Factors for Successful Evolution and Sustainability of Quality Distance Education

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Abstract

Distance education (DE) is entering its fourth generation, requiring universities to consider how to sustain this continually evolving delivery method. Competition from for-profit entities, open-source depositories, and an increasing number of non-profit universities has created a competitive marketplace for academia to navigate. Rather than consider implementation of distance education, this research focuses on defining success factors for DE evolution and sustainability in non-profit, public four-year higher education institutions. It investigates controllable factors, directly influenced by administration and faculty, needed to foster a culture supporting high quality DE. Also investigated are non-controllable factors related to the role and impact of a technology savvy student body.

A metadata analysis presents new insights for university administrators and faculty to sustain and grow existing programs. Theories for technology adoption, acceptance, and use underpin the research and conclusions. The findings suggest that higher education has moved beyond Roger's (1962) early adopter stage and is now faced with a need to establish a pathway for sustainability and growth in the face of increasing DE enrollment and technology change. Critical success factors were found to be university leadership with respect to infrastructure and faculty support systems. Additionally, faculty should continually challenge teaching paradigms and adapt pedagogy to newly adopted technology for continued success. Recommended strategies are provided along with suggested infrastructure and pedagogy components.

Introduction

With roots beginning in written correspondence courses and now utilizing multi-media applications delivered via the internet, distance education (DE) is in its fourth generation (Barak 2012). According to the Babson and Quahog Research Groups, as of the end of the 2014 academic year, distance education enrollment continues to increase despite a drop in overall enrollment in higher education institutions. Over 5.8 million students are taking at least one distance education course. This represents 28.4% of enrolled students, up from 25.9% in the 2012 academic year. Nearly half, or 2.8 million of these students, are taking courses exclusively via distance delivery. Significantly, the growth is coming in non-profit higher education, with for-profit institutions actually experiencing decreasing enrollment (Allen, Poulin, Seaman, and Straut 2016). To support this, the Babson and Quahog survey research determined that over 60% of academic leaders consider online education "critical to the long-term strategy" of their respective institutions. In summarizing the Allen et al. research, Hill considers that the state of academia is well past the Roger's technology-adoption early adopter stage (Rogers 1962) and that academia should consider itself squarely in the "early majority" of adopting distance delivery (Hill 2016).

Yet in the 2015 research, *Negotiating the Mine Field, Strategies for Effective Online Education Administration Leadership In Higher Education*, Burnette (2015) points out that while online education is establishing itself as a vital part of non-profit education, many institutions still view online education as an experimental activity. Additionally, the research found a faculty reluctance to embrace distance delivery despite growing acceptance of distance education by chief academic leaders. Essentially, ingrained traditional structures and paradigms may still impede development of distance education initiatives (Burnette 2015). The goal of this research was not to make the case for the necessity of DE, but rather to define factors needed for sustainability of DE programs established by the innovators and early adopters. The challenge to university administrators is how to sustain and evolve an established distance education program in the face of continued faculty reluctance and rapid technology shifts, while navigating a bureaucratic environment that is generally tradition based and change resistant.

Driven by stakeholders who believe in DE's importance and contribution to the educational process, successful universities embrace and implement DE as a part of their total offering (Barak 2012), but not without challenges on multiple fronts. A report sponsored by the Office of Educational Research and Improvement for the Association of the Study of Higher Education, detailed the difficulty in determining all factors impacting DE due to the complexity and instability of the field (Meyer 2002). Technology advances have quickened the growth of distance learning and fundamentally changed the way that we teach (Anderson and Karim 2013). Defining best practices in online education is impeded by the added complexity introduced through the use of multiple information and communication technologies (ICT). Not only is e-learning constantly evolving with new technologies, the consumer demographic is shifting to digitally reared student learners further complicating the determination of best DE practices. Research shows that depending on geographic region or culture, best practice will rely upon diverse initiatives (Alaneme, Olayiwola, and Reju 2010).

While the pace of technology change is increasing along with student digital sophistication, the infrastructure to provide and support e-learning is dependent upon the university investment process and faculty demographics, neither of which is generally considered a rapid change agent (Otte and Benke 2006). Confirming the financial burdens for DE, 2006 and 2010 reports for the North Carolina Office of State Budget and Management Study (OSBM) confirmed that the greatest direct costs for face-to-face (FTF) instruction are instructional salary costs. The report went on to state that additional costs associated with DE include course development, technical expertise for instructional technology specialists, training, hardware, and software required for "technology-mediated delivery" (UNC Board of Governors 2010).

The challenge for DE evolution is that administrative systems formerly geared solely to FTF instruction are entrenched, and modifying these systems to manage DE requires a new skill set (Nworie, Haughton, and Oprandi 2012). The OSBM 2010 report stated the level of commitment by campus leadership is an important component because it affects how campuses deliver and dedicate resources to distance education. However, Burnette (2015) found that tradition and politics are impediments. Research suggests that even as the need for DE leadership is recognized, the necessary competencies, qualities, and qualifications for administration are not clearly defined (Nworie, Haughton, and Oprandi 2012).

