Assessment of Risk Factors and Mitigation Recommendations for Adoption of the California Community Colleges Online Education Initiative

A Dissertation by

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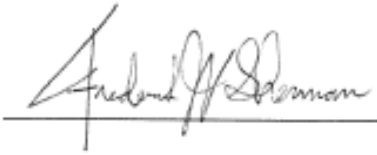

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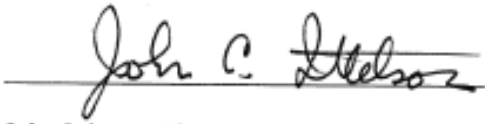

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ABSTRACT

Assessment of Risk Factors and Mitigation Recommendations for Adoption of the California Community Colleges Online Education Initiative

by Scott Conrad

The purpose of this study was to identify and prioritize a list of implementation risk factors and suggested mitigation measures for the development team of the California Community Colleges (CCC) Online Education Initiative (OEI) to improve the probability of successful implementation. This study led to the development of an authoritative and comprehensive prioritized list of risk factors and user-recommended mitigation strategies for the risks of a large-scale shared learning management system (LMS) implementation. The data collected and the conclusions derived from surveying college administrators and faculty are intended to augment the literature as well as advance the understanding of how to successfully implement a new shared LMS of this scale successfully. The participants in the policy Delphi study were 10 administrators, 10 full-time faculty members, and 7 adjunct faculty members from the cohort of the first colleges accepted to adopt the OEI. Two rounds of questionnaires were administered using the online electronic survey program SurveyMonkey. The first round asked participants to prioritize software implementation risk factors and make mitigation suggestions for the highest priority risks. The second round asked participants to rank the mitigation suggestions for the top 10 risks identified in the first round. Only 2 of the top 10 risk factors were statistically significant: underfunding of maintenance and support, and lack of faculty and staff responsibility, ownership, and buy-in for the project. There were no statistically significant differences in risk factor assessments based on job type, length of

time in job, legacy LMS, legacy LMS experience, or size of college. OEI leadership and colleges should evaluate and implement the top mitigation suggestions for at least the first 2 risk factors and preferably all of the top 10. Engaging the early adopters in assessing potential implementation risks, prioritizing them, brainstorming mitigation measures, and prioritizing those measures yielded an actionable list the team can use to reduce implementation risks and improve the probability of success of the new OEI system.

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CHAPTER I: INTRODUCTION

The American dream is threatened because a highly educated population is fundamental to economic growth and a vibrant democracy (American Association of Community Colleges [AACC], 2012a). In an increasingly competitive global economy, the economic strength and middle class of the United States depend on the education and skills of the nation's workers (Carnevale & Rose, 2011; Engle & Tinto, 2008; Lumina Foundation for Education, 2013; ManpowerGroup, 2013). The leadership of the United States in college graduation rates (associate's and bachelor's degrees), once unchallenged, is currently ranked 16th (AACC, 2012a) and is being overtaken significantly by South Korea, Canada, and Japan, which average a 55% college degree completion rate, compared to only 42% in the United States for 25- to 34-year-olds (Carnevale & Rose, 2011). If the United States does not generate more educated workers faster, the American dream of higher wages for the next generation could disappear in this country.

According to The White House (n.d.), "In the coming years, jobs requiring at least an associate degree are projected to grow twice as fast as those requiring no college experience" (para. 1). Employers will require postsecondary preparation for 63% of their new hires, and it is projected there will be a shortfall of qualified workers, leaving at least 3 million jobs unfilled, which will deny numerous Americans access to middle-class wages and career opportunities by 2018 (Carnevale, Smith, & Strohl, 2010). This deficit will accelerate unless the United States can increase the supply of postsecondary-educated workers. Carnevale et al. (2013) estimated that 60 million Americans are at risk

of being locked into permanent low-wage jobs, working poor for life, if the U.S. postsecondary education system cannot help them attain postsecondary training.

The challenge is determining how to increase the number of postsecondary-educated workers to meet the rising demand. Community colleges will provide the most cost-effective postsecondary training to help the United States close this gap (Lumina Foundation for Education, 2013; Mullin & Phillippe, 2013). Community colleges enroll 8 million of the 21 million college students in the United States. Community colleges are the brokers of opportunity for a stronger middle class and a more prosperous nation (Mullin & Phillippe, 2013). The California Community Colleges (CCC) Chancellor's Office (2015) stated,

> With baby boomers retiring as the best educated and most skilled workforce in U.S. history, labor experts are concerned that California will lack workers with the critical aptitude needed to replace them. . . . Students who earn a degree or certificate from a California community college [and pay CA taxes] nearly double their earnings within three years. Attending or graduating from a community college doubles an individual's chance of finding a job compared to those who failed to complete high school. (pp. 3-4)

However, community colleges have a much lower than desired success rate (Goldrick-Rab, 2010). The problem is determining how to improve student completion rates so the average is greater than 30% in 6 years (Moore & Shulock, 2010). Persistence and completion rates are even more alarming for low-income, first-generation college students: 60% enroll aspiring for a bachelor's degree, and only 5% reach their goal within

6 years (Engle & Tinto, 2008). The key challenge for community colleges is determining how to help students achieve their educational goals in a timely, cost-effective manner.

A number of educational scholars have suggested that investing in technology can improve student success rates (T. Anderson & McGreal, 2012; D'Aurora, 2013; Dede, 2013; Edyburn, 2011; Molina, 2013; Tally, 2013). This study focused on improving the success of adoption of a new statewide online course management system (CMS), also known as a learning management system (LMS). The latest generation of LMSs, which are also referred to as classroom response systems (CRSs), include integration of a number of new technologies including data analytics, virtual labs, e-portfolios, e-books, social media, and gaming theory to engage students more effectively, provide more feedback to the instructors and the students, and deliver greater student success (L. Johnson et al., 2013; Thille, 2012b). These systems combine advances in learning science and information technology (IT) to potentially deliver transformative change in community college instruction to enable significant improvement in student success for more students at a lower cost (Thille, 2012b). The challenge is to convince risk-averse community college administrators and faculty to accept this disruptive new technology (D'Aurora, 2013; Molina, 2013; Valente, 2011).

Community colleges are choosing LMSs/CRSs to help them increase persistence, completion, and success for more students, for a more diverse student body, and for less cost than traditional face-to-face instruction (Kazis, 2012; Thille, 2012b). The California Community Colleges (CCC) system will be implementing a new statewide Online Education Initiative (OEI) for students (Moreau, 2013). The initiative has $57 million in multiyear funding from the state legislature and Governor Jerry Brown (Moreau, 2013).

The mission is to dramatically increase the number of students who obtain associate's degrees and transfer to 4-year colleges. A key challenge to the success of this initiative will be to get the 112 community colleges in the CCC system to voluntarily adopt the new OEI.

For colleges, community colleges, and particularly California community colleges, the research gap addressed in this study was assessing the risk factors and mitigation recommendations for the highest priority risks to improve the acceptance, adoption, and implementation of the OEI to yield the maximum improvement in student success.

Background

Four main areas were covered in the background to the research. First was the association between more postsecondary-educated workers and the competitiveness of the United States in the global economy. Second was the challenges that U.S. postsecondary education faces to meet the growing demand, particularly from community colleges, the largest, most diverse, and most cost-effective providers. Third was the role of technology as a key element to improving student success outcomes. Fourth was the challenges of transformational change of a sociotechnical system when asking community colleges to adopt a new technology system that will impact all students, instructors, and administrators.

Postsecondary-Educated Worker Shortage

The middle class, political freedoms, and robust economy of the United States, relative to most countries, are the envy of the world. The 21st-century economy is a global economy, and competitiveness requires workers with 21st-century job skills

(Carnevale & Rose, 2011). A panel of employment experts, funded by the nonprofit higher education advocate Lumina Foundation for Education (2013), concluded that the United States must achieve the goal of 60% of Americans obtaining a postsecondary degree or credential by 2025 to meet the demands of the 21st-century global economy. The Great Recession that began in 2007 and officially ended (from a government statistical point of view) in 2010 highlighted the need for higher educated workers. Job losses during the Great Recession included 5.6 million jobs requiring a high school education or less and 1.75 million jobs requiring only an associate's degree or some college (Carnevale & Rose, 2011). However, the number of jobs requiring a bachelor's degree actually grew by 190,000 in this same time period (Carnevale & Rose, 2011). Since the official end of the recession in January 2010, jobs requiring an associate's degree or some college have grown by 1.6 million, almost back to prerecession levels, and jobs requiring a bachelor's degree have grown by over 2 million. Those workers with just a high school diploma or less have continued to see jobs disappear with an additional loss of 230,000 jobs since the end of the recession (Lumina Foundation for Education, 2013). The bottom line is that to maintain a healthy, employed middle class, workers need to obtain some college and preferably a bachelor's degree, or at least an associate's degree (Goldrick-Rab, 2010; Tinto, 2012).

Postsecondary Output

According to Tinto (2012), "Over the past 40 years enrollment in higher education has grown from nine million students in 1980 to over twenty million in 2012" (p. 4). In spite of this tremendous growth, demand for workers with postsecondary education is growing faster than the supply, particularly in the jobs requiring science,

technology, engineering, and math (STEM) training (AACC, 2012a; Carnevale et al., 2013; Lumina Foundation for Education, 2013; ManpowerGroup, 2013). Additionally, growth in college graduation rates, while up for all ethnic groups and socioeconomic groups, is resulting in lower socioeconomic groups falling further behind due to growth rates that lag those of higher income groups (Engle & Tinto, 2008; Greenstone, Looney, Patashnik, & Yu, 2013; Krymkowski & Mintz, 2011). For example, a longitudinal study of college graduates found,

> Although children of high- and low-income families are born with similar abilities, high-income parents are increasingly investing more in their children. As a result, the gap between high- and low-income students in K-12 test scores, college attendance and completion, and graduation rates is growing. (Greenstone et al., 2013, p. 7)

In order to optimally empower the economic engine of this nation, the United States must do a better job of enrolling and graduating students of lower socioeconomic status (Carnevale & Rose, 2011; Goldrick-Rab, 2010; The White House, 2014).

Community Colleges' Role in Postsecondary Output

Community colleges help fill this void (AACC, 2012a; Mullin & Phillippe, 2013). Approximately 35% of high school graduates matriculate into 4-year universities, and community colleges become the default postsecondary education option for the remaining 65% of the graduating students (Pourzanjani, 2011). Community colleges serve the majority of the college students in the world, and the CCC system is the largest college system in the United States and the world, serving 25% of all U.S. community college students (Baum, Ma, & Payea, 2013; Harris, 2014). In 2013, the CCC system

served 2.4 million students, the California State University (CSU) system (4-year colleges) served 400,000 students, and the University of California (UC) system (4-year research universities) served 240,000 students (California Community Colleges [CCC] Chancellor's Office, 2015). Half of all CSU graduates and over 29% of all UC graduates start at a California community college. If student success can be increased at California community colleges, the positive impact and implications for all postsecondary education in the United States could create the leverage needed to deliver dramatically improved student success rates (AACC, 2012a). This could be a key contribution to delivering a more educated workforce to meet the growing global demand for postsecondary-educated workers in the United States and sustain a vibrant U.S. middle class (Goldrick-Rab, 2010; Lumina Foundation for Education, 2013; Tinto, 2012).

Technology

The cost of postsecondary education has risen faster than the rate of inflation for the past 30 years, at a rate 3.5% higher than inflation (Baum & Ma, 2013; Ehrenberg, 2012). The need for postsecondary training of the workforce is growing (Carnevale et al., 2010; Lumina Foundation for Education, 2013; ManpowerGroup, 2013; U.S. Department of Labor, Bureau of Labor Statistics, 2014). Therefore, new, creative ways to deliver postsecondary training more cost-effectively must be found (Dede, 2013; Engle & Tinto, 2008; Lumina Foundation for Education, 2013). College administrators need to evaluate all options for improving student success (D'Aurora, 2013; Tinto, 2012). These options will include hiring and training staff, providing more financial aid to enable more students to attend full time, changing curriculums to focus students on classes that lead to attainment of a degree or certificate faster, and ensuring better orientation of new and

returning students so they can establish and work toward clear educational attainment goals (AACC, 2012a; Tinto, 2012). Administrators will also need to decide how to assess technology-related investments in terms of how these investments will contribute to potential student success (Edyburn, 2011; Stout, 2007). Technology is transforming many industries today, including education (Edyburn, 2011; Hoque, Walsh, Mirakaj, & Bruckner, 2011).

There is significant, persistent discussion in the media about how technology, particularly online learning technology, could make the traditional university obsolete (Allen & Seaman, 2013; T. Anderson & McGreal, 2012; Xu & Jaggars, 2013). Higher education is already changing due to technology, and the pace of change will likely continue to accelerate just as new technology is impacting many other industries (T. Anderson & McGreal, 2012). There is a growing variety of technology investment options that exist today that college administrators could invest in to positively impact student success outcomes (T. Anderson & McGreal, 2012; Hachey, Conway, & Wladis, 2013; Pryor, 1992).

Enabling One-to-One Learning

The ideal learning technology to improve student success would enable student success by providing each student with a customized learning experience. Research has already shown that one of the most effective ways to close the success gap is one-to-one tutoring. Bloom's (1984) seminal research showed one-to-one tutoring improves student success from the middle of the pack, the 50th percentile, to the 98th percentile. Unfortunately, one-to-one tutoring is prohibitively expensive.

Solomon Khan, the founder of the nonprofit education website Khan Academy in 2006, has built an education website that leverages technology to provide a custom one-to-one-like tutoring experience for students that is multilingual and globally accessible 24/7 for free via the Internet (Thompson, 2011). Students using the Khan Academy site can take an online assessment test, set their academic goals, and have a custom curriculum of short video tutorials created for them. The site also employs gaming theory to provide feedback and rewards to students as they make progress toward their goals (Thompson, 2011). In the past 2 years alone, the site has delivered over 200 million videos to 6 million users per month around the world (Noer, 2012). This is an example of how technology can cost-effectively improve student success. Today, most of the Khan Academy content is aimed at K-12 learners. However, the Khan Academy curriculum could be a cost-effective way to educate what community colleges call basic skills students, those requiring pre-college-level education. The Khan Academy has already embraced the new K-12 Common Core standards, with over 2,500 peer-reviewed problems and thousands of videos in use by millions of students (Noer, 2012). As Khan has shown, technology, if applied appropriately, can enhance student success. A critical challenge is to determine which technology investments will yield the best student success outcomes at a reasonable cost and then to encourage broad adoption of these new technologies. Getting community college faculty and administration to take the risk to adopt new technology and teaching methods is particularly challenging (Molina, 2013).

Technology and Student Success

Technology has the power to transform businesses relatively quickly by leveraging digital resources to create differentiated value (Bharadwaj, El Sawy, Pavlou,

& Venkatraman, 2013). How many students enrolled today have ever used a typewriter? Yet, as recently as 30 years ago, the standard was for students to submit typewritten papers. Today, most papers are submitted electronically, often via a website like Turnitin.com that checks the students' work for plagiarism, spelling, grammar, and writing level. The instructor then reads and grades the papers online, on a laptop or tablet at home or in the office. Most technology changes impacting education have been gradual, like the replacement of typewritten papers with those created with a word processing program.

Other technology changes in education have been more dramatic; for example, students today want more online classes. Enrollment in online classes has grown; less than 1% of classes in 1990 were provided online compared to 32% in 2012 (Allen & Seaman, 2013). Today's college students are also demanding more mobile access to educational materials including e-books, lecture notes, research materials, and paperless assignment submission (Dahlstrom, Walker, & Dziuban, 2013; Grajek, 2013; Stout, 2007). These new expectations can be traced to the technological transformation of industries like publishing, music, and television, where students routinely purchase e-books for their Kindle or Nook, music (e.g., iTunes), and TV shows (e.g., Netflix) online and read, listen, and watch on their mobile devices. An example of the dramatic growth of technology disruption is iTunes, which does $10 billion in sales after less than 10 years in the marketplace (Apple, 2014). Additional examples are Netflix and YouTube, which together now account for over half of all downstream Internet traffic in the United States (Holpuch, 2013), while neither company did any significant Internet downloading 10 years ago. This same type of technology paradigm shift is impacting education too.

Examples include Udacity and Coursera, startups offering massive open online courses (MOOCs), where world-renowned professors from Stanford, Massachusetts Institute of Technology (MIT), and other major universities offer online classes that thousands of students enroll in simultaneously (Allen & Seaman, 2013; Grajek, 2013). These companies are expanding the scope of learning at a lower cost.

As public funding for higher education declines, the cost of higher education is rising (Carr, 2012; Shulock, Offenstein, & Esch, 2011). At the same time, there is a growing need for a more educated workforce (Carnevale et al., 2010; Lumina Foundation for Education, 2013). A proven way to offer less costly postsecondary education is to provide more online courses (Sudhakar, 2013). Student enrollment in online courses continues to grow (Hachey et al., 2013; H. Johnson & Mejia, 2014; Xu & Jaggars, 2013). Today online course enrollment is growing at a rate of 9.3% per year, while face-to-face course enrollment has zero growth (Allen & Seaman, 2013). This rate of adoption of online courses is expected to continue to grow (H. Johnson & Mejia, 2014; Xu & Jaggars, 2013). Unfortunately, online student success continues to lag that of face-to-face classes in persistence (Hachey et al., 2013; H. Johnson & Mejia, 2014). In a recent longitudinal study of Washington State community college students, completion of online classes compared to face-to-face classes was lower by 8% overall and 12% for English classes (Xu & Jaggars, 2013), and in another study of California community college students, the gap was 11-14% (H. Johnson & Mejia, 2014). This gap in achievement raises concerns regarding investing in technology to expand online courses and its integration into all classroom teaching (Allen & Seaman, 2013; H. Johnson & Mejia, 2014; Lumina Foundation for Education, 2013; Shulock et al., 2011).

Technology is expensive. According to Gartner research, in 2012, over $12 billion was spent by higher education institutions on IT, and this spending is growing 2.9% per year (Dossani, 2013). This translates to $800 per student per year, or about 7% of student education costs (Dossani, 2013). During the past decade, college administrators have emerged as the dominant decision makers for learning technology investment decisions (Dossani, 2013). These administrators and their stakeholders, which include students, faculty, and support staff, expect technology to deliver more with less but also to not compromise education quality (Allen & Seaman, 2013; T. Anderson & McGreal, 2012; Jarratt, 2013).

Technology is impacting education. The cost of college is growing faster than inflation (Carr, 2012), students are coming to college less prepared (Goldrick-Rab, 2010), demand for online technology-enabled classes is growing over 9% per year while face-to-face class growth is flat (Allen & Seaman, 2013), and data analytics is emerging as a way to apply technology to improve student success (H. Johnson & Mejia, 2014; Tally, 2013; Thille, 2012b). However, these technologies are expensive; colleges spent $12 billion, roughly 7% of their budget, on technology in 2013 (Dossani, 2013). It is imperative to know more about how to assess technology investment alternatives relative to the contributions they make to the strategic mission of the college, to support student success in a cost-effective and timely manner (T. Anderson & McGreal, 2012).

Statement of the Research Problem

The 6-year average completion rate in California community colleges, which make up the largest postsecondary education system in the world, is only 30% (Moore & Shulock, 2010). However, there are some California community colleges that

consistently do much better, such as those in the Foothill-De Anza Community College District, which has a 69% completion rate and 15% drop rate for online courses (Moreau, 2013). What is needed is an understanding of why some colleges have better student success outcomes and to broadly share these best practices (H. Johnson & Mejia, 2014; Moore & Shulock, 2010). The CCC system is diverse, serving a student population that is 60% non-White and 55% female (Harris, 2014). The CCC system serves 41% of the veterans in California on the GI Bill (Harris, 2014). Also, 85% of the CCC students work at least part time (Harris, 2014; Pourzanjani, 2011).

Contributing to the challenge of increasing student success is the growing percentage of students needing basic skills remediation (Carr, 2012; Harris, 2014). Over 70% of the students coming to a California community college require at least one basic skills class, and 25% require two or more basic skills classes (Harris, 2014; Moore & Shulock, 2010). Basic skills classes are less-than-college-level classes. The opportunity is to implement the new OEI technology across the CCC system to improve student access and success and to keep costs low.

Online classes offer the most cost-effective and student-focused way to meet the needs of CCC students by taking advantage of economies of scale and decreasing systems complexity. In the longer term, the flexibility of the architecture will allow for new technologies with greater capacity and/or lower costs (Moreau, 2013). The CCC system offers more online courses for credit than any other higher education system, with over 1 million online students in 2012 (H. Johnson & Mejia, 2014). The OEI will enable the California community colleges to increase enrollments to quickly offer more courses

to grow the CCC system back from the 485,000 students (17% cut) lost due to budget cuts between the fall of 2008 and spring of 2013 (CCC Chancellor's Office, 2014b).

Despite the rising costs of postsecondary education, where even CCC tuition has increased 130% in the last 5 years (CCC Chancellor's Office, n.d.a), the California community colleges still offer the lowest cost per college credit in the United States (Baum, Ma, & Payea, 2013). Unfortunately, California community colleges deliver poor graduation results. Within 6 years of first enrollment, only one third of the students achieve a certificate, associate's degree, or transfer to a 4-year college. The high attrition rates, particularly of students of lower socioeconomic status, include a 50% attrition rate for students of lower socioeconomic status in the first year and less than 5% of these students achieving a certificate or associate's degree within 6 years (Engle & Tinto, 2008). Improving the success of CCC students is the best leverage point for increasing the supply of college graduates in the United States (Goldrick-Rab, 2010).

Low postsecondary education completion has negatively impacted students and society. Many students are accumulating growing student loan debts without attaining a degree or the anticipated higher earnings (Baum, Kurose, & Ma, 2013). The failure to produce more educated workers has negatively impacted employers, as evidenced by continued acute shortages of skilled workers, resulting in missed business growth opportunities (Engle & Tinto, 2008). The low success of students in achieving their goals has also impacted the taxpayers, whose taxes help subsidize higher education. When students do not succeed and get higher paying jobs, there is no offsetting benefit to society of successful high-wage-earning and tax-paying graduates (Engle & Tinto, 2008; Lumina Foundation for Education, 2013; ManpowerGroup, 2013).

These unacceptable outcomes can be improved if colleges adopt the right new technologies and implement them effectively to improve student success (Carr, 2012; Dede, 2013). The OEI is a $57 million investment in adopting technology across the CCC system to improve student success (H. Johnson & Mejia, 2014; Moreau, 2013). Research on CCC students has shown that students who take some online classes are more likely to earn an Associate of Arts degree, complete a vocational certificate, and/or transfer to a 4-year college (H. Johnson & Mejia, 2014). The problem addressed in this study was the need to assess the willingness of key stakeholders, defined as faculty and administrators, to change to a common statewide online learning environment. The success of the OEI will depend largely on the willingness of the faculty and administrators of the colleges to adopt the new online course management environment.

Purpose Statement

The purpose of this study was to identify and prioritize a list of implementation risk factors and suggested mitigation measures for the development team of the California Community Colleges (CCC) Online Education Initiative (OEI) to improve the probability of successful implementation. This research study was performed using a modified version of the software risk factors assessment instrument developed by Schmidt, Lyytinen, Keil, and Cule (2001), available in the public domain. A two-survey policy Delphi study was conducted on a sample of administrators and faculty members from the pilot group of schools that will be the first users of the OEI common CMS.

Research Questions

1. What are the most significant implementation risk factors identified by the survey participants using the Schmidt et al. (2001) common risk factors list?

2. Are there significant differences among the risk factors identified by administrators and faculty to successful implementation?
3. What are the risk mitigation recommendations to improve the adoption and success of the initiative?
4. Do the demographic factors of time in current position and prior learning management system (LMS) experience of the survey participants affect the risk assessments?
5. Are there significant differences among the risk factor assessments associated with the current LMS vendor used (e.g., Blackboard, Moodle, homegrown) and how long it has been in use?

Significance of the Problem

This study led to the development of an authoritative and comprehensive prioritized list of risk factors and user-recommended mitigation strategies for the risks of a large-scale shared LMS implementation. The data collected and the conclusions derived from surveying college administrators and faculty are intended to augment the literature as well as advance the understanding of how to successfully implement a new shared LMS of this scale successfully. The OEI implementation team can apply the findings from this study as this initiative is implemented over the next 4 years. In the future, practitioners facing similar large-scale transformational change projects can benefit by having a roadmap that could assist them in avoiding pitfalls, risks, and threats to successful adoption and implementation.

There is a growing demand for more educated workers in the United States, including an anticipated shortfall of at least 5 million college-educated workers by 2018 (ManpowerGroup, 2013; U.S. Department of Labor, Bureau of Labor Statistics, 2014). If

the United States is to keep the middle class growing, it must continue to improve the skill level of the workforce, or risk losing high-paying jobs to other countries (Baum, Ma, & Payea, 2013; Carnevale et al., 2013; Geishecker & Görg, 2013; Greenstone et al., 2013; Lumina Foundation for Education, 2013). Current and future higher wage jobs require postsecondary education (Carnevale et al., 2013; Lumina Foundation for Education, 2013). The U.S. postsecondary education system's output must grow at a faster rate to keep up with the rising demand (Lumina Foundation for Education, 2013; Tinto, 2012). Unfortunately, U.S. college graduation rates are falling behind those of other countries at a growing rate (Carnevale & Rose, 2011). To address this shortfall, the United States must improve the graduation rates of postsecondary students, particularly the 43% of those students attending community colleges (Carnevale et al., 2013; Goldrick-Rab, 2010; Tinto, 2012).

