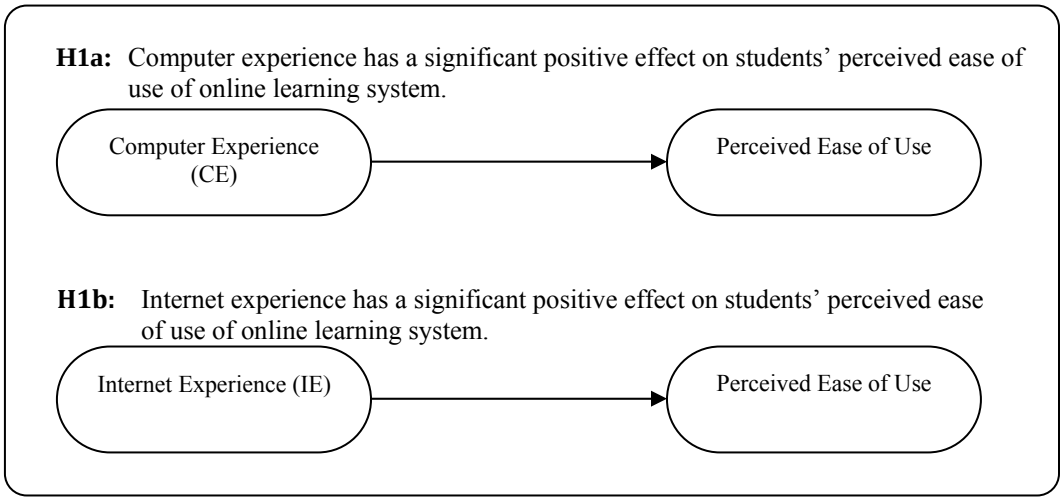
Web-based technologies are designed to facilitate the e-learning process, and therefore their perceived ease of use is a definite necessity, especially where the learners have only recently been introduced to computer and internet technology. Much effort has been devoted to creating user-friendly graphical user interfaces in software development, in recognition of the importance of perceived ease of use [17]. With web-based technologies several studies have pointed out that factors relating to the ease with which information can be found on a web site and the ease with which information can be understood affects web site perceived ease of use [72]. They identified two constructs, ease of finding (navigation) and ease of understanding (cognition), that significantly predict perceived ease of use of a web site.

Taking the cue from other researchers who worked on the extension of TAM model, we hope to provide additional understanding of the role of affect (AFF) as an antecedent to the PEU construct in TAM. We provide results related to the impact of affect on PEU. Our study involves 114 students that used a learning tool (developed in-house) as part of an introductory course in management information systems. We examine the effect of internet (IE) and computer experiences (CE) on PEU and the effect that AFF has on these relationships. Prior research in information systems has investigated the four constructs mentioned herein to understand individual reactions to computer systems [61, 67, 63, 22] however, none has used online learning tools as the target technology or directly compared and contrasted the mediating impact of affect construct on IE/CE and PEU relationships.

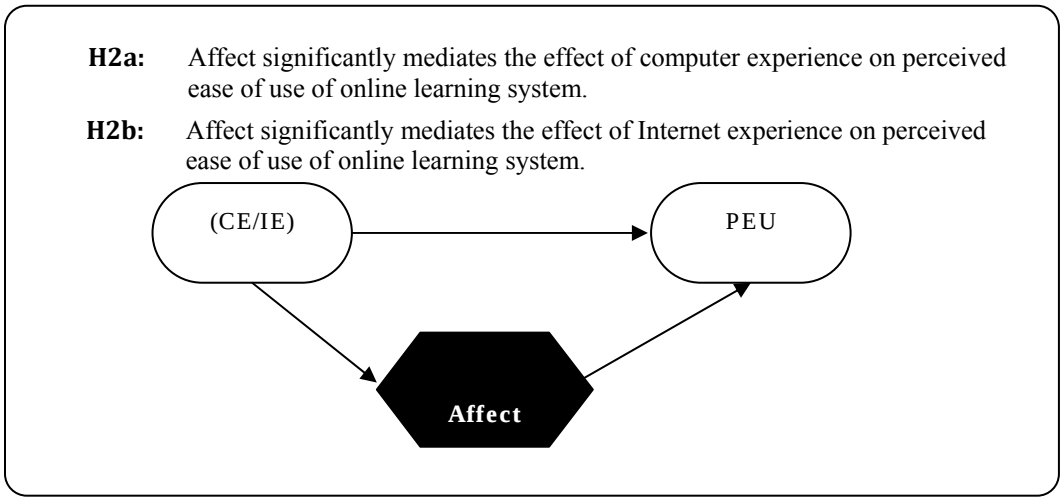
## II. RESEARCH HYPOTHESES

Bajaj and Nidumoli [23] showed that past usage (prior experience) influences the ease of use of the system, and is the key factor in determining future usage. Previous studies also indicate that the kind of computer experience influences individuals' feeling toward the use of computer. IE and CE are used to measure differences in computer experiences that individuals may have had in the past. Based on these findings, we hypothesize the following: Students that believe in a use-performance relationship with the

learning tool also believe that by using it their performance in the course will improve. Specifically we make the following two hypotheses (H1a; H1b) related to computer/internet experience and PEU, shown in figure 1.




As pointed out earlier, there is a need to further understand the role that affect plays in students' online learning. To that effect, we consider the following hypotheses (shown in figure 2):




The study was conducted in an undergraduate course setting spanning one semester, using a web-based interactive 'multiple-choice' and 'true-or-false' learning tool. Throughout the semester, students in an introductory management information systems course at a major university in Canada used this learning tool as part of the course requirements.

Developed in-house, the objective of the learning tool was to help students understand course topics by practicing multiple choice and true or false questions. The learning tool is web-based, and students were able to access it anywhere, anytime. The system monitored the students' activities by storing the time spent on the system, the chapters practiced, and scores.

At the end of the semester, a survey instrument was administered to the one hundred and fourteen students who participated in this study. Respondents were 52% female and 48% male with a mean age of twenty-three years. The respondents had an average of two years of work experience, used the internet close to one hour a day and claimed to have strong knowledge of basic software utilization.

Items (presented in Table 1) used to measure the present model constructs were adopted from the research work of Davis [65] and Venkatesh [70]. Some wording was changed to account for the context of using learning tools. All items, with the exception of computer and internet experience, were measured using a five-point Likert-type scale with answers from "Strongly disagree" to "Strongly agree."

| Construct | Item | Measure |
|---|---|---|
| Perceived Ease of Use (PEU) | PEU1 | I think that learning to navigate the on-line learning system will be easy for me. |
| | PEU2 | I think that I will find it easy to get the on-line learning system to do what I want it to do. |
| | PEU3 | I think that it would be easy for me to become skillful at using the on-line learning system. |
| | PEU4 | I think that I will find the on-line learning system easy to use. |
| Affect (AFF) | AFF1 | I like working with computers. |
| | AFF2 | I look forward to those aspects of my course work that require me to use a computer. |
| | AFF3 | Once I start working on a computer, I find it hard to stop. |
| | AFF4 | Using a computer is frustrating for me. |
| | AFF5 | I get bored quickly when working on a computer. |
| Computer and Internet Experience (CE/IE)* | CE1 | See scale below |
| | CE2 | See scale below |
| | IE1 | See scale below |
| | IE2 | See scale below |

| ***Scale →*** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| ***Question ↓*** | | | | | |
| CE1: Knowledge about computers. | V.K. | S.K. | N. | S.U. | V.U. |
| CE2: Experience with at least one of Microsoft products. | V.H. | H. | N. | L. | V.L. |
| IE1: Time using the internet. | < 6 m | 6m–1yr | 1-2yrs | 2-5yrs | >5 yrs |
| IE2:Daily internet usage. | < 15 min | 15min-1hr | 1hr-2hrs | 2-5hrs | >5 hrs |

**Table1. Measures of Study Variables**
**Scale for Computer and Internet and Experience**
**V/S = Very/Somewhat; K=Knowledgeable; H=High; L=Low**

# IV. RESULTS, ANALYSIS AND FINDINGS

The 114 usable questionnaires were examined for missing data (6 missing data were found). In our preliminary replaced the missing values [74] b7 first assessing the Cronbach's alpha coefficient for internal consistency reliability. We found, as summarized in Table 2, the reliability of PEU and AFF constructs are acceptable [74, 75]. Although the normally acceptable lower limit for alpha value indicating the consistency of the scale is .7, in exploratory research one can accept alpha value close to .6 [76].

| Variables | Cronbach's alpha | Mean | Variance |
|---|---|---|---|
| Perceived Ease of Use (PEU) | 0.929 | 3.60 | .0122 |
| Affect (AFF) | 0.901 | 3.59 | .0655 |
| Computer Experience (CE/IE) | 0.584 | 3.14 | .0406 |

**Table 2. Reliability Assessment**

Second, reliabilities of individual items were assessed by examining the loadings of the items on their respective constructs presented in Table 3. These loadings should be higher than 0.5, following the criterion suggested by Pedersen and Nysveen [28] to indicate that significant variance was shared between each item and the construct. It is expected that the loadings of all items within a construct should be high on that construct, ensuring high convergent validity, and should be low on the others. The factors, underlying variables that reflect combinations of observable variables, were extracted using the principal components method (varimax rotation) which is an optimum approach to condensation prior to rotation. Table 3 clearly shows that the three-factor solution is appropriate, and the items display desirable convergent and discriminant validity.

| | Factor 1 | Factor 2 | Factor 3 |
|---|---|---|---|
| PEU1 | **.853** | .274 | .163 |
| PEU2 | **.900** | .218 | .020 |
| PEU3 | **.836** | .183 | .029 |
| PEU4 | **.868** | .192 | .153 |
| AFF1 | .297 | **.813** | .221 |
| AFF2 | .220 | **.873** | .071 |
| AFF3 | .057 | **.807** | .202 |
| AFF4 | .447 | **.681** | .089 |
| AFF5 | .280 | **.798** | .081 |
| CE1 | .514 | .241 | **.496** |
| CE2 | .400 | .161 | **.426** |
| IE1 | .091 | -.014 | **.788** |
| IE2 | -.046 | .334 | **.525** |

**Table 3. Factor Analysis**

The proposed mediation hypotheses are often tested by using a statistical technique suggested by Baron and Kenny [80]. Mediation is considered to be established based on the following criteria: (1) A significant relationship exists between the independent variable and the dependent variable; (2) a significant relationship exists between the independent variable and the presumed mediator; and (3) in the presence of a significant relationship, the previous significant relationship between the independent variable and the dependent variable is no longer significant or the strength of the relationship is significantly decreased. However, tests can be conducted to calculate the indirect effect and its statistical significance to ascertain whether affect mediates the relationship between the experience and PEU.