Given that course design, delivery, structure, pedagogy, and content are generally specific to an academic discipline, responsibility for sustainability of quality DE should be driven at a higher hierarchical level and be supported through well-structured infrastructure. This paper addresses the three key stakeholders within a state-funded, public higher education distance education environment: the university administration as providers of infrastructure, and faculty and students as the users of infrastructure. The research seeks to determine the critical success factors needed for evolution and sustainability of an existing distance education program.

Theoretical Framework

An established distance education delivery program continually faces changing resources, technology, and faculty and student demographics. To address changing resources and technology, research from Knowles (2007) is used to identify six organizational factors that require university focus in order to succeed in creating a supportive organizational structure for DE. Of these factors, five are specifically administration oriented: 1) transformation: potential changes to policy and processes which were developed to support FTF delivery methods; 2) alignment: administration incorporating DE into the strategic plan which must include technology integration; 3) coherence: ensuring that DE content and learning outcomes are equal to FTF; 4) resources: budgeting money, time, and human capital; and, 5) leadership: to initiate, support, and sustain. Resources and technology are considered controllable by university administration; faculty and student demographics are considered non-controllable.

With respect to leadership for strategic DE implementation, and by extension sustainability, capacity to manage the rapid rate of change inherent in the field is needed (Dhanarajan 2001). Change management is also a key overall success factor for universities, and research suggests that "technological implementation is related to organizational dynamics, which in turn have a strong impact on outcomes" (Legris, Ingham, and Collerette 2003, pg. 202). Change management for DE success is dependent upon technology applications, the organizational structure, and the stakeholders. For example, consider from the organizational standpoint the paradigm shift required by administration to acknowledge workload differences between DE and FTF delivery. Knowles (2007) considered that online courses demand a different workload structure, and Nsiah (2013) stated DE requires more instructor time for preparation and student interaction. Additionally, established DE programs continually face changing resources, technology, and student demographics.

The dominant theory associated with understanding organizational change related to technology is the Technology Acceptance Model (TAM) (Gibson, Harris, and Colaric 2008). TAM was developed from the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975), which was concerned with the factors leading to a consciously intended behavior. In 1986, Davis adapted TRA to focus specifically on information systems (Davis, Bagozzi, and Warshaw 1989). Later, Davis extended his research on TAM to include the technology aspects of information systems. TAM is based on two "fundamental and distinct concepts" that influence the decision to adopt information technology (IT): 1) perceived usefulness, and 2) perceived ease of use (Davis 1989, pg. 323). Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance" job performance (Davis 1989, pg. 320). Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, pg. 320). Users of IT will develop their attitude toward adoption based on the interaction between perceived usefulness and ease of use, with the ease of use influencing the usefulness perception. Once the user's attitude allows for adoption, the intention to use is reinforced by subjective norms, defined as "a person's perception that most of the people important to him think he should" utilize the technology (Davis, Bagozzi, and Warshaw 1989, pg. 984).

TAM was one of the primary theories included in subsequent research leading to the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, G., Davis, F. 2003). UTAT extended intention to use IT by taking TAM's performance and effort expectancy, and adding social influence and facilitating conditions. UTAT development also included moderators omitted from prior research models, including age, experience, gender, and the degree to which an IT system was mandated or voluntary use. Relevant administrative policies will impact faculty performance expectancy. Effort expectancy is established by university culture and administration policies. Social influence is an interaction between faculty within a department, and also between individual faculty and their student constituents. Facilitating conditions include capital investment in

infrastructure, human resources, and related administrative policies, which also impact faculty performance expectancy. Through UTAT, administration may assess the likelihood of success for an IT introduction and design interventions "targeted at populations of users that may be less inclined to adopt and use new systems" (Venkatesh et al. 2003 pg. 426).

Research Questions

The purpose of this research is to define controllable factors and uncontrollable influences for DE sustainability and evolution in non-profit, public four-year higher education institutions. This study starts at the top of the university's administration hierarchy, researching leadership responsibility for quality distance education. Next, it considers effective utilization of resources by the professoriate with respect to interaction between technology, process, and pedagogy. Finally, it addresses the student as the consumer and as a key stakeholder. The following questions guided the research:

Q1: What are the controllable distance education university infrastructure factors?
Q2: What are the faculty attitudes needed for DE sustainability?
Q3: What are the students' role and impact on the defined success factors?