A number of researchers have indicated that technology investments can help improve student success at community colleges (T. Anderson & McGreal, 2012; D'Aurora, 2013; Dede, 2013; Peterson, 2013; Thompson, 2011). The Open Learning Initiative sponsored by the William and Flora Hewlett Foundation at Carnegie Mellon University is already achieving impressive results in the online classes that use data analytics, game theory, and closed-loop feedback to enhance the students' learning experiences and give the instructors dashboards to monitor real-time student performance (Thille, 2012b). Students have been able to complete course material in half the time of traditional classes with equal or better learning outcomes (Thille, 2012b). At Purdue University, the use of data analytics with a program called Signals and early intervention has improved student graduation rates 21% (Tally, 2013). At Rio Salado Community

College in Arizona, data analytics are being used to predict student outcomes in online courses with 70% accuracy after the eighth lesson, which allows for early intervention (Smith, Lange, & Huston, 2012). The OEI seeks to incorporate many of these advances in technology and make them cost-effectively available to all California community colleges to accelerate improvements in student success. A key challenge will be getting the colleges to adopt the new OEI common CMS. This research study's purpose was to improve the success of the adoption of the OEI common CMS by identifying the highest implementation risks and recommended mitigation suggestions for those risks.

Definitions

For the purposes of this study, the following definitions were used:

Student success. Student success for this study is defined as achievement of an associate's degree, transfer to a 4-year college, or completion of a state-recognized certificate within 6 years of first enrollment.

Technology. For this study, technology is defined as the software and processes used to enhance student success as part of the OEI.

Online courses. For this study, online courses are those in which at least 80% of the course content is delivered online.

Online Education Initiative (OEI). The OEI is a California statewide community college LMS/CRS that will be a portal environment that has online classes, planning tools, assessment tools, counseling, online tutoring, training and course development tools and content for faculty, and dashboards for faculty and students to track their progress toward student learning objectives (Moreau, 2013).

Learning management system/classroom response system (LMS/CRS). As defined by Ellis (2009), "A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of e-learning education courses or training programs" (p. 1). For this study, LMS refers to the system used by California community colleges to host and deliver their online courses. It also refers to the OEI common CMS.

Data analytics. Data analytics in the context of this study on higher educational learning is the collecting of data and analysis of those data to discover meaningful patterns in the data, which can then be communicated and used to continuously improve performance of the students by providing meaningful feedback to the students and the instructors to provide direction to the students for further learning to achieve the learning objectives (L. Johnson et al., 2013; Stamm, 2013).

Sociotechnical systems. *Sociotechnical* refers to the interrelatedness of the social and technical aspects of an organization. The technical system refers to the processes, tasks, and technology used to perform the work; for this study, that is the teaching and learning. The social system refers to the people doing/using the processes, tasks, and technology, and their attributes (skills, attitudes, and values), relationships to each other, reward/motivation systems, and authority structures (Bostrom & Heinen, 1977).

Delimitations

The study participants were delimited to administrators and faculty members (full time and adjunct) with at least 2 years of experience in their current position, working for one of the pilot phase colleges adopting the OEI for online courses. The study participants were delimited to community colleges in California; therefore, the results

may not be generalizable to other geographic areas. Survey responses are, by nature, self-reported and thus provide no mechanism to verify the responses.

Organization of the Study

This study is organized into five chapters and references used in the study's development. Chapter II consists of findings from the review of the literature, including themes that emerged from theory and the history of the main topics. Chapter III includes the details of the research design and methodology of the study. Chapter III also includes the process used in selecting the population and sample, the survey instrument, and the limitations of the study. Chapter IV is organized around the data collected from the surveys (two-round policy Delphi) and analysis of the data. Chapter V concludes the study with the findings, conclusions, and recommendations for further study. The references and appendices are included at the end of the study.

CHAPTER II: REVIEW OF THE LITERATURE

The intent of this research study was to identify and prioritize which software project implementation risk factors are most significant to the adoption of a new statewide Online Education Initiative (OEI) and what mitigation recommendations should be considered for implementation by the early adopters of the OEI to reduce the risk factors to improve the adoption and success of this initiative. This chapter focuses on the literature in the following areas: the need for improving the number of postsecondary-educated workers in the United States, why the U.S. postsecondary student success rate is falling behind that of other countries, the role of technology in improving student success, and the challenges of successfully implementing transformational technology-related change in postsecondary education. The first part of this chapter presents the current literature regarding the growing demand for higher skilled labor in the global market, how the United States is falling behind in delivering workers with the right skills to capture higher wage jobs, and the implications for the future of the U.S. middle class. The second part of this chapter focuses on why the United States is no longer the leader in postsecondary-educated workers and how improving student success, particularly at community colleges, which educate over 40% of all postsecondary students, could be a key opportunity to close this gap. The third part of the chapter reviews the literature on the role technology can play in cost-effectively improving student success, including a description of the California Community Colleges (CCC) OEI. Finally, the last part of the chapter focuses on the risks and challenges of acceptance of large technology-related work process changes, which relates to sociotechnical theory.

Demand for Postsecondary-Educated Labor

The American dream for the younger generation in the United States is threatened (see Figure 1) because a highly educated population is fundamental to economic growth, job growth, and a vibrant democracy (AACC, 2012a; Lumina Foundation for Education, 2013; Matthews, 2012). In an increasingly competitive global economy, the economic strength and middle class of the United States depend on the education and skills of the nation's workers (Carnevale & Rose, 2011; Engle & Tinto, 2008; Lumina Foundation for Education, 2013; ManpowerGroup, 2013). It is in the best interest of the country to do whatever can be done to increase the number of students who successfully earn a degree (Carnevale et al., 2013; Engle & Tinto, 2008). Employers are paying a growing premium (higher wages) for workers with postsecondary job training, and this is true not only in the United States but in 29 of the 30 most developed countries in the world (Hansson & Charbonnier, 2010). In the global labor market, if the United States cannot supply enough people with the skills needed, economic growth will be choked off (Matthews, 2012). The high-paying middle-class jobs will go to the countries with the most highly educated workforces.

As shown in Figure 2, on average, the higher a worker's level of educational attainment, the more the worker earns, and workers with more education experience lower average unemployment rates (U.S. Department of Labor, Bureau of Labor Statistics, 2014). The wage premium for a bachelor's degree over a high school diploma ranged from 37% to 45%, depending on the type of job, in 2007-2009 (Carnevale et al., 2010).

Figure 1. American dream starts with a quality education. From "The American Dream Starts With a Quality Education" [Web log post], by L. Jarrat, 2013, retrieved from http://grayslake .patch.com/groups/lennie-jarratts-blog/p/bp--the-american-dream-starts-with-a-quality-education.

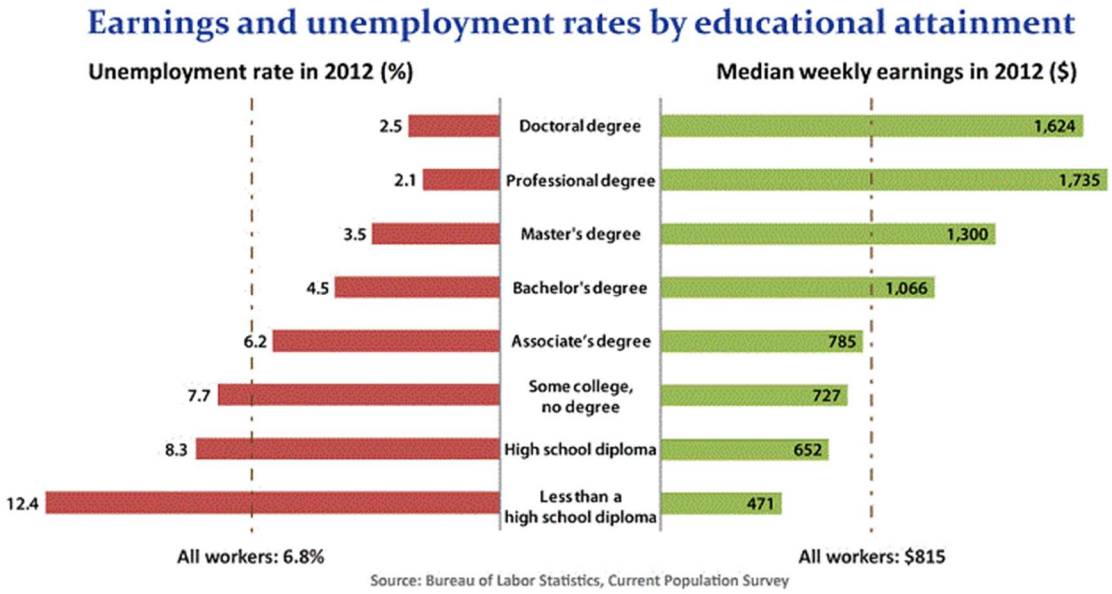

Figure 2. Earnings and unemployment rates vs. educational attainment. From "Employment Projections: Earnings and Unemployment Rates by Educational Attainment," by U.S. Department of Labor, Bureau of Labor Statistics, 2014, retrieved from http://www.bls.gov/emp/ ep_chart_001.htm. Copyright 2014 by Bureau of Labor Statistics.

Global Educated Worker Competition

The leadership of the United States in college graduation rates (associate's and bachelor's degrees combined), once unchallenged, is currently ranked 16th (AACC, 2012a) and is being overtaken significantly by South Korea, Canada, and Japan, which average a 55% college degree completion rate, compared to only 42% in the United States for 25- to 34-year-olds (Carnevale & Rose, 2011). The competitiveness of the U.S. graduation rate has been falling for the last 4 years, while almost all other developed nations' attainment rates are increasing (Matthews, 2012). The United States is the only large developed nation, and one of the few nations in the world, where the current generation of younger adults are less educated than the previous generation, particularly in California (Matthews, 2012; Moore & Shulock, 2010).

Postsecondary-educated worker shortage. According to The White House (n.d.), "In the coming years, jobs requiring at least an associate degree are projected to grow twice as fast as those requiring no college experience" (para. 1). Over 80% of the fastest growing occupations in the United States will require at least an associate's degree; 50% will require a bachelor's degree or higher (Engle & Tinto, 2008). In February of 2009, "to meet this need, President Obama set two national goals: by 2020, America will once again have the highest proportion of college graduates in the world, and community colleges will produce an additional 5 million graduates" (The White House, n.d., para. 1). The estimated number of jobs to be filled in the United States by 2018 is 46.8 million, of which 13.8 million will be new jobs and 33 million will be jobs open due to retirement of baby boomers (Carnevale et al., 2010). If current trends continue, the United States will face a shortfall of 20 million postsecondary-educated

workers by 2020 (Carnevale et al., 2013). Employers will require postsecondary preparation for 63% of their new hires, and it is projected there will be a shortfall of qualified workers, leaving at least 3 million jobs unfilled, which will deny millions of Americans access to middle-class wages and career opportunities by 2018 (Carnevale et al., 2010). This deficit will accelerate unless the United States can increase the supply of postsecondary-educated workers. Carnevale et al. (2013) estimated that 60 million Americans are at risk of being locked into permanent low-wage jobs, working poor for life, if the U.S. postsecondary education system cannot help them attain postsecondary training.

Education and U.S. global competitiveness. There is a global shortage of educated workers, and the gap is growing. ManpowerGroup (2013), a global employment services company, completed its eighth annual global employer survey in May 2013. Respondents reported that difficulty in finding workers with the right skills to fill open positions has risen from 30% in 2008 to 35% in 2013 (ManpowerGroup, 2013). This skilled worker shortage is impacting one in five employers in the world (ManpowerGroup, 2013). The impacted companies are unable to meet their clients' needs, and their business performance is being compromised, resulting in a loss of competitiveness (Carnevale et al., 2010; Lumina Foundation for Education, 2013). In the United States, the most difficult-to-fill positions are those requiring postsecondary training, such as skilled trade workers, engineers, and technicians (Baum, Ma, & Payea, 2013; Carnevale et al., 2010; Lumina Foundation for Education, 2013; ManpowerGroup, 2013). The countries that are best able to meet the rising demand for higher educated

workers will capture and retain the highest paying jobs (Baum, Ma, & Payea, 2013; Carnevale et al., 2013; Geishecker & Görg, 2013).

Offshoring increasing the need for high-skilled workers. Some critics contend that the global economy and offshoring have reduced the number of jobs available in the U.S. economy. Research has shown that the global offshoring of different industries, such as information technology (IT) services, automotive manufacturing, and financial business processing, does not appear to reduce the number of jobs in the United States (Amiti & Wei, 2005). Offshoring of jobs does, however, negatively impact the wages of low- and medium-skilled workers and positively impacts the wages of high-skilled workers (Geishecker & Görg, 2013). What the research appears to show is that offshoring reduces the demand for low-skilled workers but actually increases the demand for high-skilled workers (Amiti & Wei, 2005; Geishecker & Görg, 2013). The opportunity in the United States is to produce more high-skilled workers to better meet the growing demand so that the United States can capture more of the high-paying jobs and maintain a healthier middle class and overall economy (Carnevale et al., 2013; Lumina Foundation for Education, 2013).

Educated Workers and a Healthy Society

Increasing the education level of the workers also benefits the society in nonmonetary contributions (Baum, Ma, & Payea, 2013). A college education opens the door to many opportunities that would not otherwise be available to most individuals. Workers with postsecondary credentials are more likely to be employed and to earn more than others (U.S. Department of Labor, Bureau of Labor Statistics, 2014). Many occupations are open only to those with specific degrees or certificates (e.g., health care,

law enforcement, and skilled trades such as automotive repair; Carnevale et al., 2013; Krymkowski & Mintz, 2011). Higher levels of education correspond to better access to health care and to pensions; more educated people are more likely to engage in healthy behaviors, to be active and engaged citizens, and to be in positions to provide better opportunities for their children (Baum, Kurose, & Ma, 2013). Table 1 summarizes some of these nonmonetary benefits described in the College Board research. A society where members are engaged in the political process and make healthy life choices is better for everyone (Baum, Kurose, & Ma, 2013).

Table 1

Nonmonetary Benefits to a Bachelor's Degree vs. High School Only

Benefit	College graduate with bachelor's degree	High school diploma only
Employer-sponsored retirement plan	65%	52%
Employer-subsidized health care	69%	55%
Nonsmoker	92%	75%
Self-reported regular aerobic exercise	63%	38%
Voted in 2012 presidential election	73%	42%
Registered to vote	87%	31%

Note. Data from *How College Shapes Lives: Understanding the Issues*, by S. Baum, C. Kurose, and J. Ma, 2013, retrieved from College Board website: http://trends.collegeboard.org/sites/default/files/education-pays-2013-how-college-shapes-lives-report.pdf.

Inequality in opportunity. Democratizing postsecondary education is an urgent challenge. The U.S. Census Bureau data indicated that more than one third of children today are raised in families with lower incomes than comparable children 35 years ago (Greenstone et al., 2013). This ongoing erosion of income among such a broad group of children is troubling for the next generation. Over the same period, children living in the highest 5% of the family-income distribution have seen their families' incomes double

(Greenstone et al., 2013). According to President Obama's 2014 State of the Union address,

> A child born into the bottom 20% of the income scale has less than 1-in-20 shot of making it to the top if they do not go to college. Earning a college degree changes those odds to closer to 1-in-5. (The White House, 2014, "Schools & Education," para. 3)

The United States must do better if the country wants to continue to have a vibrant growing economy and democracy (Carnevale & Rose, 2011; Greenstone et al., 2013; Lumina Foundation for Education, 2013).

A study published by the Hamilton Project at the Brookings Institution in Washington, DC, pointed out that 50% of Americans in the first quartile of the income distribution have a college degree (Greenstone et al., 2013). Among Americans in the lowest quartile of the income distribution, fewer than 10% graduated from college (Greenstone et al., 2013). This alarming gap is growing. The college graduation rate of high-income Americans born in the 1980s was 20% higher than in the 1960s. Among low-income Americans, it grew only 4% (Greenstone et al., 2013). The impact of not achieving postsecondary education goals in the United States perpetuates the income divide and inequality and erodes the middle class (Engle & Tinto, 2008; Goldrick-Rab, 2010; Lumina Foundation for Education, 2013).

America's Middle Class Dependent on an Educated Workforce

The middle class, political freedoms, and robust economy of the United States, relative to most countries, have been the envy of the world. The 21st-century economy is a global economy, and competitiveness requires workers with 21st-century job skills

(Carnevale & Rose, 2011). A panel of employment experts, funded by the nonprofit higher education advocate Lumina Foundation for Education (2013), concluded that the United States must achieve the goal of 60% of Americans obtaining a postsecondary degree or credential by 2025 to meet the demands of the 21st-century global economy. The Great Recession that began in 2007 and officially ended (from a government statistical point of view) in 2010 highlighted the need for higher educated workers. Job losses during the Great Recession included 5.6 million jobs requiring a high school education or less and 1.75 million jobs requiring only an associate's degree or some college (Carnevale & Rose, 2011). However, the number of jobs requiring a bachelor's degree actually grew by 190,000 in this same time period (Carnevale & Rose, 2011). Since the official end of the recession in January 2010, demand for jobs requiring an associate's degree or some college have grown by 1.6 million, almost back to prerecession levels, and jobs requiring a bachelor's degree have grown by over 2 million. Those workers with just a high school diploma or less have continued to see jobs disappear with an additional loss of 230,000 jobs since the end of the recession (Lumina Foundation for Education, 2013). The bottom line is that to maintain a healthy, employed middle class, workers need to obtain some college and preferably a bachelor's degree, or at least an associate's degree (Goldrick-Rab, 2010; Tinto, 2012).

Why U.S. Student Success Is Falling Behind

There is a growing demand for more educated workers in the United States, including an anticipated shortfall of at least 5 million college-educated workers by 2018 (ManpowerGroup, 2013; U.S. Department of Labor, Bureau of Labor Statistics, 2014). If the United States is to keep the middle class growing, it must continue to improve the

skill level of the workforce, or risk losing high-paying jobs to other countries (Baum, Ma, & Payea, 2013; Carnevale & Rose, 2011; Carnevale et al., 2013; Geishecker & Görg, 2013; Greenstone et al., 2013; Lumina Foundation for Education, 2013). Current and future higher wage jobs require postsecondary education (Carnevale et al., 2013; Lumina Foundation for Education, 2013). The U.S. postsecondary education system's output must grow at a faster rate to keep up with the rising demand (Lumina Foundation for Education, 2013; Tinto, 2012). Unfortunately, U.S. college graduation rates are falling behind those of other countries at a growing rate (Carnevale & Rose, 2011). The United States ranks in the bottom half for all postsecondary degree completion and ties for last in baccalaureate degree completion among industrial countries (Engle & Tinto, 2008). Only one third of community college entrants complete a credential of any kind (Goldrick-Rab, 2010). To address this shortfall in college-educated workers, the United States must improve the graduation rates of postsecondary students, particularly the 43% of those students attending community colleges (Carnevale et al., 2013; Goldrick-Rab, 2010; Tinto, 2012).

What follows is a review of the literature on why the United States is falling behind with postsecondary student success.

Changing Student Demographics

Compared to most other countries in the world, the United States, and particularly community colleges like those in the CCC system, serves a very diverse student population. The CCC system serves a student population that is 60% non-White and 55% female (Harris, 2014). The CCC system serves 41% of the veterans in California on the GI Bill (Harris, 2014). Also, 85% of the CCC students work at least part time

(Harris, 2014; Pourzanjani, 2011). Community colleges enroll more low-income and minority students than 4-year institutions. More than half of Hispanic and Native American undergraduate students and over 40% of Black and Asian students are enrolled in community colleges (AACC, 2012a). However, only 30% of low-income, 26% of Black, and 26% of Hispanic community college students achieve their educational goals compared to 39% of White and 36% of high-income students (AACC, 2012a). Student success rates must be improved. What follows is a review of the literature in areas contributing to low student success in more depth.

Less prepared students. More U.S. students are enrolling in postsecondary education, but the majority of the students enrolling in community colleges are not academically prepared for college-level classes (Carnevale & Rose, 2011; Collins, 2012). Approximately 35% of new college students enroll directly into a 4-year institution. The other 65% typically start college at a community college, often because they are academically unprepared and/or unable to be accepted at a 4-year college (Pourzanjani, 2011). Of those students who require at least one remedial course, less than 25% will ever achieve student success (Bailey, Jaggars, & Jenkins, 2012).

Basic skills classes are less-than-college-level classes. Contributing to the challenge of increasing student success is the growing percentage of students needing basic skills remediation (Carr, 2012; Harris, 2014). In 2013, 77% of the new students enrolling in a California community college were unprepared for college-level work (Harris, 2014), and nationally, 60% of new community college students require at least one basic skills class (AACC, 2012b). Figure 3 shows that the number of students

requiring remedial classes is over 50% higher at public community colleges than at 4-year public colleges.

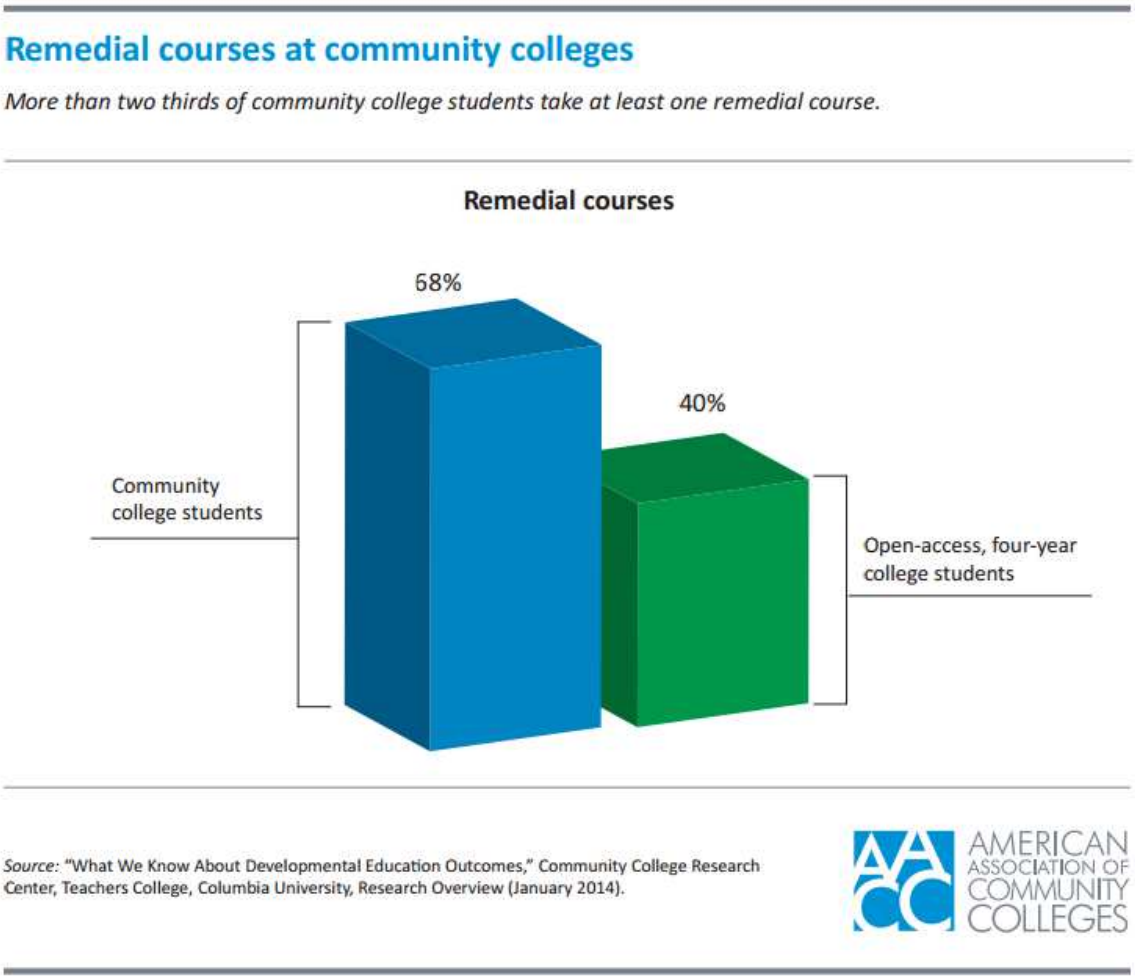

Figure 3. Remedial courses at community colleges. From "Remedial Courses at Community Colleges," by American Association of Community Colleges, 2014, *DataPoints*, retrieved from http://www.aacc.nche.edu/Publications/datapoints/Documents/Remedial_04162014.pdf.

Over 25% of new community college students require two or more basic skills classes (Harris, 2014; Moore & Shulock, 2010). The student success rate for college-ready students is 71% (Harris, 2014). The student success rate drops to 41% for students requiring remediation (Harris, 2014). Often financial aid will not cover the costs of non-college-level courses, creating increased costs for these students. Also, the delay in

progress to complete these courses discourages students, increasing their dropout rate (D'Aurora, 2013). Research has shown that the number one predictor of college success is preparation (AACC, 2012a). It is essential to work with the K-12 system to improve the preparedness of future college students to improve their student success (Collins, 2012; Matthews, 2012; Tinto, 2012). For those students who do arrive unprepared, the research has shown that to improve student success, it is essential to get them to college-level courses as quickly as possible, preferably with a cohort, counseling support, and full-time attendance (Collins, 2012; D'Aurora, 2013; Engle & Tinto, 2008).