H1a and H1b hypothesized that CE and IE have a significant effect on PEU. As shown in figure 3, the effect of IE on PEU was significant ( = 0.224, t=2.438, p = 0.016), supporting H1a; the effect of CE on PEU was significant ( = 0.556, t=7.079, p = 0.000).

H2a and H2b hypothesized that the effect of IE and CE on PEU would be mediated by affect. The relationship between IE and AFF was significant ( = 0.343, t=3.870, p = 0.000). When PEU was regressed on both IE and AFF, no significant relationship was found between IE and PEU ( = 0.051, t=.051, p =.556) but the relationship between AFF and PEU was significant ( = .506, t=5.883, p =0.000). Thus we can conclude that affect does not mediate the relationship between IE and PEU.

The relationship between CE and AFF was significant ( = 0.724, t=11.119, p = 0.000). When PEU was regressed on both CE and AFF, a significant relationship was found between CE and PEU ( = 0.396, t=4.707, p =.000) and the relationship between AFF and PEU was significant ( = .333, t=3.960, p =0.000). Thus we can conclude that affect mediates the relationship between CE and PEU since the strength of relationships between the CE and PEU was reduced from 0.724 to 0.396.

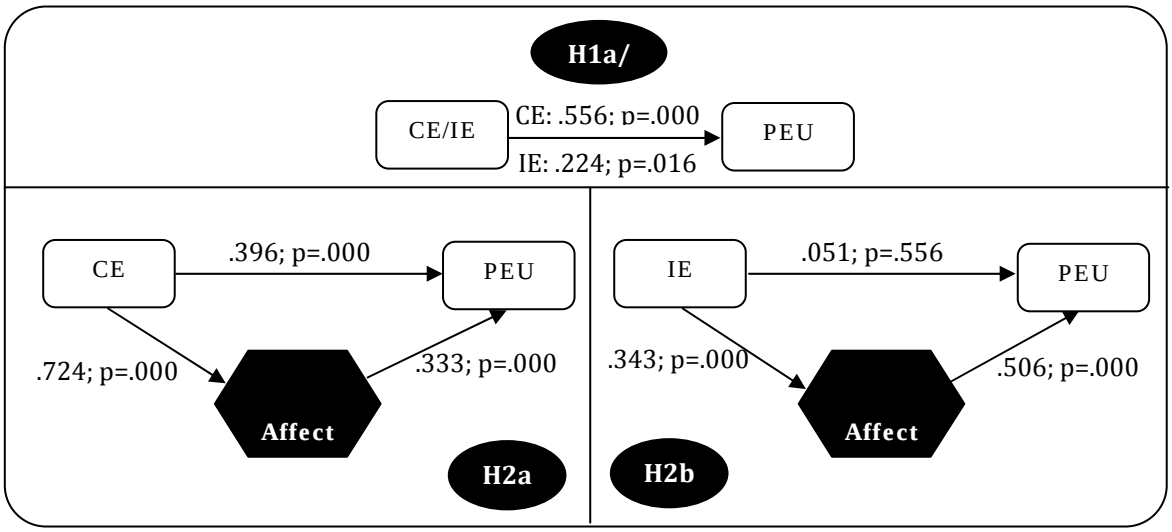



**Figure3. Mediation of Affect (Hypotheses supported) Between CE/IE and PEU**

Although the construct CE/IE has been used to represent technology experiences related to computer usage, IE1 (time using the internet) and IE2 (daily internet usage) have limited influence on the users' perception of the ease of use. The decision to use these items for the construct is mainly based on inconclusive results of the past studies concerning the impact of computer experience on attitude. Past research indicates that computer experience positively correlates with computer attitudes [78, 79, 80, 81, 29, 82, 83] and computer use [78, 82]. But in fact, some results indicate that the greater exposure or increase in computer experience may exacerbate computer anxiety and promote more negative attitudes toward computers [84]. This pattern of results suggests the presence of some third, unaccounted for factor, which may mediate or moderate the effects of computer experience on attitude [84]. In addition, the challenge in understanding the impact of computer usage on user perception is due to the inappropriate measures used to measure computer experience. Often, the amount of time users spend on computer and computer experience are used interchangeably [85, 86, 87, 88, 89]. Thus, we have included two objective items (IE1, IE2) and subjective items (CE1, CE2) to measure the concept of computer experience. Our data indicate that the time spent on the internet regularly does influence users' perception of how they may be able to use online tools designed to enhance their learning experience. Based on factor analysis, the only items with higher than .5 loading are IE1 (duration of usage) and IE2 (frequency of use). However, we chose to include CE1 and CE2 to represent users' total "computer experience". To further investigate how individual variables are related to PEU, we have considered the following relationships:

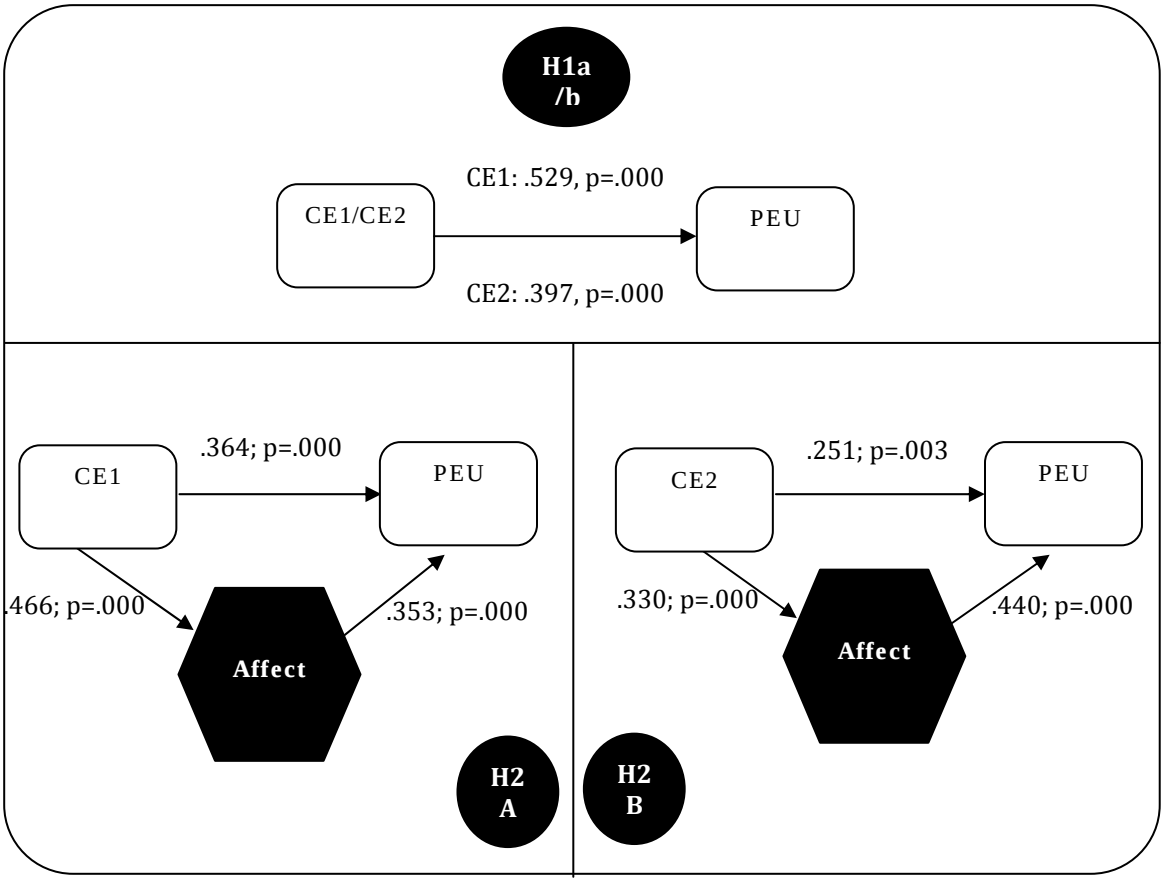



**Figure3a. Mediation of Affect (Hypotheses Supported) Between CE and PEU**

H1a and H1b hypothesized that CE1and CE2 have a significant effect on PEU. As shown in figure 3a, the effect of CE1 on PEU was significant ( = 0.529, t=6.597, p = 0.000), supporting H1a; the effect of CE2 on PEU was significant ( = 0.397, t=4.576, p = 0.000).

H2a and H2b hypothesized that the effect of CE1 and CE2 on PEU would be mediated by affect. The relationship between CE1 and AFF was significant ( = 0.466, t=5.578, p = 0.000). When PEU was regressed on both CE1 and AFF, a significant relationship was found between CE1 and PEU ( = 0.364, t=4.302, p =.000), and the relationship between AFF and PEU was significant ( = .353, t=4.176, p =0.000). Thus we can conclude that affect does mediate the relationship between CE1 and PEU since the strength of relationships between the CE1 and PEU was reduced from 0.529 to 0.364.

The relationship between CE2 and AFF was significant ( = 0.330, t= 3.706, p = 0.000). When PEU was regressed on both CE2 and AFF, a significant relationship was found between CE2 and PEU ( = 0.251, t=3.055, p =.003) and the relationship between AFF and PEU was significant ( = .440, t=5.348, p =0.000). Thus, we can conclude that affect mediates the relationship between CE2 and PEU since the strength of relationships between the CE2 and PEU was reduced from 0.397 to 0.251.

