

Review of Literature  
Blended Learning: Using ALN to  
Change the Classroom – Will it Work?

Summer Workshop 2006

Karen Vignare  
Michigan State University

Abstract

Blended learning also known as hybrid, mixed mode, flexible or distributed learning, is gaining acceptance and being adopted throughout higher education. In this chapter, a review of the literature on blended learning is presented using the Sloan Consortium's Five Pillars quality framework for online asynchronous learning networks. Evidence is mixed as to whether blended learning is truly a unique learning environment or just a simple combination of traditional face-to-face and online instructional approaches. The early research indicates that blended learning can be as successful as either online or face-to-face instruction; however, there is a great need for more study on its effectiveness.

## Review of Literature Blended Learning: Using ALN to Change the Classroom – Will it Work?

Blended learning is gaining acceptance and being adopted at college campuses throughout the US (Bonk & Graham, 2005; Allen & Seaman, 2004). The availability of online technologies like course management systems, the recognition that the Internet is a valuable communications tool, the convenience and flexibility of having fewer campus meetings, and research on how we learn all seem to support the growth of blended learning. Some scholars argue blended could be more powerful and even transformative for higher education as compared to other forms of learning (Garrison & Kanuka, 2004; Bransford, Brown & Cocking, 2000; McCombs & Vakili, 2005). The evidence of such a transformation is thus far limited but not without promise. This chapter will provide an investigation of the research currently available on blended learning and what research is needed to gain a more comprehensive understanding of blended learning and its potential in education.

Research from asynchronous learning networks (ALN) and how that research applies to the blended learning format will be the primary source of information. Use of the Sloan-Consortium (Sloan-C) quality framework, built around the Five Pillars of learning effectiveness, faculty satisfaction, student satisfaction, access and cost effectiveness, provides the organization for reviewing the literature (Moore, 2002). It is clear that it is important to consider other sources of information and effort is undertaken to connect ALN research to the use of educational technologies, established research for the traditional, face to face classroom, and learning theories; however, the driving phenomenon for blended learning is the advent of ALN and Internet communications technologies. While other technologies and different types of blended learning experiences are viable (see definitions below) the focus of this chapter is limited to the planned integration of ALN and the traditional classroom.

### Defining Blended Learning

The definition of blended learning varies considerably. For example, corporate blended learning could be a mixture of face-to-face instructor led and self-paced online learning (Graham, 2005). Some educational researchers believe blended learning should include the use of mixed media as a definition (Osguthorpe & Graham, 2003). Another generic example, a course which uses a web-site or a course management system plus a classroom experience would be blended learning. However, a significant group of educational scholars seem to prefer defining blended as simply the combination of online (mostly asynchronous) learning with face-to-face learning environments. The definition for blended courses that emerged from research workshops sponsored by the Sloan-Consortium is:

1. Blended courses integrate online with face-to-face instruction in a planned, pedagogically valuable manner; and
2. Do not just combine but trade-off face-to-face time with online activity (or vice versa). (Niemiec & Otte, in press)

This definition helps focus this literature review. Since 1998, the University of Central Florida (UCF) has been using a similar definition for its blended learning courses termed mixed-mode courses (Dziuban, Hartman, Moskal, Sorg, & Truman, 2004). The UCF data reveals that blended learning is effective and can lead to higher student success (grades) rates in specific academic disciplines (Dziuban et al., 2004). In addition faculty seem to be very satisfied with teaching

either blended or online as long as they receive training and academic support (Schroeder & Oakley, 2005). Research by Garrison and Kanuka (2004) posited that blended learning is not only an acceptable methodology but a transformative one for higher education. This view that online learning technology could transform learning was also suggested by Bransford et al. (2000) in their book on how people learn. Hiltz and Turoff (2005) also strongly support the view that the introduction of asynchronous learning networks to campus courses will be viewed as a critical breakthrough in improving learning. McCombs & Vakili (2005) reached a similar conclusion because blended learning can lead to a more learner-centered education environment.

However, not all of the research is positive. A recent experiment of a course taught in all three modalities concluded that fully online was the best of all the approaches—better than blended and better than face-to-face (Reasons, Valadares & Slavkin, 2005). Vaughn and Garrison (2005) did not find any evidence that blended learning improved student cognitive presence while exclusive ALN environments did show that evidence. Wu and Hiltz's (2004) study of students in blended courses found that online discussions were meaningful, but no evidence was shown to support the hypothesis that blended was significantly better than fully online. Proponents of learner-centered design and institutional transformation would argue that the focus must be on individuals and changing the educational progress from a course by course set of outcomes to a competency based criteria for a curriculum or discipline (Weimer, 2002; Tagg, 2003; McCombs & Vakili, 2005). Instructional technologists might also argue that educational improvement comes from more highly interactive technologies, like gaming and simulations (Dede, 2005). However, institutional limitations such as funding, user-friendly technology, culture, organizational structure and staff are not always available to support those kinds of dramatic changes. Blended learning however is a relatively simple and effective change that institutions can indeed adopt.

The student mix and demand for technology is very different than it was even ten years ago. Today's traditional aged students essentially grew up on the Internet but represent only a small portion of the total college population. Seventy-five percent of all students in higher education would be called non-traditional, work full-time; older than 18-22; delayed going to college, etc. (Oblinger & Oblinger, 2005; Snyder, 2005). The differences in these populations are striking. The Net Generation expects technology integration and having something online is not enough (Kravik & Caruso, 2005). Contrary to the headlines and misperceptions, the evidence from UCF's work is that student's 25 years and older seem to be more satisfied than younger students with online and blended learning (Hartman, Moskal & Dziuban, 2005). It is also important to remember that not all college students have ready access to the Internet (Oblinger & Oblinger). Requiring online learning for the students who lack Internet access is problematic. Approximately 20% of all higher education students now take online courses thereby allowing students with busy lives another way of completing courses and degrees (Allen & Seaman, 2005). Students often can be persuaded about the benefits of new ways of learning if they understand what they are supposed to gain as a result of using these techniques (Hartman et al.).

#### Sloan-C Quality Pillars Framework

The organization of this chapter is based on the Sloan-C Five Pillars quality framework (see Figure 1). Sloan-C describes these pillars as:

The Sloan-C principles, known as the pillars or elements of quality, parallel the familiar principles of continuous quality improvement (CQI), using metrics to improve products and processes. In higher education, the quality goal is scalability to achieve capacity and

breadth through attention to learning effectiveness, access and affordability for learners and providers, and faculty and student satisfaction. These elements are interdependent (Moore, 2002).



*Figure 1.* Sloan-C Five Pillars Framework.

Beginning with learning effectiveness, the pillars offer researchers and higher education concepts to begin to benchmark. It is important to note that while each of the pillars have individual characteristics, they are also related to each other. Much of the research in one pillar overlaps or impacts other pillars. Learning effectiveness includes demonstrating that learners are given the tools to be good students. Research in the area often starts with global measures of effectiveness like retention and completion but certainly includes much more. Student satisfaction begins the preparation needed to prepare students for online learning. It also includes the services that are needed to support learners and community elements needed for students to feel satisfied about their online learning experiences? Faculty satisfaction is interwoven in learning effectiveness and other pillars and focuses on what is needed to make sure that faculty feel prepared and satisfied with their online teaching. Access has to do with providing opportunities for students to pursue an education. Cost effectiveness has to do with the institutional cost and benefit analysis of integrating ALN or blended learning into its operations.