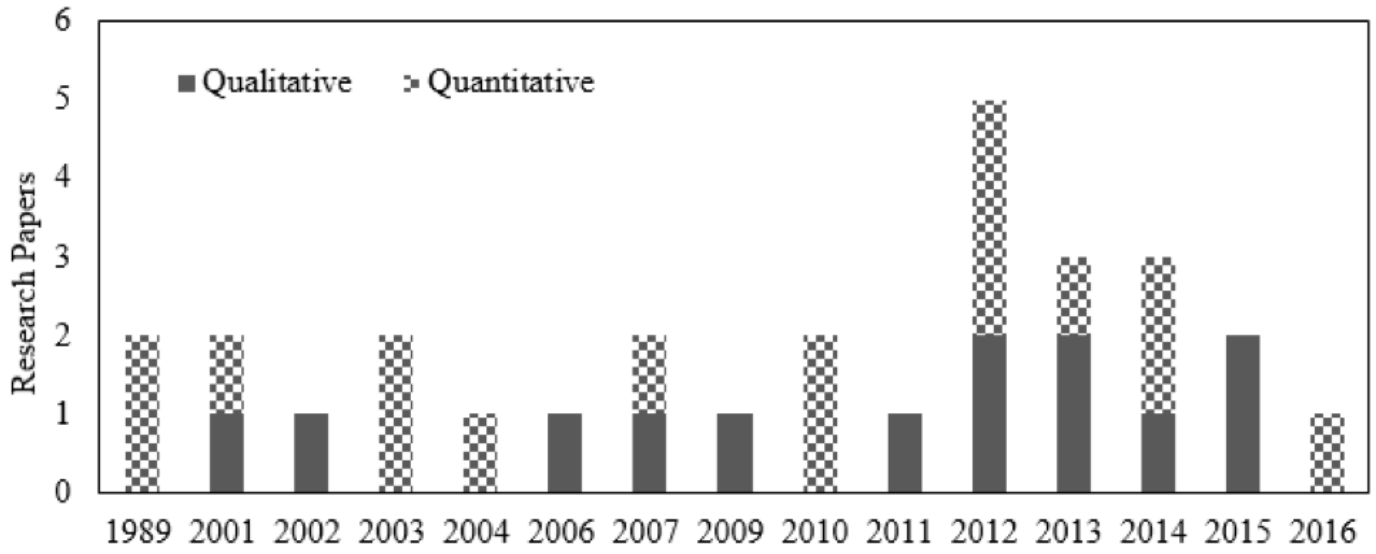
Methodology

A review of literature was first conducted for research articles from 2001 along with supporting articles on technology acceptance models from 1989. Peer reviewed articles were searched on a university library database and scholar.google.com using keywords: 1) distance education, 2) DE leadership, 3) sustainability, 4) information and communication technology, 5) DE pedagogy, 6) DE infrastructure. More than 50 articles were reviewed, with final utilization of 28 references selected from sources listed in Table 1. Additionally, several non-peer-reviewed sources are listed in the references and used as background to support the analysis. The selected articles provided data to address the research questions, utilizing mixed methods with 75% data driven and 25% literature reviews. The analytical methods were a combination of 46% qualitative and 54% quantitative; selected research was skewed toward more recent works as shown in Figure 1.

Table 1. Sources for Metadata Analysis

Table 1. Sources for Metadata Analysis

Type	Discipline	Quantity
Journal	Distance Education	10
Journal	Higher Education	4
Journal	Information Systems or ICT	4
Academic Conference	Higher Education	4
Journal	Management Science	2
Academic Conference	Distance Learning	2
Journal	Communication	1
Research Group Report	Distance Education	1



From the review of the 28 papers, findings and conclusions were summarized into the three general hierarchical classifications: university administration, faculty, and students. University administration focused on leadership facilitating distance education and faculty through the general term of infrastructure. In turn, faculty attitudes and pedagogy facilitates student learning in a distance environments, and finally, student responsibility is a key stakeholder in distance education. Each of these classifications was subsequently compartmentalized into specific data categories for sustainability as graphically described in Figure 2 and summarized in Table 2. In all, 86 individual findings were categorized into 200 data points to provide guidance to address the research questions.

Table 2. Meta-Analysis Finding's Breakdown

Category	Specific Classifications	Data Points	Percent
University Infrastructure	Technology Hardware and Facilities	8	10%
	Instruction Technology Support Staff	18	23%
	Admin Policies and Procedures	32	42%
	ICT Software	15	19%
	Training	4	5%
Faculty Attitude and Pedagogy	Adoptability	33	38%
	Sharing Best Practices	8	9%
	Adaptability	46	53%
Student Responsibility	Communication	4	11%
	Technology Infrastructure	12	33%
	Internal Motivation	12	33%
	Time Management	7	19%
	Technology Sophistication	1	3%

Controllable Distance Education University Infrastructure Factors (Q1)

As technology driven DE is becoming mainstream in state-funded, public universities, the efficacy of DE administrative leaders becomes as equally important as the university infrastructure investment (Burnette 2015). University infrastructure includes: 1) administration policies and processes, 2) ICT software, 3) instructional technology support staff, 4) technology hardware and facilities, and 5) training programs relating to distance delivery.