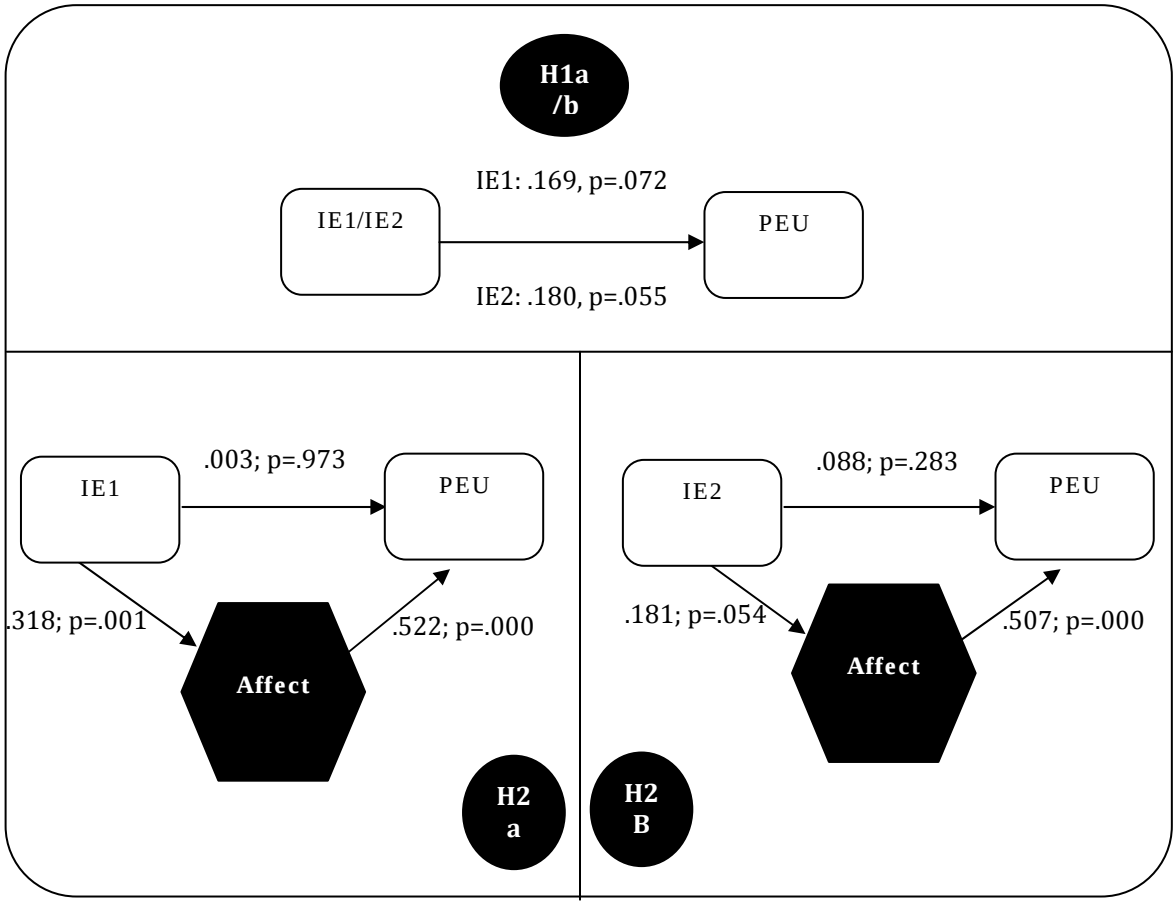



**Figure 3b. Mediation of Affect (Hypotheses Not Supported) Between IE and PEU**

H1a and H1b hypothesized that IE1and IE2 have a significant effect on PEU. As shown in figure 3b, the effect of IE1 on PEU was marginally significant ( = 0.169, t=1.816, p = 0.072), supporting H1a; the effect of IE2 on PEU was marginally significant ( = 0.180, t=1.937, p = 0.055).

H2a and H2b hypothesized that the effect of IE1 and IE2 on PEU would be mediated by affect. The relationship between IE1 and AFF was significant ( = 0.318, t=3.553, p = 0.000). When PEU was regressed on both IE1 and AFF, no significant relationship was found between IE1 and PEU ( = 0.003, t=.034, p =.973), and the relationship between AFF and PEU was significant ( = .522, t=6.122, p =0.). Thus we can conclude that affect does not mediate the relationship between IE1 and PEU.

The relationship between IE2 and AFF was marginally significant ( = 0.181, t= 1.948, p = 0.054). When PEU was regressed on both IE2 and AFF, no significant relationship was found between IE2 and PEU ( = 0.088, t=1.078, p =.283) and the relationship between AFF and PEU was significant ( = .507, t=6.201, p =0.000). Thus we can conclude that affect does not mediate the relationship between CE2 and PEU.

## V. CONCLUSIONS, IMPLICATIONS AND LIMITATIONS

The primary objective of this study was to investigate the role that affect plays in mediating the impact of computer experience on perceived ease of use in the context of learning tool utilization. Affect was shown to mediate the impact of CE on PEU thereby supporting H1a, H1b and H2a but not H2b. Similar conclusions are reached when the internet computer experiences and general computer experiences were separated for the analysis. When the general computer experience is considered, the affect was shown to

mediate the impact of computer experience on PEU but not when the internet experience was considered. The results suggest that computer related personality traits influence perceived ease of use in some cases. However, this assertion is not as straightforward as it seems because the quality of support in terms of professionalism, friendliness and enthusiasm also has a profound influence on computer acceptance [66]. This alone has major significant impact on how educational information systems in general, and learning tools in specific, should be designed and implemented.

A few limitations to this study exist and should be noted. First, the questionnaire approach is not free of respondent subjectivity, and the survey was taken at one point in time. User reactions change in time and may depend on the environment such as the classroom location and time of course. Second, caution must to be taken in generalizing the results due to the fact that participants in this study were from different cultural backgrounds with different cultural beliefs influencing their perceptions and attitudes.

Also, previous studies have shown that perceptions and attitudes differ between the mandatory or voluntary use of information technology (in this case, the learning tool). This study is limited in that respect because it did not differentiate between mandatory or voluntary use. In fact, students were given the choice to use the learning tool either for practice with no score value to the overall course grade or for 10% value of the course grade.

Finally, conclusions are based on the use of a specific learning tool which was developed in-house. Other learning tools can have different designs, be developed for different platforms (in this case it was web-based) and used under different settings. This therefore may not generalize across a wide set of learning tools.

This research was motivated by an interest in understanding the role that personal level of anxiety and affect play in mediating perceived ease of use. Our study shows that positive affect has a strong significant mediating influence on perceptions of the learning tool being easy to use. Our findings suggest that prior to introducing prospective students to learning tools they should be tested for the type of computer experiences they have had. In the context where the learning tool usage is motivated by the score obtained, affect does mediate the CE-PEU relationship. In other words, individuals who are more joyful on the web have better attitude about the ease of use of learning tools. However, direct internet experiences (IE) and PEU relationship is not mediated by the affect variable.

The findings demonstrate the value of the contribution of affect as a mediator to perceived ease of use of learning tools. With the continuous development of richer and more appealing interfaces, this study stresses the importance of intrinsically motivating experiences such as ‘affect’ for learning. As a means to better understand the dynamics of human computer interactions, the feelings a person ascribes to some previous computer experience need to be understood [31, 57]. This construct might dominate as a predictor of usage intentions. Course designers and managers who desire to successfully implement new learning tools in a higher education or training context need to be aware of this relationship to create an environment supportive of subjective attitudes.
Another key implication for designers/managers relates to guidelines for the design of learning tools. Positive attitude is more likely to be experienced with learning tools that are interactive and motivating. Paying close attention to integrating interactive features in the design of learning tools and providing incentives to motivate usage assists those responsible for diffusion of the learning tools.

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## VII. ABOUT THE AUTHORS

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# A SYNTHESIS OF SLOAN-C EFFECTIVE PRACTICES: DECEMBER 2009

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## ABSTRACT

Encouraging continuous improvement in the quality, scale and breadth of online education, the Sloan Consortium invites practitioners to share effective practices. This report synthesizes effective practices submitted by Sloan-C members to the online collection at http://www.sloanconsortium.org/effective as of December 2009. The synthesis includes links to the provider institutions and to detailed postings about practices.

## KEYWORDS

Learning Effectiveness, Scale, Institutional Commitment, Access, Faculty Satisfaction, Student Satisfaction, Quality Framework

## CONTENTS

# I. INTRODUCTION

The Sloan-C Effective Practices collection enables educators to share practices that help make quality online education more affordable, accessible and effective. Sloan-C's quality framework calls for metrics to measure progress towards these goals via five key principles for achieving quality. Effective Practice postings demonstrate evidence of effectiveness in each of these pillars.


**Learning Effectiveness**: Online learning outcomes meet or exceed institutional, industry, and/or community standards.

**Scale**: Institutions continuously improve services while reducing cost to achieve capacity enrollment.

**Access**: All learners who wish to learn online have the opportunity and can achieve success.

**Faculty Satisfaction**: Faculty achieve success with teaching online, citing appreciation and happiness.

**Student Satisfaction**: Students are successful in learning online and are pleased with their experience.

As technology introduces new possibilities, the effective practices collection is a collaborative work in progress. Educators share emerging knowledge and advance it, and Sloan-C recognizes excellence, awarding practices that meet these criteria:

- **Innovation**: The practice is inventive or original.
- **Replicability**: The practice can be implemented in a variety of learning environments.
- **Potential impact**: The practice would advance the field if many adopted it.
- **Supporting documentation**: The practice is supported with evidence of effectiveness.
- **Scope**: The practice explains its relationship with other quality elements.

Practices in one area affect quality in others, thus the pillars are related and interdependent. When members post practices, they help influence the future of education. Practices are automatically eligible for annual Sloan-C awards. Appendix A lists effective practice awards, and Appendix B is the rubric for evaluating effective practices.

This synthesis groups effective practices according to solutions that contributors have provided to some frequently encountered questions. Hyperlinks are provided so that readers can examine details about practices and the organizations and people who have generously shared them.

# II. STUDENT SATISFACTION

Sloan-C's goal for student satisfaction is that students are successful in learning online and are typically pleased with their experiences. Measurement of student attitudes finds that:

- Discussion and interaction with instructors and peers is satisfactory;
- Actual learning experiences match expectations;
- Satisfaction with services (advising, registration, access to materials) is at least as good as on the traditional campus;
- Orientation for how to learn online is satisfactory; and
- Outcomes are useful for career, professional and academic development [1].