First-generation college attendees. Only 11% of low-income, first-generation students achieve student success in college compared to 55% of non-first-generation, higher income students (Engle & Tinto, 2008). Worse yet, 75% enroll in a community college aspiring to earn a bachelor's degree, and only 5% ever achieve that goal (Engle & Tinto, 2008). Thirty-eight percent of community college students come from families where neither parent was educated beyond high school, compared to 25% of students at public 4-year institutions (Goldrick-Rab, 2010). First-generation college students struggle without parental role models and a parent knowledgeable in the need for college preparation, disciplined study habits, selecting a course of study, and how to get financial aid (Goldrick-Rab, 2010). These students are most vulnerable their first year at college; they are four times more likely to drop out in the first year of school than their peers (Engle & Tinto, 2008). If these students are given more support and early intervention, their student success can significantly improve (Bailey et al., 2012; Engle & Tinto, 2008; Goldrick-Rab, 2010).

Older students. Another key indicator of student success is whether the student attends full time and whether the student engages in the college community. What follows is a brief description of the median community college student today (Goldrick-Rab, 2010; Horn & Nevill, 2006; McClenney, Marti, & Adkins, 2012).

Figure 4 is a picture of what a median community college student looks like today. The median community college student is a 24-year-old Latina female. She is financially independent (not supported by her parents), works at least 32 hours per week, and attends school part time and likely in the evening. She will require at least 1 year of basic skills classes. Her parents did not attend college, and she selected the local community college on recommendations of her high school counselor and friends. There is a 33% chance she is married with at least one child and a 25% chance she is a single parent (Horn & Nevill, 2006). Over 53% of community college students are over age 23, and 35% are over age 30 (Horn & Nevill, 2006). These older students are more likely to need to juggle work and family commitments including life events like marriage, childbirth, and divorce that impact their ability to attend school full time, engage in the college community, or ever achieve their educational goals (Engle & Tinto, 2008; Goldrick-Rab, 2010; McClenney et al., 2012). These older students need more support and schedule flexibility to be successful. Online courses often better meet the flexibility needs of these older students (H. Johnson & Mejia, 2014).

Lack of clear goals. Students with clear goals are more likely to succeed (Bailey et al., 2012; Engle & Tinto, 2008; Goldrick-Rab, 2010; Kazis, 2012; McClenney et al., 2012). Students without clear goals are less likely to achieve student success. Less than half of students develop an academic plan during their first term, even though 66% of

Figure 4. Average community college student. From "Community College Summer Sessions Rebounding in California, Making Life Easier for Students," by C. Bear, 2013, *KQED News*, retrieved from http://ww2.kqed.org/news/2013/05/31/getting-classes-at-californias-community-colleges-easier-this-summer/.

colleges have a process for helping students set academic goals by the end of their first term (McClenney et al., 2012). Research has indicated that leveraging technology to remind and assist students in developing goals and tracking their progress can improve success (H. Johnson & Mejia, 2014; L. Johnson et al., 2013; Smith et al., 2012; Tally, 2013; Thille, 2012b).

Part-time attendance and work. Sixty percent of community college students attend part time, and 40% of these part-time community college students work full time (McClenney et al., 2012). Only 20% of college students graduate high school and go directly to college full time without working (Matthews, 2012). Students who work up to 20 hours per week actually have higher persistence rates than students who do not work, but students who work more than 20 hours a week do not do as well (Engle & Tinto, 2008). Research has shown that if students are given more financial aid and support so that they do not have to work more than 20 hours a week, their student success can be improved (Engle & Tinto, 2008; Goldrick-Rab, 2010; Matthews, 2012; Tinto, 2012).

Ironically, the financially independent students who must work full time to support themselves and their dependents and therefore must attend school part time have their financial aid eligibility reduced both because of their part-time enrollment status (less than half-time students are ineligible for any financial aid) and their higher employment status, making it even harder for them to complete their educational goals (Goldrick-Rab, 2010).

Rising Cost and Lower Subsidy of Postsecondary Education

From 1982 to 2006, the cost of higher education in the United States increased 439% compared to the consumer price index that only increased 106% (National Center for Public Policy and Higher Education, 2011). Community college costs also increased more rapidly than the general rate of inflation for the past 30 years, making postsecondary education less affordable, particularly for low-income students (Baum & Ma, 2013).

In 2013, the average cost of community college rose 3.5%, and the average financial aid available declined due to declining government subsidies and more students competing for less money (Baum & Ma, 2013). While the rate of cost increase for higher education was lower in 2013 than in most recent years, it still outpaced inflation and continues to make higher education less affordable for low-income students (Baum & Ma, 2013). Public subsidy of higher education has been on a steady decline since 1989-1990 from $9.74 per $1,000 in personal income to $5.42 in 2012-2013, a 44% decline (Baum & Ma, 2013). This decline in public subsidy has forced colleges to increase tuition to offset the loss. CCC tuition, still the lowest in the United States, increased 130% between 2009 and 2012 (Harris, 2014).

The increased costs have forced students to seek more financial aid, and students who receive financial aid appear to make consistent progress (Engle & Tinto, 2008; Goldrick-Rab, 2010). However, students are paying for more of the increasing college costs with student loans (Wilson, 2012). Financing community college with loans reduces the financial return to the students, and even if they do not achieve a degree and get a higher paying job, they must still pay back the student loans, causing more financial hardship. Students of lower socioeconomic status receive more grants but still borrow more money than their wealthier peers, with those who do attain a degree having 19% more loan debt and those who do not finish having more debt and fewer resources to repay the debt (Engle & Tinto, 2008).

The funding cuts also forced colleges to cut classes. The CCC system cut over 25% of the credit classes between 2009 and 2012 (Harris, 2014), making it harder for students to get the classes they needed to finish their educational goals on time, further increasing the cost of their education.

To address the rising costs, the public must support more funding for college subsidies, and colleges must find ways to continue to reduce costs without impacting the quality or accessibility of needed classes for students (Bailey et al., 2012; Habley, Valiga, McClanahan, & Burkum, 2010; Hill & Feldstein, 2013; Kazis, 2012; Shulock et al., 2011). The literature shows that online classes, if done correctly, may be a cost-effective way to address this need (Dede, 2013; Goldrick-Rab, 2010; Hachey et al., 2013; Stout, 2007; Thille, 2012b). This will be discussed further in the section on technology.

Faculty

Learning is the core function of a community college (Valente, 2011). Improved learning outcomes are the result of effective teaching, and effective teaching results in more engaged students who are more likely to achieve student success (O'Banion, 2012). Research has shown that interaction with faculty to get advice and engage in the college community is a key determinant of student success (Bailey et al., 2012; Goldrick-Rab, 2010; O'Banion, 2012). What follows is what the research has shown regarding improving teaching to improve student success.

Adjunct faculty. Colleges, especially community colleges, have shifted more work to adjunct (part-time) faculty members to reduce costs (Center for Community College Student Engagement, 2014; Goldrick-Rab, 2010; O'Banion, 2012). The use of full-time faculty members on a full-time-equivalent (FTE) basis at U.S. colleges has declined from 70% of faculty members in 1970 to 30% in 2012 (Dossani, 2013). Part-time faculty members, often referred to as adjunct or contingent faculty members, teach 58% of community college classes (Center for Community College Student Engagement, 2014). These faculty members teach over half of the students but are typically younger, have less experience, receive little or no benefits, and have no commitment from the college they work for beyond the current semester (Center for Community College Student Engagement, 2014). Yet, these same adjunct instructors teach over 55% of the developmental and introductory courses that research has shown are critical to student success (O'Banion, 2012). Only 7% of the adjunct faculty members feel student advising is part of their job versus 55% of full-time faculty members (Center for Community College Student Engagement, 2014). The research has shown that a key contribution to

student success is the relationship and advice of the instructors (Bailey et al., 2012; Engle & Tinto, 2008; Goldrick-Rab, 2010; Habley et al., 2010; McClenney et al., 2012). To improve student success, adjunct instructors must be part of the solution. Colleges need to pay them a living wage and incent them to engage students and invest in their professional development so they can be inspiring teachers and advisers to students (Goldrick-Rab, 2010; O'Banion, 2012).

Professional development. The faculty members need to engage in more professional development with a focus on improving student success (Goldrick-Rab, 2010; O'Banion, 2012). Faculty members need time and support from the administration for planning, curriculum development, and regular meetings to assess and share best practices for student success (O'Banion, 2012).

Faculty shortage. There is a severe shortage of faculty members in nursing; allied health; and science, technology, engineering, and math (STEM; Hardy, Katsinas, & Bush, 2007). Teachers in these fields are in high demand, and two thirds of the community college faculty members in these areas are between the ages of 45 and 64 and will retire in the next decade, making this problem even worse (Goldrick-Rab, 2010). Math is a key gateway course for student success (Bailey et al., 2012). If colleges cannot hire enough good math teachers, this will continue to be a critical failure point for students.

Increasing Student Success by Leveraging Technology

There has been extensive research and longitudinal studies done on college students to understand how to improve student success. In *Catching the Early Walker*, R. Bennett, Kottasz, and Nocciolino (2007) summarized the key behaviors of successful

students. Table 2 provides a summary of the key behaviors to improve student success and the evidence of those behaviors.

Table 2

Key Behaviors for Improving Student Success

Key behavior	Demonstrations of the behavior
Commitment to being a student	Full-time attendance, work < 20 hours/week, spend time on campus and doing homework every day
Academic preparation for college-level work	Take college prep classes in high school; develop study habits before going to college
Clear, specific career-related goals	Have a clear educational goal and plan to achieve the goal when enrolling
Engaged as part of the college community academically and socially	Spend at least 4 hours a day on campus interacting with instructors and peers academically and socially; develop friends and mentors at the campus

Note. Data from "Catching the Early Walker: An Examination of Potential Antecedents of Rapid Student Exit From Business-Related Undergraduate Degree Programmes in a Post-1992 University," by R. Bennett, R. Kottasz, and J. Nocciolino, 2007, *Journal of Further and Higher Education, 31*(2), 109-132.

The more the students exhibited these behaviors, the more successful they were in achieving student success (R. Bennett et al., 2007). Research has shown that intervention in the first year significantly improves student success (R. Bennett et al., 2007; Habley et al., 2010; Smith et al., 2012; Tally, 2013; Tinto, 2012). Research has also shown that technology can be used to track students and facilitate early intervention to dramatically improve student success (Edyburn, 2011; Smith et al., 2012; Stephens & Myers, 2014; Tally, 2013). Next, the literature on applying technology to improve student success is discussed.

Educating Students More Flexibly, Faster, and Cheaper

The United States faces the challenge of serving more students, serving a greater variety of students, and reducing the cost of instruction—all while simultaneously improving quality (Thille, 2012a). However, education is delivered virtually the same way now as it has been for hundreds of years (Carr, 2012). It is a very labor-intensive process, but the cost of labor has risen while productivity has stayed flat (Thille, 2012a). The emerging disciplines of learning science, data analytics, and online learning are converging to potentially fundamentally change how education is delivered and provide improved education productivity (lower cost), more customization (tailored learning for each student), and scalability to serve larger numbers of students (T. Anderson & McGreal, 2012; Sudhakar, 2013; Thille, 2012b). What follows is a discussion of the literature on how technology can potentially deliver dramatic, transformational change in higher education and some of the risks and barriers that must be overcome to achieve the desired changes.

Online and Hybrid Class Delivery

Online education has been offered since the dawn of the Internet in the 1990s at many community colleges (Radford, 2011). The media is in love with the latest online course offerings aimed at serving an unlimited number of potential attendees, called massive open online courses (MOOCs; Carr, 2012). MOOCs highlight the potential and the pitfalls of online learning (Grajek, 2013). The potential is that anyone, anywhere, anytime could take a programming class from MIT's or Stanford's top instructors (open access on a global scale) for free (no cost to the student; Carr, 2012). The pitfalls to be overcome, however, are many: student readiness to take the class (if not ready, most drop

out); exam proctoring and student authentication (academic integrity); student engagement (online counseling); privacy and security (ensuring test data and identity data are secure); and the real elephant in the room: Is the learning from a MOOC equivalent to a smaller online, hybrid, or face-to-face class (quality; Allen & Seaman, 2013; Carr, 2012; Grajek, 2013)?

The literature shows that students enrolled in online versus hybrid or traditional face-to-face classes have historically shown lower student success, typically 10% to 14% less than students in face-to-face classes (H. Johnson & Mejia, 2014; Kim, Olfman, Ryan, & Eryilmaz, 2014; Xu & Jaggars, 2013). However, students who take some online classes are more likely to achieve their educational goals than students who only take traditional courses (H. Johnson & Mejia, 2014). Interest and participation in online classes continues to grow; 9.6% of classes students enrolled in were online in 2002 compared to 36% in 2011 (Allen & Seaman, 2013). A meta-analysis conducted by the U.S. Department of Education (Means, Toyama, Murphy, Bakia, & Jones, 2010) found,

- Students who took all or part of their courses online did better than their peers in face-to-face classes. This finding is controversial since it contradicts conventional wisdom but was confirmed again in a longitudinal study of CCC students (H. Johnson & Mejia, 2014).
- Students who took courses combining online and face-to-face instruction (hybrid) performed better than their peers in face-to-face or purely online classes.
- Students who invested more time in their online learning than their peers in face-to-face classes performed better. Student effort appears to be a bigger influence on success than the medium of teaching.

- Performance differences varied by subject area; in general, online classes in technical areas like STEM and computer programming showed much smaller performance differences from face-to-face classes versus sociology and business-type courses.

Online performance also varies significantly for the same courses at different colleges (Moreau, 2013; Thille, 2012b; Xu & Jaggars, 2013). These differences are attributed to the following factors:

- Student preparedness for online classes: Students who are more comfortable with technology and have better study habits and motivation do better (Hachey et al., 2013; Kim et al., 2014; Means et al., 2010).
- Instructional design: Courses designed to optimize the use of technology and give the students more control over the pace of learning yield better results (Edyburn, 2011; Lacro, 2013; Thille, 2012b).
- Teacher training: Instructors who are comfortable with teaching online and are trained to take advantage of the technology better engage their students, and the students achieve better success (Mitchell, 2011; Sudhakar, 2013).
- Use of data for feedback and intervention: Colleges that collect and use data on the students' and instructors' interaction and progress toward student learning objectives, including early intervention, achieve much greater success (Stephens & Myers, 2014; Tally, 2013; Tinto, 2012).

The literature on student success with online and hybrid courses consistently points to the need to collect and use data to improve the quality of student learning and instruction and to give instructors and students regular feedback to help the students

achieve their learning objectives (Hachey et al., 2013; Means et al., 2010; Shields, 2011; Thille & Smith, 2011; Tinto, 2012).

Data Analytics

There is an emerging discipline called adaptive learning that combines computer software database technology, statistical modeling, and learning theory to evaluate, with evidence, a student's progress and understanding of course material and then provides feedback to the student and instructor based on previous students' patterns of success to adapt the course to better match the student's learning needs (Carr, 2012; Thille, 2012b). Real-world examples of the successful application of adaptive learning include Purdue University's Signals project, where student success improved 21% (Tally, 2013); Carnegie Mellon University's Open Learning Initiative, where an online statistics course achieved better student success in half the time of a face-to-face equivalent class (Thille, 2012a); Rio Salado Community College in Tempe, Arizona, where student success is predictable with 70% accuracy after only eight lessons and triggers faculty intervention if students are off track (Smith et al., 2012); and the Khan Academy for math instruction, literally serving millions of users per day (Noer, 2012; Thompson, 2011). The more these systems are used, the more data they collect and the more adept the systems become at providing each student with the right information in the right form at the right moment to maximize student success (Carr, 2012; H. Johnson & Mejia, 2014; Thille, 2012b).

Smart Design

Over $12 billion is spent on technology in higher education according to a recent Gartner report, and approximately half of this spending is related to instructional technology (Dossani, 2013). Students look to their instructors to teach them how to use

the technology, but instructors, especially adjunct instructors, do not see this as their role (Dahlstrom et al., 2013). To improve student success using technology, the users of the technology must be trained and aligned on expectations (Edyburn, 2011; Mitchell, 2011).

California Online Education Initiative

The California State Legislature, in the fall of 2013, approved a bold initiative to dramatically increase the number of CCC students who obtain associate's degrees and transfer to 4-year colleges by providing online courses and services within a statewide CCC OEI (California Community Colleges Online Education Initiative [CCC OEI], 2014c). The OEI is expected to integrate, improve, and evolve existing technology services on behalf of California's community college students with the following goals (CCC OEI, 2014b):

- Increase the number of college associate degree graduates and transfers to four-year colleges
- Improve retention and success of students enrolled in Online Course Exchange courses
- Increase California Community Colleges education for underserved and underrepresented [populations] including individuals with disabilities and those with basic skills needs [less-than-college-level education needs]
- Increase ease of use and convenience of the online [course] experience
- Decrease the cost of student education [delivery]
- Significantly increase demand for online course delivery (p. 1)

The online education system will include the following elements:

- the organizational structure and Online Education Consortium . . . ;

- online course development, approval, and delivery;
- associated faculty/staff orientation . . . ;
- [a] wide range of associated student services;
- and the technology to provide these capabilities [with 24/7 support]. (CCC OEI, 2014d, para. 1)

A cornerstone of the OEI is a new common course management system (CMS), commonly known as a next-generation learning management system (LMS), which will be accessible to students statewide online via a common education management platform. The new CMS will be more than just a CMS. It will provide users not only with a rich set of online courses but also support services that meet the unique needs of CCC students, faculty, staff, and colleges (CCC OEI, 2014c). The support services will help address every aspect of the student experience, crossing departments, divisions, and systems, in an integrated fashion to personally engage all students, leveraging sophisticated online tools based on analytics and behavioral patterns with multiple levels of support triggered by the students' interactions with the system to maximize student success (Moreau, 2013).

The state has allocated $57 million for the development and implementation of the OEI over the next 4 years (Moreau, 2013). Foothill-De Anza Community College District and Butte College will host the initiative. Foothill will be leveraging its prior experience in online course development using an open-source LMS to achieve among the highest online student success results in the state. The CCC Technology Center at Butte College has built an existing technical infrastructure that already supports the statewide common application, electronic transcript, and electronic portfolio used by

millions of CCC students per year (Moreau, 2013). The new initiative will build on the prior experience and successful leadership of these two colleges to quickly scale up the new online initiative to serve all 112 CCC institutions within 4 years. The first classes will be taught with the new OEI in the fall of 2015.

The first cohort of eight California community colleges to help develop and use the new system were selected in June 2014 (CCC OEI, 2014c). This study focused on conducting a policy Delphi survey of a sample of the administrators and faculty from this first cohort to learn their assessment of the highest implementation risks and recommended mitigation suggestions for those risks. The goal is to improve the success of the launch and adoption of the OEI to improve CCC student success and maximize the return on this substantial technology investment in higher education.

Risks to Adoption of New Methods and Tools

Higher education institutions are resistant to change (T. Anderson & McGreal, 2012; Dede, 2013; Thille & Smith, 2011). This resistance to change is not a new phenomenon. A hundred years ago, a new disruptive technology threatened to change education and universities. The disruptive technology was the U.S. Postal Service and correspondence courses in the 1920s (Carr, 2012). Schools rushed to create correspondence courses and enroll new students who never set foot on campus. Administrators, faculty, and alumni were distressed that this new technology would be the ruin of colleges.

This sounds a lot like what is happening with the modern MOOCs. As time went on, the correspondence courses did reach millions of new students cost-effectively, but the completion rates were low and the university model was not threatened. However,

the quality of the educational experience of a correspondence course did not match that of face-to-face courses (Shields, 2011). With new technology, online courses have the potential to approach the level of quality of face-to-face courses and threaten the traditional "sage on the stage" (King, 1993, p. 30) educational model. What follows is a review of the challenges to implementing technology changes in higher education, particularly in community colleges.

Education Industry Resistance to Change

Most higher education institutions are publicly funded, particularly community colleges. The CCC system, the largest college system in the world, is publicly funded (Shulock et al., 2011). Public institutions are beholden to multiple constituents, including legislators, the business community, instructors, classified staff, administrators, taxpayers, and the families of students and alumni (Goldrick-Rab, 2010). CCC institutions are unique in that they are overseen by both a locally elected board, typically aligned with the local K-12 school districts, and a statewide board of governors (CCC Chancellor's Office, 2014b). The local board tries to serve the local public and business interests, which may not align with students' educational goals and needs (Goldrick-Rab, 2010). In California today, funding is mostly based on enrollment, and some districts have elected to tax themselves to provide local tax funding in addition to the state funding. Research has shown that there is a correlation between spending and student success outcomes (Goldrick-Rab, 2010). Therefore, the very large districts and those that have supplemental local tax funding have relatively more money and higher student success (Goldrick-Rab, 2010). Adopting large-scale online programs with data analytics and customized course development optimized for online delivery is expensive (Dede,

2013; Engle & Tinto, 2008; Goldrick-Rab, 2010; Thille, 2012b). To implement the best potential changes for standardization and leverage will require broad acceptance and adoption across very diverse colleges across the entire state that do not have a history of sharing best practices and have a strong "not invented here" bias (Dede, 2013).

Transfer to 4-year vs. vocational training vs. basic skills training. California community colleges have three primary missions: to facilitate transfer to a 4-year school, to provide vocational job training, and to provide basic skills (remedial) training (Harris, 2014). Most of the state funding and focus in the California community colleges at this time is on the first mission (transfer to a 4-year school; Moreau, 2013). The new student success program highlights transfer to 4-year institutions first (Harris, 2014), yet over 60% of incoming students lack basic skills, and most students will exit without transferring but likely will acquire and use vocational training. The research has shown that the first priority is to shift the focus from teaching to successful learning and to measure progress (Engle & Tinto, 2008; Ewell, 2011; McClenney et al., 2012). The CCC system is transitioning to this and is collecting standardized data on all students to track progress. The next step is getting the colleges to use the data to change their practices to focus on improving student learning outcomes (Ewell, 2011; Hachey et al., 2013; Zarkesh & Beas, 2004). Research by the Lumina Foundation for Education, as part of the Achieving the Dream Initiative with 160 colleges in 30 states over the past 10 years, indicated that all constituents in the college community must have buy-in to embrace and use new technology and methods to achieve successful transformation (McClenney et al., 2012).

Funding shift: Paying for results instead of enrollment. The American Association of Community Colleges (AACC), Lumina Foundation for Education, Gates Foundation, and many other higher education advocacy groups have been lobbying state-funded college systems to shift primary funding away from a focus on enrollment to a focus on student learning and success (Ewell, 2011; Lumina Foundation for Education, 2013; Vuong & Hairston, 2012). California's Student Success Task Force (CCC Chancellor's Office, 2014b) recommendations were adopted by the state legislature and are being implemented over the next 3 years to shift more of the funding to pay for student success (Ewell, 2011; Harris, 2014). This shift will take time and will likely have a transformational effect as those colleges that adapt and achieve student success will grow, and those that do not will shrink and potentially disappear.

Faculty and staff development. Faculty and staff development around teaching and learning is critical to getting acceptance of systematic transformational change to a focus on student learning (O'Banion, 2012). The challenge is to get the institutions to focus on creating student learning environments and student success pathways leveraging technology to assist, collect data, sound early alerts, and facilitate early interventions to improve student success outcomes (Bailey et al., 2012; Goldrick-Rab, 2010; Tinto, 2012).

Standards and transferability. Research has indicated that a significant number of the courses students take at community colleges do not transfer to 4-year schools and represent a huge waste of student and college resources (National Center for Public Policy and Higher Education, 2011). Often courses are not accepted at the 4-year schools because they do not meet the schools' standards for the class. This often results in the students having to retake the class and taking longer to graduate. Improving the

standardization of course content for transferability between community colleges and 4-year schools will significantly contribute to improving student success. Texas and Florida have reduced this problem by implementing common course numbers for community college and 4-year-college-equivalent classes, so students can easily identify transferable classes (National Center for Public Policy and Higher Education, 2011). The challenge will be getting instructors to accept and adapt their courses to the statewide standards. The Achieving the Dream project data showed that engaging the faculty members and the faculty unions and providing faculty development yields success for adoption and use of common course standards (O'Banion, 2012).

Risk Mitigation for a New Educational Sociotechnical System

Sociotechnical system theory stresses the importance of the technology aspect of software systems combined with human interactions and organizational culture, particularly as they relate to the implementation of changes in an organization (Appelbaum, 1997). The design and implementation of a new e-learning system, and more specifically the transition from a traditional classroom or even from a first-generation LMS to a new LMS, represents a daunting challenge that requires a deep understanding of the sociotechnical factors, which could facilitate or hamper the transition (Hustad & Arntzen, 2013; Watson & Watson, 2013). The interaction between humans and technology in an e-learning system should be considered a complex sociotechnical system.

Traditional face-to-face teaching and older LMSs have a teacher-centric paradigm where the teacher is the "sage on the stage" (Hustad & Arntzen, 2013, p. 17; King, 1993). The early LMSs focused more on digitizing instructional materials, efficient storage,

organization/grade management, indexing, search, and retrieval, but the instructor was still the primary deliverer of information (Hustad & Arntzen, 2013). The new generation of LMSs using Web 2.0 (online collaboration) focus on collaboration and learning following the "guide on the side" learning paradigm (King, 1993, p. 30). This shift requires teachers to teach differently, to guide learning rather than impart knowledge (T. Anderson & McGreal, 2012; Kim et al., 2014; Watson & Watson, 2013). The students also have to take a more proactive and engaged role in their own learning (Hustad & Arntzen, 2013; Kim et al., 2014; Thille, 2012b). The most significant challenge to the adoption of new collaborative Web 2.0 LMSs will be that many faculty members fear losing control when shifting from faculty-centered to student-centered learning (Dossani, 2013; Hustad & Arntzen, 2013). Education institutions often lack a culture of openness to trying new technologies among faculty members, at least partially due to their perception that technology does not facilitate deep learning (Hustad & Arntzen, 2013; Watson & Watson, 2013).