There is abundant research supporting the leadership role of a university's administration to establish culture and provide resources necessary for success. Research has found that leadership and vision,

complemented by proactive management, are vital for successful distance education (Stansfield et al. 2009; Nsiah 2013). A factor analysis by Muilenburg and Berge identified administrative structure and organizational change, along with support services, as key factors to successful DE implementation (Muilenburg and Berge 2001). Meyer suggested that the long term commitment required to support sustainable DE requires vision, leadership, and support, along with changes to policy and practice (Meyer 2002). As posited by Holt et al., there should be a degree of shared leadership between all administrators in light of the "complexities of the contemporary technological landscape" (Holt, Palmer, Gosper, Sankey, and Allan 2014, pg. 382).

University infrastructure includes consideration of policies and practices that come from comparisons between the FTF and DE environment, such as course size, scheduling virtual meeting times as classrooms, proctoring requirements, teaching lab based hands-on courses, software accessibility (ownership, licenses, utilization), and establishing minimum student technology infrastructure standards. Another opportunity for evolution includes an updated scheduling policy. Universities are structured to coordinate and schedule FTF course offerings to avoid conflicts in time and classroom space. However, synchronous and hybrid DE class virtual meeting times are generally not university scheduled and unilaterally determined by the course instructor. As the volume of DE courses increases, instructors are beginning to encounter virtual meeting scheduling conflicts. Without organizational control, the burden falls upon students to decide which online class has priority. Universities should consider upgrading FTF classroom-scheduling policies and software to include DE courses' virtual schedules.

Beyond the initial investment in ICT, facilities, and hardware, long-term financial planning is required for sustainable e-learning infrastructure (Stansfield et al. 2009). Financial considerations such as continuing funding, servicing related debt, and depreciation of assets are infrastructure considerations. Human resource investments for sustainability is another financial consideration. The skills needed to function in a multi-media DE environment successfully come at a cost of time and money (Dhanarajan 2001). Return on investment in facilities, hardware, software, and connectivity will go unrealized in the absence of non-teaching support staff and training for all DE stakeholders.

Faculty attitudes needed for DE sustainability: Pedagogical Adoptability (Q2a)

Distance education has been defined as "pedagogy empowered by digital technology" (Alaneme, Olayiwola, and Reju 2010; Bokhari and Ahmad 2011) and, as such, requires faculty to adopt new technology and evolve as technology changes. While effective teaching is facilitated by an institution's infrastructure, the ultimate responsibility falls to the faculty. University administration has primary responsibility for providing the infrastructure and resources to sustain the quality of DE, but proper faculty involvement will provide the desired quality of experience and efficacy of learning (Kist and Brodie 2012). Additionally, faculty should adjust techniques to complement the technology for the best outcomes (Cudney and Ezzell 2015).

Newton's First Law speaks to inertia, and that objects in a certain state of motion will remain in that state unless external forces are applied. Metaphorically speaking, faculty are the objects, and their DE pedagogy and delivery methods may be considered their state of motion. Regardless of course content stability, multi-media technology delivery methods continue to evolve. The question for faculty then becomes how and when to adopt new technology and methods. The underlying challenge to faculty is finding "multiple paths to learning, capitalizing on student's different learning styles" by testing and re-testing technology applications within pedagogy (Meyer 2002, pg. vii). Early examples of multi-media presentations were simple narrated PowerPoint presentations. This rudimentary system was replaced by screen recording software such as Camtasia Studio, a screen capture software from TechSmith, that allows faculty not only to record voice, but also to start down the path to a more professional production with several add-ins and editing features. Faculty interested in less time intensive approaches opted for lecture capture, where recordings of live FTF

instruction was typical. Capital-intensive "recording studios" gave way to classroom mounted web cams and video streaming. Learning Management Systems (LMS), such as Blackboard and Moodle, evolved to integrate their own lecture capture systems, such as the Tegrity application used within the Blackboard LMS.

The key sustainability concern is that digitally produced content has a shelf life due to ongoing content changes and continual textbook edition changes. Additionally, video capture has evolved from lengthy recorded lectures (usually of dubious sound and picture quality) to short duration, targeted e-learning video snippets and tutorials. Required faculty effort level for multi-media adoption went from near zero within FTF lectures to "significant" effort for multi-media DE best practices. Two internet marketing studies support a preference of short video snippets over recorded lecture from a student attention-span standpoint. Tubemogul, an enterprise software company specializing in scalable digital video campaigns, reported in 2008 that half the audience of online video is gone by the one minute mark, and only 10% go a full five minutes (Camp 2013). ComScore, an internet digital technology research company, reported in 2013 that the desired length of online video content is just over five minutes (Greenfield 2013). This trend is observed in commercial educational software. Case in point is the company Lynda.com, a LinkedIn Company, specializing in online tutorials for "software, creative, and business skills" that are being deployed by leading edge universities to complement instructor lead and developed content. These video courses range in length from half an hour to several hours, but the content is divided and indexed into snippets generally no longer than five minutes.