Student satisfaction with the entire learning experience begins with preparing learners for the online environment, continues throughout the curriculum, and continues past graduation with career services and lifelong learning. As emphasized by the Western Cooperative for Educational Telecommunications 2002 report "Beyond the Administrative Core: Creating Web-Based Student Services for Online Learners," "students expect more than static web pages—they are looking for personalized and integrated information and services that will support their higher education experience [2]."

## 1. How can schools help learners get started with online learning?

A full range of online services comparable to services provided on campus helps ensure that the quality of learning is at least equivalent to learning in face-to-face settings.

- The Illinois Virtual College Online Student Resource Center (IVC) helps students succeed in online learning with online resources for: Getting Started, Student Resources (Assessment & Testing; Diverse Populations; Financial Assistance; Health & Wellness; New Students;

Purchasing Books Online; Returning Adult Students; Transfer Information), Academic Success Skills (Study Skills/Online Tutoring Sites; Library Skills/Online Research Sites; Writing/Communication Skills; Survival Skills; GPA Calculator), Career & Life Planning (including tutorials that walk students through planning process), and Technology Tools (including tutorials). Students interested in taking an online course can walk through the resources at their own pace, or they can go directly to a category of information. Students at all sixty-six Illinois campuses can also visit in person any of forty IVC Student Support Centers, one located in every community college district in the state.

- Stark State College requires students to complete an agreement that tells them what to expect and how to succeed.
- Fernuniversitat Hagen provides online tools for enhancing learning effectiveness for easy access to personal data and calendars, assignment results, courses, and contact information for tutors and classmates.
- At the University of North Texas ecampus, a student guide meets all five pillars of quality by providing access to course information for online students, student satisfaction in knowing that they are prepared for the academic and technical requirements of the online course, learning effectiveness in permitting students to get a head start on course requirements, faculty satisfaction in knowing that their students know about course expectations, and cost effectiveness and institutional commitment in making course and program information available to prospective and current students before they decide to enter. University of North Texas also requires beginning students to enroll in Web Institutes so that student cohorts support one another.
- At Saint Leo University, a required online orientation introduces learners to resources and expectations, with an overview of support services and resources, through an online, instructor-led orientation course that assures connection and connectivity to entry level students.
- At GoArmyEd (formerly eArmyU), ViCTORY (Operation Virtual Counselor Transforms Online Resources for You) is a model for Soldier academic support and success; this fully integrated proactive student-support reaches out to soldiers in more than 50 countries. eArmyU counselors regularly contact soldiers at critical points in their progress, helping to ensure a high rate of completion.
- Similarly, mentors at Western Governors University know that learners' approaches in its competency-based program may range through a continuum of transforming, performing, conforming or resisting, and so mentors establish regular contact with learners to reduce feelings of frustration and isolation.
- Long Beach City College (LBCC) provides its orientation on learning skills, Internet skills, and communication skills to all LBCC faculty and students and to others who wish to use the resources at S.I.D.E. Road: Success in Distance Education.
- Washington State University helps students learn to communicate online with the help of virtual facilitators.

## 2. How can schools help learners make good choices?

- To help students project and manage their time and also to help decide which courses they can succeed in, Troy State Montgomery provides a syllabus display and time on task as part of the registration process.
- At Athabasca University, the detailed syllabus helps students preview expectations before taking the course and reduce anxiety, pace themselves and even work ahead of schedule to accommodate business and personal commitments.
- At the University of Phoenix (UOP), personalized, student-centered life-long learning for adult learners includes consideration for the schedules of working adults; thus, courses are taken one at a time during a six-week-long intensive semester. UOP's small class size, academically qualified

practitioner faculty, and outcomes oriented curricula focus on providing students with workplace competence, teamwork practice, and improved communication skills.

- At Washington State University, flexible enrollment options offer students control of learning, so that they can choose to enroll in a regular semester or extend for a couple of semesters. To help establish social presence and preview subject matter for prospective students, Washington State University provides brief RealPlayer videos in which the professor welcomes students with an introduction to the course.
- Empire State College requires a course that becomes an educational planning environment in which students and their mentors assess their preparation for college; consider personal, professional and educational goals; identify prior learning; analyze what students need to learn; select courses; choose a concentration, make a curricular plan, and develop and articulate a degree program.
- At Northern Virginia Community College, a tutorial instructional model builds learner-instructor interaction into course, assignment, submission and feedback processes.

## 3. How can schools build community among learners?

- Because student satisfaction is rooted in a learning community, The Pennsylvania State University World Campus's community website connects online students to the university and builds a learning community; and its student/faculty helpdesk, an online customer service, makes online experiences more satisfying for faculty and online students.
- At the State University of New York Learning Network (SLN), courses emphasize the importance of required interactions between student and faculty, and SLN continuously assesses student satisfaction and reported learning, interaction, learning community formation, and more.
- To encourage its graduates to stay identified with its community, University of California Berkeley offers tuition discounts for alums for online courses.
- To prepare its students for their online course experience, Berkeley College has a comprehensive plan for preparing online students including an orientation site for its online degree students, a required online preparatory course that prepares online students to understand the particulars of online learning and navigate the course management system, an online library orientation, a special one-stop shopping center online degree site with messages from advisors and students services, an online tutoring site that is always available to help students with course material and writing assistance, and ongoing faculty and technical support.
- At Rochester Institute of Technology each online course has a customized course page with course information, school policies, access and equipment information, and resources.
- Frederick Community College (FCC) provides a comprehensive array of online library materials and services. Library resources available by remote access include the library catalog, reference data bases, online journals and full-text resources, government documents, news services, and other sources. The library also creates custom web pages with resources that are relevant to individual courses. Services provided online include reference and research assistance, document delivery, interlibrary loan, partnering programs with local libraries, and library user training, including research techniques.
- To welcome students to the course community, a professor at Charter Oak State College telephones students on the first day of class to establish communication.
- At Mercy College, students feel more comfortable about asking for assistance when they can ask their peers, students who are tutors, facilitators, and role models.
- At the University of Massachusetts Lowell, a course community and resource website builds community building through sharing of student pictures, current and past student work and extensive resources.

- The University of Arizona College of Nursing Online PhD Program rotates student photos on its portal as an easy way for learners to match names with faces.
- "Well begun is half done" at Old Dominion University where the online student orientation website an interactive gateway that helps prospective students to become acquainted with distance learning. Students can assess their computer proficiency, learn about course registration and choose from a variety of helpful tutorials. Faculty may refer students and advisees to the site and it can easily be embedded into a preexisting website or course site. The Orientation site not only serves as an efficient segue to distance learning, but also proves to be an encompassing resource that can be referenced throughout distance learners' academic careers.
- Connecticut Distance Learning Consortium provides a collaboratively designed eportfolio platform to support learning, reflections, advising, career services, and assessment. Students use the platform to track and annotate their education, experience and goals. They can collect samples of their work to create portfolios and showcase specific experiences, photos, career documents, and portfolios to invited faculty, peers, employers, or others. A "counselor" view allows students to work virtually with advisors and career counselors.
- At Saint Joseph's College of Maine, proactive academic advising for distance students meet the institutional goal of providing distance students with access to the same or better resources as their campus-based counterparts. Academic advisors maintain regular contact with prospective students via phone, mail, and email, and help students evaluate their academic and technical readiness for distance learning. Along the way, they encourage students to consider how their pursuit of distance education will fit into their family and work lives and to solicit support from family and friends.
- Students help students learn at Mercy College where students who have excelled in online courses become "wizards," online teaching assistants. In Mercy College's Master of Organizational Behavior program cohorts build online learning community as learners engage with permanent 12-month cohort of learners, with a permanently assigned mentor, and a permanent team of instructors; learners report a transformation in their academic, personal and professional development; and the program boasts a 90% success rate.

## 4. How can schools and faculty assess student satisfaction?

- To make sure it provides a satisfying learning experience for graduate students, the Stevens Institute of Technology's WebCampus monitors student satisfaction and other responses every semester by surveying its online graduate students to find out how eager students are to learn and to be involved with their learning environment, how ready they are to collaborate with other students, and how at ease they are with their instructors. Students perceive that their learning is on a par with traditional modes and that the programs provide what they desire in graduate education.
- Professor Denise Marchionda at the University of Massachusetts Lowell realized students would appreciate guidelines for managing the online week, so she provided a template for structured activities; students appreciate the guidelines and the distributed pacing of activities, and the template eliminates questions and reminders about the schedule.

## 5. How can schools increase student satisfaction with learning?

Learning designed for student satisfaction is convenient, flexible, relevant, personalized, and engaging; it offers learners options for learning activities and for controlling the pace of learning.

- The University of Massachusetts uses the real-time case method to enhance the learning experience, providing extended, in-depth coverage to students at many schools, with real-time

interactivity with the case company. Students report high satisfaction with the authenticity of the real case study work that sustains their interest and enthusiasm. Also at UML, a pause and post method improves the frequency and quality of discussion board posts in an education course.

- Capella University students visit its online writing support center frequently and appreciate the writing tips featured regularly on its learning portal.
- The Pennsylvania State University finds that learners enjoy ePortfolios as a way to evaluate their learning experiences and to share their reflections with peers and potential employers.
- For designing and conducting large classes that are intellectually engaging and satisfying for students, Professor Murray Turoff of the New Jersey Institute of Technology provides tips for managing large groups effectively: synchronizing, organizing, socializing, collaborating, sharing and feedback.
- At the University of Toledo, an online writing center increases satisfaction among students and faculty by helping students improve writing skills and avoid plagiarism.

## 6. How can schools use technology to enhance student satisfaction?

- To create a website that intuits and satisfies expectations, Embry Riddle Aeronautical University surveyed its constituents and also invited visitors to give feedback on its website design and incorporated results to create a thoughtful web design that welcome current and perspective users.
- Another platform designed with users in mind, Moodle is an open-source learning management system designed by faculty with continuous feedback from users as a user-friendly interface for constructive interaction with content and classmates. Designed with a social constructionist framework, Moodle includes many features to enhance social, cognitive and teaching presence: user friendly overall design; easy course, user, and site management; assignment, chat, survey, forum, quiz, and resource modules; and wiki (collaborative writing), encyclopedia, and glossary functions.
- University of Nebraska in Lincoln (UNL) uses video conferencing so that doctoral students can present their work without having to travel.
- Faculty at three universities—West Virginia University, University of North Carolina at Charlotte, and Virginia Tech—found that audio feedback enhances student satisfaction and saves faculty time.
- At American Public University (APUS), students use online collaborative document editors which streamline project workflows and improve cognitive outcomes because of easy collaboration, easy multimedia inclusion and manipulation, and the relationship between online document collaboration tools and wikis.