Engaging the users in the planning and risk mitigation. Change theory research has indicated that one of the best ways to gain acceptance of change is to engage those who will be impacted by the change in the process of creating the change (L. Anderson & Anderson, 2010; D'Aurora, 2013; Martin, 2011; Roueche, Baker, & Rose, 1989). In a recent study of the implementation of a new LMS, the key complaints from users were related to ease of use and knowledge sharing between courses and instructors (Hustad & Arntzen, 2013). For success, the users wanted more input in the design of the system so that it would work the way they wanted to teach, not the way a software engineer wanted the users to access a database. The instructors and students

need to be engaged in the design process, be trained on how to use the system, be given the time to learn, and have technical support on call when they need it (even on nights and weekends). The system designers, instructors, and users need to focus on "What makes a good learning experience for the students?" (Hustad & Arntzen, 2013, pp. 29-30).

Understanding the fears and concerns of users. Successful change management requires that the change leadership team understand the hopes and fears of those affected by the change and that those issues be acknowledged and addressed (L. Anderson & Anderson, 2010; Grant, 2012; Martin, 2011; Watson & Watson, 2013). The faculty members are likely to have the most fear of a new data-driven, student-centered LMS (Thille, 2012b; Watson & Watson, 2013). A closed-loop, evidence-based learning technology is disruptive to faculty members who are used to an intuitive approach to course development, delivery, and assessment. These faculty members may fear for their jobs and their academic freedom (Thille, 2012b; Watson & Watson, 2013). They need to be engaged early and often in the development and implementation of a new LMS to mitigate their fears and concerns.

Establishing clear goals and measurable outcomes to mitigate risks. The change literature consistently emphasizes that successful transformational change requires that the leadership team have clear goals, clear and consistent communication, and proactive monitoring and mitigation of risks (D. Anderson & Anderson, 2010; D. L. Anderson, 2011; Brower & Balch, 2005; Kezar, 2001; Martin, 2011; Nadler & Hibino, 1990; Roueche et al., 1989). The key to success in educational technology investments is to make sure the investments align and contribute to improved student success (Edyburn,

2011). To ensure this alignment is understood and consistent requires clear goals, clear communication, regular testing for alignment, and appropriate adjustments as needed to achieve the transformational change and improved student learning potential of the technology projects.

Conclusions

The literature shows the crisis the U.S. middle class is facing as technology, globalization of industry, declining public support for subsidization of higher education, and the lack of productivity improvements in the education industry are leading to U.S. workers being less competitive in the global market. The demand for high-skilled workers, with postsecondary education, is exceeding the supply in the United States. The consequence is that workers without postsecondary education skills earn lower wages and are more likely to be unemployed, less healthy, and less engaged in their community. The United States must increase the production of postsecondary graduates to sustain the middle class and the American dream of the next generation having a standard of living as good as or better than the previous generation (Carnevale et al., 2010; Carr, 2012; Lumina Foundation for Education, 2013).

The literature shows that the United States can increase postsecondary productivity by leveraging technology, particularly with online and hybrid classes. Online classes can reach older students and working students, and they offer more flexibility, individualized learning, and early intervention for students at risk. The convergence of faster Internet, data analytics, new teaching paradigms, and database software is enabling mass customization of the students' learning experiences and

potential dramatic improvements in student success, cost-effectively (T. Anderson & McGreal, 2012; Dede, 2013; Dossani, 2013; Edyburn, 2011; Noer, 2012).

The potential improvements in student success and more resulting postsecondary-educated workers earning higher wages as part of a vibrant U.S. middle class are contingent on the U.S. higher education industry embracing transformational change. The literature shows that changing how higher education institutions deliver education is a difficult but necessary challenge (Carr, 2012; Engle & Tinto, 2008; Goldrick-Rab, 2010; Tinto, 2012; Watson & Watson, 2013).

The education industry is composed of largely autonomous colleges with faculty members who tend to operate disconnected from one another and often distrust technology and oppose change in how learning is delivered as infringement on their academic freedom (Watson & Watson, 2013). Reviewing the literature on organizational change led to the conclusion that to successfully implement this large-scale cultural change will require the change leadership team to engage those affected by the change early and often throughout the process (help them own the change); understand the hopes and fears of those affected by the change and acknowledge and address those issues; and have clear goals, clear and consistent communication, and proactive monitoring and mitigation of risks (D. Anderson & Anderson, 2010; D. L. Anderson, 2011; Brower & Balch, 2005; Kezar, 2001; Martin, 2011; Nadler & Hibino, 1990; Roueche et al., 1989).

The literature reviewed in this chapter demonstrated the connection between the declining middle class, the lack of sufficient postsecondary student success, and the potential of technology to help improve higher education productivity and student

success, and it highlighted the challenges to implementing transformational change in higher education to achieve greater student success.

Synthesis Matrix

Appendix A is a synthesis matrix of the references found in the literature and their relevance to the major topics in this study.

CHAPTER III: METHODOLOGY

Overview

This chapter provides an overview of the methodology utilized for this policy Delphi study. It explains how input was obtained from experts to answer the research questions. The purpose statement, research questions, research design, the instrument used to assess the software project risks, the population and sampling criteria, methods of obtaining the data from the participants, data analysis, and limitations to the study are discussed.

Purpose Statement

The purpose of this study was to identify and prioritize a list of implementation risk factors and suggested mitigation measures for the development team of the California Community Colleges (CCC) Online Education Initiative (OEI) to improve the probability of successful implementation.

Research Questions

1. What are the most significant implementation risk factors identified by the survey participants using the Schmidt et al. (2001) common risk factors list?
2. Are there significant differences among the risk factors identified by administrators and faculty to successful implementation?
3. What are the risk mitigation recommendations to improve the adoption and success of the initiative?
4. Do the demographic factors of time in current position and prior learning management system (LMS) experience of the survey participants affect the risk assessments?

5. Are there significant differences among the risk factor assessments associated with the current LMS vendor used (e.g., Blackboard, Moodle, homegrown) and how long it has been in use?

Research Design

A mixed-methods (quantitative and qualitative research) policy Delphi survey research methodology was used to quantitatively identify and prioritize the 34 large software project risk factors Schmidt et al. (2001) identified for large software projects and to generate a qualitative list of prioritized recommended mitigation suggestions for the risks identified as most likely and significant. Qualitative survey research is used to gather data using open-ended questions that must be analyzed through the use of informed judgment to identify the major and minor themes expressed by the participants (Patten, 2007). A qualitative research project uses an inductive approach to planning the research (Patten, 2007). For this study, the researcher used an adaptation of the Schmidt et al. (2001) survey instrument, available in the public domain, created by Valente (2011). This quantitative instrument used a Likert scale for questions ranging from 1 to 10, where 1 indicated least important and 10 indicated most important (Valente, 2011). The survey questions were modified to specifically reflect the OEI project implementation. This survey (Appendix B) included 52 items, of which 47 asked for the opinions and perceptions of the participants. The survey was administered using SurveyMonkey, a well-known supplier of online surveys. The qualitative modification to the survey was to have participants suggest and prioritize mediation suggestions for the most significant implementation risks.

The research employed a nonexperimental descriptive design. McMillan and Schumacher (2009) noted, "Research using a descriptive design provides a summary of an existing phenomenon using numbers to characterize individuals or groups" (p. 22). Descriptive research characterizes something as it is. In this study, the researcher characterized the perceived risks to the planned OEI implementation and proposed mitigation suggestions to address the risks identified as most significant.

The type of mixed-methods research conducted was a policy analysis Delphi research method. According to McMillan and Schumacher (2009), "Policy analysis evaluates government policies to provide policy-makers with pragmatic, action oriented recommendations" (p. 438). The study focused on identifying the administrator and faculty participants' perceptions of risks to the OEI implementation and recommended mitigation suggestions to address the most significant risks. A microapproach was used. This involved field-based data collection to get the facts using a policy Delphi approach. This was a descriptive study to identify and describe the perceived risks and recommended mitigation suggestions to the most significant risks to the OEI implementation.

The policy Delphi method was used to collect and analyze data to answer the research questions. The policy Delphi is defined as a variant of the conventional Delphi technique, which was first introduced in 1969 (Turoff & Linstone, 1975). The technique is a structured group communication process that uses a series of questionnaires (typically three to five) interspersed with controlled feedback to allow a group of experts (typically 10 to 50) to collectively explore consensus and disagreement on a particular policy issue (Turoff & Linstone, 1975). The goal is to investigate opposing views,

describe alternatives, and provide a constructive forum in which compromise can occur (Adler & Ziglio, 1996; Meskell, Murphy, Shaw, & Casey, 2014; Turoff & Linstone, 1975). The policy Delphi approach ensures that all major alternatives and connotations of a policy—or in this case, perceived risks and possible mitigation suggestions—are raised, their level of consensus or divergence established, and a sense of acceptability of each practice option assessed (Meskell et al., 2014). By not explicitly seeking consensus, the policy Delphi process avoids the conflict that is often evident in the conventional Delphi method and is therefore best described as a tool that investigates policy and best practice issues and contributes to informed decision making (Adler & Ziglio, 1996).

Delphi is "characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem" (Turoff & Linstone, 1975, p. 3). The problem of implementing a statewide system that impacts every community college administrator, faculty member, and student in terms of student success outcomes is a complex problem. Turoff and Linstone (1975) outlined seven properties of problems most appropriate for a Delphi study. Table 3 summarizes the properties and their relevance to the current study.

The research design process is outlined below:

- The study used a qualitative, policy Delphi method to analyze the decision-making process (Adler & Ziglio, 1996; Chou, 2002; Turoff & Linstone, 1975).
- The study involved the researcher creating a two-round Delphi survey of administrators and faculty members using the web-based SurveyMonkey tool to administer the surveys, collect feedback, and analyze data.

Table 3

Delphi Study Problem Properties vs. Current Study

Delphi problem property	OEI implementation risk assessment problem property
The problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis.	Solutions to LMS implementation problems will vary by college (e.g., size, past LMS experience, tenure of faculty, etc.), but there may be rules of thumb that can be applied to improve results across all colleges.
The experts do not have a history of adequate communication and represent diverse backgrounds.	College administrators have not typically shared their technology risk assessment and mitigation practices with each other in a systematic way.
More individuals are needed than can effectively interact in a face-to-face exchange.	The OEI could potentially impact every faculty member, administrator, and student. Data are needed to identify and mitigate the risks. A survey can be a first step in identifying and mitigating the risks.
Time and cost make frequent group meetings infeasible.	The administrators and faculty are busy and spread across the state.
The efficiency of face-to-face meetings can be increased by supplemental group communication process.	Using SurveyMonkey and e-mail, the group communications can be facilitated efficiently.
Disagreements among individuals are so severe or politically unpalatable that the communication process must be refereed and/or anonymity assured.	The level of diversity of opinions is unclear but likely large, and the political implications demand anonymity when decisions of spending millions of dollars of public money are on the line.
The heterogeneity of the participants must be preserved to ensure validity of the results (e.g., avoid the bandwagon effect).	Diverse participation is needed to get meaningful results.

Note. Data from *The Delphi Method: Techniques and Applications*, by M. Turoff and H. A. Linstone, 1975, p. 4. Copyright 1975 by Addison-Wesley.

- The goal in Round 1 was to prioritize potential OEI implementation risks and get input on mitigation recommendations for the top 10 risk factors using an adaptation of the Valente (2001) survey instrument (Appendix B), available in the public domain.

- The goal in Round 2 was to prioritize the proposed mitigation measures for the top 10 risk factors identified in Round 1 (Appendix B).

- The survey results were coded and analyzed to prioritize risks, identify and prioritize potential mitigation suggestions, and identify similarities and differences in recommendations of different types of participants.

This policy Delphi research study used a purposeful sampling strategy (Patton, 2005) to identify administrator and faculty participants. The study employed grounded theory to define what theory emerged from systematic comparative analysis grounded in the survey feedback (Patton, 2005). The study employed a reality testing (positivist) approach to better understand the risks and possible mitigation recommendations to improve the success of the implementation of the OEI to improve student success (Patton, 2005).

The first step in a policy Delphi study is the formulation of the issues by outlining the potential options that should be under consideration (Turoff & Linstone, 1975). In this study, the researcher adapted the Valente (2011) survey instrument for the initial survey. This is a validated survey instrument in the public domain for technology project assessment in community colleges and other large organization technology implementation risk assessment (Valente, 2011). The resulting information was then put to the Delphi panel of experts to expose the options available to determine initial positions and offer any additions. In principle, the process requires three to five rounds, but this is typically shortened to two to three in practice (Meskell et al., 2014; Turoff & Linstone, 1975). This study included two rounds.

Population

The population included current CCC educational administrators, full-time faculty members, and adjunct instructors (part-time faculty members). A population for a qualitative study can be large or small and is defined as a group of individuals who share the same characteristics (Creswell, 2012). The ideal approach is to select a sample population that is representative of the entire population. For this study, the population included all educational administrators and full- and part-time faculty members at California community colleges. Table 4 outlines the total population numbers derived from the CCC Chancellor's Office (2014a) website.

Table 4

Estimated Target Population and Sample Population

	Total employment all CCCs (target population)	Divide by 112 total colleges to get avg./college	Multiply by 8 colleges, first cohort	Minus 20% est. < 1 year in position (sample population)
Educational administrators	1,899	17	136	109
Full-time faculty	16,943	151	1,208	966
Part-time faculty	39,972	357	2,856	2,285
Total	58,814	525	4,200	3,360

Note. Data from *Report on Fall Staffing for 2013*, by California Community Colleges Chancellor's Office, 2014a, retrieved from http://employeedata.cccco.edu/headcount_by_district_13.pdf.

Sample

The survey sample population, the subset of administrators and faculty members who participated in the study (McMillan & Schumacher, 2009), was from the first cohort of eight CCC full-launch colleges (see Table 5) that applied and were selected to adopt the OEI.

Table 5

CCC OEI Pilot Launch Colleges

Pilot group	Colleges
Full-launch colleges	Butte College, Coastline Community College, Foothill College, Shasta College, Fresno City College, Lake Tahoe Community College, Mt. San Jacinto College and Ventura College
Student readiness staging group	Antelope Valley College, Cabrillo College, College of the Canyons, Monterey Peninsula College, West Los Angeles College, Rio Hondo College, MiraCosta College and Hartnell College
Tutoring staging group	Imperial Valley College, Ohlone College, Columbia College, Los Angeles Pierce College, Saddleback College, Barstow Community College, Mt. San Antonio College and Victor Valley College

Note. Data from "CCC OEI Announces 24 Colleges for Pilot Launch of Statewide Program" [News release], by California Community Colleges Online Education Initiative, 2014a, p. 1, retrieved from http://ccconlineed.org/.

The following criteria were used by the OEI team to select the pilot colleges, as defined in a news release from the CCC OEI (2014a):

- Use of Open CCCApply, a systemwide online application and identification system for California Community Colleges admission and financial aid (see http://home.cccapply.org/)
- Established online degree programs that could contribute knowledge and best practices based on experience
- Established professional development programs that assist faculty members with online education-oriented pedagogical and student services concerns
- Geographical location (north, south, central), and size of student population (small, medium, large)

- Diversity of course management systems (CMS), important for learning about the best practices, features and functions of the different systems in order to inform the ultimate selection of a common CMS.
- Accreditation status
- Capacity, in terms of faculty and staff, to add more online courses
- Pilot involvement in related CCC projects, the Common Assessment Initiative (CAI) (http://cccassess.org/) and Educational Planning Initiative (EPI) (http://cccedplan.org/). (pp. 1-2)

The process for being selected to be in the first cohort began with California community colleges interested in being in the first cohort filling out an application to join the Online Education Consortium (CCC OEI, 2014c). The application period was from April to May 2014. In August 2014, the first 24 cohort colleges were selected to include colleges that represent a subset/sample of the CCC system; for example, at least one selected applicant was from a very large urban district like Los Angeles or San Francisco, a couple were from small rural districts, a few more were from districts with large minority populations, and some were from medium-size and ethnically diverse colleges. The goal of the consortium was to pick the first cohort to reflect the diversity of the CCC system as much as possible. The group of 24 pilot colleges were segmented into three staging groups of eight colleges each (see Table 5 for a listing of all 24 pilot colleges).

The target population of this study was from the eight full-launch colleges. The appropriate number of administrators and full- and part-time faculty members to participate in the study was determined by taking the CCC Chancellor's Office total numbers and dividing by 112 (total number of CCC institutions) to get the average per

school and multiplying this by 8 (number of full-launch colleges; see Table 4). This number was further reduced by excluding administrators and faculty members with less than 1 year of experience in their current position (not enough experience to be considered expert), and this was conservatively estimated to be 20% of the population. From this target population, which was defined in Table 4, the researcher recruited 27 participants from seven of the eight colleges. One college required an institutional review board (IRB) process that would have delayed the study an additional semester, so it was excluded.

Participant Selection Process

Purposive sampling was used to select the participants. Purposeful, or purposive, sampling is used to understand certain select cases in their own right rather than to generalize results to a population (Isaac & Michael, 1971). Purposive sampling is employed to learn about issues central to the purpose of the study and the research questions. Extreme case sampling is a type of purposeful sampling used to examine cases that perform unusually well (Isaac & Michael, 1971). With this type of sampling, the researcher's strategy is to concentrate on the participants who will yield the most useful information (McMillan & Schumacher, 2009). For this study, the cohort school selections and participants from the cohort schools were selected to provide the most useful information to the study.

The study sample consisted of 10 current administrators, 10 current full-time faculty members, and seven current adjunct faculty members, all with at least 1 year of experience in their current positions. These participants had the recognized authority and expertise needed to contribute to the study (Adler & Ziglio, 1996; Skulmoski, Hartman,

& Krahn, 2007; Turoff & Linstone, 1975). The researcher sought to identify 10 participants in each job category using purposive sampling. The researcher engaged the OEI pilot college application point person to identify potential participants from each of the eight colleges in the first cohort of full-launch colleges who could provide the most useful information. The participants from each category were not necessarily from the same college. Administrators and faculty members with less than 1 year of experience in their current positions were excluded.

From this first cohort of colleges, the point person from each college for this initiative was contacted by the OEI executive committee to request submission of potential candidates to be on the Delphi panel from that college. The researcher, with guidance from the OEI executive committee and the dissertation committee, recruited the potential participants using the following criteria:

- at least 1 year of experience in current position;
- willingness to engage in the time demands of the Delphi panel during the study period, October-December 2014;
- passion for the success of the OEI and willingness to share opinions on how to make it successful; and
- diversity—participants were selected to provide as much diversity as possible since the goal of a policy Delphi process is to generate as many different possible solutions and viewpoints as possible.

Using these criteria, the OEI primary contact for each college helped the researcher recruit the participants for the study.

For a policy Delphi study, participants should be selected to reflect a wide range of opinions since the objective is to investigate opposing views, describe alternatives, and provide a constructive forum in which compromise can occur (Meskell et al., 2014). The goal was not to explicitly seek consensus. A policy Delphi approach avoids the inevitable conflict that is typical in a conventional Delphi method and instead focuses on investigating policy issues to contribute to better informed decision making (Meskell et al., 2014).

Instrumentation

The researcher, using the Internet-based tool SurveyMonkey, collected the data. According to Turoff and Linstone (1975),

> Policy Delphi deals largely with statements, arguments, comments and decisions. Its purpose is to force participants to think about the pros and cons of an issue to a point where they are no longer neutral on the issue. Therefore, statements are designed to elicit conflict and disagreement, as well as to clarify opinions, and the response categories do not permit neutral answers. (p. 87)

The study used an adaptation of the survey instrument developed by Valente (2011), available in the public domain, to assess risk factors to enterprise resource planning (ERP) implementations at California community colleges for his doctoral dissertation. Valente's survey was adapted from an instrument developed by Schmidt et al. (2001), also available in the public domain, to assess software project risks that technology managers consider most important. Schmidt et al. conducted three simultaneous surveys in three countries: Hong Kong, Finland, and the United States. Schmidt et al. used a ranking-type policy Delphi survey to generate a rank-order list of

risk factors. Valente (2011) adapted the Schmidt et al. instrument for an ERP implementation risk assessment survey of 111 of the 112 colleges in the CCC system, with approximately 20% participation of the administrators taking the survey (over 1,000 participants). Valente's instrument was adapted for this study to assess the OEI implementation risks and mitigation suggestions as perceived by administrators and faculty members. This study solicited the participating administrators and faculty members to assess and rank the implementation risk factors in the context of implementing and using the OEI systems in a CCC setting. Assessment and ranking of the risk factors and mitigation recommendations were based on the expertise, knowledge, and experience of the survey participants.

Credibility

The researcher was trained in the policy Delphi technique by studying the literature and receiving coaching from the Brandman University dissertation advisory team. The researcher had participated in three prior qualitative interview research studies. The researcher had the dissertation committee and one other Brandman University Delphi-trained and experienced research instructor review the surveys and coded data for consistency and accuracy. The researcher documented known biases related to the research topic, subjects, survey, and analysis processes.

Data Collection Procedures

The survey and planned procedures were first approved by the IRB of Brandman University, Irvine, California, before the survey was sent and data were collected to ensure that any risk of harm to human subjects was minimized. Participants completed the surveys voluntarily, with consent, and anonymously.

The confidentiality of the participants and the data they provided the researcher was extremely important. Confidentiality is defined as the care and control of the participants' personally identifiable information, the data the participants provide, and privacy of the information. The researcher took great care to ensure the privacy of all participants' data at all times. Throughout the study, the researcher kept all information secured on a password-protected personal computer and on an encrypted and password-protected cloud storage server. All printed papers with participants' personally identifiable information were shredded immediately after use. The researcher will destroy all survey data 1 year after completion of the study.

All participants provided informed consent to participate in this study. The first page of the survey provided the informed consent verbiage and required the users to click an "accept" button prior to proceeding with the survey. (See Appendix C for the informed consent form.) The researcher was the only person with knowledge as to who the study participants were.

The data for this study were acquired over a 3-month period in the fall of 2014 in a series of two online SurveyMonkey surveys. Complete anonymity is not possible in a policy Delphi study "because the multiple iterations and 'round' structure of questionnaires necessitate that researchers know who has responded so that they can dispatch subsequent questionnaires" (Meskell et al., 2014, p. 34). The term "quasi-anonymity" is used to indicate that the researcher will know the participants but their judgments and opinions will remain strictly anonymous and confidential (Meskell et al., 2014, p. 35). Response rates were maintained in this study by providing a clear outline of

the commitment required, frequent reminders, personalized correspondence, and quick turnaround between rounds (Meskell et al., 2014).

Data Analysis

Data analysis was conducted for the quantitative survey responses using SurveyMonkey's built-in statistics tools, SPSS and Excel. Both descriptive and inferential statistics were computed using SPSS and Excel software to address the research questions.

For the first and third research questions, a Pareto chart of responses and standard deviations was calculated to determine the top factors. For the second and fourth research questions, an independent samples *t* test and ANOVA was run on the risk factor rankings to determine if the differences between the groups were statistically significant and worth noting. Finally, for the fifth research question, a multi-variate analysis of variance (MANOVA) between multiple factors, subject groups and vendors selected, was used to determine if there were any significant differences in the risk factors based on the selected prior LMS vendor.

Limitations

Every study, no matter how well it is conducted, has some limitations (Patton, 2005). Turoff and Linstone (1975) outlined eight key limitations to a policy Delphi study in their seminal book on the Delphi method:

1. Discounting the future: The human tendencies to underestimate long-term and secondary impacts and overestimate short-term impacts.

2. The prediction urge: Most people prefer a precise prediction or recommendation, but the purpose of this type of Delphi is to encourage diverse opinions; prediction is far less important than alternatives and differences in views.
3. The simplification urge: Complex systems, like deciding on new IT systems, which interact with many other systems, frequently exhibit strongly counterintuitive behavior. "Unless the components of a system are autonomous we should never expect to forecast the behavior of the whole by forecasting the behavior of its parts" (p. 565).
4. Illusory expertise: Experts are not necessarily the best forecasters. Experts concentrate on what they know and risk missing new technologies they do not anticipate or know about. In a drive for conformity, the tyranny of the majority may cause the single maverick's better insight to be overlooked. Experts are not free of bias.
5. Sloppy execution: This could include poor selection of participants who might all be too like-minded, superficial analysis of responses resulting in missed underlying assumptions, or impatience by the participants resulting in hasty answers without adequate thought.
6. Optimism: Pessimism bias. The human bias toward overpessimism in the long-range impacts and overoptimism in the short-range impacts of technology.
7. Overselling: Is Delphi the best method to answer these research questions?
8. Deception: The Delphi process is not immune from manipulation by the researcher or the participants. The communications process and its structure must be explicit and consistent to minimize this risk.

The survey participants were limited to a subset of California community colleges and the administrators and faculty members from those colleges who chose to participate. Students were not included. The data collected relied on the cooperation and honesty of the respondents, who were all professionals in the education field.

To keep the survey anonymous, the researcher worked with the OEI executive steering committee to develop appropriate distribution lists for the survey. Depending on the size of the institution, the same individual may perform multiple functions, and therefore only one response covering multiple functional areas was expected to be received. Additionally, the respondents self-identified as to which group they belonged to: administrator, full-time faculty member, or adjunct faculty member.

Summary

The method used to answer the research questions related to identifying and prioritizing the risk factors to the successful implementation of the OEI in terms of student success was the policy Delphi process. This method is a variant of the Delphi technique originally developed by the RAND Corporation in the 1960s to more economically engage experts in military-related technology forecasts (Adler & Ziglio, 1996; Meskell et al., 2014; Turoff & Linstone, 1975). The expected output was a substantial number of new ideas and an evaluation of those ideas for use in decision making (Adler & Ziglio, 1996; Turoff & Linstone, 1975). Research using the policy Delphi process can help identify limitations and circumstances in which policies work and can help identify unintended consequences of policy (Meskell et al., 2014). With this knowledge, it was the intent of this study to improve the successful implementation and

adoption of the OEI at California community colleges for applying technology to improve student success outcomes.