#### Learning Effectiveness

One of the larger questions facing the field is whether blended learning is effective as measured through traditional methods of grades, course completion, retention, and graduation rates. An even greater question is whether blended learning is "better" than other learning environments. The results from fully online learning courses show mixed results but overall meta-analyses show that online courses are at least as effective as traditional classroom instruction (Russell, 2001; Zhao, Lei, Lai, & Tan, 2005). In the Zhao et al. research the meta-analyses certainly support no significant difference findings but it also supports the fact that distance learning can be better than face-to-face when instructor involvement, interaction, content studied, learner capabilities, and the right mix of human interaction and technology are combined. While the focus of this meta-analysis was on distance learning, Zhao et al. included blended learning research studies. Others would argue that comparing the two environments does not allow education to move beyond the comparison trap to look for new and different outcomes (Sener, 2004). According to the Sloan-C Five Pillars framework, the appropriate measure for learning effectiveness is to make sure the quality of online learning is as good as the quality of classroom learning. Research does support that fully online ALN is effective

especially when looking at measures of retention, completion, course outcomes, perceived learning, shifts in cognitive presence, and deeper learning. The research available on blended learning measuring these same attributes is harder to find and currently more ambiguous.

Retention of students is important for most universities and is measured by course completion rates, program completions, and graduation. Buried in the data are course drop-outs, stop-outs, and student withdrawals. Much of the data on fully online ALNs suggest that retention rates are not as high as for face-to-face instruction. Some research suggests that the comparisons are not as easy to make as the headlines have indicated data reported are inconsistent (Howell, Laws & Lindsay, 2004). The best extrapolations come from the Department of Education, Institutional Postsecondary Educational Data and Statistics where graduation rates must be reported for all four- and two-year programs. Associate degree colleges graduate approximately 35% of their students versus a 50% graduation rate at traditional four-year colleges. No similar data is yet reported for fully online programs. What is known though from Allen and Seaman's (2004, 2005) work is that nearly 50% of the institutions offering ALN courses are associate degree colleges. Thus, when comparisons of graduation rates are made, it should be noted that more ALN courses and programs are offered by colleges which already have a low rate of graduation. Until more accurate data appear for ALN courses, it is simply premature to say graduation rates are lower for ALN.

Moving to the course level data, Ingle (2005) reports completion rates for fully online courses of 57% for two-year schools, 84% for four-year schools, 85% upper division programs only, and 86% for graduate schools. In Vignare (2002) and Starenko, Vignare, & Humbert (2006), course completion rates of 95% were almost exactly the same for both fully online and blended courses offered at the Rochester Institute of Technology. It is again difficult to locate comparable face-to-face data on course completion, so until accurate and equitable comparisons can be found either in single institutions like the RIT data reported above or across multiple campuses it is simply too early to indicate that course completion data shows that ALN is lower than face-to-face. Using course outcomes as measured by grades or drops, withdrawals and failures (DWFs), Dziuban et al. (2004) data show that blended learning completion rates at UCF are higher than fully online and in some cases higher than traditional face-to-face learning but that there are significant differences among the disciplines. In Reasons et al. (2005) the data on course grades and tests showed students in the fully online courses doing better than either face-to-face or blended courses. There are also a number of case studies which report outcomes were very similar for blended learning courses versus face-to-face or ALN courses (Carroll, 2003; Christensen, 2003; King & Hildreth, 2001; Johnson, 2002). And much like the distance learning effectiveness research there are studies which show blended learning to be more effective (Boyle, Bradley, Chalk, Jones & Pickard, 2003; Cottrell & Robinson, 2003; Dowling, Godfrey & Gyles, 2003).

Other measures of blended learning's learning effectiveness tend to show weak but positive results that blended learning is enhancing the learning environment. Garrison and Kanuka (2004) concluded that data from their survey research show that students believe that they are learning from discussions but their actual performance is only slightly positive and not statistically significant (Wu & Hiltz, 2004; Vaughan & Garrison, 2005). For example, analysis of online discourse supports that more knowledge construction occurs online but it is no different in the amount of triggering events or the resolution phase (Swan, 2005; Vaughan & Garrison). Students perceive both learning and satisfaction as higher in the fully online ALN environment provided the faculty have been prepared to teach online (Shea, Pickett & Pelz, 2003).

The McCombs and Valiki (2005) approach that applies the learner centered framework from the American Psychological Association (APA) includes 14 principles organized into four research validated domains of cognitive and meta-cognitive, motivational and affective, developmental and social, and individual differences. The APA defines learner-centered as follows:

"Learner-centered" is the perspective that couples a focus on individuals learners--their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs--with a focus on learning--the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners. This dual focus then informs and drives education decision making. Learner-centered is a reflection in practice of the Learner-Centered Psychological Principles--in the programs, practices, policies, and people that support learning for all." (McCombs & Vakili, 2005, p. 1564)

The APA, McCombs and Vakili (2005), and Weimer (2002) identify principles, practices and teaching ideas to make instruction more student centered as well as effective. Online learning technologies enable most of these teaching ideas but many learner-centered proponents do not mention using fully online ALN or blended learning as a strategies for implementing better instruction. McCombs and Vakili use case studies and research from online learning to identify how strategies used online to enable a learner centered framework.

The 14 principles of learner centered psychological principles as published from the APA work group include under cognitive and metacognitive factors, nature of learning process, goals of the learning process, construction of knowledge, strategic thinking, thinking about thinking and context of learning; under motivation and affective factors, motivation and emotional influences on learning, intrinsic motivation to learn, and effects of motivation on effort; under developmental and social factors, developmental influences on learning and social influences on learning; and under individual-difference factors, individual differences in learning, learning and diversity and standards and assessment (as reprinted in McCombs & Vakili, 2005). All of these principles of learning are typically guidelines for good ALN design as well. In ALN there has been a clear indication that by applying instructional design principles while also allowing some just in time adjustment that students seem more satisfied with the outcomes of the courses (Graff, 2003; Karagiorgi & Symeou, 2005; Lohr & Ku, 2003).

There are clear differences between the instructional design and ALN learning effectiveness proponents. Instructional design has been more aligned with the learning theory of behaviorism (Gagne & Driscoll, 1988). ALN recognizes the importance of constructivism and social constructivism (Hiltz & Goldman, 2005; Swan, 2005). Examples of how online learning can be structured to enhance all learning theories is also a current research topic of discussion (Hung, 2001). Learning theories have also been attached to specific academic disciplines that can be taught through behaviorism (Hung; Zhao et al., 2005; Dziuban et al., 2004). Allen and Seaman (2005) further document that business, liberal arts, computer and information sciences, and health professions and related sciences are more prevalent as fully online degrees programs. It is clear that academics from across the country are reaching a similar consensus that certain online instructional strategies align easier to certain content. The research does not preclude that fully online and blended cannot be introduced in other fields but that for instructional reasons these academic disciplines have found online more effective at this early juncture in certain fields.

### Faculty Satisfaction

According to the Sloan-C framework, faculty satisfaction factors include administrative and technical support, quality control, institutional rewards, research opportunities, access to new populations of students and participation in interactive learning communities (Moore, 2005). In much of the research, faculty satisfaction seems to be tied to two things: choice and preparedness. Faculty who are required rather than choose to teach online or blended learning are often more reluctant to redesign courses. Recent research also dispels the notion that core faculty do not teach online (Allen & Seaman, 2005). Faculty who are given the instructional support and the preparation time to learn how to teach online indicate they are more satisfied with their online teaching experience (Shea et al., 2003; Dziuban et al., 2004). In addition, there appears to be no difference in the level of faculty satisfaction regardless of whether faculty teach fully online courses or blended courses (Dziuban et al.). Case study research from faculty also point to high levels of satisfaction when faculty feel that their teaching strategies have impacted students positively. The evidence of meeting students needs for flexibility and the evidence that multiple learning styles are being addressed through using blended learning strategies also increase faculty satisfaction (Shea et al.).