# III. LEARNING EFFECTIVENESS

Sloan-C's goal for learning effectiveness is evidence that the quality of learning online is comparable to the quality of traditional programs, meeting or exceeding industry standards for learning outcomes. Metrics for learning effectiveness may demonstrate that:

- Interaction is key: with content, with instructors, classmates, the interface, and via vicarious interaction
- Online and traditional courses achieve comparable learning outcomes
- Online course design takes advantage of capabilities of the medium to improve learning (testing, discussion, materials)
- Communications and community building are emphasized
- Swift trust characterizes the online learning community

- Distinctive characteristics of programs are highlighted to demonstrate improved learning

Learning effectiveness online benefits from community efforts that help learners adjust their roles to become more aware of learning, more motivated and self-directed, and more confident in online environments. As Swan explains, learning effectiveness benefits from purposeful interaction; see Relationships between Interactions and Learning In Online Environments [3], a concise summary of the principles of interaction, many of which are exemplified in the effective practices listed in this synthesis. A continuing large-scale collaboration among educators who understand the significance of interaction in learning isThe Community of Inquiry Framework – it is demonstrably effective for Multi-Level Institutional Evaluation and Continuous Quality Improvement.

## 7. How can learning design enhance interaction?

Perceptions of learning effectiveness correlate with perceptions of social presence.

- At Florida State University, social presence begins with introductions in which students complete a personal profile complete with photo; profiles are accessible to the members of the course.
- Courses at the State University of New York University at Albany are designed for effective discussion management via modules for readings with critiques, lesson planning, and reflective journals that lead to abundant professor-student interaction.
- For effective interaction, students and faculty benefit from clear expectations about communicating; clear expectations help manage the volume and quality of interaction. Thus, Prince George's Community College finds that improving navigation helps students find what they need and cuts down on questions to faculty.
- Clark College advocates front-loading content in course design so that students have already engaged with course work before they attend their first class meeting.
- Across its curriculum, Mercy College finds that defining effective participation helps learners contribute postings that are: substantial (relate to the course material), concise (one screen may be the ideal message length), provocative (encourage others to respond), hermeneutical (expand concepts or connects ideas in new ways), timely (occur in a reasonable time frame—when the topic is under discussion), logical (support point of view with reasons and evidence), and grammatical (are well written).
- At Herkimer Community College, Professor Bill Pelz encourages student-led discussion to build complex understandings of psychology concepts; discussions require postings that are relevant, important, thought-provoking, original and timely. Moreover applying research on presence to guide online discussions, Pelz helps students develop social, cognitive and teaching presence by grading for postings that document, explain and apply information that contributes to the understanding of some issue under discussion so that classmates gain insight into the subject, and learners become teachers.
- Miami University finds that using the Quality Matters rubric to guide online course development, including emphasis on interaction, builds quality assurance into the final product; likewise Seton Hall University relies on the Quality Matters rubric to provide faculty with a consistent foundation for developing online courses.
- Emphasizing interaction (with content, peers, teachers, and interface [2]) aids collaboration, one of the most important aspects of online education; thus, a professor of education at Kent State University designs courses that include opportunities for both individual and group work via personalized instruction and problem based learning.

- Second Life is a highly interactive virtual world that is proving engaging for faculty and students alike. Sloan-C hands out note-card directions in Second Lifeand identifies avatars by students' real names.

## 8. How can learning design enhance collaboration?

Asynchronous learning networks (ALN) optimize opportunities for collaborative learning and demonstration of learning.

- The University of Florida's Internet MBA uses online peer evaluation of writing assignments so that students give reciprocal feedback on each others' projects.
- For teachers in training, the University of Cincinnati's early childhood learning community uses multimedia for virtual assessment of and reflection on student teaching to enable students to do student-teaching in their own communities, and use online channels to self-evaluate, to obtain mentoring, and to create online journals and portfolios.
- At the University of Massachusetts Lowell (UML), professors in various disciplines use online resources to enhance learning. A UML education course uses electronic portfolios for organizing and assessing; each student builds an individual repository of materials, demonstrating industry and growth across a semester's worth of work. Portfolios help students and faculty demonstrate and track learning. A UML psychology professor provides a publication in personality psychology that integrates original writings of theorists, case studies and personality assessment inventories, so that students can apply, personalize and critique theoretical knowledge. UML accounting professors enable the practical application of accounting concepts using EDGAR, the Security and Exchange Commission's (SEC) electronic data gathering, analysis, and retrieval system so that students have meaningful illustrations and practical applications of financial reporting using actual SEC data.
- At Stevens Insitute of Technology professors use virtual teams for teaching marketing in an online course so that students learn experientially, doing actual marketing projects in collaboration.

A special collection of effective practices focuses on student-generated content as a special affordance of online learning that encourages active learning and demonstrable outcomes.

- At North Carolina State University, students enjoy electronic peer review for giving each other feedback, improving skills, and building on each other's work.
- At the University of Reading's School of System Engineering, students produce assessment learning objects to help each other learn programming.
- Minneapolis College of Art and Design showcases an online gallery of student and alumni work so peers and prospects can share inspiration.
- At Northern Virginia Community College students publish their own practical applications of math problems. Podcasting performances helps students develop skills in speaking English.
- At the University of North Carolina at Pembroke, students have created an Online Encyclopedia of Criminal Justice and gain experience "editing, revising, and organizing the content."

## 9. How can learning design inculcate academic honesty?

Adjustment to online learning includes understanding institutional policies for academic honesty and integrity.

- Florida State University applies the same honor code online and face to face.
- At the Virtual Academic Integrity Laboratory (VAIL), visitors to the online University of Maryland University College Center for Intellectual property find resources for faculty and administrators and for students.
- To verify identity, Pace University provides secure testing for online learners through a proctoring network.

## 10. How can schools assess learning effectiveness?

- In the University at Albany's computer and media education courses, students participate in and learn to create lesson plans incorporating rubrics—not only do rubrics help assess student performance, by helping students focus on what matters in the course, they help refine the course and reduce questions about grades, easing faculty workload.
- Massachusetts Institute of Technology recognizes that a common objective scale for quality can benefit higher education efforts in joint development and shared resources, ultimately reducing the overall costs of online learning. Thus, MIT proposes a new methodology for evaluation: the pedagogical rating of online courses. This tool for overall evaluation of online courses or modules demonstrates that pedagogical effectiveness increases as cognitive opportunity increases, via attention to learning styles, media elements, and interaction.
- Michigan State University uses LON-CAPA, open source freeware for assessment and content management, to obtain immediate, detailed feedback about online homework, which can be used to quickly adjust lectures, recitation sessions, and individual help to address learner needs.
- The University of Wisconsin-Madison's Master of Engineering in Professional Practice has an integrated assessment system for courses, overall program and post-program career impacts that includes an evaluation of each course by students and faculty; an evaluation of the overall program at graduation; and a follow-up survey of alumni, their co-workers, and their family members to measure the impact of the program upon professional and personal development of alumni. The practice provides evidence of continuous improvement through regular team review and implementation of assessment results.
- At the College of Southern Maryland, professors incorporate assessment in three ways: 1) creation of a learning guide (explicit roadmap), 2) reorganized presentation and design, and 3) addition of classroom assessment techniques (CATs) in each course module. Students "welcomed the opportunity to participate in activities to assess their learning more frequently throughout the course."

## 11. How can technology support learning?

Learning benefits when relevant, active, interaction with content enables learners to apply skills and concepts. Technology offers options for simulations, online labs, and collaborations that support active learning.

- At Rio Salado, an online class helps students actively learn human anatomy using online resources such as interactive tutorials, tests, puzzles, practice labs, games, and written assignments.
- A course at Riverside Community College shows that outcomes improve when students have online access to elementary algebra with interactions, tutorials and workshops.
- Sheffield College boasts 100% success rates in its preparatory English certificate that helps students qualify for university entry.

- At William Rainey Harper College, a chemistry course includes a lab environment that demonstrates applications of theoretical concepts, including lab applications via blended learning, combining online and face-to-face learning.
- A course in ethics at the University of Massachusetts Lowell uses a mock trial to engage students in critical thinking about technology.
- Stanford designs custom tutorials using courselets, self-contained, integrated sets of learning materials for unlimited practice and review to enhance the learning experience for students and reduce the demand for faculty time.
- At Indiana University, the TALON Learning Object System provides repurposeable learning objects that faculty can easily adapt to create interactive content for writing, visual learning, math and more so that students can master skills and content.
- The University of Vermont College of Medicine transformed traditional education with an integrated curriculum that includes a wide variety of multimedia educational technology tools and applications for hybrid learning environments, including reusable learning objects, virtual reality models, streaming audio and video, and online exams. Because students interact with the self-directed, online educational tools at their own speed on their own time, prior to attending face-to-face lectures, faculty have been more efficiently focusing their face-to-face time with students in class.
- At Carnegie Mellon, speakers of English as a second language use an automated reading tutor that listens (Project LISTEN) and "intervenes when the reader makes mistakes, gets stuck, clicks for help, or is likely to encounter difficulty."
- Kansai University receives positive evaluations from students who receive lectures at home via 3D virtual space.
- WGBH PBS models rich multimedia content that is both educational and entertaining in its Nova program *The Elegant Universe* — each segment provides online transcripts, assignments, animations, interactivities, links to related sites and references, technical support, cinematography, narrative, video clips, and audio including music.

## IV. SCALE

Scale enables institutions to offer their best educational value to learners and to achieve capacity enrollment. Scale in online education is often a reflection of institutional commitment to providing quality online, so that online education achieves outcomes that are at least equivalent to outcomes achieved in other delivery modes in ways that are affordable for providers and for learners. In many cases, as the practices listed here demonstrate, online programs create efficiencies for "avoiding, reducing, and conserving costs" [4] that exceed those in traditional modes. An overview of issues institutions face in scaling online programs is provided by Oakley and Moloney [5].