The implication is that successful multi-media DE should engage students and get to the point quickly. Applying this principle to faculty adoptability, faculty need to move away from "effortless" FTF lecture recording, and adopt desktop video publishing technology. However, additional time commitment is needed to manage the technology learning curve required with the adoption of ever changing ICT. Until the technology is mastered, the design and build of course content is hindered. Faculty comfortable in the role of researcher and "provider of information" are now thrust into the role of learner in order to adopt new and evolving DE technologies. These time commitments, while considered student centric, do not further the research and publication needs of most tenured and/or tenure-track faculty. Effort to create narrated video snippets will vary by discipline and instructor, however, a decade of recording experience shows one should budget one hour of effort for ten minutes of quality video content. In summary, advances in ICT challenge the instructor to adopt new methods and technologies. Faculty technology application decisions include: video content creation (tutorials vs. content instruction), feedback methods (text, voice, screen capture, video), use of social media, game theory with serious games, adaptive learning, and student interface (desktop or mobile). These continual challenges force faculty to adopt new learning technologies and modify pedagogy to compensate. As addressed by the next research question, faculty should condition themselves also to adapt their pedagogical approaches.

Faculty attitudes needed for DE sustainability: Pedagogical Adaptability (Q2b)

Faculty require adaptation of new methods and adoption of new technology to provide equal or better quality content and learning outcomes when compared to FTF delivery. Unfortunately, Burnette (2015) found a "surprising and disappointing" (pg. 21) resistance among faculty to online education despite the maturity of the delivery method. The challenge in adoption and adaptation of new educational technologies is to uphold fundamental learning theories such as clear instructional goals, perceived relevance of tasks in relation to goals, and motivation to engage the cognitive process of learners (Kist and Brodie 2012; Killen 2009).

Faculty engagement in DE is impacted by their level of interest, teaching style, self-identity and classroom role (Knowles 2007). Knowles (2007) considered transformation and engagement factors in that instructors must first embrace DE as a valid form of higher education delivery. Once faculty make the behavioral step into DE, the instructor role faces evolution with new ICT and the

pervasiveness of e-learning. Faculty-controlled DE success factors identified by Knowles (2007) include: 1) transformation, the need for instructors to assess and, where required, change approaches to teaching; 2) pedagogical alignment, instructional design, role of the teacher, and integration of DE and FTF curriculum; and 3) engagement, the need for faculty to adapt to a new educational environment. Additional factors impacting the student quality of experience in DE which are in direct control of faculty include: content organization, learning management system organization and navigation, interaction opportunities, options for the learning path, and sufficient course materials. Outside of faculty control, but nonetheless faculty responsibilities to mitigate, are technology tools support and malfunctioning technology applications (Kist and Brodie 2012). Faculty must learn to adapt to changing technology and changing student technological capabilities when considering proper applications. Professors must embrace the fact that they must now add "technology tools" to their personal inventory requirements for lifetime learning, as researching only in their field will not provide sufficient background to provide quality distance education.

The faculty challenge is to integrate appropriate technology tools in conjunction with clear feedback (Tsai, Yuen, and Cheung 2012). Tsai et al. (2012) noted learning and retention increased by as much as 100% when students were actively involved in a lecture, discussion, or self-study. Thus, the trend has evolved toward synchronous DE or hybrid courses combing static course content with virtual classroom meetings. Current technology offers a variety of tools for virtual discussion, including web-based video conferencing and avatar-based Second Life.

With respect to course preparation and organization, research shows that traditional FTF classroom instruction has long favored informative and spontaneous oral instruction. Some faculty take advantage of this, as anecdotal evidence shows there are some instructors still in the process of assembling course materials as a semester starts. While not ideal, this is still a manageable aspect of a FTF course where content may be developed as the semester progresses. However, quality DE instruction is geared toward a hybrid delivery of asynchronous material mixed with synchronous (virtual) instructor interaction. To facilitate this, the entire course structure and content needs to be organized by the start of the semester, with only minor modifications as the general rule. Spontaneity is difficult to achieve in DE instruction as the entire course content needs to be prepared and integrated into the learning management software from the start (Barak 2012).

Research has shown that a DE course benefits the most when there is instructor interaction with students (Anderson and Karim 2013; Mupinga, Nora, and Yaw 2006). The question then becomes how to define "interaction." Early generations of distance education considered text to suffice for interaction, and in 21st century DE this evolved from email messages to discussion boards (asynchronous) to real time text and chat sessions (synchronous). E-learning was originally (technologically) restricted to discussion boards, text chats, and email. A 2004 study by Russo and Campbell found that email interaction is vital for quality of experience and positive learning outcomes (Nsiah 2013; Russo and Campbell 2004).

As many DE instructors can attest through anecdotal evidence of email time stamps, DE students tend to complete work in the evenings, early morning hours, and weekends. These are not typical FTF instructional work hours, yet DE students issue questions electronically on their own schedule, not the instructor's. Additionally, the time zone impact of instructor and student location cannot be discounted and contributes to a 24/7 DE instructor responsibility. Regardless of the professor's time commitment to respond, Dennen et al. (2007) stated that email communication is insufficient and student requirements are increasing to include virtual interaction (Nsiah 2013; Dennen, Darabi, and Smith 2007).