Of critical importance to faculty is to continue to be successful at the many tasks they have been assigned—typically teaching, research, publication, grantsmanship, participation in learning communities and participation in college governance. Done well, each of these functions takes time and to get faculty to improve or try new teaching methodologies requires efficient academic support mechanisms. Providing the right level of support and providing it the best way for faculty is a clear concern to institutions and as important as student support and technology infrastructure needs (Arabacz, Pirani & Fawcett, 2003).

Administrative departments that support online learning on campus must find ways to appeal to faculty to get them to come to training (Otte, 2005; Hitt & Hartman, 2002). Training varies greatly in some institutions and can consist of how to use basic technology tools as well as how to develop effective pedagogical techniques (Arabacz & Baker, 2003; Ives & Steinbrenner, 2005). However, a lack of sufficient support is likely a main reason why many faculty do not participate in online and blended instruction.

So what kind of support seems to help faculty more? The evidence for this question seems to come from faculty themselves. Faculty engage in new learning methodologies for several reasons but primarily because there is a desire to deliver good instruction. This includes the desire to improve student communication, to offer new pedagogical approaches for learning content, to offer students with different learning styles more approaches to meet their needs, to be more flexible for students, to offer students more practice through online assessments, to require more active student participation than a lecture and to provide “real” world experiences for students (Theroux & Kilbane, 2005; Schweizer et al., 2003; King, 2002; Meyer, 2003; Cottrell & Robinson, 2003; Boyle et al., 2003; Riffell & Sibley, 2004; Cameron, 2003; Bonk & Dennen, 1999; Starenko et al., 2006; Christensen, 2003; MacDonald & McAteer, 2003). The overriding theme seems to be centered on the belief that blended learning will support better student outcomes. Examples of these innovative instructional techniques can be found in Table 1 below.

Table 1. *Blended Learning Pedagogies*

Instructional technique	Description	Reference
Case Studies	Real-time business case	Theroux & Kilbane (2005)
Small group	Set up online groups & blended groups	Schweizer et al. (2003)
Discussion Critical thinking	Discussion used to promote critical thinking from students in teacher education;  Coded discussion to show evidence of higher order thinking  Add instructional variety	King (2002)  Meyer (2003)  Cottrell & Robinson (2003)
Self-assessment	Allows online tests and homework	Boyle et al. (2003); Riffell & Sibley (2004)
Simulation	Graphical representation of material	Cameron (2003)
Role Playing	Students must adopt role and respond in discussion	Bonk & Dennen (1999)
Debate	Tax Policy debates during Presidential election	Starenko et al. (2006)
Learn by Doing	Instructional design	Christensen (2003)
Tutoring support	Integrates tutoring strategies	MacDonald & McAteer (2003)

Underlying these uses of blended learning and the sources of faculty satisfaction is the desire to help students comprehend or master learning objectives.

To achieve these instructional outcomes, it is assumed that campuses need to provide better pedagogical support for faculty. This support would likely come from instructional design, information technology support and faculty exchanges of teaching ideas. Instructional design and

teaching support centers are not new but are becoming more pervasive. Higher education remains one of the few enterprises where those in highly skilled front end critical roles like teaching are never taught what are the best ways to teach. In absence of this kind of required training in graduate school, it seems that some institutions are recognizing a need for supporting teaching through academic support personnel. In many cases, support departments were established for smaller, self-contained distance learning enterprises. Extending these services to more mainstream operations has become a challenge. Arabacz et al. (2003) concluded that many institutions are concerned with delivering the right level of support to users of information technology to faculty and that more colleges indicated that they offered technology software and other tool training more so than instruction on pedagogical techniques.

There is also a movement to align faculty support centers with information technology (Ives & Steinbrenner, 2005). Faculty support centers often try to encourage faculty to get together to exchange ideas. Even if the numbers of academic support personnel are increasing there still remains the question or problem of how to provide faculty with the time and what are the appropriate incentives to try blended learning. In the early days of online learning it was common to offer faculty release time and/or overload/summer pay for building online courses. While this practice still occurs, several large distance learning providers are beginning to feel that money would be better spent giving faculty more time to exchange ideas with other faculty and meet with instructional design personnel and not in extra pay (Otte, 2005). The rationale behind this is that the time to exchange ideas is more powerful and may have more impact when faculty collaborate with other faculty. Faculty would have more time to exchange ideas and learn from other faculty in their own disciplines if the money were spent to support this effort.

Even though instruction is at the heart of blended learning there are still many other roles as mentioned earlier that faculty must fulfill, does blended learning help or hinder these roles? While research is not required of all faculty, for those who fall under publish or perish rules, blended learning probably helps in offering flexibility in their own schedules to research and write (Monolescu et al., 2004). There is also evidence that the scholarship of teaching has grown to be “real” research (Weimer, 2006). Yet, given the slow to change culture of higher education as well as faculty interests, it seems unlikely that many faculty will be able to make blended learning the main topic of their academic research. Another function faculty are often required to undertake is grantsmanship. While much of this is tied to research, there are grant programs such as the Fund for the Improvement of Post Secondary Education (FIPSE) that are directed to college teaching and learning. Perhaps the single greatest impediment to faculty participation is the promotion and tenure process (Monolescu et al.). Faculty who participate in online learning and blended learning feel as if tenure and promotion committees ignore the work and effort it takes to invest in a blended learning course (Monolescu et al.). Anecdotes are told about mid-tenure faculty avoiding technology enhanced courses because these courses take significant effort and time and are not recognized as important by tenure and promotion committees.

The satisfaction that faculty derive from offering a blended course is tied to student satisfaction and the improved or perceived improvement in learning. The satisfaction appears to be driven by a desire to make instruction more effective. This is not a new goal for faculty. Early research has noted that faculty often change their instructional techniques but that maintaining these changes and getting other faculty to adopt them takes instructional support through technology and personnel (Dziuban, Shea & Arbaugh, 2005). It appears that both blended and fully online learning require universities to support faculty with technology and sharing of

pedagogical practices if they want to maintain and disseminate these approaches (Dziuban et al., 2005; Arabacz et al., 2003).

Another tenet of the faculty satisfaction pillar is whether faculty continue to have control of the course and its learning outcomes. Much of the research currently available comes from faculty reporting on their experiences (Boyle et al., 2003; Carroll, 2003; Christensen, 2003; Cottrell & Robinson, 2003; Johnson, 2002; King, 2002; Meyer, 2003; Riffell & Sibley, 2004). In these cases, faculty created the course and designed the evaluation. It is important to recognize that it may be desirable for faculty to share quality control as they do in face-to-face courses with other faculty.

Other research shares institutional views on the quality of blended learning courses offered by faculty, but generally that research is similar to what institutions expect to be reported on any other courses or programs (Aycock, Garnham, & Kaleta, 2002; Dziuban, et al., 2004). It is important to recognize that faculty may need to share quality control as they do in face-to-face courses with other faculty or within a department. Most of the Center for Academic Transformation courses started with courses which had documented poor quality outcomes (Twigg, 2004). In order to receive grant funding, faculty had to be willing to work with other faculty as well as with someone in the administration. The purpose of imposing such a structure was so more people shared in the process and disseminated the techniques for teaching, learning and evaluation (Twigg).