- Institutions continuously improve services while reducing cost to achieve capacity enrollment
- Cost effectiveness models are tuned to institutional goals
- Tuition and fees reflect cost of services delivery
- Scalability, if an institutional objective, can be accommodated
- Partnering and resource sharing are institutional strategies for reducing costs
- Mission-based strategies for cost reduction are continuously formulated and tested
- Intellectual property policies encourage cost effective strategies

## 12. How can schools share resources to improve learning and avoid costs?

Consortia and other partnerships offer institutions opportunities to improve quality by sharing knowledge, resources and costs.

- In the Virtual Library of Virginia (VIVA), thirty-nine state-supported colleges and universities in the Commonwealth of Virginia use technology to improve learning and productivity, and at the same time avoid costs (estimated $74.5M) by sharing library resources online.
- WISE (Web-based Information Science Education) is a collaborative for sharing library and information science resources.
- The Colorado Community Colleges Online share the costs of online services including student admissions, records, advising, and bookstore.
- Business schools at four different universities from Canada to Florida collaborate in using the real-time case method (RCTM) to enhance learning and reduce costs —RCTM is scalable to more universities.

## 13. How can redesign improve access, affordability, and learning, and save effort?

Re-designing courses can improve learning and access, free up faculty time, reduce physical plant costs, reduce dropout, failure, withdrawal (DFW) rates, and maintain or increase enrollment.

- The Pew Course Redesign Project demonstrates how substitutions of technology for labor increase access, achieve cost savings, and utilize technology to facilitate learning. In courses in multiple settings, universities are able to reduce classroom space and contain costs or achieve some cost savings by substituting a primarily asynchronous learning model for the traditional classroom model.
- A redesigned computer literacy course at the University of Buffalo produced 54–60% reductions in cost per student.
- An introductory psychology course at University of Southern Maine reduced lecture time, increased interaction and completion rates, and reduced cost per student by more than 50%.
- At the University of Dayton, redesign reduced course sections of introductory psychology by 50% by combining sections with more collaborative and interactive learning models.
- At Brigham Young University, redesigning freshman composition resulted in less time in class, greater interaction, and maintained learning outcomes and satisfaction.
- Vanderbilt University's distributed learning electronics labs increase access and decrease the number of trips to a physical lab at a reduced cost.
- At Virginia Tech, an online math course eliminates class meetings, maintains learning outcomes, and improves completions.
- At the University of Iowa, a redesigned chemistry course enables students to report homework and laboratory results online, with a cost savings of about ten dollars per student.
- Indiana University-Purdue University Indianapolis lowered the cost of introductory sociology by about 20% while improving learning outcomes and completion rates.
- An introductory Spanish course at the University of Tennessee Knoxville reduced faculty workload by automating grading; the redesigned course increased enrollment and achievement.
- The Pennsylvania State University redesigned an introductory statistics course with a 30% reduction in cost per student, reducing lecture and preparation time, adding computerized testing, and increasing interaction.
- Faculty at West Chester University improved instruction and reduced workload by introducing a virtual biology laboratory.

- Western Kentucky University's self-paced, web-based computer literacy course reduced cost per student by two-thirds while increasing enrollment more than threefold.
- The University of Central Florida redesigned a course in American National Government, and anticipates annual cost avoidance of $70K in physical space while increasing collaboration and interaction.
- With the addition of a teaching assistant, Rio Salado redesigned math courses to reduce faculty staffing and increase enrollments with a decrease in per student costs of 37%.
- The University of Maryland University College introduced interactive faculty training via CD-ROM to provide a standardized, high-quality, flexible, and reusable delivery mechanism to worldwide faculty in its more than 3000 sections of faculty training; its online faculty development workshops emphasize direct application so faculty can immediately implement what they learn.

## 14. How can schools use technology to improve strategic planning?

- At The Pennsylvania State University, cost effectiveness means balancing educational outcomes and costs, thus The Pennsylvania State World Campus adopted a budgeting system that includes the costs of faculty compensation, instructional design, faculty development activities, marketing, and student services administration.
- The University of California, Davis compares face to face and online courses for cost-effectiveness and student pass rates, linking student learning outcomes with development and delivery costs.
- Central Virginia Community College has a comprehensive plan to enhance the quality of online education via assessment and five-year goals.
- Michigan State University's Office of MSU Global created an effective 5-phase business planning and costing model that streamlines the development and implementation process for online degree and certificate programs; its program costing model aims to ensure return on investment; and its global academic business planning model helps plan and implement hybrid degree and certificate programs in partnership with international higher education institutions.
- Florida State University's Office for Distributed and Distance Learning created an About Online Learning @ FSU website that features snapshots of online learning data under six categories that reveal a variety of information about FSU's courses, students and instructors related to FSU's online degree programs. This website has become a tool for reflective and demonstrative purposes that can ultimately lead to teaching and learning improvements and for strategic planning.
- At the University of North Texas, the Quality Enhancement Program is an ongoing process for accreditation that "meets all five pillars of quality by providing access to information about the QEP through presentations to thousands of faculty and students, student satisfaction in knowing that the university is focusing much effort into improving the undergraduate experience, learning effectiveness in engaging students in active problems-based learning, faculty satisfaction in being empowered to unleash their creativity and do what they do best - share their passion for their subject matter, and cost effectiveness and institutional commitment in providing an institution-wide focus on making big classes better."

## 15. How can schools use technology to provide cost effective services for faculty, students and administrators?

- Kentucky Virtual University planned for effectiveness and efficiency by creating a one-stop shopping portal that collocates admissions, registration, resources, the virtual library (KVL), the virtual high school (KVHS), and adult education (KVAE).
- Duquesne University provides important financial information to students by listing the various funding options on its tuition web page.
- The Pennsylvania State University's comprehensive academic advising and information system saves approximately $1M and considerable transaction time while giving students more responsibility for learning.
- Florida State University created an efficient and user-friendly test proctoring process that reduces duplications and eliminates the need to mail exam materials to proctors.
- At Pace University, secure testing and asynchronous faculty and curriculum development tools provide support to faculty, and curriculum development projects improve student and faculty satisfaction with little or no additional cost.
- An online faculty staffing tool is a more efficient means of scheduling faculty course assignments at the University of Maryland University College.
- The Rochester Institute of Technology's History Department cost effectively built an online course with free materials and, in the process, created an online inventory of resources that are freely available online for other educators to create web-enhanced, blended or fully online humanities and social science courses.

# V. ACCESS

Access for anyone who is qualified and motivated to pursue studies calls for administrative and support services and for more choices for more learners and more kinds of learners. Thus effective practices in access show how organizations facilitate learning opportunities in large and small ways.

- Diverse learning abilities are provided for (at-risk, disabilities, expert learners)
- The reliability and functionality of delivery mechanisms are continuously evaluated
- Learner-centered courseware is provided
- Feedback from learners is taken seriously and used for continuous improvement
- Courses that students want are available when they want them
- Connectivity to multiple opportunities for learning and service is provided

## 16. How can specialized online student services and resources make access easier?

- Pace University supports students with online support services, including math tutoring, and measures the effectiveness of these services.
- The University of Phoenix provides one-click access to student services and resources directly from online courses.
- Saint Leo University provides online access to community-building activities and opportunities.

- Community College of Baltimore County, Essex offers a "walk through the web" course in several formats to introduce students, faculty and staff to all of the services that are provided on CCBC-Essex's web site.
- Connecticut Distance Learning Consortium provides eTutoring.org, a collaborative program and platform that shares tutoring expertise among member institutions, thus giving students access to more support.
- Kentucky Virtual University (KYVU) enables students from participating institutions to register for KYVU courses using common application and registration forms.
- The Pennsylvania State University responds rapidly to users, emphasizes service, and projects a distinctive identity through its website that provides a smooth connection to information, programs, and services.
- For a highly mobile learner population, GoArmyEd provides U.S. Army Soldiers unprecedented access to all the resources needed to pursue higher education while simultaneously serving in demanding work environments.
- So students can get information any time, Maryland AskUsNow is a 24/7 live online interactive library service that uses the expertise of librarians to provide Maryland residents with answers to questions, research guidance, and help navigating the Internet. The University of Maryland University College 's electronic document delivery service allows UMUC students and faculty to access journal articles and book chapters.
- At Davidson College, open access to scientific journals online means more equitable access, and using primary published research results can enhance student learning by developing critical and other higher-order thinking skills.
- To ease and speed admission processes, Saint Leo University reports transfer credit rapidly from its data base of thousands of sources of equivalencies and provides degree completion program outlines quickly. For students who want customized learning help, SMARTHINKING provides anywhere, anytime tutoring in real time one-on-one online tutoring services to students.
- Pace University provides a tip for enhancing access— use mid-week start/end frames for assignments; at Pace, working adults prefer mid-week rather than weekend due dates.
- At New Jersey Institute of Technology, Professor Murray Turoff designed a one room schoolhouse so that students can choose to attend blended or face to face sections of the course.

## 17. How can schools help students access support and adapt to academic culture?

- When students decide to enroll, Boise State (BSU) helps them visualize the enrollment procedure via an online flowchart; BSU's "boot camp" is an asynchronous online training program that prepares students for succeeding online.
- Northern Virginia Community College provides many ways for prospective students to find out about courses; before enrolling; its continuous enrollment and expandable course sections help meet growing learner demand for more access.
- The State University of New York Learning Network (SLN) provides learners and faculty access to online learning communities as critically important learning resources.
- Access also means that students are aware of choices and resources, thus Fairleigh Dickinson seeks to meet its objective to create skilled lifelong global learners by requiring all of its undergraduates to take online courses.
- Pace University's university/industry partnership with CAEL, the Council for Adult and Experiential Learning and the telecommunications industry provides access for telecommunications employees and their employers.

- Maryland Digital Library (MDL) provides online electronic library resources to Maryland higher education institutions.
- Rice University connects graduate students to virtual guests in asynchronous discussions, enabling students to interact with experts, expressing individual concerns and discussing them without time and place constraints.
- Two pilot projects at the University of Helsinki demonstrate the potential of mobile Learning to increase access to learning opportunities and resources.
- Once students are enrolled, access includes helping students make education more affordable, thus Embry-Riddle Aeronautical University makes buying and selling used textbooks online easy.