CHAPTER IV: RESEARCH, DATA COLLECTION, AND FINDINGS

Overview

This chapter restates the purpose of the study, the research questions, the methodology, and the population and sample for the study. An analysis of the data and the summary of findings are discussed.

The goal of this study of the first set of California community colleges that will fully implement the new Online Education Initiative (OEI) common course management software in fall of 2015 was to identify and prioritize a list of implementation risk factors and mitigation suggestions for the development team of the California Community Colleges (CCC) OEI to improve the probability of successful implementation. The study also evaluated if there were any significant differences in risk recommendations depending on the participants' job type, length of experience in their job, or prior experience with online learning management systems (LMSs). This chapter starts with a brief summary of the results of the two surveys, followed by the general results and finally a brief summary of the findings for each research question.

Purpose Statement

The purpose of this study was to identify and prioritize a list of implementation risk factors and suggested mitigation measures for the development team of the California Community Colleges (CCC) Online Education Initiative (OEI) to improve the probability of successful implementation. This research study was performed using a modified version of the software risk factors assessment instrument developed by Schmidt et al. (2001), available in the public domain. A two-survey policy Delphi study was conducted on a sample of administrators and faculty members from the pilot group

of schools that will be the first users of the OEI common course management system (CMS). There were a total of 27 active participants (those who completed all or more than 90% of the questions) in the two-round Delphi survey: 27 in the first round and 22 in the second round. The survey participant population, as shown in Figure 5, was relatively equal for the three groups for both surveys. These respondents represented an estimated population of 2,940 administrators and faculty members from the seven participating colleges.

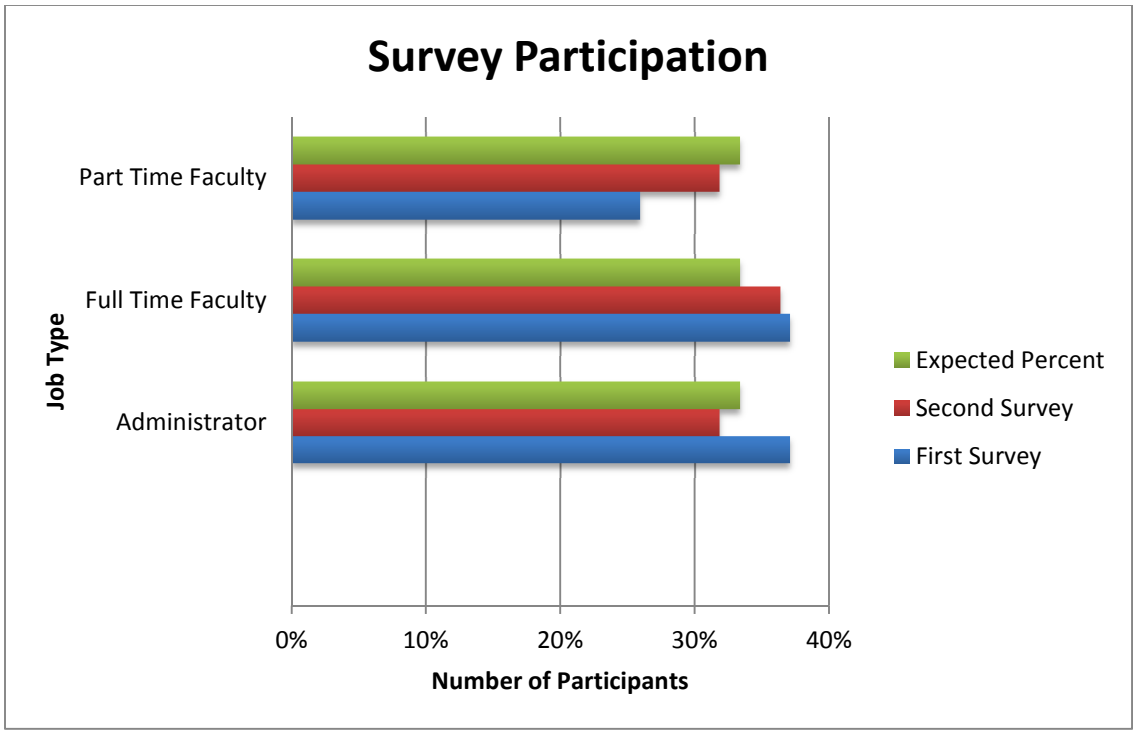

Figure 5. Survey participants.

Research Questions

1. What are the most significant implementation risk factors identified by the survey participants using the Schmidt et al. (2001) common risk factors list?

2. Are there significant differences among the risk factors identified by administrators and faculty to successful implementation?
3. What are the risk mitigation recommendations to improve the adoption and success of the initiative?
4. Do the demographic factors of time in current position and prior learning management system (LMS) experience of the survey participants affect the risk assessments?
5. Are there significant differences among the risk factor assessments associated with the current LMS vendor used (e.g., Blackboard, Moodle, homegrown) and how long it has been in use?

Research Methods and Data Collection Procedures

The method used to answer the research questions in this study related to identifying and prioritizing the top 10 risk factors to the successful implementation of the OEI in terms of student success was the policy Delphi process using an online survey tool. This method is a variant of the Delphi technique originally developed by the RAND Corporation in the 1960s to more economically engage experts in military-related technology forecasts (Adler & Ziglio, 1996; Meskell et al., 2014; Turoff & Linstone, 1975). Data were collected from participants using two sequential online surveys administered via a link in an e-mail. The first survey collected information on the participants' demographics, prioritization of the reasons for change, prioritization of the change risks, and potential suggestions for mitigations to the top risks. The output from the first survey was a ranked list of the top 10 risks and a prioritized list of recommendations to reduce those risks. The second survey asked participants to validate

the ranking of the top 10 risks and rank the suggested mitigation measures for the top 10 risks.

Research using the policy Delphi method can help identify limitations and circumstances in which policies work, and can help identify unintended consequences of policy (Meskell et al., 2014). The output of this study was a list of highest perceived risks and a set of recommendations to help mitigate those risks. With this knowledge, it is the intent of this study to improve the successful implementation and adoption of the OEI at California community colleges for applying technology to improve student success outcomes.

This policy Delphi study included two surveys that addressed five research questions, which sought to determine if there were significant differences in the ways community college administrators, full-time faculty members, and part-time faculty members perceived, assessed, and ranked risk factors based on their personal perceptions and experiences. In addition to soliciting demographic information, the surveys asked the participants to rank a list of eight reasons to change from their current LMS and to rank a list of software project risk factors using a Likert scale assessing the minimal value of 1 for least important and 10 for most important. (Copies of the survey instruments are found in Appendix B.) Table 6 provides a summary of responses to the first and second surveys. For the first survey, there were a total of 27 participants who completed 90% to 100% of the questions. One participant abandoned the survey with no data entered. For the second survey, there were a total of 22 participants; only one participant skipped one question in the second survey.

Table 6

Surveys Response Summary

Participants	Est. target pop. at 7 colleges	1st survey 100%	1st survey abandoned	1st survey partial	2nd survey 100%	2nd survey abandoned	2nd survey partial
Administrators	95	8	1	2	7		
Full-time faculty	845	9		1	8		
Part-time faculty	2,000	7		0	6		1
Total	2,940	24	1	3	21	0	1

Note. The surveys only included seven of the eight full-launch colleges.

The researcher consulted a statistics professor from Sonoma State University, Ai-Chu Wu, for advice on how to address the missing data in the three partially completed surveys from the first round. There was one question skipped by one participant in the second survey that did not affect the analysis of the results, so no adjustments were needed for the second survey.

The first survey covered 53 questions with 27 respondents for a total of 1,431 total data elements. There were a total of 80 missing data elements (questions not completed), representing 5.6% of the total responses. The research literature varies on opinions as to the appropriate cutoff for missing data. Some research experts recommend 5% as a cutoff (Schafer & Graham, 2002), others assert a 10% cutoff as adequate (D. A. Bennett, 2001), and others have used 20% (Peng, Harwell, Liou, & Ehman, 2006). The two key considerations advocated in the literature to decide whether missing data are problematic are, first, whether the data set has sufficient statistical power to detect the effects of interest, and second, whether there is a pattern to the missing data (i.e., whether or not the data are random; Schlomer, Bauman, & Card, 2010). The amount of data

missing was relatively small (5.6%) in this study, so the missing data were not expected to severely impact the statistical analysis. The second consideration is the randomness of the missing data. The missing data exhibited no obvious patterns.

To evaluate the effects of compensating for the missing data, the researcher used mean substitution as the imputation strategy. Applying an imputation strategy to fill in the missing data allows for simpler calculation of comparison statistics since the number of observations for all questions is the same (Schlomer et al., 2010). Many statisticians consider the mean substitution method a poor method of imputation because it increases bias in both regression coefficients and standard errors (D. A. Bennett, 2001; Peng et al., 2006; Schafer & Graham, 2002; Schlomer et al., 2010). However, it is common practice and acceptable for less than 10% missing data (Schlomer et al., 2010). The researcher had only 5.6% missing data, so the mean substitution was deemed acceptable. The researcher then ran the statistical analysis using the full data set, with no imputation, and noted no changes in the statistical significance of the outcomes. All reported data that follow are from the full data set, with no substitutions.

Population and Sample

The study population included current CCC educational administrators, full-time faculty members, and adjunct (part-time) faculty members. There are 112 California community colleges with an estimated 1,900 administrators, 17,000 full-time faculty members, and 40,000 adjunct (part-time) faculty members. The sample population for this study was selected from seven of the eight full-launch colleges that were chosen to be in the CCC OEI pilot launch program. Eventually, all 112 California community colleges will use the OEI system. Twenty-four colleges were accepted to be in the first

three phases of the rollout of the OEI. The first eight were the initial target sample group for this study. Two of the eight colleges required additional IRB reviews, and only one of the two responded to the researcher's IRB submission. The college that did not respond was excluded from the study. The sample from the remaining seven colleges included an estimated pool of 95 administrators, 845 full-time faculty members, and 2,000 part-time faculty members.

A total of 10 administrators, 10 full-time faculty members, and seven part-time faculty members volunteered to participate in the first survey, and seven administrators, eight full-time faculty members, and seven part-time faculty members participated in the second survey. The volunteers were a biased sample, in that they all had significant LMS and community college teaching experience and were interested enough in the success of the new proposed system to invest time in this project for no compensation. This is consistent with the intent of a policy Delphi survey, which seeks passionate, engaged participants (Franklin & Hart, 2007; Meskell et al., 2014; Skulmoski et al., 2007).

Survey 1

Survey Population Demographics

The survey participant population was expected to be evenly divided among administrators, full-time faculty members, and part-time faculty members. The actual participant population, as shown in Figure 5, was approximately equally composed of administrators, full-time faculty members, and part-time faculty members.

After establishing participants' job types, the next set of survey questions asked participants to share their years of experience in their current position and their years of LMS experience. As shown in Table 7, the survey participants had extensive job and

LMS experience, validating the qualifications of the participants as "experienced experts."

Table 7

Survey Participants' Experience: Survey 1

Variable	*n*	Total mean
Position type		
Administrator	10	
FT faculty	10	
PT faculty	7	
Position experience		10 yrs
≤ 5 yrs	7	
6-10 yrs	12	
> 10 yrs	8	
Legacy LMS experience		3 yrs
≤ 2 yrs	1	
3 yrs	6	
4 yrs	12	
District size (FTES)		19,000 FTES
< 10,000	4	
10,000-20,000	13	
> 20,000	10	

Note. The totals in the columns vary due to missing data elements. These totals reflect the actual reported data. FTES = full-time equivalent students.

The next question looked at the distribution of the participants by the size of their colleges. Participants were asked to self-designate their college size. As can be seen in Figure 6, the participant distribution was reasonably close to the expected distribution. The expected distribution was derived by looking up the actual student populations for the seven participating colleges on the CCC Chancellor's Office (n.d.b) Data Mart website.

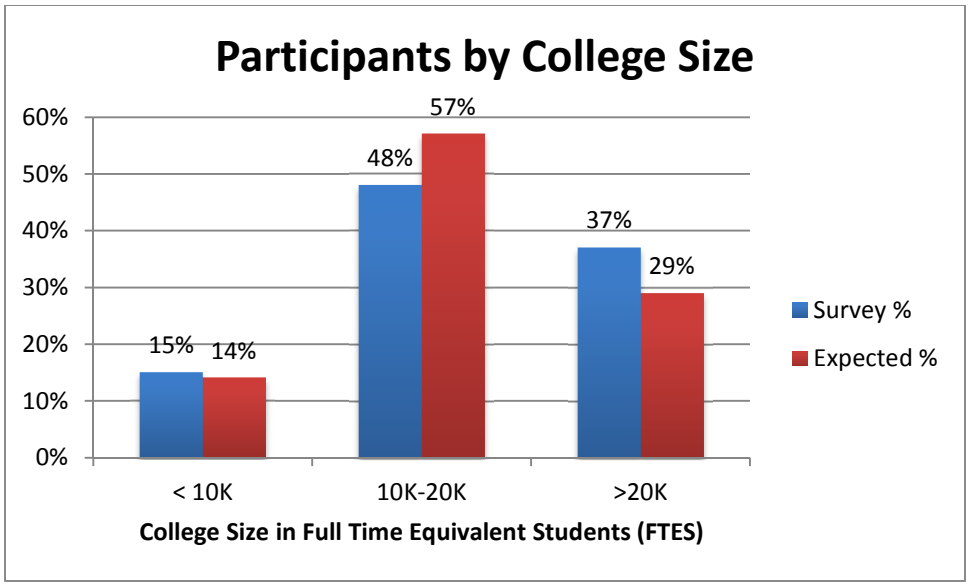

Figure 6. Participants by college size.

The next set of questions focused on the legacy LMSs used by the survey participants. As can be seen in Figure 7, about half of the participants used Blackboard as their LMS, and just fewer than 30% used homegrown systems; the remaining participants used a variety of other systems. Figure 8 shows that all types of participants had about the same amount of experience on the different types of legacy LMSs. As shown in Table 8, 73% of the survey participants had at least 5 years of LMS experience, and the distribution appeared normal with a mean of 7.5 years. Table 9 shows that the legacy LMS systems used by the survey group were mature, with 100% having been in production at least 3 years and 89% more than 5 years. The data appear to show that the participants met the study objectives of being experienced with LMSs, experienced in the job, and representative of the diversity of the colleges in the CCC system.

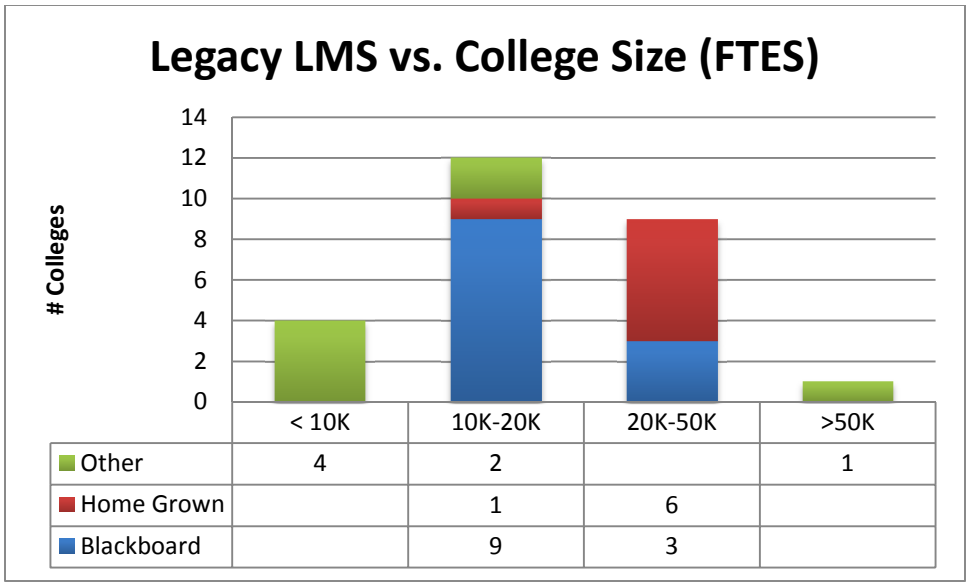

Figure 7. Legacy LMS vs. college size (full-time-equivalent students).

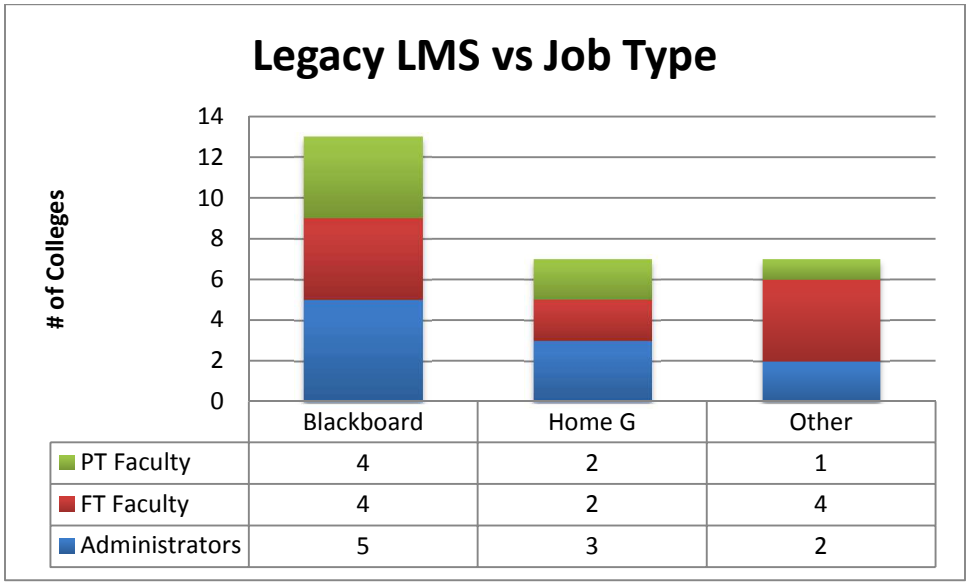

Figure 8. Legacy LMS vs. job type.

Table 8

Legacy LMS Experience

Years	Frequency	%
< 5 years	7	27%
5-10 years	11	42%
> 10 years	8	31%
Total	26	100%

Table 9

Legacy LMS Maturity

Project phase	Frequency	%
In production/use for < 2 years	0	0%
In production/use 3-5 years	3	11%
In production/use for > 5 years	24	89%
Total	27	100%

Reasons to Change to New LMS

The next set of questions asked participants to prioritize the eight most common reasons for changing from their legacy LMS to a new LMS. The rankings of the list of eight reasons to change from the legacy LMSs to a new LMS were consistent for all three groups and for both surveys. Table 10 lists the top reasons for change in rank order. Note that the top three reasons were all related to needs for improvements (e.g., improving the students' success, improving services to support the students, and improving the efficiency of the learning process). The next five reasons for change were more related to compliance, competitiveness, and replacing old technology.

Table 10

Legacy LMS—Reasons to Change (Ordered List)

Rank	Reason to change LMS
1	Increase user (students, faculty, or staff) satisfaction
2	Improve services for students, faculty, and staff
3	Increase efficiency (e.g., reduce cost, improve speed of transactions/processes)
4	Modernize the campus IT environment by replacing aging legacy (out-of-date) CMS
5	Keep institution competitive in order to attract additional students, improve enrollment management
6	Enhance accountability and regulatory compliance
7	Provide better management tools for decision making and planning
8	Compete with proprietary online institutions

Risk Factor Prioritization

The final set of 34 questions asked participants to rate on a 10-point Likert scale, with 1 being least important, the importance of 34 common large software implementation risks. Table 11 summarizes the ranked results of the participants' ratings in total and by job type. Figure 9 shows a box plot of the means of the risk factors. The data show a very diverse spread of ratings for each of the factors as shown in the box plot and standard deviations. There were also a few instances of outlier data points. The consensus on the top 10 risk factors will be discussed further in the analysis of the research questions later in this chapter.

Finally, in addition to rating the risk factors, participants made suggestions for mitigation measures for the risk factors they felt were most significant. The risk factor mitigation suggestions for the top 10 rated risk factors were captured and summarized for the participants to rank order in the second survey. The responses to the first survey were diverse and appeared to be representative of the target population.

Table 11

Risk Factor Rankings Comparison by Job Type

Risk factor	Total			Administrators			FT faculty			PT faculty		
	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.
21. Underfunding of maintenance and support. (Support for products in the maintenance phase. If the institution is unprepared or does not budget for this, the project can be judged a failure even if successful in all other aspects.)	1	7.96	1.54	1	8.13	1.89	2	7.33	1.41	2	8.29	1.20
5. Lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s). Failure to gain user commitment. (Laying blame for "lack of faculty/staff responsibility" on the project leader rather than on the users.)	2	7.84	1.82	2	8.00	1.31	1	7.67	2.45	10	7.57	1.64
20. Underfunding of development. (Setting the budget for a development effort before the scope and requirements are completely identified and defined.)	3	7.44	1.94	4	7.25	2.05	11	6.67	2.06	1	8.57	1.31
4. Lack of top management commitment to the project. (This includes oversight by administrators and visibility of their commitment, committing required resources, changing policies as needed.)	4	7.33	2.01	5	7.00	2.07	9	6.88	2.42	4	8.14	1.46
8. Lack of adequate user (faculty, staff, and student) cooperation and involvement. (Functional users must actively participate in the project team, and commit to their deliverables and responsibilities. User time must be dedicated to the goals of the project.)	5	7.24	2.01	7	6.88	1.89	6	7.00	2.50	7	7.86	1.55

Table 11 (continued)

Risk factor	Total			Administrators			FT faculty			PT faculty		
	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.
27. Insufficient staffing. (Not enough skilled people assigned to the project.)	6	7.16	2.41	3	7.38	2.50	27	6.11	2.93	6	8.00	1.13
24. Lack of required knowledge/skills among project personnel. (For example, technology and teaching experience online.)	7	7.12	1.99	10	6.63	2.39	12	6.67	2.12	3	8.14	0.99
13. Lack of effective CMS project management skills. (Project teams are formed, and the project manager does not have the power or skills to succeed. Project management must be properly addressed.)	8	7.08	2.28	9	6.71	2.43	16	6.56	2.96	5	8.00	0.76
7. Failure to manage end-user (faculty and student) expectations. (Expectations determine the actual success or failure of a project. Expectations mismatched with deliverable—too high or too low—can cause problems. Expectations must be correctly identified and constantly reinforced in order to avoid failure.)	9	6.96	1.86	13	6.38	2.00	5	7.00	2.18	11	7.29	1.31
19. New and/or unfamiliar subject matter for both users and developers. (Lack of knowledge of the field, requirements, terminology, and functionality of the software leading to poor requirements definition.)	10	6.88	1.86	15	6.00	2.14	4	7.00	1.73	9	7.57	1.51
10. Lack of appropriate experience of the user representatives. (Users assigned who lack necessary knowledge of the application or the organization.)	11	6.88	2.32	22	5.88	3.23	3	7.33	1.66	13	7.14	1.77

Table 11 (continued)

Risk factor	Total			Administrators			FT faculty			PT faculty		
	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.
28. Staffing volatility. (At some point in the project, losing the key staff such as project manager, analysts, or technicians, especially in new technology.)	12	6.76	2.45	6	7.00	2.51	17	6.44	2.92	20	6.86	2.10
31. Stability of technical architecture. (Such as computer hardware, software, and network.)	13	6.72	2.30	14	6.00	2.00	21	6.33	2.74	8	7.86	1.81
23. Scheduling—artificial deadlines. (Presence of unrealistic deadlines or functionality expectations in given time period.)	14	6.68	2.08	8	6.75	2.25	14	6.67	2.69	24	6.57	1.19
14. Improper definition of roles and responsibilities. (Members of the project team and/or the organization are unclear as to their roles and responsibilities. This includes outsourcers and consultants.)	15	6.52	2.22	12	6.50	2.27	22	6.33	2.83	26	6.57	1.58
18. Misunderstanding the startup requirements. (Not thoroughly defining the requirements of the new system before starting, consequently not understanding the true work effort, skill sets, and technology required to complete the project.)	16	6.52	2.52	21	5.88	2.85	15	6.67	2.87	19	6.86	1.85
1. A climate of change in the institution and organizational environment that creates instability in the project.	17	6.48	1.98	11	6.50	2.20	18	6.33	1.73	22	6.71	2.26
22. “All or nothing”/Full implementation all at once. (Requires budgeting entire project at the outset, leading to underfunding in later years of project.)	18	6.44	1.92	18	5.88	1.81	19	6.33	1.94	15	7.00	2.03

Table 11 (continued)

Risk factor	Total			Administrators			FT faculty			PT faculty		
	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.
17. Project not based on sound institutional requirements. (Users and developers ignore business/institutional requirements; develop system for sake of technology.)	19	6.44	1.94	19	5.88	2.17	10	6.78	1.86	28	6.43	1.92
30. Introduction of new technology. (Using new, or "bleeding edge," technology or major technological shift occurs during the project.)	20	6.44	2.14	24	5.75	3.11	7	6.89	1.27	27	6.43	1.85
9. Failure to identify all stakeholders (e.g., students). (Tunnel vision leads project management to ignore some key stakeholders in the project, affecting requirements definition, implementation, etc.)	21	6.40	2.16	23	5.75	1.91	23	6.33	2.87	14	7.00	1.36
11. Growing sophistication of users leads to higher expectations. (Users are more knowledgeable, have seen sophisticated applications, apply previous observations to existing project.)	22	6.36	2.02	31	5.38	2.26	8	6.89	2.26	23	6.57	1.16
12. Not managing change properly. Poor or nonexistent controls. (Each project needs a process to manage change so that scope and budget are controlled. Scope creep is a function of ineffective change management and of not clearly identifying what equals success.)	23	6.36	2.18	20	5.88	2.17	24	6.22	2.68	18	6.86	1.60
26. Poor project team relationships. (Strains existing in the team due to such things as burnout or conflicting egos and attitudes.)	24	6.24	2.15	27	5.50	2.45	20	6.33	2.50	25	6.57	1.25

Table 11 (continued)

Risk factor	Total			Administrators			FT faculty			PT faculty		
	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.
16. Scope creep, changing scope and objectives during the project. (Not thoroughly defining the scope of the new system and the requirements before starting, consequently not understanding the true work effort, skill sets, and technology required to complete the project.)	25	6.24	2.37	17	6.00	2.67	29	5.89	2.62	21	6.71	1.89
25. Lack of "people skills" in project leadership. (Project manager lacks the management skills in dealing with people on the team.)	26	6.24	2.59	30	5.50	2.83	31	5.89	3.02	12	7.29	1.51
34. Lack of control over consultants, vendors, and subcontractors. (Could lead to schedule or quality problems beyond control of project manager. No legal recourse due to poor contract specification.)	27	6.21	2.48	25	5.63	2.83	25	6.13	3.00	17	6.86	1.55
6. Conflict between different departments (e.g., distance ed. and faculty; administration and faculty). (Serious differences in project goals, deliverables, design, etc., calls into question concept of shared ownership.)	28	6.08	2.69	33	5.13	3.14	13	6.67	2.55	31	6.14	2.45
33. Multivendor projects complicate dependencies. (Integration of packages from multiple vendors hampered by incompatibilities and/or lack of cooperation between vendors.)	29	6.00	2.31	29	5.50	2.56	30	5.89	2.89	29	6.29	1.19
2. Mismatch between institutional culture and required business process changes needed for new system. A mismatch between the culture and the changes required by the new system.	30	6.00	2.43	26	5.63	2.92	26	6.11	2.32	32	6.00	2.31

Table 11 (continued)

Risk factor	Total			Administrators			FT faculty			PT faculty		
	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.	Rank	Mean	Std. dev.
15. Unclear/misunderstood initial scope/objectives. (It is impossible to pin down the real scope or objectives due to differences or fuzziness in the user community.)	31	5.76	2.15	16	6.00	2.14	32	5.11	2.57	30	6.14	1.67
3. Change in CEO or senior management. (New president, vice president, and/or managers set new direction that causes mismatch between institutional needs and project objectives.)	32	5.60	2.65	32	5.25	2.87	34	4.89	2.67	16	7.00	2.31
32. External dependencies not met. (Consultants or vendors do not deliver or go out of business.)	33	5.28	2.28	28	5.50	2.45	33	4.89	2.62	33	5.43	1.93
29. Excessive use of outside consultants. (Can lead to a conflict of interest, for example, billable hours vs. budget, or resulting in the internal staff not having significant involvement and insufficient knowledge transfer.)	34	5.28	2.91	34	4.25	3.06	28	6.00	2.83	34	5.43	2.93
Total averages		6.56	2.20		6.15	2.39		6.42	2.43		7.00	1.66

Note. Ratings are from a 10-point Likert scale, 1 being lowest risk and 10 being highest risk.