While less peer-reviewed research is available, it is important to mention other models that are directed by the central administration. For-profit universities typically use this model although more universities and colleges are beginning to use a development model which includes subject matter experts typically a group of faculty along with instructional designers, instructional support and technologists (Laster, 2005). The development time and initial costs can be longer but the trade-off is usually the course can be used by all faculty teaching that course. No doubt in this model total faculty control of quality is removed. Quality control is shared. However, this model does not seem to be spreading quickly. The Allen and Seaman (2004) data reports that less than 10% of online learning courses are offered by for profits and that they represent less than 5% of the higher education marketplace. Furthermore in a convenience sample which did not include for-profits, less than 13 % of the respondents indicated that they use a team of faculty and staff to design online courses (Vignare, Geith, & Schiffman, in press).

#### Student Satisfaction

The student satisfaction quality pillar includes student services, technology infrastructure and support, interaction with faculty and other students, learning community and course/learning outcomes which match or exceed expectations (Moore, 2005). The student satisfaction pillar is often closely aligned with student services. Many accreditation bodies, national associations and state higher education regulatory policies recommend or require certain basic student services be met by those who offer online learning. Due to this scrutiny, it is understandable that in some ways there is less debate about student services. The Western Cooperative on Education Technologies (WCET) includes parts of all five Sloan pillars in their recommendations on student services (Shea & Armitage, 2002). While there is some tendency to say all factors in education are part of student satisfaction, even in traditional education we know some factors are more important than others. Beyond just measuring overall course and/or learning satisfaction, student preparation for online learning, communicating sound academic choices, building a

student community, access to services, and improving and supporting the learning environment all seem to be critical for student satisfaction (Moore).

For students, satisfaction can be measured globally and individually. While many blended and online learning providers collect data on student satisfaction, the Dziuban, Moskal, and Hartman (2005) collection of nearly 200,000 student surveys over seven years is the most extensive. The volume of surveys combined with the fact that the surveys have been repeated every other year and consistently report similar findings are indicative that high levels of student satisfaction can be achieved (Dziuban et al.). Much smaller scale studies also show that blended learning satisfies students. The larger questions seem to be how does blended learning satisfy students and what measures should be used to benchmark the attributes that lead to student satisfaction. Even traditional residential programs are still trying to determine what attributes should be measured to determine student satisfaction. Growing in importance are those measuring student engagement and those establishing the timeliness and reliability of student support services. The National Survey on Student Engagement (NSSE) uses questions which measure how much time and involvement students have with coursework, faculty and campus activities to determine how engaged is a student in their learning (Klein, Kuh, Chun, Hamilton & Shavelson, 2005). Noel Levitz dichotomizes whether services are used and whether they are important (Low, 2000). More and more campuses are also attempting to align their overall assessment to include student services.

Preparing students to learn online may seem simple but it clearly starts with communication. Online communication consists of keeping websites and course catalogs up to date. While some colleges make it clear in their course schedules that courses are blended, many do not. For example, in cases where faculty are experimenting with blended learning which happens quite frequently, students begin the course not always knowing that it will be a blended. Minimally, students should receive clear instructions through websites and orientations about the online technologies needed to participate. Access to computers, ability to use the computer and being prepared for an online experience should be a part of that preparation and unless students know ahead of time that they are enrolling in a blended course, they may be less satisfied with the initial hurdles. The opposite argument could be proffered that if blended learning is considered just another instructional strategy such as small group work, does notice have to be given to students. The likely answer to this dilemma lays more with the student population. Given that very few students (less than 30% - are full-time and located on-campus or near campus, it is clear that knowing how your time is going to be spent in class or managed by yourself would be important information for them (Oblinger & Oblinger, 2005). On the other hand, once students experience blended learning, they become critical of the way time in the classroom is spent (Kerres & DeWitt, 2004). They develop opinions as to what activities could be done online and what might be done better in person.

If online learning technologies are being used, should student services like orientation, access to online technology support, online library access or online academic support like tutoring or writing help, which are highly recommended for fully online be available? Again the answers to the questions are similar to ones asked earlier and it will depend on the make up of the students participating in blended learning. Most of the research thus far on blended has not included studies on student services. The best practices gathered on the value of student services in student satisfaction come from both traditional face-to-face and fully online programs. In both modalities, we know that only certain students will need services and support, the real question is if they are enrolled in blended learning should they have the choice of whether the support is

face-to-face or online. The nature of the students who enroll in the courses or programs should be considered when making those decisions. There is growing trend that many student services are offering online support to all students regardless of location. Libraries are converting many card, book, and microform services to electronic database systems which allow all students online access. More and more evidence is surfacing that online tutoring services once exclusively offered to distance students are being maximized so they can be offered to most students.

Another recommendation for online learning environments is for students to feel as though they are part of a community. The nature of the community role varies and have different names including communities of learning, inquiry, and practice (Garrison, Anderson & Archer, 2000). Students take on different roles in these communities. There is disagreement as to whether community should be required outside and only offered to those students interested. Community-building techniques include establishing open student communities (lounges, cafes), allowing chat or discussion boards for sharing information, establishing the same access to services and advice, and providing online student mentors or peers. Online mentors and tutors are often very useful to students who are just starting out and they serve a role of being an intermediary for faculty and academic support units (Boyle et al., 2003; Chang, 2004).

Technology infrastructure support is also important. A recent survey on students and technology, 27% of the students expected to need technology support when using a course management system (Kravik & Caruso, 2005). Information technology personnel seem to struggle less with the question of student support than they do with faculty support (Kravik & Caruso; Arabacz et al., 2003). Recommendations vary but many campuses already offer 24 x 7 technical support. What seems to vary is the amount of pedagogical support for students using online technologies. This may be due in part to what is a natural dividing line—where does a student need instructor help to be successful in the course and where can the technology support center help students without crossing the boundaries into helping the student complete work. Kravik and Caruso conclude that:

According to survey respondents, the primary benefit of technology (for students) used in courses is convenience, followed by communication with the instructor and other students (connection), management of course activities, and improved student learning. (p.57).

The language used differs a little but these are similar to findings that occur in fully online learning research. Specifically, students choose online for convenience. However, post online course satisfaction surveys find that students value the connection usually termed improved interaction with faculty and other students, perceived learning effectiveness and the ability to control when they learn. (Shea, Swan, Frederickson, & Pickett, 2001). However, the expectations of students continue to change. Younger students, those from the Net Generation perceive their faculty to be less responsive when technology is used in the course (Dziuban, Moskal, & Hartman, 2005). However, to date the Zhao et al. (2005) meta-analyses of distance learning effectiveness shows students were more likely to be successful in distance learning as long as they had a high school degree. The difference in the two pieces of research may indeed mean that younger students may not have any issues with being successful online but instead they are very different in their expectations of how technology should be integrated into courses.

#### Access

The access pillar includes technical, academic and administrative services (infrastructure), learning resources, pre-course access and readiness, appropriate program information, and program and course variety. Under the technical, academic, administrative

services fall the issue of making sure all students have equal access to online learning. For the most part access is addressed at an institutional level and it is clear that the mission of the institution impacts its willingness to support access to blended learning (Niemic & Otte, 2005). Beyond the institutional responsibilities there still are strategic considerations like do students and faculty need access to alternative modalities such as blended learning (Otte, 2005). In certain universities such as the City University of New York, the University of Illinois Chicago and the University of Central Florida, the issue of access to learning was strategic for convenience, for flexibility and for improved learning. However, the scope of access goes beyond individual institution and a national consideration remains whether students have access to the programs of their choice (Mayadas, 2001).