## 18. How can schools provide access to special populations?

- The University of Washington's DO-IT (Disabilities, Opportunities, Internetworking, and Technology) Center makes distance courses accessible to students with disabilities, provides resources about accessibility online, and promotes the accessible design of online courses nationwide.
- The Western Cooperative for Educational Telecommunications provides students, researchers and administrators with guidance for time- and location-independent support and information services, including academic advising, career planning, financial aid, library services, orientation, personal counseling, tutoring, disability services, call centers, and for re-engineering student services.
- An exemplar of such services is Rio Salado, which uses a systems approach to online learning: its integration of the activities of course development and support, student services, faculty services, information services, admissions and records and marketing departments makes Rio able to offer students hundreds of unique courses, with 90% of the courses available for students to enroll in every two weeks (twenty-six start times per year), with the remainder of the courses usually available for enrollment six to eight times per year. Rio never cancels a class, even if only one student enrolls.
- James Madison University provides summer online courses so that students can meet their graduation requirements when courses are inaccessible during the Fall and Spring terms on campus.

Access to learning for specialized populations of learners occurs in various discipline-based courses with practices that might be adapted or use across disciplines, like these in:

**Business:**

- FCIB, an association of executives in finance, credit, and international business, and Michigan State University Global (MSU Global) formed an innovative partnership that applies an instructor-led, cohort-based model for corporate online learning and leads to certificates in international credit and risk management.
- University of Central Florida provides a 3-D Interactive Accounting Model that motivates students to understand and manipulate inputs and outputs.
- At Ohio State University, a Statistical Buffet gives students choices for their own mix of activities for learning the same set of course objectives. Using automated course administration and individualized web content optimizes each student's experience and improves success rates.
- At Morrisville State College an IT internship provides field-work in a selected business, industry, government or educational setting. This real-world work experience gives students “increased

confidence in their own technical abilities. To date, more than 90 percent of interns have received offers of full-time employment by their internship sponsor."

**Education and Computer Science:**

- At Harvard University, modeling experiential learning and exemplary standards helps learners use various pedagogies, media and technology to improve learning.
- Rice University connects teachers in training with virtual guests who are expert teachers through asynchronous discussions; virtual guests can host asynchronous interactive discussions and students can interact with them expressing individual concerns without time and place constraints.
- At the University of Massachusetts Lowell, a course in theory and research in curriculum keeps students current with virtual textbooks, web hot spots, and weekly newsflashes.
- The University of Virginia provides virtual electronics laboratories using visual representations of microelectronics devices to help students internalize concepts.
- The University of California-Riverside (UCR) Graduate School of Education uses electronic portfolios in its teaching credential program. To foster students' critical thinking and interpersonal skills, and enable students to make connections between service and their academic work,
- Bemidji State University's Distributed Learning in Teacher Education (DLiTE) program uses e-service for experiential service learning opportunities in online courses.
- At the University of Illinois, Urbana-Champaign, the Library and Information Science program creates a significant difference in the way students participate in a rapidly changing profession, including helping learners is to create a community of practice in the new online environment.
- San Francisco State University conducts a learn-by-doing course in Training Needs Assessment in which teams of students perform needs assessments for real clients in corporate, non-profit, higher education, and K-12 education settings.

**Engineering:**

- The University of Toledo's (UT) collaborative partnering approach enables UT to offer engineering technology online degree programs statewide.
- Stevens Institute of Technology, in partnership with several scholarly global organizations, provides graduate engineering certificate programs online.

**Environment:**

- The University of Wisconsin-Stevens Point (UWSP) Extension offers environmental studies online and in hybrid formats.
- NOAA's interactive course: Collaborative Processes, is self-paced series of interactive modules explores roles and processes, stakeholders, meeting and conflict management, and assessment of task/process behaviors can help identify individual and collective styles.

**Health:**

- Creighton University provides a Doctor of Pharmacy degree, expanding access to underserved populations in rural areas that are not within driving distance of a place-bound pharmacy school.
- Rochester Institute of Technology, in conjunction with the Monroe County (NY) Health Alert Network (HAN) and the New York State Association of County Health Officials (NYASCHO), funded by a grant from the Centers for Disease Control (CDC), offers instructor-led online learning for adult voluntary learners who need job-related training.

**Humanities:**

- Integrated Medical Curriculum (IMC) provides The Doctor's Dilemma, an interactive medical ethics role-playing program that uses text- and photo-based material to explore "complex or controversial issues found in contemporary medical practice" through role-playing.
- Minneapolis College of Art and Design's Distance Learning Initiative re-creates the studio-based model online for art and design education.
- Goucher College's MA in historic preservation is a hybrid program that requires one in-person introductory meeting.
- Boston Architectural Center offers online professional design education, a field which relies on expressive representation, subjective interpretation, and critique in a wide range of graphic, verbal and quantitative media.

**Science:**

- Western Washington University's integrated laboratory network (ILN) provides better access to scientific instrumentation and expertise anytime, and from anywhere by allowing students and researchers to operate instruments located at different campus locations via the internet. The ILN also enables direct exchange of information, data, and classroom material, modeling the virtual laboratory of the future, enabling learners and teachers to apply the philosophy that science is a dynamic, iterative, ongoing, and collaborative process.
- Northern Virginia Community College provides chemistry laboratories for science majors using home laboratories, computer exercises, field trips, and college laboratories to improve access and learning experience.
- The University of Colorado at Denver (UCD) offers lab-based science courses in online and hybrid formats for anytime anywhere chemistry experiences.

## 19. How can schools use technology to improve access?

Training users and employing technologies that simplify operations eases access for various constituents in organizations.

- The University of Illinois - Springfield facilitates technical support with screen capture software, GifgIfgiF, that animates software demonstrations; and it uses Impatica to reduce the need for plug-ins, converting PowerPoint lectures into streaming Java presentations.
- Duquesne University enables learning-on-the-go for access to course and study materials so that busy adult students can listen to audio recordings any time via MP3.
- Washington State University 's Distance Degree Programs uses streaming technologies to publish course descriptions, faculty bios and student testimonials in close-captioned streaming audio with revolving photos, allowing students an opportunity to quickly and easily see and hear the fine details of WSU-DDP online courses.
- At Atlantic Cape Community College, faculty-staff-student partnerships produce reusable and shareable learning objects.
- Distance learning faculty specialists bridge the gap between faculty and administration through the Distance Learning Faculty Specialist (DLFS) model, developed by Eastern Oregon University to help involve faculty in distance education.
- The University of South Queensland (USQ) is building strategically planned, systematically integrated, institutionally comprehensive implementation of information and communication technologies including automated responses, intelligent object databases, and other information and communication technologies, including automated response systems and intelligent object

databases to automate certain aspects of interaction with students, increasing access to higher education on a global scale.

- At San Francisco State University, some courses use the "HyFlex" course and design process so that students may choose to attend face-to-face synchronous class sessions or complete course learning activities online without attending class in person.

# VI. FACULTY SATISFACTION

Faculty satisfaction with online teaching reflects institutional commitment to building and sustaining environments that are personally rewarding and professionally beneficial. The practices listed here include resources and strategies for ensuring faculty success.

- Faculty satisfaction metrics show improvement over time
- Faculty contribute to, and benefit from online teaching
- Faculty are rewarded for teaching online and for conducting research about improving teaching online
- Faculty experiences, practices and knowledge about online learning is part of the institutional knowledge sharing structure
- There is a parity in workload between classroom and online teaching
- Significant technical support and training are provided by the institution

## 20. How can schools foster greater community among faculty?

One of the great benefits for faculty who teach online is the opportunity to connect with new communities. Within these communities, quality is a frequent topic for discussion, activities and resource sharing.

- Maryland Faculty Online provides affordable faculty technology training via the Faculty Online Technology Training Consortium (FOTTC); its Project Synergy is a collaborative effort to train Maryland faculty in the 23 higher education institutions. FOTTC gathers, reviews, enhances, and disseminates interactive, technology-based, Web-accessible learning objects for use in key discipline areas. The project has enabled faculty to develop a repository of over 100 Web-accessible learning objects in six key discipline areas; the learning objects are enhanced with assignments, assessments, and instructions for using these learning objects effectively. The project has also developed models for enhancing learning objects in the disciplines. The project helps to establish the Maryland Faculty Online web site as the statewide web-based training center for the ongoing professional development of faculty.
- The University of Calgary's best practices in e-learning online showcase enables practitioners in e-learning to meet, share and showcase their best practices with each other.
- University of Illinois at Chicago (UIC) and Great Cities Institute integrate adjunct faculty into the community of practitioners through activities and incentives.
- The University of Massachusetts Lowell promotes faculty collaboration through an online faculty book club; the book club enables faculty to discuss issues and share effective practices.
- Florida Community College at Jacksonville Distance Learning uses a virtual mentoring program to support online adjunct faculty with instructional and technical support and to liaise between faculty and Virtual College staff.
- At the University of Massachusetts Lowell, veteran online faculty mentors become cyber-celebrities and guest speakers who interact and share their experiences with faculty new to online teaching and course development.

- George Mason University created a faculty fellows program to increase faculty skills and interest in online education and to provide social and technical support.
- Florida State University recognizes faculty as WebStars and publishes their effective teaching tips on special web pages for sharing knowledge about using technology to improve quality of instruction.
- California State University, Chico provides an online rubric for online instruction to demonstrate and encourage exemplary faculty work in online education.
- Members of online communities can stay abreast of the rapidly changing environment and apply information to the development of their online offerings by subscribing to University of Illinois Springfield daily blogs on new and developing initiatives, methodologies, and technologies in ALN.

## 21. How can schools prepare faculty to teach online more effectively?

Faculty preparation for teaching online measurably improves learning effectiveness and satisfaction.

- Because learning effectiveness also focuses on faculty, The Pennsylvania State University provides a self-paced faculty development program that helps faculty understand distance education students; recognize how distance education differs from traditional resident instruction; determine course goals, learning model, and content; determine course assignments, interactions and assessments; choose delivery technology; and understand legal issues in course design. The program includes guidelines for clear communication and netiquette.
- Another useful self-paced teaching aid is the Learning to Teach with Technology Studio (LTTS) at the Indiana University (IU) School of Education. This program offers K–12 teachers forty five online courses that include email facilitation and a standard course structure. The structure of courses is described in an online IU tour:

    - Problem: Introducing the problem
    - Process: How to go about solving the problem
    - Solution: Completing the course project
    - Assessment: How your work will be assessed
    - Resources: What resources are available to help you

To enable faculty to design courses and control the quality of content, schools and organizations provide training and resources.