Professors find they need to adapt their style from leader to facilitator and communicator. The facilitator role requires preparation, organization, technology selection, and support. The communicator, the most difficult and time consuming, utilizes multiple paths and technologies. In effect, the "housekeeping" items casually addressed in FTF settings become regimented

communication requirements. The question then becomes, how should students navigate all that content? While this is typically addressed in the opening FTF class, there is considerably more effort for DE. Syllabus quizzes are typically adopted, as is inserting a "Read Me First" section for each course module to provide the pathway. Another best practice to adopt as role of communicator includes regular weekly opening announcements to define the week's game plan and deadlines, along with updates during the week. However, as important as communication is to effective teaching, communication involves two parties, the professor and the students.

Student role and impact on the defined success factors: (Q3)

As faculty adopt appropriate technology and adapt methods and pedagogy, the ultimate responsibility for successful DE should consider student responsibilities. A student's desire to take DE classes rather than traditional FTF is based on convenience, availability, and flexibility rather than on their learning preferences (Anderson and Karim 2013). Further, a student's success in a DE course depends upon internal motivation, organization, and time management skills. Academic performance can be enhanced when the factors that influence a student's motivation are acted upon by faculty. Dillon and Stolk (2012) used a cluster analysis to explore student motivation and examined group-based motivation profiles within academic settings (Dillon and Stolk 2012). Using a self-determination theory model to gain insight into students' perceived motivations in a college course environment, they found that students adopt a range of situational motivations that do not fall neatly into the conventional "intrinsic" or "extrinsic" categories. There are two implications with this study. First, it confirms the "uncontrollable" aspect of faculty and administration to impact a quality DE experience. Second, and most significant for faculty and classroom practice, was with regard to students who sense their coursework is relevant but are unsure as to why. Students falling into this latter classification need to be able to express these feelings to faculty, as the DE experience limits personal interactions where body language is useful to communication.

An additional factor often overlooked is student technology sophistication, infrastructure, and self-motivation to engage with new technology. Lack of skills in using various technologies, cost of purchase, and technology renewal are key issues (Dhanarajan 2001). An underlying assumption of faculty is that all DE students are technologically savvy. The impact of this myth is often felt as students engage with new technologies and methods found in various courses, climbing the learning curve at different rates. For example, as DE moves from self-directed asynchronous instruction to synchronous and/or hybrid with virtual meetings, students may need hardware, software, and broadband technology upgrades for video and voice communication. Then, there is the ability to master the new technology in order to participate in the course.

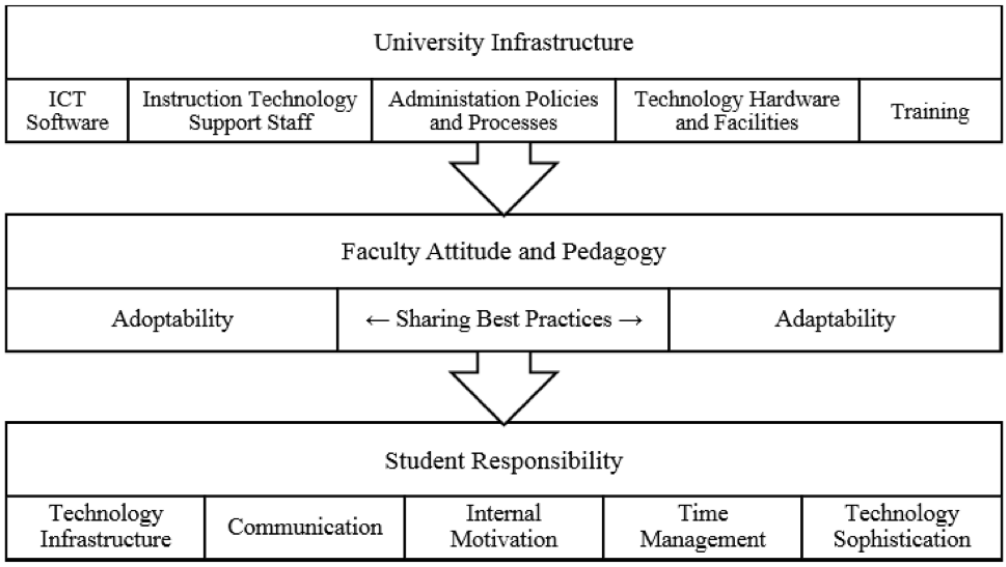
However, student learning is facilitated by interaction between learners and their environment (Anderson and Karim 2013) and student-instructor online interaction provides the most significant benefits for DE (Mupinga, Nora, and Yaw 2006). Since there is no predominant DE student learning style, DE courses should be developed to accommodate multiple learning styles (Mupinga, Nora, and Yaw 2006). With respect to the evolutionary aspect of DE, the key finding is that learning styles will change as time passes and students' digital literacy changes, often to exceed that of the professoriate. The best path to successful DE lies in a university's culture, support from administration, and financial resources to facilitate institutional evolution to keep pace with the consumer.