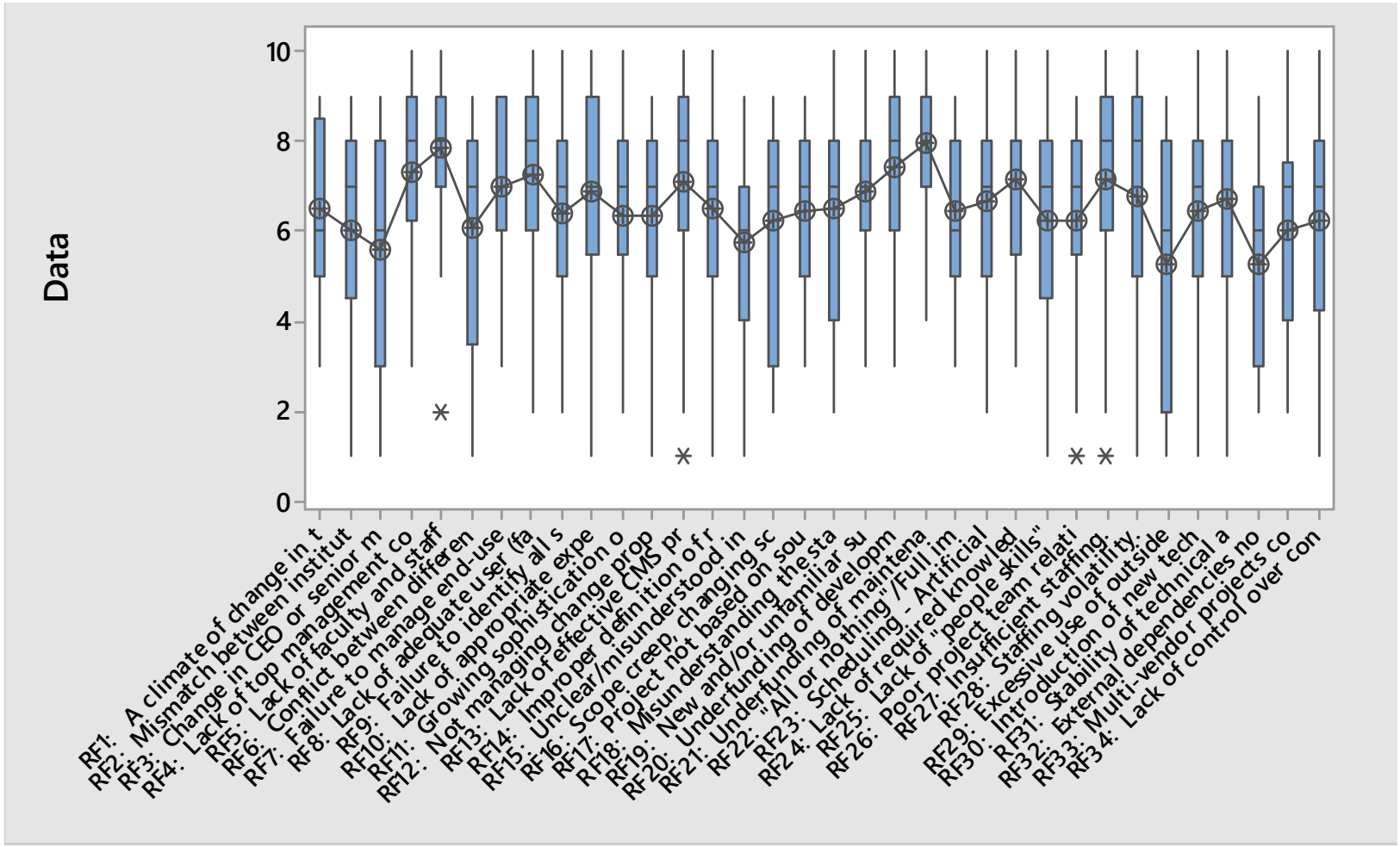

Figure 9. Box plot of means of risk factors (RF1:RF34). Outlier data points are represented by stars.

Survey 2

The second survey was conducted the week after the first survey closed and ran 2 weeks in the first half of December 2014. The second survey was administered to the 27 first survey participants; 22 completed the second survey. The second survey asked participants to provide their demographic information, reconfirm the priority of the reasons to change to a new LMS, reconfirm the priority of the top 10 risk factors, and rank the proposed mitigation suggestions for each of the top 10 risk factors.

Demographics

Table 12 shows the relative demographics of the participants in the first and second surveys, which are approximately the same. Twenty-two of the 27 first survey participants completed the second survey for 81% retention. In the second survey, respondents were required to report position experience and LMS experience, so the data were more complete than in the first survey where respondents could, and many did, skip these questions.

Table 12

Demographics of First and Second Survey Participants

	Position type			Position experience (years)			LMS experience (years)		
Survey	Admin	FT faculty	PT faculty	≤ 5	6-10	> 10	≤ 2	3	4
First	10	10	7	7	12	8	1	6	12
Second	7	8	7	6	8	8	5	6	11

Reasons for Change

Participants in the second survey were asked to confirm the rank order of the primary reasons to change from their legacy LMSs to the new OEI system. In the second

survey, as shown in Figure 10, both the full- and part-time faculty prioritized the risk factors in the same order as they did in the first survey, but the administrators ranked several of the change driver factors in a different order than the faculty. A one-way analysis of variance (ANOVA) did not show any statistically significant difference at the 95% confidence interval. If more data were collected from a larger sample, it is possible that there could be a significant difference in the relative priority of some of the reasons for change between the administrators and the faculty.

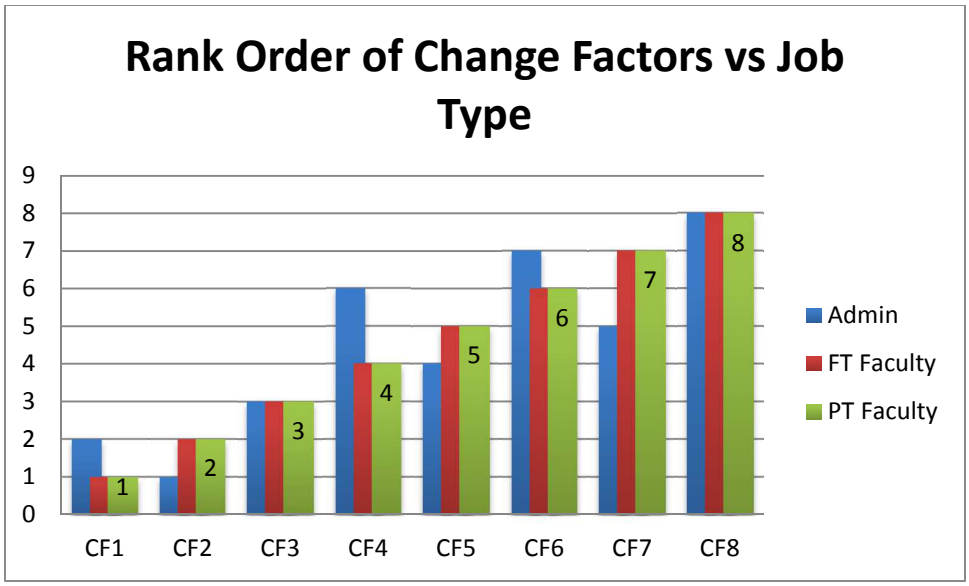

Figure 10. Rank order of change factors vs. job type: Survey 2.

Risk Factors

The second survey asked participants to confirm the ranking of the top 10 risk factors. The top two risk factors were again found to be statistically significant with a one-way ANOVA at 95% confidence, just like in the first survey. This difference can also be seen to be the most significant in Figure 11. The other eight risk factors had no statistically significant difference in their means. The second survey affirmed the

importance of addressing the top two risk factors: adequate funding for maintenance, and faculty and staff ownership of the need to change.

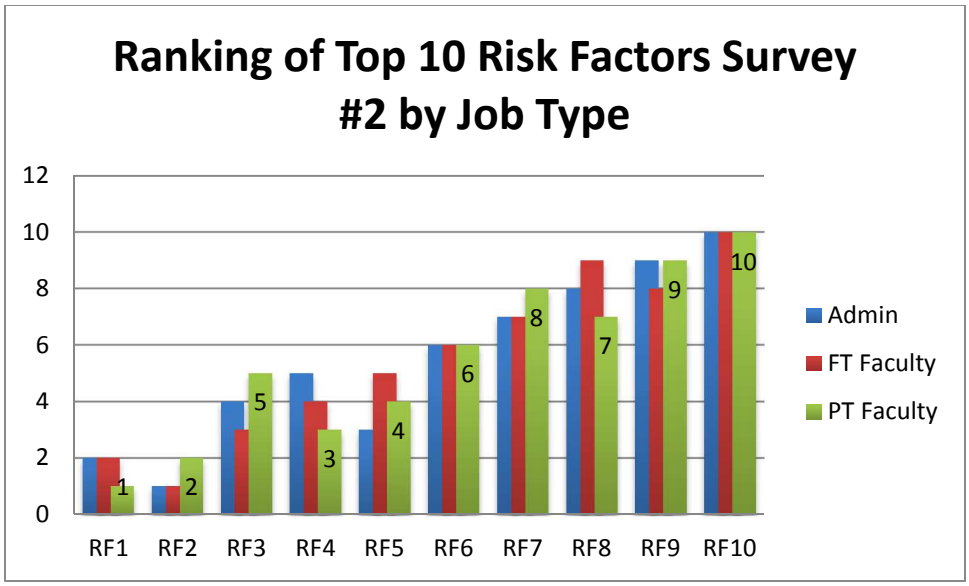

Figure 11. Ranking of means of top 10 risk factors: Survey 2.

Risk Mitigations

What follows is a summary of the prioritization of risk mitigation suggestions for each of the top 10 risk factors and also whether any of the recommendations were found to be statistically significant with a one-way ANOVA with 95% confidence. The rankings of mitigation suggestions for each risk factor are shown in Figures 12-21. The ranked mitigation suggestions are represented in the *x*-axis of the figures as M1.1 (mitigation suggestion rank 1 for Risk Factor 1), M1.2, and so forth.

Figure 12 summarizes the Pareto list (sum of all three job type inputs in Pareto order, lowest being most important) for mitigation suggestions for Risk Factor 1. A one-way ANOVA was conducted, and all of the risk factors were found to be statistically all the same, with 95% confidence. Since this risk factor was found to be statistically

significant, the OEI team should seriously consider implementation of the recommended risk mitigation suggestions.

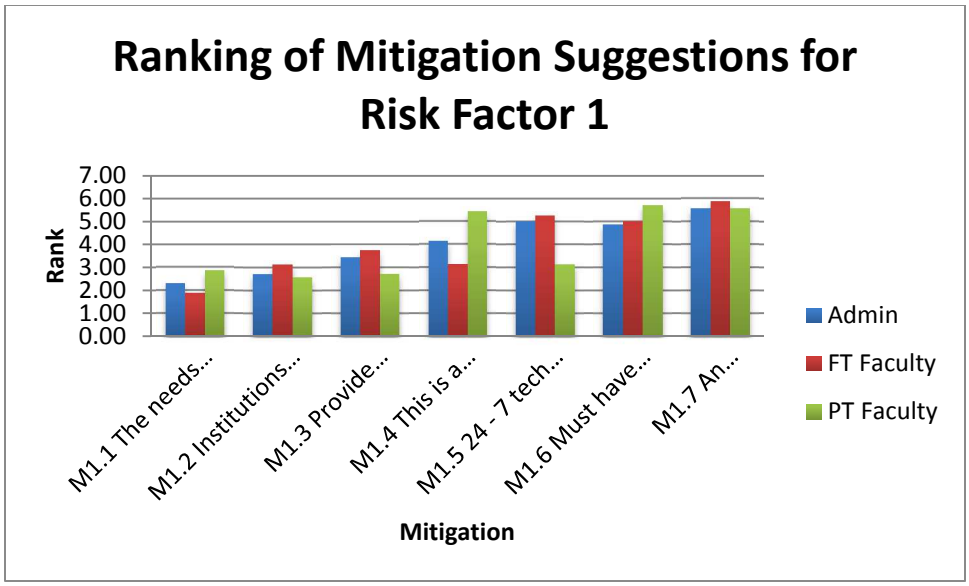

Figure 12. Ranking of mitigation suggestions for Risk Factor 1.

Risk Factor 2 was also significant, but again there were no statistically significance differences between the mitigation suggestions as determined by a one-way ANOVA. It is recommended that the top-ranked mitigation suggestions (see Figure 13) be strongly considered for implementation.

Risk Factors 3 through 10 were not statistically significant, but the recommended risk mitigation suggestions should be reviewed and strongly considered to improve the success of the OEI implementation. It should be noted that the ranking of the mitigation suggestions for Risk Factors 3 through 10 did vary by job type but not significantly. If a larger sample size (more survey participants) were used, it is possible there might be a statistically significant difference between the job type groups. Figures 14-21 show the recommended mitigation suggestions in total rank order.

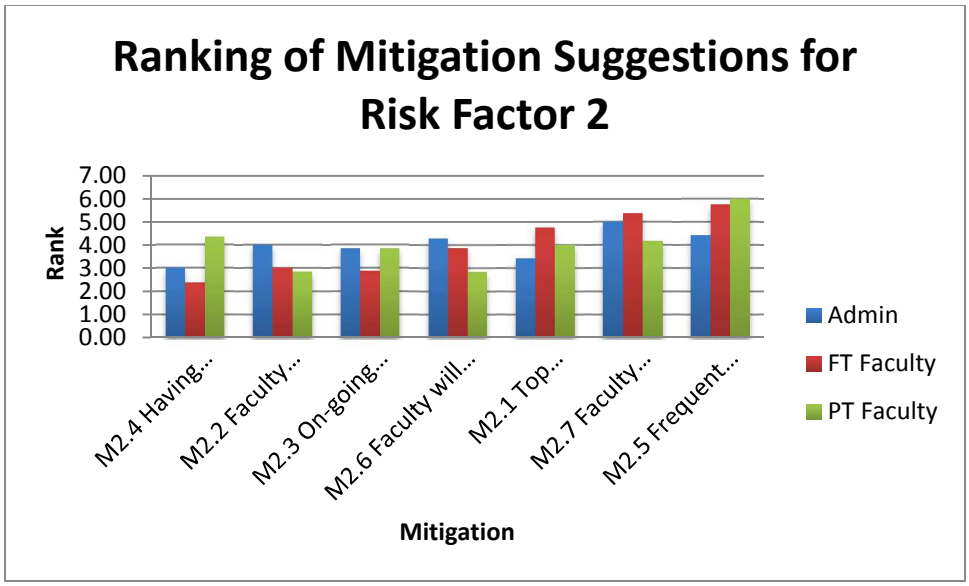

Figure 13. Ranking of mitigation suggestions for Risk Factor 2.

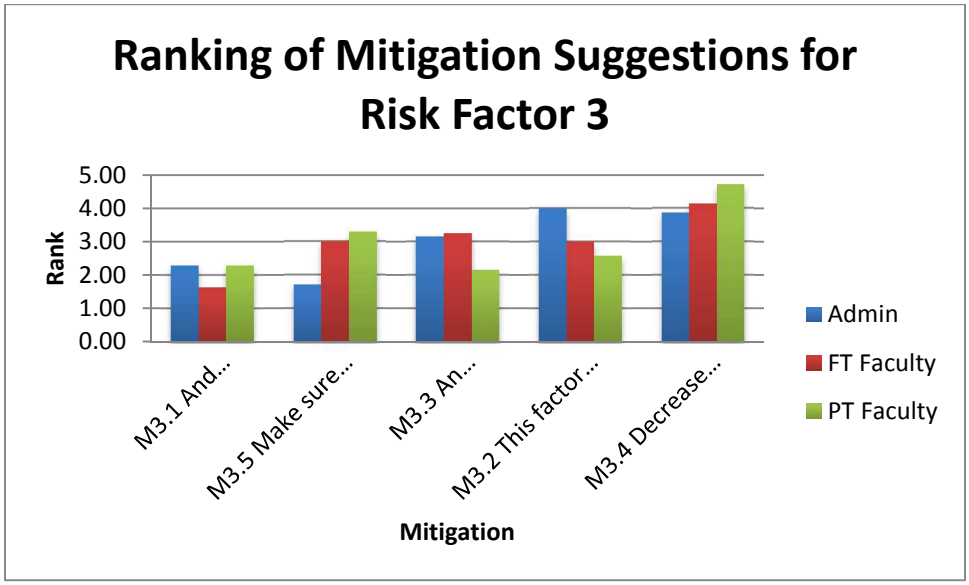

Figure 14. Ranking of mitigation suggestions for Risk Factor 3.

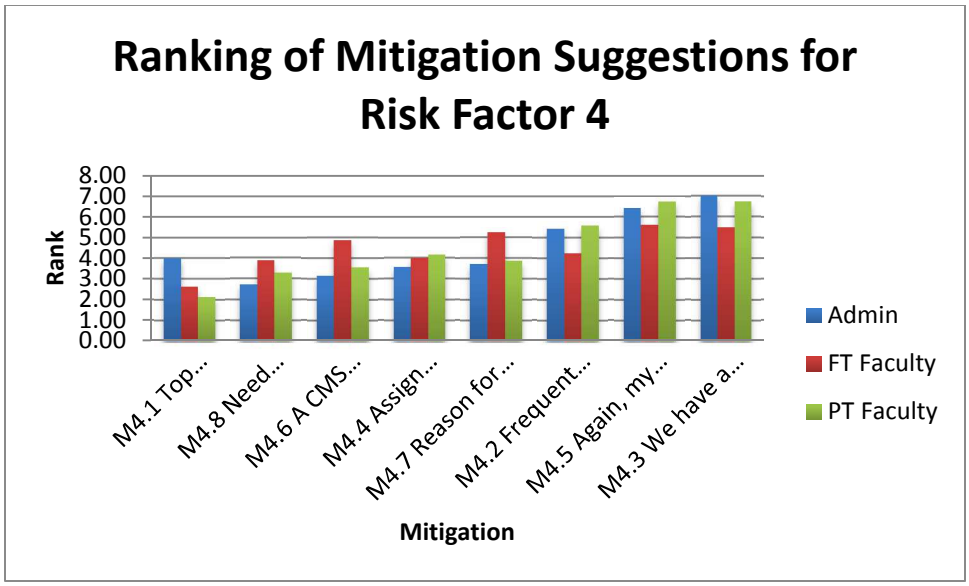

Figure 15. Ranking of mitigation suggestions for Risk Factor 4.

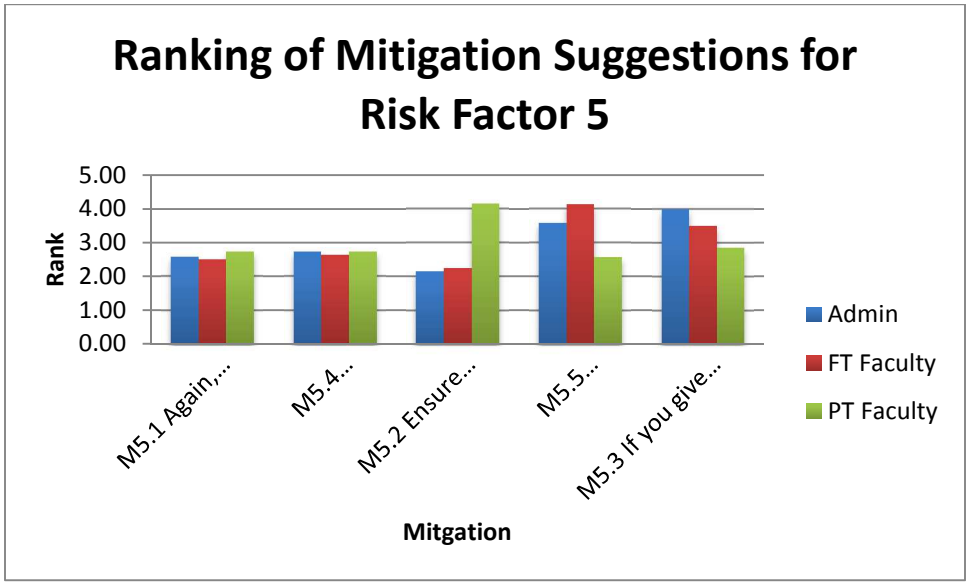

Figure 16. Ranking of mitigation suggestions for Risk Factor 5.

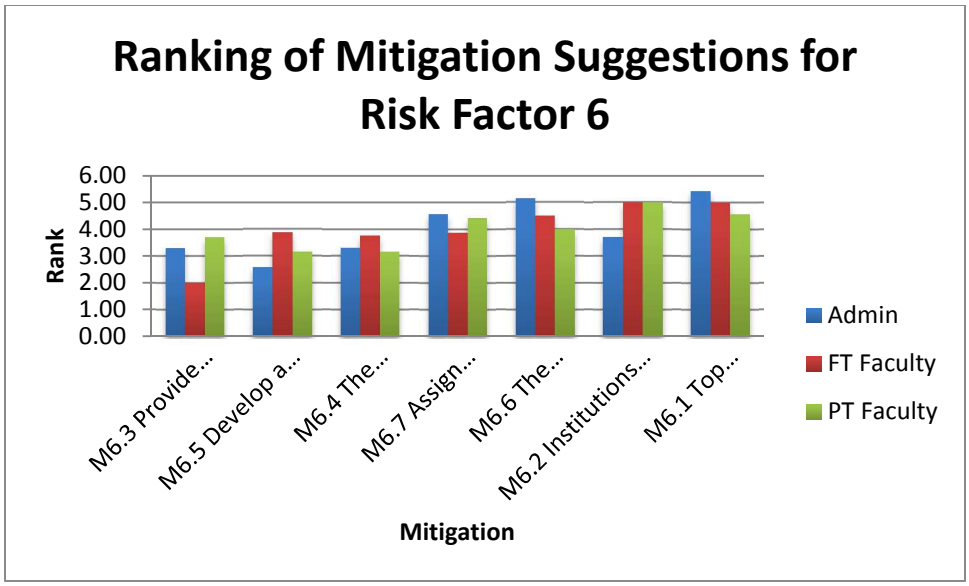

Figure 17. Ranking of mitigation suggestions for Risk Factor 6.