- At Berkeley College, faculty training and support are available totally online via asynchronous faculty training and support.
- A four-stage faculty development process, created by State University of New York Learning Network, leads to high faculty satisfaction with teaching online.
- The Monroe Model, created by Monroe Community College, is a site-based and online support framework that addresses any issues or questions faculty might face.
- CoreOnline at Boise State University is a graduated faculty development model, in which teams of faculty learn online instruction skills and practice them as they collaborate on the development of a targeted general education core course.
- At University of Nebraska Lincoln's Extended Education and Outreach, a five-week online summer faculty development program of training for online teaching takes both novice and experienced online instructors through the steps of course development and management, online teaching, and online assessment.

- The Berkeley College Online Faculty Resource Center is a media-rich interactive site that provides faculty with comprehensive resources.
- Catalyst is the University of Washington 's online faculty guide to distance teaching ; Catalyst uses multiple feedback mechanisms (e.g., focus groups, online evaluations, surveys, usability studies, e-mail and face-to-face comments) to assess its effectiveness and overall impact.
- The learning to teach online program (LeTTOL) program, created by South Yorkshire Further Education Consortium, helps participants gain the skills they need to develop and deliver online courses.
- At Dallas Baptist University, an online teaching tips website is open to public use and commentary.
- Faculty teaching online find that knowing behavior patterns improves teaching and learning, thus researchers at the University of Central Florida design learning activities and interaction to correspond to learners' energy levels, need for approval, and styles of dependence and independence. For teachers in training, a professor at the University of Central Florida shows students how to create digital stories that help teachers learn to use multimedia and their students to learn vocabulary.
- North Carolina State University Distance Education and Learning Technology Applications (DELTA) RFP Program, created by North Carolina State University, funds faculty in the planning, design, and development of distance education programs.

## 22. How can schools encourage and support research opportunities for faculty?

In the relatively young field of online education, faculty and others enjoy opportunities for research and publication.

- The Indiana Partnership for Statewide Education has assembled guiding principles for faculty in distance learning online to help faculty members teach courses online.
- The Greater Detroit Area Partnership for Training improves faulty satisfaction with its analysis of faculty experience and standards of excellence that addresses concerns identified by faculty feedback.

## 23. How can schools recognize and reward faculty who teach online?

Studies like the above can lead to initiatives that improve faculty satisfaction by rewarding faculty for their achievements in development, research and teaching online.

- In its ongoing study and enhancement of faculty satisfaction, The Pennsylvania State University World Campus implements three principles to study and enhance faculty satisfaction: proactively and continuously managing expectations, distinguishing between “real” and “perceived” problems, and identifying and targeting the locus of control and change; its multidimensional UniSCOPE model for review of scholarly activity recognizes and rewards faculty for online activities.
- Northeastern University's Center for Innovative Course Design rewards faculty through student-nominated faculty awards for effective and innovative technology use —faculty receive recognition for effective or innovative use of technology to support good teaching and learning; students feel empowered by nominating examples of effective practice.

- Auburn University has fundamentally transformed its tenure and promotion process giving faculty more freedom of choice for spending time and resources.
- And Indiana University Purdue University Indianapolis includes technology scholarship in its faculty reward structure for the use of technology for teaching and learning.

## 24. How can technology help organize and enhance faculty activities?

Technology enables rapid distribution, integration, and feedback of information that can lighten faculty workload.

- Uni Open Platform for instructor support and workload management, created by FernUniversitat Hagen, automates administrative processes, allowing faculty members to spend more time supporting and advising students.
- A professor at the University of Maine at Fort Kent continuously improves his syllabus, incorporating and publishing results by annotating the syllabus during course delivery; using feedback for reflecting, evaluating, and planning ahead; and by documenting and sharing the improvements made to his course.
- At Athabasca University, faculty members can update their materials themselves via their browsers with the use of blogging software with an estimated 90% reduction in the time usually taken to update online course materials from two weeks per semester to one day; to keep the community current with tools, Athabasca graduate students compare the growing array of LMS software at http://cde.athabascau .ca/softeval/.
- Berkeley College uses Intranets Conferencing, a commercial service that enables faculty to confer online and develop or modify an online course, incorporate media, and have their questions, problems, and concerns attended to quickly and easily anywhere and anytime.
- At the University of Houston (C.T. Bauer College of Business), faculty share ethics learning objects to save faculty development time.
- The Learning Online Network-Computer-Assisted Personalized Approach (LON-CAPA), developed at Michigan State University, is open source software that enables instructors to create computer-assisted personalized assignments, quizzes, and examinations.
- The Multimedia Educational Resource for Learning and Online Teaching (MERLOT) peer reviews online teaching-learning materials and publishes materials online, making them freely available to faculty everywhere.
- At Berkshire Community College, a blog supports faculty development; the blog includes summaries of events, links to articles of interest, video clips of workshops, calls for proposals, and professional development opportunities.
- Kansas State University shares its ELATEwiki with faculty and students and also with the public. The wiki is useful in many ways:

  First, it allows expert teachers to share their knowledge in a fast and effective way. It allows these experts to correct and improve on ideas contributed by others. Second, novice teachers can use ELATEwiki to learn new techniques and explore ideas for improving their teaching. They can also contribute cutting-edge ideas and ensure new knowledge is made available to more established teachers. Third, ELATEwiki supports classroom access to material. Not only is the material on ELATEwiki available as a student resource, it can be used as a site for developing and posting student projects that are visible to the entire world. This sense of moving a project beyond the classroom and making it a valuable artifact tends to motivate performance and encourage collaboration between student team members, peers, experts outside the classroom,

and teachers. And finally, ELATEwiki's access feature ensures that meaningful and effective access will follow the student as they move from academic to professional life.

## VII. CONCLUSION

The practices in this synthesis may be refined for local contexts and adapted across a wide range of institutions. Thanks to the generosity of effective practices contributors, the questions in this synthesis identify some ways asynchronous learning networks are transforming higher education. Yet, the questions are by no means comprehensive, and the practices suggest a multitude of innovations still to be developed and shared. Readers are welcome to add questions and comments, to build on these ideas, and to contribute more practices to Sloan-C Effective Practices so that the goal of quality, breadth and scale in anytime, anywhere education becomes a reality for more learners than ever before possible.

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## IX. APPENDIX A: AWARD WINNING EFFECTIVE PRACTICES

A Systems Approach to Online Learning
Multidimensional Model for Review of Scholarly Activity
Online Support Services -- Focus on Student Satisfaction
Anytime Anywhere Chemistry Experience
Cost-Effective Distributed Learning with Electronics Labs
Asynchronous Audio Feedback to Enhance Teaching Presence and Students' Sense of Community
Combining Effective Individualized and Group Instruction
Content Area Vocabulary Digital Stories
Discipline-Specific Online Writing Lab with 24/7 Access and Asynchronous Peer Tutoring
Effective Feedback to the Instructor from Online Homework
ELATEwiki: E-Learning and Teaching Exchange Wiki to Support Faculty Development
Engaging Students Through Electronic Peer Review
Faculty Self-Study Research Project
Integrated Laboratory Network: Better Access to Scientific Instrumentation
Providing anytime, anywhere online access to higher education for a highly mobile learner population
Repurposeable Learning Objects: the TALON Learning Object System
Supporting Online Adjunct Faculty: A Virtual Mentoring Program
The Real-Time Case Method: Access to Real-Time, Real-World Cases
The Statistical Buffet
Using Cohorts to Build an Online Learning Community

Using Quality Matters to Guide Online Course Development
Using the "HyFlex" Course and Design Process
Using the Community of Inquiry Framework Survey for Multi-Level Institutional Evaluation and Continuous Quality Improvement
WISE, A Collaborative Distance Education Model for Library and Information Science
Wizards: Student Tutors Help Peers Learn
Mixed Delivery Model Proves Cost-Effective

# X. APPENDIX B: RUBRIC FOR EVALUATING EFFECTIVE PRACTICES

1. **Innovation: The practice is inventive or original in realizing the potential of online learning and related information/communication technologies.**

    - N/A (No evidence provided)
    - Poor (Little or inadequate evidence provided)
    - Average (Nice practice, but early mainstream at best)
    - Good (Early adopter, or a nice variation on a previous innovation)
    - Excellent (Clearly a pioneer and/or recognized leader in realizing the potential of this practice)

2. **Replicability: The practice can be implemented or its resources shared in a variety of learning environments.**

    - N/A (No evidence provided)
    - Poor (Little or inadequate evidence provided)
    - Average (The practice could be replicated or its resources shared in other learning environments)
    - Good (Evidence that practice has been replicated or its resources shared in one or more other institutions or learning environments)
    - Excellent (Evidence that practice has been replicated or its resources shared in many other institutions or learning environments)

3. **Potential impact: Wide adoption of the practice will improve learning, affordability, access and/or satisfaction among providers and/or users.**

    - N/A (No evidence provided)
    - Poor (Little or inadequate evidence provided)
    - Average (Other institutions should think about adopting this practice. Wide adoption would improve practice in one pillar area)
    - Good (Other institutions should seriously consider adopting this practice. Wide adoption would improve practice in one or more pillar areas)
    - Excellent (Every institution should be doing this! Wide adoption would improve practice in several pillar areas)

4. **Supporting documentation: The practice supports claims of effectiveness with research and/or other empirical data.**

- N/A (No evidence provided)
- Poor (Little or inadequate evidence provided)
- Average (Effectiveness claims are supported with anecdotal or another single data source)
- Good (Effectiveness claims are supported with research and/or other empirical data from multiple sources)
- Excellent (Effectiveness claims are supported with research and/or other empirical data from multiple sources; demonstrates effectiveness over a significant time period (1-2 yrs. or more)

**5. Scope: The practice demonstrates relationships among learning, affordability, access, and faculty and student satisfaction.**

- N/A (No evidence provided)
- Poor (Little or inadequate evidence provided)
- Average (States how the practice relates to one or more other pillars)
- Good (Demonstrates a strong relationship with one other pillar)
- Excellent (Demonstrates exceptionally strong relationship with another pillar, or demonstrates strong interrelationship with several other pillars)

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