Discussion

A university's vision ultimately determines the success of developing and sustaining a quality DE program. Vision is realized through three critical factors: 1) university infrastructure, 2) faculty pedagogy, and 3) student responsibility. Figure 2 shows an overview, with the university infrastructure as the controlling agent for faculty and student success. University infrastructure success factors are further refined to include administration policies and processes, ICT software, instructional support staff, technology hardware and facilities, and training. Administration leadership works "to build relationships, credibility, and trust" to provide required infrastructure and

resources for facilities, tools, and systems to deliver instruction (Burnette 2015, pg. 13). As DE has become more ubiquitous, paradigm shifts are required for administrators with budgetary responsibility.

It is incumbent upon administration to recognize that technology-based processes are not a "once and done endeavor." For example, hardware costs may be a one-time expense, but software maintenance and technology hardware upgrades should happen with greater frequency than changes to FTF classrooms. DE requires an increase in technology and instructional support staff, such as instructional designers, instructional technologists, and other non-teaching education support staff (Nworie, Haughton, and Oprandi 2012). As technology advances, the need for renewal and replacements drives continuous faculty and support staff training. Budgets, along with paradigms, need to recognize that faculty may need support for travel costs purely for training, as opposed to more traditional research endeavors.



Faculty, as the face of DE, are the pivotal stakeholder in sustaining a quality DE program. Established paradigms based on university vision and faculty experience are being challenged by an increasing percentage of upcoming junior faculty. Many of these new professors have first-hand experience as distance learners, and bring with them a pre-disposition of effective methods and required technologies. They may also lack a sense of institutional accomplishment from the original DE implementation, and thus be less inclined to be complacent with the status quo, resulting in new demands on infrastructure and resources.

Additionally, Carnegie classification and faculty rank are considerations for administrators and professors. The tenure system becomes a mitigating factor for faculty development and DE delivery (Otte and Benke 2006). The underlying challenge for a Research I school, where teaching load is primarily borne by graduate assistants and/or part-time faculty, is to create motivations for professors to become leaders and adopters of e-learning technology. This challenge is compounded by the inherent inefficiency and cost of training short-term instructors due to high turnover. Research II and III school professors are also tasked with research and publications. Faculty may be more focused on their own career agenda and therefore not willing or able to dedicate time to new DE technology training (East, LaMendola, and Alter 2014). Publications are typically part of the annual review process, and faculty may be building up their curricula vitae for a potential move to a Research I university.

Technology applications and student motivators are dynamic; thus technological adoptability and pedagogical adaptability by the professoriate are key DE evolutionary considerations. Faculty should be willing to incorporate new and changing technology into the classroom, making changes as existing ICT becomes obsolete. Adaptability is further required for time commitments. DE tends to

encompass an "anytime, anyplace, and anywhere" aspect. Thus, quality DE instruction contends with students whose primary learning hours are evenings and weekends. Faculty with a history of using recitation sections and/or office hours for student interaction should adapt to student expectations of 24/7 accessibility, feedback, and help. A cultural shift in the professoriate is needed to switch the paradigm from teaching in blocks of time during standard working hours to that of distributed teaching over the entire week (Otte and Benke 2006).

Finally, the students' role in successful DE may not be considered passive. Students are challenged on both their ability to master new technology and to provide personal infrastructure suitable to the course technology. Student involvement should be significantly more proactive for both time management and ICT training. Complicating the task for faculty is that there are multiple demographic considerations. First, there are 18-22 year old "traditional" college students. Second, all the others, which include: 1) baby boomers and Generation X who did not grow up with internet and digital technologies, and 2) millennials who are the leading edge of the information technology burst (Bump 2014). Tailoring instructional improvements will motivate students in ways more beneficial for learning (Kirn and Benson 2013), but generation splits make design and delivery of DE more complicated. Thus faculty need to consider multiple education modes and technologies, which in turn add more demands on their time and infrastructure resources from the university.

The review of literature and synthesis of success factors for evolving and sustaining a DE program point to the need for a synergistic relationship between university infrastructure, faculty, and students. Successful distance education should manage the controllable aspects of the organization's infrastructure and faculty pedagogy. Strategies for each are defined below:

University Administration

The following bullets note strategies for university administration, starting with a clearly defined and communicated vision, supported throughout the organization. Support includes human and financial resources, and possibly modifications to long standing paradigms. Table 3 lists key initiatives and goals for university-provided infrastructure.

1. Establish the vision of distance education's importance to the university's future.
2. Support paradigm changes through policies, processes, resources, and investment.
3. Proactively plan and budget for technology advancement and recurring support costs.
4. Provide resources, time, and incentives for faculty to adopt new instructional technology.