Much work has been done in higher education through enactment of the Americans with Disabilities Act to support students with disabilities; however, there is no doubt that more needs to be done to make the classroom barrier-free. Burgstahler (2002) provides guidelines and interpretation on how online technologies meet the needs of the students with different types of disabilities. The U.S. Census Department tracks the number of individuals with the various types of disabilities and estimates that there are 54 million Americans with disabilities (Waldrop & Stern, 2003). The National Center of Education Statistics provides information at both the K-12 and postsecondary level. In the postsecondary environment there are some 428,280 students with disabilities (Lewis & Farris, 1999). The focus of much of the accessibility literature centers on what are the right technologies for assisting students with disabilities and what are the principles of universal design. Universal design refers to the process of pre-designing instruction so that it meets the needs of all learners. Successful blended learning models recommend planned and integrated use of the classroom and online. Universal design could be part of the instructional planning for blended learning.

Burgstahler (2000) shares with us how online distance learning Internet-based communication can be one of the easiest ways to accommodate students with disabilities.

Text-based, asynchronous resources such as electronic mail, bulletin boards, and listserv distribution lists generally erect no special barriers for students with disabilities. If a prerequisite to a course is for students to have access to electronic mail, individuals with disabilities can choose an accessible e-mail program to use. A student who requires assistive technology to access e-mail will have resolved any access issues before enrolling in the course. His own computer system will provide whatever accommodations he needs. E-mail communication between individual students, course administration staff, the instructor, guest speakers, and other students is accessible to all parties, regardless of disability. (<http://www.rit.edu/~easi/itd/itdv08n1/burgstah.htm>)

While there is no doubt that it is good policy to provide a barrier-free classroom, the issues surrounding accessibility often do not even consider classroom communication (Schenker & Scadden, 2002). One of the pedagogical strengths of online learning is the ability to provide a barrier-free or level playing field for all students in the classroom (Harasim, Hiltz, Teles, & Turroff, 1995). This environment, where communications are open to all faculty to students and students to students, is very conducive to students with disabilities. The opportunity to meld the two learning environments seems to present itself through blended learning. Initial evidence seems to support blended learning as a good solution for improving communication in the Deaf and Hard of Hearing student populations (Starenko et al., 2006; Humbert & Vignare, 2004).

Several case studies have also been presented regarding the success of online learning for students with disabilities. At Athabasca University—a fully online distance education university—

-studies on course completion rates indicate that students with disabilities complete and succeed at lower rates than students without disabilities (Moisey, 2004). This finding of lower success would likely be the same in the traditional college courses (Lewis & Farris, 1999). An important finding of the Moisey research is that the students with visual and hearing disabilities complete and succeed the best of all students with disabilities. The Open University of the United Kingdom and the National Technological Institute for the Deaf at the Rochester Institute of Technology have also published research on the effectiveness of distance learning for students with hearing disabilities (Richardson, Long & Woodley, 2003, Long & Beil, 2005). In both cases hearing and non-hearing students were shown to be just as successful in the online learning environment. The next step is really finding out whether the opportunity to communicate more regularly with everyone—faculty and other students is important. The Long & Beil and Long, Vignare, Mallory & Rappold (in press) research showed that for the deaf and hard of hearing that blended learning significantly improved the quantity and quality of interaction. Further study is needed but if blended learning offers both an easily accessible and more interactive classroom, it could become both a learning and cost effective tool in accommodating the needs of students with disabilities.

Much of the remaining tenets in the access pillar were addressed to an extent in the student satisfaction pillar. There is little research available thus far on learning resources, student readiness or course and program offerings available in blended learning. What can be surmised from the fully online research is that most policy and national association guidelines recommend that there be learning resources and opportunities for students to prepare for online courses.

#### Cost Effectiveness

The cost effectiveness and institutional commitment quality pillar is the least researched pillar. Information from fully online cost effectiveness research is important to making the case for blended learning (Bishop, 2005). The cost effectiveness pillar includes issues like institutional commitment as evidenced through infrastructure, marketing, business strategies, scalability and partnerships. Within those parameters is an underlying constant that fully online and blended learning continually meet cost effective standards. Campus Computing publishes annually information on dispersion of technologies throughout higher education and reports that the purchase of course management software has penetrated 80% of the market (Greene, 2004). The question no longer is whether an online learning technology tool is available but whether it is maximized. Strategically institutions must align their information technology to ever increasing demands for flexible teaching and learning environments. In an online learning survey, institutions feared they will not keep up with the demand for support from both faculty and students but nonetheless recognized the need to cost effectively invest in the technology and support resources needed (Arabacz et al., 2003).

Schiffman (2005) identified two reasons online learning commenced from a sample of Sloan-C institutions: to increase access and to increase quality. Increasing access is defined more as providing access to education to non-traditional students and therefore more like continuing or adult education units of the college. Those institutions that initiated online learning for quality are exemplified as those trying to address internal problems like student success and improved pedagogical techniques (Schiffman; Twigg, 2004). Arabacz et al. (2003) seemed to align blended learning with increasing quality, but the rise of marketing of blended learning graduate programs may indicate that access and revenues end up being a strong force in the growth of blended learning as well. The differentiation in starting point, quality or access, is useful for understanding the type of business model established. However, it is important to understand that

the goal of access does not exclude quality (Greenberg, 2004; Lynch, 2005; Twigg). By far the number of institutions trying to increase access is much larger than those that started online learning to improve quality (Schiffman).

Several case studies of institutions that differ in their starting points reveal significant differences in how online and blended learning operations are set up. Two large public universities that established online learning to improve the quality of the teaching and learning environments were University of Central Florida (UCF) and the City University of New York (CUNY). The operations in each university were established as an integrated and mainstream function (Otte, 2005; Dziuban et al., 2003). The two institutions established the operations and business process units inside of the Information Technology divisions. Support for faculty and students was also coordinated or controlled by this same division. CUNY maintains a two-level approach with a university-wide coordinating level augmented by individual colleges controlling certain aspects of the training, teaching and learning experiences. Examples of universities that initiated online learning to extend access include the University of Maryland University College, University of Massachusetts at Lowell, and the Stevens Institute of Technology (Bishop & SchWeber, 2002; Moloney & Tello, 2004; Ubell, 2004). Organizationally distance learning was set up as an extension or continuing education operation. While each college applies online learning in unique ways, these colleges are expected to be profitable and still produce quality online learning.

In the 1990s and early 2000s, many questions were raised as to whether online learning particularly asynchronous learning was cost effective. Many who were skeptical of ALN, demanded economic justification for the investment required to support online learning. Bishop (2003) published a synthesis of best practices which demonstrated that ALN can indeed be a cost effective investment for the university. Most of the best practices and much of the case study research published by universities also come from universities that identify themselves as self-funded and those that commenced online learning to expand access. Fewer studies can be found from online learning colleges that started with the explicit goal of improving quality. This was probably caused by the fact that there were simply fewer colleges that started online learning to improve instructional quality. The work by the Center for Academic Transformation and the Pew Foundation supports the possibilities of improving quality while reducing costs (Twigg, 2004).