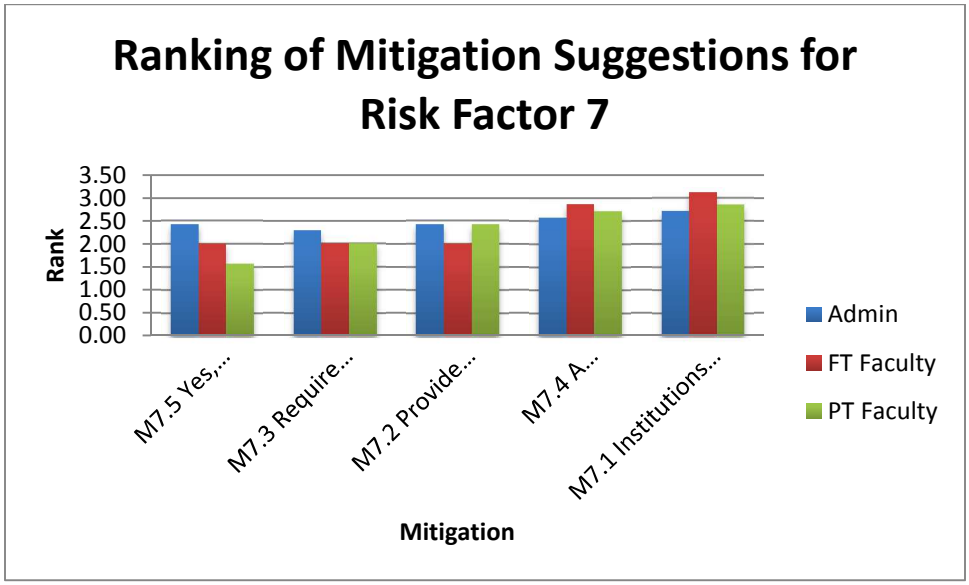

Figure 18. Ranking of mitigation suggestions for Risk Factor 7.

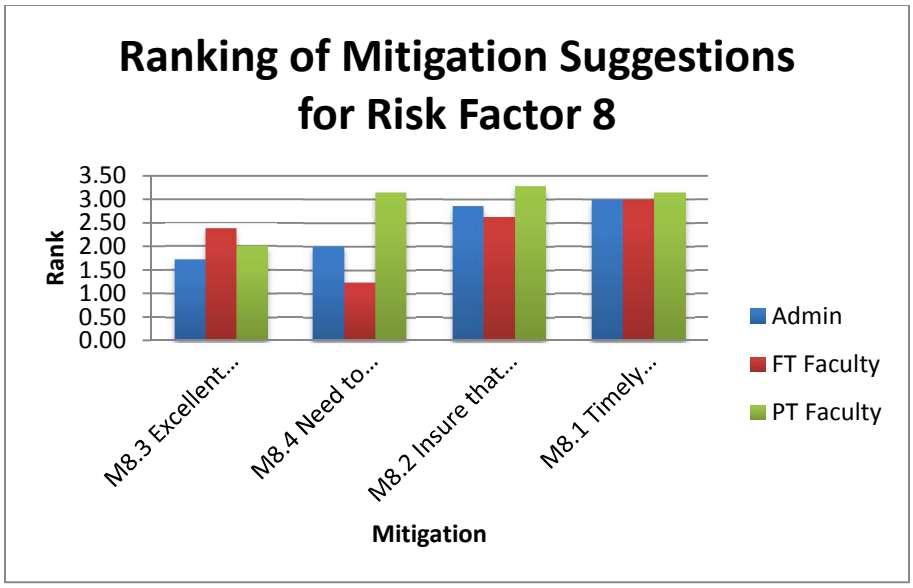

Figure 19. Ranking of mitigation suggestions for Risk Factor 8.

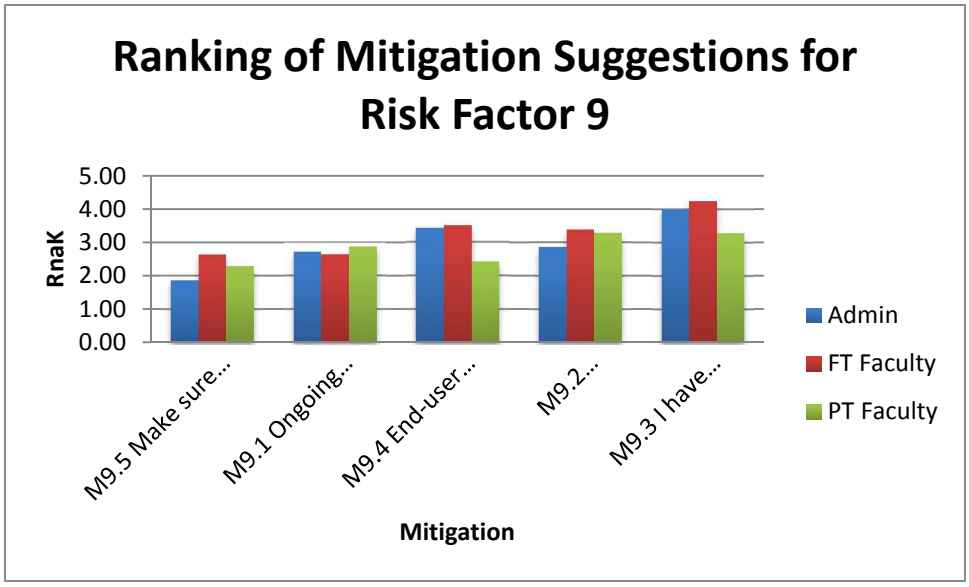

Figure 20. Ranking of mitigation suggestions for Risk Factor 9.

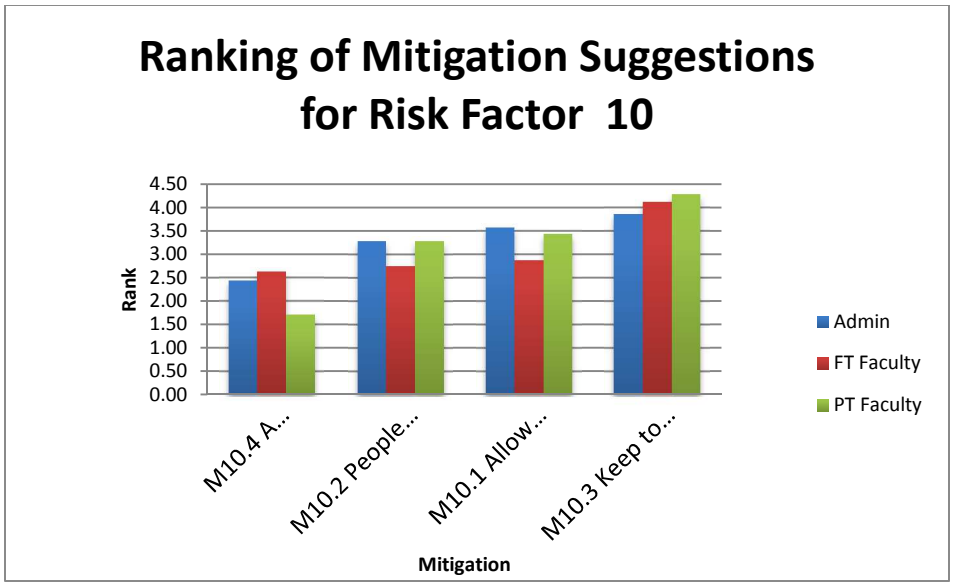

Figure 21. Ranking of mitigation suggestions for Risk Factor 10.

Data Analysis by Research Question

Research Question 1

What are the most significant implementation risk factors identified by the survey participants using the Schmidt et al. (2001) common risk factors list?

A Pareto chart of the means from the first survey identified the top 10 risk factors. Table 13 outlines the top 10 risk factors. Three themes emerged in the top 10 risk factors. The first theme was funding; development funding (Risk Factor 20), support funding (Risk Factor 21), and staff funding (Risk Factor 27) tie to the college's commitment of critical resources to the project as the highest risk factor. The second theme was commitment; users (Risk Factor 8), administrators (Risk Factor 4), and staff (Risk Factor 5) must all have buy-in and be committed to the success of the implementation. The third theme was training and skills; the bottom four risk factors all related to the need for additional skills and training for success.

Table 13

Top 10 Implementation Risk Factors

Theme	Risk factor	Total		
		Rank	Mean	Std. dev.
Funding	21. Underfunding of maintenance and support. (Support for products in the maintenance phase. If the institution is unprepared or does not budget for this, the project can be judged a failure even if successful in all other aspects.)	1	7.96	1.54
Commitment	5. Lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s). Failure to gain user commitment. (Laying blame for "lack of faculty/staff responsibility" on the project leader rather than on the users.)	2	7.84	1.82
Funding	20. Underfunding of development. (Setting the budget for a development effort before the scope and requirements are completely identified and defined.)	3	7.44	1.94
Commitment	4. Lack of top management commitment to the project. (This includes oversight by administrators and visibility of their commitment, committing required resources, changing policies as needed.)	4	7.33	2.01
Commitment	8. Lack of adequate user (faculty, staff, and student) cooperation and involvement. (Functional users must actively participate in the project team, and commit to their deliverables and responsibilities. User time must be dedicated to the goals of the project.)	5	7.24	2.01
Funding	27. Insufficient staffing. (Not enough skilled people assigned to the project.)	6	7.16	2.41
Skills	24. Lack of required knowledge/skills among project personnel. (For example, technology and teaching experience online.)	7	7.12	1.99
Skills	13. Lack of effective CMS project management skills. (Project teams are formed, and the project manager does not have the power or skills to succeed. Project management must be properly addressed.)	8	7.08	2.28
Skills	7. Failure to manage end-user (faculty and student) expectations. (Expectations determine the actual success or failure of a project. Expectations mismatched with deliverable—too high or too low—can cause problems. Expectations must be correctly identified and constantly reinforced in order to avoid failure.)	9	6.96	1.86

Table 13 (continued)

Theme	Risk factor	Total Rank	Total Mean	Total Std. dev.
Skills	19. New and/or unfamiliar subject matter for both users and developers. (Lack of knowledge of the field, requirements, terminology, and functionality of the software leading to poor requirements definition.)	10	6.88	1.86

Note. Data from Survey 1.

A one-way ANOVA was run to test the hypothesis that all of the means were statistically equal at an alpha level of 0.05 using Tukey pairwise comparisons; four factors were found to be significantly different (means not equal to all others) with 95% confidence: Risk Factor 21 and Risk Factor 5 at the high end of the means, and Risk Factor 32 and Risk Factor 29 at the low end of the means. This analysis was done twice, once with all data and once with outlier data removed, yielding identical results. Table 14 summarizes the Tukey pairwise comparisons from SPSS. The significance of Risk Factor 21 and Risk Factor 5 is that these two factors likely have the most influence of the top 10 risk factors on the success of the implementation. Risk Factor 32 and Risk Factor 29 are significantly less influential than the other risk factors and therefore could be more safely ignored.

The bottom line is that the two most influential risk factors for success are making sure there is sufficient funding for maintenance and support (Risk Factor 21) and making sure there is commitment and buy-in for the new system from the faculty and staff (Risk Factor 5).

Table 14

Grouping Information Using the Tukey Method and 95% Confidence

Factor	Description	*n*	Mean	Grouping
RF21	Underfunding of maintenance	25	7.96	A
RF5	Lack of faculty and staff	25	7.84	A
RF32	External dependencies	25	5.28	B
RF29	Excessive use of outside consultants	25	5.28	B

Note. Data from Survey 1. The statistical analysis was done using SPSS.

Research Question 2

Are there significant differences among the risk factors identified by administrators and faculty to successful implementation?

Table 15 shows a summary of the means and standard deviations of the different position types. It would appear that there might be a difference between the job types, particularly the part-time faculty members since they tended to have higher average means and lower standard deviations (more consistent answers) in Survey 1 and higher standard deviations in Survey 2, as shown in Table 15. However, the one-way ANOVA using Tukey pairwise comparisons with a 95% confidence interval showed no significant difference between the job types. If there had been more survey participants who exhibited consistent differences in ratings, it is possible there might be a difference between the assessments by job type; however, the data in this study affirmed the null hypothesis that there is no difference in risk assessments between job types.

Table 15

Summary of Means and Standard Deviations for First and Second Surveys by Job Type

	Survey 1		Survey 2	
Job type	RF mean	RF std. dev.	RF mean	RF std. dev.
Administrators	6.21	2.17	5.50	1.79
Full-time faculty	6.42	2.29	5.50	1.81
Part-time faculty	7.22	1.62	5.50	2.50
Total avg.	6.62	2.20	5.50	2.03

Research Question 3

What are the risk mitigation recommendations to improve the adoption and success of the initiative?

Table 16 summarizes a Pareto chart of the means of the ratings for each of the recommended risk mitigation suggestions for each of the top 10 risk factors. Looking at the top-ranked recommended mitigations, a few themes emerged (common repeated recommendations), which will be expanded on in Chapter V. Briefly, the most common themes were communications, sustained commitment (funding and priority of time of staff), and training.

Research Question 4

Do the demographic factors of time in current position and prior learning management system (LMS) experience of the survey participants affect the risk assessments?

Table 17 summarizes the data from the first survey on the participants' years of experience versus the means and standard deviations of the risk factors. The data appear to show that more experienced survey participants had a higher mean for risk factors.

Table 16

Pareto of Recommended Mitigations for Top 10 Risk Factors

Risk factor	Rank	Mean	Recommended risk mitigation
1. Underfunding of maintenance and support.	1	2.32	The needs for training and support are often underestimated for all users (e.g., faculty, students).
	2	2.82	Institutions should adopt a total-cost-of-ownership model that incorporates support staffing levels.
	3	3.32	Provide funding.
	4	4.18	This is a real fear. Acknowledge the fear.
	5	4.50	24/7 tech support is required.
	6	5.18	Institutions must have on-campus CMS support staff who are not colocated with IT staff.
	7	5.68	An exploratory committee should be formed to assess the options and costs associated with each before a budget is set.
2. Lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s).	1	3.29	Faculty input must be facilitated, and faculty should be compensated for training time.
	2	3.33	Faculty will have buy-in for the project if they receive training from an instructional designer.
	3	3.48	Ongoing communication with and engagement of the faculty to participate in the implementation process.
	4	3.67	Engage faculty to participate in choosing the CMS.
	5	4.14	Top administrators need to make their expectations crystal clear.
	6	4.71	Faculty and staff need to understand that online education is a growing segment of education.
	7	5.38	Frequent information meetings and symposia; expressed commitment by governing bodies and faculty committees.
3. Underfunding of development.	1	2.05	The funding needs of an LMS implementation/deployment are often underestimated. Need to fund for success.
	2	2.77	Make sure the budget is defined commiserate with needs.
	3	2.86	An exploratory committee should be formed to assess the options and costs associated with each option before a budget is set for a development effort.
	4	3.64	Ensure there is adequate funding; too often publicly developed CMS development efforts are underfunded.
	5	3.68	Decrease the scope to match the funding.

Table 16 (continued)

Risk factor	Rank	Mean	Recommended risk mitigation
4. Lack of top management commitment to the project.	1	2.91	Top administrators need to acknowledge the change is significant and commit reasonable resources to manage/ease the transition.
	2	3.91	Assign someone to be the point person prior to the changes taking place.
	3	4.00	Need strategic plan authored through participatory governance that drives decisions and institutional commitment.
	4	4.27	A CMS cannot be implemented successfully without oversight, in terms of guidelines, policies, and training.
	5	4.73	Reason for change needs to come from the top down. Have clear procedures published.
	6	4.77	Frequent information meetings; back channel conversations with lots of listening; working through details of how the project would benefit the college.
	7	5.59	We do get updates in our online committee. The larger campus and faculty are not aware of the OEI project.
	8	5.82	Must change college policy to encourage online instruction.
5. Lack of adequate user (faculty, staff, and student) cooperation and involvement.	1	2.50	Development of college CMS support staff and ongoing training for faculty.
	2	2.59	Administrators must make expectations clear to all stakeholders, and they must provide appropriate resources, rewards, and consequences.
	3	3.09	The CEO/senior management needs to communicate that online education is important and hold all parties accountable for their part in that success.
	4	3.32	Ensure participatory governance project sponsorship, including academic senate sponsorship and student government sponsorship.
	5	3.50	If you give the faculty a choice to use the old CMS or the new CMS, you will not have faculty buy-in or cooperation.

Table 16 (continued)

Risk factor	Rank	Mean	Recommended risk mitigation
6. Insufficient staffing. (Not enough skilled people assigned to the project.)	1	3.09	The support staff needs to be in place prior to implementation.
	2	3.18	Develop a staffing plan and a budget to support the staffing plan.
	3	3.55	Provide staffing.
	4	4.05	Assign skilled and knowledgeable people to the project.
	5	4.32	Institutions should adopt a total-cost-of-ownership model that incorporates support staffing levels, a service level agreement (SLA), and ongoing training costs.
	6	4.55	The budget should take this into consideration, because lack of staffing means lack of support, and this leads to attrition.
	7	5.27	Top administrators should trust user (faculty and staff) opinions on what will be required for rollout. They are usually correct, in my opinion.
7. Lack of required knowledge/skills among project personnel.	1	2.05	Require project personnel to have experience in teaching online and or technology experience relating to online learning. Keep administrators who do not have a clue or desire out of the process.
	2	2.27	Provide training.
	3	2.55	A mandatory faculty certification program and mandatory student orientation program are critical to faculty and student success in online education.
	4	3.14	Institutions should adopt a total-cost-of-ownership model that includes support staffing levels, a SLA with satisfaction levels, and ongoing training costs.
8. Lack of effective CMS project management skills.	1	2.00	Assign a person or group with appropriate authority to manage the project and make their roles and responsibilities clear.
	2	2.27	An excellent project manager is needed, one who has authority to make people accountable to meet deadlines, provide resources, stick to timeline, etc.
	3	2.82	Timely periodic evaluations of project manager; creation of "early warning" criteria that may indicate if the process is off track; participation of advisers, faculty, and staff
	4	2.91	Ensure that project management includes all user representation. Create a local steering committee.

Table 16 (continued)

Risk factor	Rank	Mean	Recommended risk mitigation
9. Failure to manage end-user (faculty and student) expectations.	1	2.09	Need to continually communicate with end users during selections and implementation
	2	2.73	Ongoing evaluations and reworking of expectations is needed.
	3	3.00	Mandatory training (from technology and pedagogical standpoints) to ensure that the end result meets the expectations of the faculty and the student.
	4	3.41	Information sharing is of key importance.
	5	3.77	Work with faculty and college CMS staff to develop the expectations of the delivery system.
10. New and/or unfamiliar subject matter for both users and developers.	1	1.86	A mandatory faculty certification and student orientation is the best way to mitigate for lack of knowledge with online education and CMS requirements.
	2	2.68	Make sure to have CMS experts on the team.
	3	3.09	People can be trained if training is available on an ongoing basis.
	4	3.50	Allow long-time online faculty training to make the transition between the old CMS and the new CMS. These faculty may have fears of change.
	5	3.86	Keep to the basics. Do not try to develop some high-level CMS system that community college students will not understand.

However, a one-way ANOVA found no significant difference between the means with 95% confidence.

Table 17

Differences in Risk Factor Assessment vs. Position Experience

Years of experience	Frequency	%	Mean RF	Standard deviation RF
0-5	6	24%	7.17	1.72
6-10	12	48%	7.50	1.98
> 10	7	28%	9.00	1.16
Total/avg.	25	100%	7.89	1.62

It is important to note, as previously discussed, Risk Factors 5 and 21 were found to be significant and were ranked first and second in the top 10 risk factors. The researcher conducted a one-way ANOVA for Risk Factor 5 and Risk Factor 21 versus time in position and prior LMS experience. The one-way ANOVA for Risk Factor 5 found no significant difference in the means based on time in position, as shown in the Tukey difference of means plot in Figure 22. The one-way ANOVA of Risk Factor 21 also showed there was not enough evidence to conclude that any of the *x* variables (risk factor ratings) had a statistically significant relationship to time in position.

Next, the researcher examined if there were any statistically significant relationships between risk factor assessments and prior LMS experience. As shown in Table 18, the means and standard deviations for the risk factors were similar for all levels of experience. A one-way ANOVA was run for Risk Factor 5 and Risk Factor 21, and no evidence of a statistically significant relationship was found.

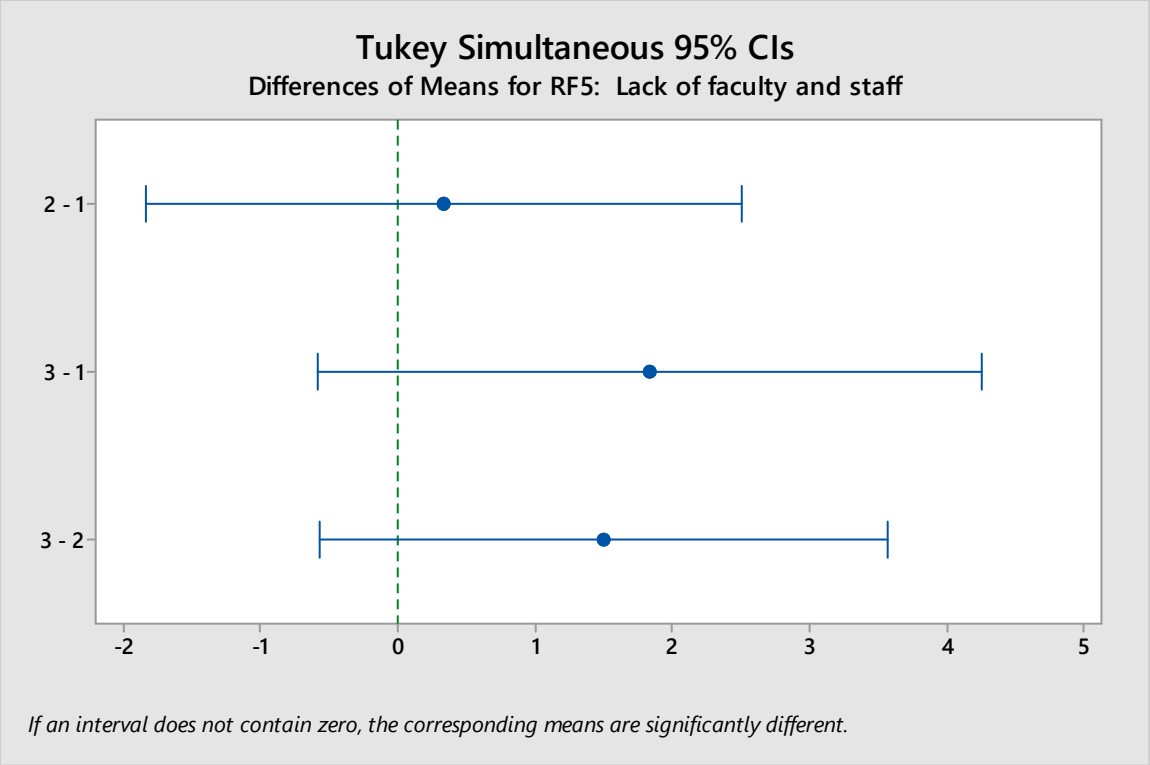

Figure 22. One-way ANOVA Tukey plot for Risk Factor 5 vs. time in position.

Table 18

Differences in Risk Factor Assessment Based on Prior LMS Experience

Legacy LMS exper. (years)	Frequency	%	Mean RF	Standard deviation RF
< 2	7	26%	6.50	1.65
3	12	44%	6.47	1.43
4	8	30%	6.71	1.80
Total/avg.	27	100%	6.56	1.63

In summary, for Research Question 4, there were no significant relationships found between risk factor assessments and the length of prior work experience or prior LMS experience.

Research Question 5

Are there significant differences among the risk factor assessments associated with the current LMS vendor used (e.g., Blackboard, Moodle, homegrown) and how long it has been in use?

A summary of the means and standard deviations for legacy LMS vendor versus average risk factor assessment is shown in Table 19. The table appears to show that home grown systems might have a higher average user risk rating. In other words, colleges with homegrown systems may be more attached to those systems and harder to convert to a new system. A multivariate analysis of variance (MANOVA) was done for legacy LMS type versus risk factor assessments. The MANOVA assessment was done to determine if there were differences too small to be detected by ANOVAs. A MANOVA also detects multivariate response patterns, which single-response ANOVAs might miss. The MANOVA results were negative; no statistically significant relationships were found between the CMS type and the risk factor assessments for the two significant risk factors: Risk Factor 5 and Risk Factor 21. Figure 23 shows the residual plots for Risk Factor 5. A significant outlier data point is evident in the normal probability plot and the histogram. The MANOVA was redone with this data point excluded, and the results still showed no statistical significance.

Another MANOVA was done with respect to risk factor assessments versus LMS legacy experience. As shown in Table 20 and Figure 24, no significant relationships were found. The data showed no statistically significant relationship between risk factor assessments and legacy LMS vendor or legacy LMS experience.

Table 19

MANOVA for Legacy LMS Type

Criterion	Test statistic	*F*	Num.	Denom.	*p*
Wilks'	0.82239	0.488	8	38	0.857
Lawley-Hotelling	0.20671	0.465	8	36	0.872
Pillai's	0.18521	0.510	8	40	0.841
Roy's	0.14125				

Note. MANOVA calculated using SPSS.