Table 3. University Infrastructure Requirements

ICT and Software Applications	Training
• Animation Services	• Instructor Software Certifications
• Commercial Software Alliances	• IT Academies
• Internal/Closed Social Media	• IT Security
• Learning Management Systems	• Customized Department Training
• Virtual Environment / Remote Desktop	• Seated Workshops – Faculty
• Websites	• Teaching With Technology Expositions
Specialized Technology Support Staff	**Technology Hardware and Facilities**
• College Level Technology Support	• In-class lecture capture / recording
• Course Management Systems	• Recording Studios
• University ICT: Internal / External	• Virtual Computer Lab
• Web Meeting Software	• Web Servers and back up

Faculty Pedagogy

The four bullet points summarize the strategy for faculty to adopt technology and adapt pedagogy. Table 4 provides example technologies and methodologies for faculty.

1. Invest time into learning and mastering instructional technology.
2. Share best practices and attend instructional education training.
3. Adopt new instructional technologies.
4. Where possible, utilize common instructional technology within a department.
5. Adapt pedagogy to exploit features of new technology.

Table 4. Faculty Pedagogical Support Examples

ICT and Software Applications*	Training
• Instructional Videos (Lynda.com) • Communication Policies • Lecture Capture (Tegrity, Mediasite) • Screen Capture (Snippet, SnagIt) • Video Tutorial recording (Camtasia) • Virtual Classroom (VMware, Second Life) • Web Conferencing (Saba Meeting)	• Best-Practices Workshops • Desk-Side Training • Online Self Help **Technology Hardware and Facilities** • Ability for faculty to recognize needs for classrooms and request as needed

* Examples in parenthesis

Student Responsibilities

While not controllable by the university or faculty, both can have a tremendous amount of influence. The goal is for the university and faculty to minimize complexity and cost for students. That said, students are considered a stakeholder and must recognize their own accountability to be an active participant in the distance education process. The following are primary student responsibilities:

1. Understand and acquire required technology.
2. Take personal responsibility for their own level of technology sophistication.
3. Invest time to train and learn instructional technology in advance of course application.
4. Communicate to faculty.

Summary

Originally introduced as asynchronous education, delivered anytime and anywhere, e-learning is moving in two parallel paths within higher education institutions. The first path, and focus of this research, subscribes to the viewpoint that the student is the consumer and that quality of service and experience is critical to success. Thus, asynchronous courses are fading in favor of synchronous and hybrid instruction, requiring attitude shifts from professors and academic institutions supported by new infrastructure and technology investment. The second path is the adoption of commercially developed and delivered e-learning software based on interactive multimedia and adaptive learning platforms integrated into faculty pedagogy. Figure 2 conceptualized the success factors for sustaining a quality DE program at a state-funded, public university. To support the success factors, three research questions were posed.

The first question sought to identify the controllable university infrastructure factors needed to sustain DE. Success factors encompassed administration policies and investment, technology facilities and applications, and human resource management for support staff and faculty. While institutional culture and infrastructure should lead, faculty development is vital. This is a severe challenge in an environment where professional development is generally not part of the academic culture and research professoriate. Professional development cannot be addressed by simply offering training (Otte and Benke 2006) Incentives and/or methods to engage faculty are the greatest

leadership challenges for university administration to develop successful e-learning.

The second research question asked: “What are the faculty attitudes needed for quality DE sustainability?” The advancement of distance education should be through engaged faculty (Dhanarajan 2001). Figure 2 summarized these attitudes as adoptability or willingness to use new technologies and DE techniques, along with adaptability of pedagogy. Quality DE instruction requires engaged instructors with the initiative to modify their role to become co-learners with students (Nsiah 2013). Faculty should have the initiative to adopt new technology as it becomes mainstream within academia, and then to adapt their pedagogy to exploit it. As instructors are compelled to learn new technologies and continually evaluate pedagogy to maintain quality of service in DE, the quality of complementary FTF instruction cannot fail to improve.

The third and final research question asked: “What is the role of the student in the success factors?” This third component in the DE equation is outside university control and is somewhat subjective. Influenced by generational attitudes and technology experience, student engagement in e-learning is highly individualized. Thus, student motivation and initiative are vital to their overall success and quality of experience in e-learning. However, universities can and should intercede to facilitate the availability of appropriate individual student technology infrastructure. To engage adequately in a virtual environment, students should need to invest in suitable technology for participation, and universities should continually define and update specifications. Where possible, universities should leverage their instruction through academic alliances or procurement programs to assist students. Also, although significantly harder, universities much encourage commonality of ICT applications between faculty and course delivery to students.

Future research needs to clarify the role of the public university system, specifically shared technology applications, human resources, and financial support required to sustain and evolve state-of-the-art quality instruction. Additionally, more research is needed for the development of a costing model that would establish an investment level, either in total dollars or cost per student, which would help quantify e-learning success in a non-profit, public or private higher education environment.

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