The University of Texas opened a branch campus, the TeleCampus for the express purpose of providing additional outreach while maintaining and improving quality and has been able to demonstrate that its costs are not only comparable to face-to-face courses offered by other branches but lower in many cases (Robinson, 2005). Since their costs are near the low end of all the UT campuses, the state is now looking into the feasibility of designing online instruction to meet expected increasing enrollment needs to manage capital investments into the campus branches. Cost savings, better use of space, improved learning outcomes and continued growth has also been reported by the UCF (Dziuban, Hartman, Juge, Moskal & Sorg, 2005). The Technology Costing Method (TCM) created in part by the Western Cooperative for Education Technology (WCET) provides colleges with tools to improve their costing of technology expenditures (Johnstone, 2004). Through the use of these tools, colleges have been able to gauge concepts like return on investment through implementation of TCM (Jewett & Henderson, 2004). The clear message being sent here is that today all publicly funded operations must be more accountable (Gandel, Katz & Metros, 2004). While the notion of accountability is grounded in business evaluation methods like return on investment, it is becoming increasingly clear that there will be no turning back from this level of scrutiny with new federal laws like The Sarbanes

Oxley Act of 2002. The Sarbanes Oxley Act resulted after numerous corporate governance scandals like Enron and WorldCom but also requires non-profit institutions to also be publicly accountable and use standard accounting practices for their fiscal operations.

Meyer (2005) demonstrated that not only is there research that supports that cost effectiveness can be linked to improving quality but argues that planning for cost effectiveness is a necessity for online learning. Scarafiotti (2003) recommends that planning for cost-effective student services is an integral part of creating online learning at any institution and was especially true at her own institution, Rio Salado Community College. Rio Salado has experienced tremendous growth and manages to enhance quality while keeping costs in check. Beyond ethical and looming new accounting principles, are also regulatory compliance of accreditation, local, state and federal expectations. Organizations must meet the accreditation guidelines, but by further applying business evaluation practices like cost effectiveness helps them yield even higher level results. State and local governments have reduced funding to publicly funded colleges while demanding more accountability. The result is that many colleges must demonstrate greater returns on government investments.

#### Conclusions and Recommendations

Blended learning may have started after fully online ALN proved to be successful, but it seems to be gaining acceptance at colleges that were very different than many of the early leaders of the online movement. Blended learning research falls in all of the Five Pillars of the Sloan-C framework but more is needed. Research would be especially useful in the faculty satisfaction, student satisfaction and access pillars. The nature and application of blended learning may imply that it focuses more on learning effectiveness and cost effectiveness. The summary of what is known seems to show that researchers believe that blended learning will have greater (more widespread) impact than fully online ALN. It is possible that the planned pedagogical integration of face-to-face and online learning could spark new opportunities for cost effectiveness and sustainable improvement in student cognitive thinking and greater adoption of learner-centered instruction.

The research reveals great potential for introducing new instructional strategies/techniques. Faculty will use these strategies to offer students even more ways to achieve successful course outcomes. For faculty to be innovative and improve blended learning they will need access to reliable technologies. Technology support, pedagogical support, faculty time to plan and execute and exchange ideas with other faculty will be critical for success. Students require similar levels of infrastructure and technological support as do faculty. Students also perceive that they are better connected, can manage their courses better and learning improves when technology is added to courses. There are strategic institutional considerations for the access and cost effectiveness pillars. Institutions must decide whether to support access to blended learning for all students or whether it will be targeted to particular students. According to most campus computing or information technology surveys of higher education, the technology support structures are in place for blended learning. While the technology can always be improved, the existing hardware and software is capable enough to do an effective job. Institutional support on pedagogical techniques can likely be expanded. From a cost effectiveness perspective, it is clear that maximizing resources, maximizing investment (or minimizing costs) while achieving better outcomes is a strategic question. Research from mainly fully online ALN suggests that to get the most from an investment like blended learning, institutions need to apply more business-like principles and strategically plan for successful implementation.

The blended learning and applicable ALN work is mostly in the form of case studies. There is a need for substantial research to be undertaken at the multiple institution level so the data can be analyzed to see if they are generalizable. There is also a need for researchers to perform meta-analyses on the case study research to attempt to quantify the data. It would also be useful to review this work to attempt to frame effective practices for blended learning much like Sloan-C does for ALN.

## References

- Allen, I. E. & Seaman, J. (2005). *Growing by degrees: Online education in the United States, 2005*. Needham, MA: Sloan-C.
- Allen, I. E. & Seaman, J. (2004). *Entering the mainstream: The quality and extent of online education in the United States, 2003 and 2004*. Needham, MA: Sloan-C.
- Arabacz, P. & Baker, M. B. (2003). Evolving campus support models for e-learning. *Educause Center for Applied Research*.
- Arabacz, P., Pirani, J. & Fawcett, P. (2003). Supporting e-learning in higher education. *Educause Center for Applied Research*.
- Aycock, A., Garnham, C., & Kaleta, R. (2002). Lessons learned from the hybrid course project. *Teaching with Technology Today*, 8(6). Retrieved from <http://www.uwsa.edu/ttt/articles/garnham2.htm>
- Bishop, T. (2005). Reinventing the university: The business of online education. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Engaging communities* (pp. 197-205). Needham, MA: Sloan-C.
- Bishop, T. (2003). Linking cost-effectiveness with institutional goals: Best practices in online education. In J. Bourne & J. C. Moore (Eds.), *Elements of quality online education: Practice and direction*, 4 (pp. 75-86). Needham, MA: The Sloan Consortium.
- Bishop, T. & SchWeber, C. (2002). Link cost to quality. In J. Bourne & J. Moore (Eds.), *Elements of quality online education*, 3 (pp. 45-58). Needham, MA: Sloan-C.
- Bonk, C. & Dennen, V. (1999). Learner issues with WWW-based systems. *International Journal of Educational Telecommunications*, 5(4), 401-417.
- Bonk, C. & Graham, C. (2005). *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.
- Boyle, T., Bradley, C., Chalk, P., Jones, R., & Pickard, P. (2003, October). Using blended learning to improve student success rates in learning to program. *Journal of Educational Media*, 28(2-3), 165-178.
- Bransford, J.D., Brown, A.L., & Cocking, R.R. (2000). *How people learn: Brain, mind, experience and school*. National Research Council. Washington, D.C.: National Academy Press.
- Burgstahler, S. (2000). *Access to Internet-based instruction for people with disabilities*. Hershey, PA: Idea Group Inc.
- Burgstahler, S. (2002). Universal design of distance learning. *Journal of Information Technology and Disabilities*, 8(1), Retrieved May 13, 2005, from <http://www.rit.edu/~easi/itd/itdv08n1/burgstah.htm>.
- Cameron, B. (2003). The effectiveness of simulation in a hybrid and online networking course. *TechTrends*, 47(5), 18-21.
- Carroll, B. (2003). Going hybrid: Online course components increase flexibility of on campus courses. *Online Classroom*, 4-7.
- Chang, S. (2004). Online learning communities with online mentors (OLCOM): Model of online learning communities. *The Quarterly Review of Distance Education*, 5(2), p. 75-88.
- Christensen, T.K. (2003). Finding the balance: Constructivist pedagogy in a blended course. *Quarterly Review of Distance Education*, 3(4), 235-243.
- Cottrell, D.M. & Robinson, R.A. (2003). Blended learning in an accounting course. *The Quarterly Review of Distance Education*, 4(3), 261-269.

- Dede, C. (2005). Planning for 'neomillennial' learning styles: Implications for investments in technology and faculty. In D. Oblinger & J. Oblinger (Eds.), *Educating the net generation*, (pp. 15.1-15.22). Boulder, CO: Educause.
- Dowling, C., Godfrey, J.M., & Gyles, N. (2003). Do hybrid flexible delivery teaching methods improve accounting students' learning outcomes? *Accounting Education*, 12(4), 373-391.
- Dziuban, C.D., Hartman, J., Juge, F., Moskal, P.D., & Sorg, S. (2005). Blended learning enters the mainstream. In C.J. Bonk & C. Graham (Eds.), *Handbook of Blended Learning: Global perspectives, local designs* (pp. 195-208). San Francisco: Pfeiffer.
- Dziuban, C., Moskal, P., & Hartman, J. (2005). Higher education, blended learning, and the generations: Knowledge is power--No more. In J. Bourne & J.C. Moore (Eds.), *Elements of quality online education: Engaging communities* (pp. 85-102). Needham, MA: Sloan-C.
- Dziuban, C., Hartman, J., Moskal, P., Sorg, S., & Truman, B. (2004). Three ALN modalities: An institutional perspective. In J. Bourne & J.C. Moore (Eds.), *Elements of quality online education: Into the mainstream* (pp. 127-148). Needham, MA: Sloan-C.
- Dziuban, C., Moskal, P., Juge, F., Truman-Davis, B., Sorg, S. & Hartman, J. (2003). Developing a web-based instructional program in a metropolitan university. In B. Geibert & S. H. Harvey (Eds.), *Web wise learning: Wisdom from the field*. Philadelphia, PA: Xlibris Publications.
- Dziuban, C., Shea, P. & Arbaugh, J. (2005). Faculty roles and satisfaction in asynchronous learning networks. In S.R. Hiltz & R. Goldman (Eds.), *Learning together online: Research on asynchronous learning network* (pp. 169 – 190). Mahwah, NJ: Lawrence Erlbaum.
- Gagne, R. & Driscoll, M.P. (1988). *Essentials of learning of instruction* (2<sup>nd</sup> ed.). Englewood Cliffs, NJ: Prentice Hall.
- Gandel, P., Katz, R., & Metros, S. (2004), The 'weariness of the flesh' reflections on the life of the mind in an era of abundance. *Educause Review*, March/April, 40-51.
- Garrison, D. R, Anderson, T. & Archer, W. (2000). Critical inquiry in a text based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 1-19.
- Garrison, D.R & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7(2), 95-105.
- Graff, Martin. (2003). Learning from web-based instructional systems and cognitive style. *British Journal of Education Technology*, 34(4), 407- 418.
- Graham, C. R. (2005). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3-21). San Francisco, CA: Pfeiffer Publishing.
- Greenberg, M. (2004). A university is not a business (and other fantasies). *Educause Review*, March/April, 10-16.
- Greene, K. (2004). *Campus computing 2004: The 15<sup>th</sup> national survey of computing and information technology in American higher education*. Encino, CA: The Campus Computing Project.
- Harasim, L., Hiltz, S.R., Teles, L. & Turroff, M. (1995). *Learning networks: A field guide to teaching and learning online*. Cambridge: MIT Press.

- Hartman, J., Moskal, P. & Dziuban, C. (2005). Preparing the academy of today for the learner of tomorrow. In D. Oblinger & J. Oblinger (Eds.), *Educating the net generation* (pp. 6.1-6.15). Denver: Educause.
- Hitt, J.C. & Hartman, J.L. (2002). *Distributed learning: New challenges and opportunities for institutional leadership*. Washington, D.C.: American Council on Education, Center for Policy Analysis.
- Hiltz, S. R. & Goldman, R. (2005). *Learning together online: Research on asynchronous learning networks*. Mahwah, NJ: Lawrence Erlbaum.
- Hiltz, S. R. & Turoff, M. (2005). Education goes digital: The evolution of the online learning and the revolution in higher education. *Communications of the ACM*, 48(10), 59-65.
- Howell, S.L., Laws, R. D., & Lindsay, N. K. (2004). Reevaluating course completion in distance education: Avoiding the comparison between apples and oranges. *The Quarterly Review of Distance Education*, 5(4), 243-252.
- Hung, D. (2001). Theories of learning and computer-mediated instructional strategies. *Education Media International*, 38(4), 281-287.
- Humbert, J. & Vignare, K. (2004). RIT introduces blended learning—successfully!. In J. C. Moore (Ed.), *Elements of quality online education: Engaging communities, wisdom from the Sloan Consortium, volume 2 in the wisdom series*. Needham, MA: Sloan-C. Retrieved from [http://www.sloanconsortium.org/summerworkshop2004/draftpapers/humbert\\_090104.doc](http://www.sloanconsortium.org/summerworkshop2004/draftpapers/humbert_090104.doc)
- Ingle, F. (2005). *Student retention and completion rates in a postsecondary online distance learning environment*. (Doctoral Dissertation. Published. Nova Southeastern University, 2005).
- Ives, S. & Steinbrenner, K. (2005). Bridging the divide: Combining faculty centers and instructional technology support. *Educause Center for Applied Research, Research Bulletin*, 9. Retrieved from [http://www.educause.edu/content.asp?page\\_id=666&ID=ERB0509&bhcp=1](http://www.educause.edu/content.asp?page_id=666&ID=ERB0509&bhcp=1)
- Jewett, F. & Henderson, T. (2004). The technology costing methodology project: Collecting and interpreting instructional cost data. *Planning for Higher Education*, 32 (1), 15-27.
- Johnson, J. (2002). Reflections on teaching a large enrollment course using a hybrid format. *Teaching with Technology Today*, 8(6). Retrieved from <http://www.uwsa.edu/ttt/articles/jjohnson.htm>
- Johnstone, S. (2004) A policy perspective on learning theory and practice in distance learning. In T. Duffy & J. Kirkley (Eds.), *Learner-centered theory and practice in distance education* (pp. 395-408). Mahwah, NJ: Lawrence Erlbaum Associates.
- Karagiorgi, Y. & Symeou, L. (2005). Translating constructivism into instructional design: Potential and Limitations. *Journal of Educational Technology & Society*, 8(1), 17-27.
- Kerres, M. & De Witt, C. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*. 28 (2-3), 101-113.
- King, K. (2002). Identifying success in online teacher education and professional development. *Internet and Higher Education*, 5, 231-246.
- King, P. & Hildreth, D. (2001). Internet courses: Are they worth the effort? *Journal of College Science Teaching*, 31, 112-115.
- Klein, S., Kuh, G., Chun, M., Hamilton, L., & Shavelson, R. (2005). An Approach to measuring cognitive outcomes across higher education institutions. *Research in Education*, 46 (3), 251-276.

- Kravik, R. & Caruso, J. (2005). ECAR Study of Students and Information Technology 2005: Convenience, Connection, Control and Learning. *Educause Center for Applied Research*. Boulder, CO: Educause.
- Laster, S. (2005). Model driven design: Systematically building blended learning experiences. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Into the mainstream* (pp. 159-175). Needham, MA: Sloan-C.
- Lewis L. & Farris, E. (1999). *An institutional perspective on students with disabilities in postsecondary education*. Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved May 4, 2005, from <http://nces.ed.gov/pubs99/1999046.pdf>
- Lohr, L. L. & Ku, H. (2003). Development of a web-based template for active learning. *The Quarterly Review of Distance Education*, 4(3), 213-226.
- Long, G. & Beil, D. (2005). The importance of direct communication during continuing education workshops for deaf and hard-of-hearing professionals. *Journal of Postsecondary Education and Disability*, 18(1), 5-11.
- Long, Vignare, Mallory, & Rappold. (in press). Access to communication for deaf, hard-of-hearing and ESL students in blended learning courses. *Journal of Postsecondary Education and Disability*.
- Low, L. (2000). *Are college students satisfied? A national analysis of changing expectations*. Noel Levitz, USAgroup Foundation, A News Agenda series, 1-35.
- Lynch, D. (2005). Success versus value: What do we by the business of online education? In J. Bourne & J. C. Moore (Eds.), *Elements of quality online education: Engaging communities*, 6 (pp. 183-195). Needham, MA: The Sloan Consortium.
- MacDonald, J., & McAteer, E. (2003). New approaches to supporting students: strategies for blended learning in distance and campus based environments. *Journal of Educational Media*, 28(2-3), 129-146.
- Mayadas, F. (2001). Testimony to the Kerrey Commission on web-based education. *Journal of Asynchronous Learning Networks*, 5(1), 134-138.
- McCombs, B. & Vakili, D. (2005). A learner-centered framework for e-learning. *Teachers College Record*, 107, 1582-1600.
- Meyer, K. (2005). Planning for cost-efficiencies in online learning. *Planning for Higher Education*, 33(3), 19-30.
- Meyer, K. (2003). Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Networks*, 7(3), 55-65.
- Moisey, S. (2004). Students with disabilities in distance education: Characteristics, course enrollment and completion, and support services. *Journal of Distance Education*, 19(1), 73-91.
- Moloney, J. & Tello, S. (2004). Achieving quality and scale in online education through transformative assessment: A case study. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Into the mainstream*, 5 (pp. 199-213). Needham, MA: Sloan-C.
- Monolescu, D., Schifter, C., Greenwood, L. (2004). *The distance education evolution: Issues and case studies*. Hershey, PA: Idea Publishing.
- Moore, J. (2005). A synthesis of Sloan-C effective practices. *Journal of Asynchronous Learning Networks*, 9(3), 55-73.
- Moore, J. (Ed.). (2002). *Elements of Quality: The Sloan-C framework: Pillar reference manual*. Needham, MA: Sloan-C.

- Niemiec, M. & Otte, G. (in press). *Blended learning in higher education: A report from the Sloan-C 2005 Workshop*. Needham, MA: Sloan-C.
- Oblinger, D. & Oblinger, J. (2005). *Educating the net generation*. Denver: Educause.
- Osguthorpe, R. & Graham, C. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, 4(3), 227-233.
- Otte, G. (2005). Using blended learning to drive faculty development (and vice versa). In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Engaging communities* (pp. 71-83). Needham, MA: Sloan-C.
- Reasons, S., Valadares, K., & Slavkin, M. (2005). Questioning the hybrid model: Student outcomes in different course formats. *Journal of Asynchronous Learning*, 9(1), 83-94.
- Richardson, J., Long, G., & Woodley, A. (2003). Academic engagement and perceptions of quality in distance education. *Open Learning*, 18(3), 223-244.
- Riffell, S.K., & Sibley, D.F. (2004). Can hybrid course formats increase attendance in undergraduate environmental science courses? *Journal of Natural Resources and Life Sciences Education*, 33, 1-5.
- Russell, T. (2001). *The no significant difference phenomenon : A comparative research annotated bibliography on technology for distance education: As reported in 355 research reports, summaries and papers*. Montgomery, AL: International Distance Education Certification Center. Retrieved January 28, 2005, from <http://www.nosignificantdifference.org/>
- Robinson, R. (2005). The business of online education: Are we cost competitive? In J. Bourne & J. C. Moore (Eds.), *Elements of quality online education: Engaging communities*, 6 (pp. 173-181). Needham, MA: The Sloan Consortium.
- Scarafiotti, C. (2004, Winter). Five important lessons about the costs of e-learning. *New Directions for Community Colleges*, 128, 39-46.
- Schenker, K. & Scadden, L. (2002). The design of accessible distance education environments that use collaborative learning. *Journal of Information Technologies and Disabilities*. 8 (1). Retrieved May 14, 2005, from <http://www.rit.edu/~easi/itd/itdv08n1/scadden.htm>.
- Schiffman, S. (2005). Business issues in online education. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Engaging communities* (pp.151-171). Needham, MA: Sloan-C.
- Schroeder, R. & Oakley, B. (2005). Adding clicks to bricks: Increasing access to mainstream education. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Engaging communities* (pp. 101-115). Needham, MA: Sloan-C.
- Schweizer, K., Paechter, M., & Weidenmann, B. (2003). Blended learning as a strategy to improve collaborative task performance. *Journal of Educational Media*, 28(2-3), 211-224.
- Sener, J. (2004). Escaping the comparison trap: Evaluating online learning on its own terms. *Innovate*, 1(2). Ft. Lauderdale: Nova Southeastern University. Retrieved from <http://innovateonline.info/index.php?view=article&id=11>
- Shea, P. & Armitage, S. (2002). *WCET LAAP Project beyond the administrative core: Creating web-based student services for online learners*. Retrieved January 3, 2006, from <http://www.wcet.info/projects/laap/guidelines/overview.htm>
- Shea, P., Pickett, A., & Pelz, W. (2003). A follow up investigation of 'teacher presence' in the SUNY Learning Network. *Journal of Asynchronous Learning Networks*, 7(2), 61-80.

- Shea, P. J., Swan, K., Fredericksen, E. E., & Pickett, A. (2001). Student satisfaction and reported learning in the SUNY learning network. *Elements of quality online education*, 3 (pp. 145-156). Needham, MA: Sloan-C.
- Snyder, T. (2005). *Digest of Education Statistics, 2004*. The National Center for Education Statistics, the Department of Education, United States. Retrieved from <http://nces.ed.gov/programs/digest/d04/>
- Starenko M., Vignare, K., & Humbert, J. (in press). Enhancing student interaction and sustaining faculty instructional innovations through blended learning. In A. Picciano & C. Dziuban (Eds.), *Blended Learning*. Needham, MA: Sloan-C.
- Swan, K. (2005). A constructivist model for thinking about learning online. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Engaging communities* (pp. 13-30). Needham, MA: Sloan-C.
- Tagg, J. (2003). *The learning paradigm*. Bolton, MA: Anker.
- Theroux, J. & Kilbane, C. (2005). The real-time case method: The internet creates the potential for new pedagogy. In J. Bourne and J.C. Moore (Eds.), *Elements of quality online education*, 3 (pp. 31-40). Needham, MA: Sloan-C.
- Twigg, C. (2004). Improving learning and reducing costs: New models for online learning. *Educause Review*, September/October, 28-38.
- Ubell, R. (2004). Stevens Institute of Technology: Webcampus. *Journal of Asynchronous Learning Networks*, 8(3), 1-3.
- Vaughan, N. & Garrison, D.R. (2005). Creating cognitive presence in a blended faculty development community. *Internet and Higher Education*, 8(1), 1-12.
- Vignare, K., Geith, C. & Schiffman, S. (in press). Business models for online learning: An exploratory survey. *Journal of Asynchronous Learning Networks*.
- Vignare, K. (2002). Longitudinal success measures for online learning students at the Rochester Institute of Technology. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Practice and direction*, 4 (pp. 261-278). Needham, MA: Sloan-C.
- Waldrop, J. & Stern, S. (2003). *Disability status: 2000*. U.S. Census Department. Washington D.C. Retrieved May 15, 2005, from <http://www.census.gov/prod/2003pubs/c2kbr-17.pdf>
- Weimer, M. (2006). *Enhancing scholarly work on teaching and learning: Professional literature that makes a difference*. San Francisco: Jossey-Bass.
- Weimer, M. (2002). *Learner-center teaching: Five key changes to practice*. San Francisco: Jossey-Bass.
- Wu, D. & Hiltz, S. R. (2004). Predicting learning from asynchronous online discussions. *Journal of Asynchronous Learning Networks*, 8(2), 139-151.
- Zhao, Y., Lei, J., Lai, B.Y.C., & Tan, H. S. (2005). What makes the difference? A practical analysis of research on the effectiveness of distance education. *Teachers College Record*, 107(8), 1836-1884.