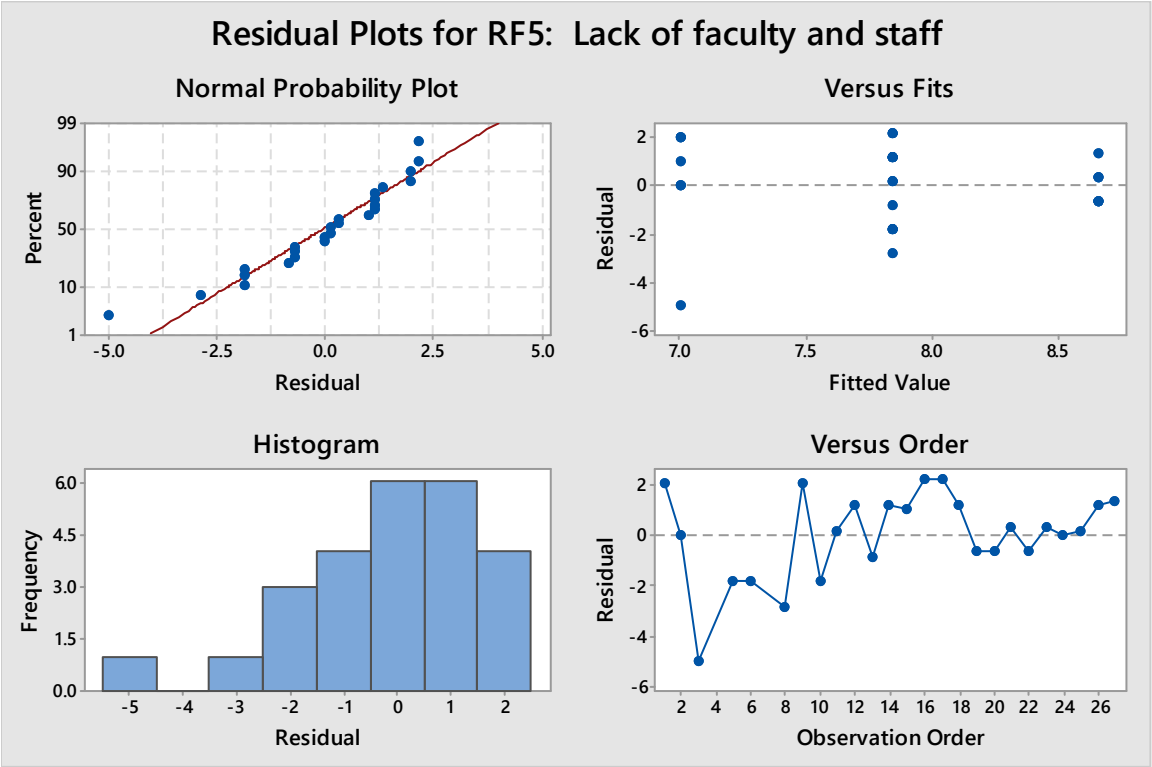

Figure 23. MANOVA residual plots for Risk Factor 5 vs. legacy LMS type.

Table 20

MANOVA for Legacy LMS Experience

Criterion	Test statistic	*F*	Num.	Denom.	*p*
Wilks'	0.79492	0.578	8	38	0.790
Lawley-Hotelling	0.24363	0.548	8	36	0.812
Pillai's	0.21649	0.607	8	40	0.766
Roy's	0.14386				

Note. MANOVA calculated using SPSS.

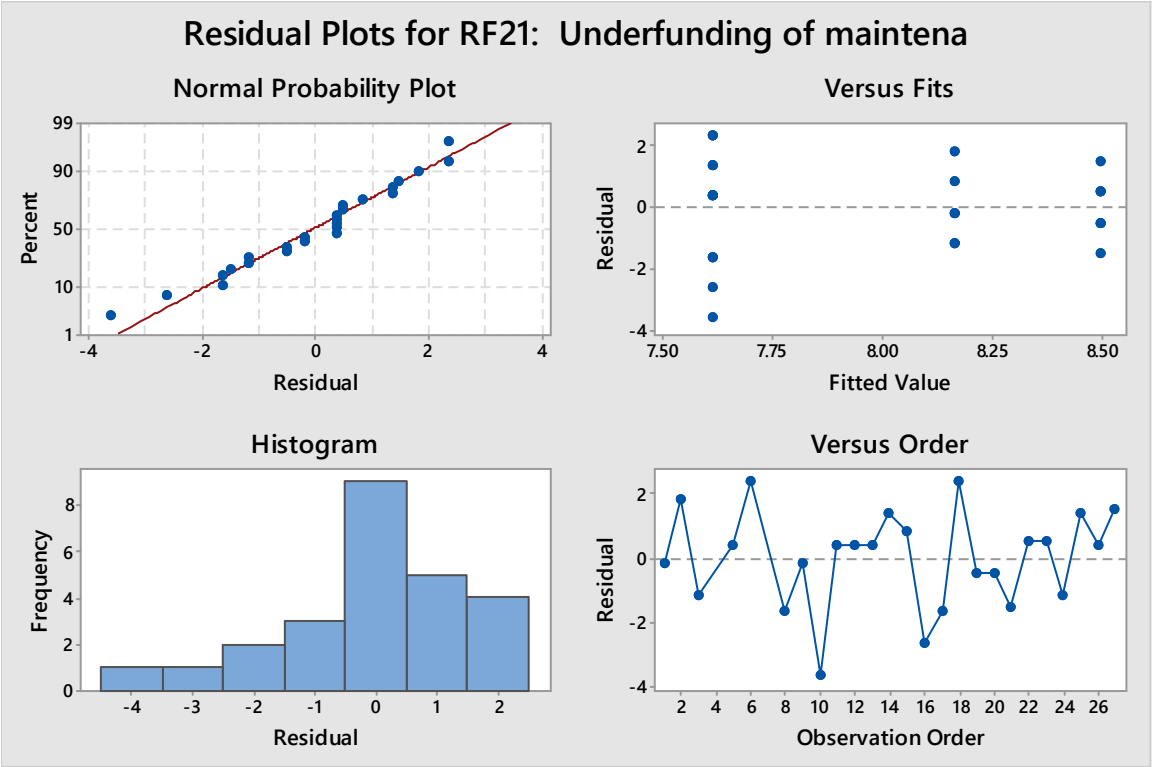

Figure 24. MANOVA residual plots for Risk Factor 21 vs. legacy LMS type.

Summary

What follows is a brief summary of the findings from this research project. First, the survey participants' demographics mirrored those of the target population on multiple dimensions: district size, job types of participants, job experience, legacy LMS types, and

legacy LMS experience. The participants were engaged and provided rich answers based on their personal experience and preferences, which was reflected in the relatively high spread of still normally distributed answers to the survey questions.

Next, Table 21 summarizes the rank-order list of the top eight reasons the participants felt their colleges should change to a new LMS. The top three reasons were all related to needs for improvements (e.g., improving the students' success, improving services to support the students, and improving the effectiveness of the learning process with the LMS). The next five reasons were related to compliance improvements and competitiveness.

Table 21

Key Reasons to Change to New LMS

Theme	Rank	Reason to change LMS
Improve	1	Increase user (students, faculty, or staff) satisfaction
	2	Improve services for students, faculty, and staff
	3	Increase efficiency (e.g., reduce cost, improve speed of transactions/processes)
Compliance and competitiveness	4	Modernize the campus IT environment by replacing aging legacy (out-of-date) CMS
	5	Keep institution competitive in order to attract additional students, improve enrollment management
	6	Enhance accountability and regulatory compliance
	7	Provide better management tools for decision making and planning
	8	Compete with proprietary online institutions

The core of this study was the participants' assessment of the 34 most common large software project implementation risk factors. Four of the 34 risk factors were found to be statistically significant. As shown in Table 14, the top two risk factors had means of 7.84 and 7.96, the bottom two 5.28 and 5.28. The average mean was 6.56, as shown in

Table 11. The top two factors are of most interest since these two risk factors were prioritized as the most important by the survey participants: Risk Factor 21, underfunding of maintenance and support, and Risk Factor 5, lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s) (i.e., user commitment). The means of the proposed mitigation recommendations were not statistically different, so using the means of the recommendations as a guide for priority may be helpful. Table 22 summarizes the prioritized recommendations for these two highest risk factors that should be considered.

Table 22

Most Significant Implementation Risks and Suggested Mitigations

Risk factor	Rank	Mean	Recommended risk mitigation
1. Underfunding of maintenance and support.	1	2.32	The needs for training and support are often underestimated for all users (e.g., faculty, students).
	2	2.82	Institutions should adopt a total-cost-of-ownership model that incorporates support staffing levels.
	3	3.32	Provide funding.
	4	4.18	This is a real fear.
	5	4.50	24/7 tech support required.
	6	5.18	Must have on-campus CMS support staff who are not colocated with IT staff.
	7	5.68	An exploratory committee should be formed to assess the options and costs associated with each before a budget is set.
2. Lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s).	1	3.29	Faculty input must be facilitated and faculty should be compensated for training time.
	2	3.33	Faculty will have buy-in for the project if they receive training from an instructional designer.
	3	3.48	Ongoing communication with and engagement of the faculty to participate in the implementation process.
	4	3.67	Engage faculty to participate in choosing the CMS.
	5	4.14	Top administrators need to make their expectations crystal clear.
	6	4.71	Faculty and staff need to understand that online education is a growing segment of education.
	7	5.38	Frequent information meetings and symposia; expressed commitment by governing bodies and faculty committees.

Finally, Table 23 summarizes the findings from this study for the five research questions. There were no significant differences in risk assessments found for any of the demographic factors of job type, job experience, LMS type, LMS experience, or prior type of LMS. Two of the top 10 risk factors were found to be statistically significant, and these should be evaluated carefully and addressed by the OEI implementation teams.

Table 23

Research Question Findings and Implications

Research question	Key findings	Implications
1. What are the most significant implementation risk factors identified by the survey participants using the Schmidt et al. (2001) common risk factors list?	Risk Factors 21 and 5 are significant.	Focus on mitigation of these top two risk factors for most impact to improve implementation success.
2. Are there significant differences among the risk factors identified by administrators and faculty to successful implementation?	No significant difference	Job type does not change implementation risk assessments.
3. What are the risk mitigation recommendations to improve the adoption and success of the initiative?	See Table 22	Strongly consider risk mitigations and implement for at least the top two risk factors.
4. Do the demographic factors of time in current position and prior learning management system (LMS) experience of the survey participants affect the risk assessments?	No significant difference	Time in current position and prior LMS experience does not change implementation risk assessments.
5. Are there significant differences among the risk factor assessments associated with the current LMS vendor used (e.g., Blackboard, Moodle, homegrown) and how long it has been in use?	No significant difference	Legacy LMS vendor and how long it has been used does not change implementation risk assessments.

CHAPTER V: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The American dream is threatened because a highly educated population is fundamental to economic growth and a vibrant democracy (AACC, 2012a). In an increasingly competitive global economy, the economic strength and middle class of the United States depend on the education and skills of the nation's workers (Carnevale & Rose, 2011; Engle & Tinto, 2008; Lumina Foundation for Education, 2013; ManpowerGroup, 2013). The leadership of the United States in college graduation rates (associate's and bachelor's degrees), once unchallenged, is currently ranked 16th (AACC, 2012a); the top countries are achieving a 55% college degree completion rate, compared to only 42% in the United States for 25- to 34-year-olds (Carnevale & Rose, 2011). If the United States does not generate more educated workers faster, the American dream of higher wages for the next generation could disappear in this country.

The largest higher education system in the world is the California Community College (CCC) system, serving 2.4 million students per year. The CCC system serves a student population that is 60% non-White and 55% female (Harris, 2014). The CCC system serves 41% of the veterans in California on the GI Bill (Harris, 2014). Eighty-five percent of the CCC students work at least part time (Harris, 2014; Pourzanjani, 2011). To better serve this diverse population of working students, technology can be applied to enable more flexibility in the instructional delivery methods and more engagement with the students to improve students' completion rates (Goldrick-Rab, 2010; Thille, 2012b). The state of California is funding a new Online Education Initiative (OEI) to create a technology-enabled system for all CCC students to have

access to online courses with support anywhere in California for college transfer-level courses (CCC OEI 2014c). This system is being created to take advantage of online teaching pedagogy, data analytics, and online 24/7 student and faculty support to deliver flexible, supported classes and help students achieve academic success (Moreau, 2013). This system has the potential to dramatically improve student success, but only if it is accepted and widely adopted in the diverse 72 independently governed districts of the CCC system.

This study identified the top 10 implementation risks to the planned $57 million OEI online course management system (CMS) to help reduce the implementation risks and improve the potential success of the system to more quickly help students achieve greater success. This was accomplished by generating a prioritized list of recommended mitigation suggestions to the top 10 risks identified by the study participants. Finally, the study's five research questions asked if there were significant differences in risk recommendations depending on the participants' job type, length of experience in their job, or prior experience with online learning management systems (LMSs). The study population included all CCC administrators and faculty. The sample populations for this study were administrators and full- and part-time faculty from seven of the first eight colleges selected by the OEI team to implement the new common CMS starting in the fall of 2015. This study used a policy Delphi research method that included two online surveys of a representative sample of administrators, full-time faculty members, and part-time faculty members from seven of the eight colleges selected to be the first adopters of the new common CMS. There were a total of 27 participants in the first survey, and 22 of the 27 participated in the second survey as well.

Major Findings

The most significant deliverable of this study was the ranked compilation of the top 10 implementation risk factors and ranked list of suggested mitigation measures for each of these risk factors. The rankings and mitigation suggestions were obtained from actual practitioners (administrators and full- and part-time faculty members) who had selected, installed, and used online LMSs in California community colleges (see Table 16 in Chapter IV for the ranked list of factors and recommended mitigation suggestions). The top two of the 10 risk factors were found to be statistically more significant than the others: *underfunding of maintenance and support* and *lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s) (i.e., user commitment)*. Another key finding was that this study did not reveal any statistically significant difference in the risk assessments of the participants on any of the demographic factors measured: job type, time in job, LMS type, LMS experience, and size of college.

The deliverables from this research were to highlight the top 10 implementation risks as identified by a sample of members of the teams that will be the first to implement the new OEI system. The study participants achieved consensus on the top risks, generated a set of mitigation suggestions, and prioritized these for implementation. What follows is a brief summary of the findings and link to past research for each of the five research questions from the study.

Research Question 1

What are the most significant implementation risk factors identified by the survey participants using the Schmidt et al. (2001) common risk factors list?

The study data showed that four of the 34 risk factors assessed were statistically significant—two at the high impact end of the spectrum and two at the low end. The two factors at the low end can be safely ignored: *external dependencies not met* and *excessive use of outside consultants*. The two risk factors at the high end, *underfunding of maintenance and support* and *lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s) (i.e., user commitment)*, should be taken seriously and addressed. These nontechnical risk factors were found to be significant in the Schmidt et al. (2001) study and the Valente (2011) study. In fact, the number one risk in the Valente study, which assessed the biggest risks to enterprise resource planning (ERP) systems implantation in California community colleges, was maintenance support as well.

The mitigation recommendations had a few common themes, which are summarized in Table 24:

- communications—consistent, persistent dialog and updates;
- sustained commitment of budget and people's time; and
- training—new methods require training at the beginning and on an ongoing basis for success.

These three themes were mentioned multiple times in the suggested mitigations for the top 10 risk factors.

Table 24

Common Themes in Mitigation Recommendations

	Theme		
Top-10 risk	Communications	Sustained resources commitment	Training
1	1	4	1
2	4	2	2
3		4	
4	4	2	1
5	2	2	1
6	1	4	1
7		1	3
8	1	3	
9	3	1	1
10		2	3
Total	16	25	13

Research Question 2

Are there significant differences among the risk factors identified by administrators and faculty to successful implementation?

The study found no statistically significant difference between the risk assessments of participants based on the different job types. In other words, the administrators, full-time faculty members, and part-time faculty members were all generally in agreement on the most important risks and suggested mitigation measures to apply to reduce those risks. The research literature refers to the unionization of full- and part-time faculty as evidence of misalignment in priorities (Castro, 2000; Ladd & Lipset, 1973). The research literature also refers to a growing rift between faculty and administration (Lewis & Altbach, 1996). However, the rift that is union related typically is more about wages and working conditions rather than the educational pedagogy (Castro, 2000; Ladd & Lipset, 1973; Lewis & Altbach, 1996). Change research, including Valente's (2011) study, typically finds that the faculty and administrators are in

agreement on the need for change to improve student success, which is what the OEI is trying to address (Goldrick-Rab, 2010; Thille, 2012a; Valente, 2011; Watson & Watson, 2013). The finding in this study is that the administration and faculty are aligned on the need for improving student success by implementing new software tools like the OEI is planning to deliver. They also agree on the risks that must be addressed to make the implementation a success.

Research Question 3

What are the risk mitigation recommendations to improve the adoption and success of the initiative?

The relatively small number of participants in a policy Delphi study limits the number and breadth of potential mitigation recommendations (Franklin & Hart, 2007; Schmidt et al., 2001). However, the small group in this study did make some excellent recommendations and validated them between themselves with the prioritization exercise in the second survey. The change management literature indicates that these countermeasures to the top risks, having been developed by the stakeholders, have a higher probability of being adopted and implemented to improve the project outcome (Molina, 2013; Watson & Watson, 2013; White, Harvey, & Kemper, 2007).

Research Question 4

Do the demographic factors of time in current position and prior learning management system (LMS) experience of the survey participants affect the risk assessments?

The study results revealed no significant difference in risk assessments based on time in position or prior LMS experience. A larger sample might have revealed some

differences for these demographic factors. This study did not find any significant effects on the implementation risk assessments due to variations of the demographic factors.

Research Question 5

Are there significant differences among the risk factor assessments associated with the current LMS vendor used (e.g., Blackboard, Moodle, homegrown) and how long it has been in use?

Like Research Question 4, there were no significant differences in risk factor assessments found relative to legacy LMS vendor or how long the LMS had been in use. Since all of the participants were relatively experienced with at least one LMS and were actively participating in this new LMS implementation process, it would be reasonable to assume that because they all had similar long-term experiences, they would assess new system implementation risks in a similar way. Further testing of a much larger sample would be needed to check this hypothesis as to why there is no difference. Based on the data collected and analyzed, the demographic factors analyzed did not show any significant differentiation in risk assessments.

Conclusions

There were five research questions for this study, but the real conclusions were derived by systematically synthesizing the answers to the five questions and the data from the two surveys. The study generated three key conclusions:

1. There must be a clearly communicated case for change embraced by all stakeholders.
2. The shared governance culture of colleges requires all stakeholders to reach consensus on the key risks and mitigations.

3. Implementation must include consistent, sustained priority for success. This will be evidenced by time, money, and priorities.

Case for Change

The literature on change management (D. Anderson & Anderson, 2010; Nadler & Hibino, 1990; White et al., 2007) and the survey participants' feedback (consistent ranking of the priority of the reasons that must exist for change) clearly indicate that it is critical that the key stakeholders agree on the needs for change. The OEI team must clearly communicate how the new system will improve the success of students and how it addresses the specific change needs outlined by the faculty and administrators. Once the need for change is clearly established and agreed upon, the team can work together to identify and address the implementation risks the new system will face. If the team does not achieve consensus on the need for change, it will be much more difficult to gain acceptance from the colleges to try, accept, and adopt the new system. The colleges must be motivated and in alignment on the need for a change to improve the success of the project implementation.

Consensus Alignment—Administrators and Faculty

The shared governance culture of the California community colleges demands that the faculty and administrators work together. This finding is consistent with Valente's (2011) study on ERP implementations for California community colleges and is consistent with other research studies on change in academic institutions (Watson & Watson, 2013; White et al., 2007). A key finding was that this study did not reveal any statistically significant difference in the risk assessments of the participants on any of the demographic factors measured: job type, time in job, LMS type, LMS experience, and

size of college. Often faculty and management feel they are not aligned on how to implement and grow online learning. However, the faculty and administration appear to perceive the risks similarly, not differently. The conclusion is that there is common ground to build on here to work together to address the risks and concerns to improve the students' learning outcomes, a common shared goal, by successfully applying the new LMS. The faculty and administrators must be united to support the new LMS to improve the success of the implementation so that together they can better help students achieve their educational success goals.

Sustained Addressing of the Risks

A key conclusion of this study is that successful implementation will be dependent on successfully addressing the implementation risks. This must be an ongoing process, not just an event. The faculty and administrators cannot make this the program of the semester. Successful implementation will require a sustained effort reflected in time, money spent, and priority given to the new system over a period of years, not weeks or months. Improving long-term student success requires a long-term sustained effort.

The top two of the 10 risk factors were found to be statistically more significant than the others: *underfunding of maintenance and support* and *lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s) (i.e., user commitment)*. The OEI leadership team and adopting colleges should pay close attention to mitigating these two risk factors as much as possible to improve the successful adoption of the new OEI common CMS. Interestingly, a previous research study of ERP implementation risks for all 112 California community colleges also identified underfunding of maintenance and support as the number one implementation risk

(Valente, 2011). Valente (2011) thought the high assessment of this risk factor at the time may have been a result of the budget cuts due to the recession of 2009-2011, but the recession is now over, and this issue still comes up as most significant for another type of large software project. The conclusion is that this issue must be addressed to mitigate implementation risk and should not be an area where budgets are cut. The faculty and the administration must make sustained support of the new system a top priority for the system to succeed. The budget and time allocated for this implementation must remain a high priority reflected in the funding and percentage of time spent by both administrators and faculty on addressing issues, training, feedback, and corrective action to ensure the system meets the students' needs successfully.

The second ranked risk factor was lack of faculty and staff ownership and buy-in for the project. This factor speaks to what the change literature refers to as the compelling need to change and full engagement of the key stakeholders (D. Anderson & Anderson, 2010; Nadler & Hibino, 1990; Senge, 1994; Watson & Watson, 2013). It is important to note that these two factors are not about technology. One of these factors deals with funding and the other with ownership as categorized by Schmidt et al. (2001) in their research. The change literature supports the finding that the most critical factors for large software systems' success are not technical issues (Appelbaum, 1997; Bostrom & Heinen, 1977; Schmidt et al., 2001). They are typically organizational issues or, as seen here, funding/prioritization issues (Appelbaum, 1997; Bostrom & Heinen, 1977; Nadler & Hibino, 1990; Schmidt et al., 2001; Thille, 2012a; Valente, 2011). The conclusion is that sustained communications with all stakeholders are required to address these risks. These risks do not end when the system is first turned on. To truly mitigate

these risks requires all stakeholders to keep up their investment, as demonstrated in time and money, sustained over time, to support the students and the use of this system in a way that supports the students' success.

Summary

The deliverables from this research were to highlight the top 10 implementation risks as identified by a sample of members of the teams that will be the first to implement the new OEI system. The study participants achieved consensus on the top risks, generated a set of mitigation suggestions, and prioritized these for implementation. By engaging these stakeholders in this process and based on the change management literature (L. Anderson & Anderson, 2010; Nadler & Hibino, 1990; Roueche et al., 1989; Watson & Watson, 2013), it is hoped this study will help improve the success of the OEI implementation. The other key finding is that the demographic factors the researcher hypothesized might impact risk assessments were all found to be not significant. A larger survey sample would be needed to further validate this finding. Also, there must be caution in that each college culture is unique, and while there is consensus on the risks, there may need to be variance and adaptations of the mitigation suggestions to achieve the best results depending on the culture of each of the individual colleges (Roueche et al., 1989; Watson & Watson, 2013).

Implications for Action

The CCC system is the largest higher education system in the world, serving 2.4 million students per year (Harris, 2014). It is a decentralized system with 72 districts governed by locally elected boards. It is also a system with a state-level board and chancellor's office and a system that matriculates students with occupational training,

certificates, and associate's degrees and feeds students into both public and private 4-year colleges to pursue bachelor's degrees. Finally, the CCC system is a system that needs to change to improve student success (Bailey et al., 2012; Goldrick-Rab, 2010; Harris, 2014; Tinto, 2012). Only half of CCC students complete a degree or certificate in 6 years (Harris, 2014). If the new OEI system can help students complete their goals faster, everyone wins. The students get better paying jobs faster, and the state spends less money on subsidizing their education. The upside potential for all stakeholders is significant.

The OEI has the potential to help improve student success by making more classes students need available when and where they need them across the system (CCC OEI, 2014c) so that they can finish faster. By leveraging technology to improve student support and using data analytics to intervene quickly when a student needs help, retention and completion rates can be significantly improved (Moreau, 2013; Thille, 2012b). If the OEI is successful, this could be a model other college systems adopt globally. To realize this potential, the OEI must have early successful adoption, and the team must learn from the early adopters how to facilitate faster, more successful adoption for the next wave of colleges. This study has provided a first step to improving the implementation success by engaging early adopters in identifying the top potential implementation risks and suggesting mitigation strategies the team can implement to reduce the implementation risks.

Implementing system-wide changes in a bureaucracy this size is challenging (Carr, 2012; Watson & Watson, 2013). California's $57 million bold initiative to create the OEI to enable all CCC students' access to online classes through this system has the

potential to be transformational (Moreau, 2013). For this transformation to begin, the independent districts and colleges in the CCC system must see the opportunity and be willing to incur the costs of change to adopt this system and make it a success for their students. The focus of this study was on how to enable greater acceptance and adoption of the new system by proactively engaging some of the key stakeholders in identifying the greatest implementation risks and developing potential mitigation measures to consider and implement to reduce those risks. What follows are specific action recommendations to the OEI implementation team.

Build a Strong Case for Change—Get All Stakeholders Aligned

The first step in any change is for the stakeholders to perceive a need for change (L. Anderson & Anderson, 2010; Martin, 2011). The potential benefits of the change must outweigh the costs (Roueche et al., 1989). The end users must also be part of the process (Martin, 2011). They must see the need for change, understand the benefits and the costs of the change, and be engaged throughout the process (Senge, Scharmer, Jaworski, & Flowers, 2005). This is particularly true for academic institutions with a culture of shared governance like the CCC system (Kezar, 2001; Watson & Watson, 2013).

The OEI leadership team should continuously survey their implementation stakeholder team to make sure they are aligned and adjust their communications and strategies based on the feedback. They should also consistently and persistently communicate the OEI value proposition to the stakeholders and show how the new system is meeting/will meet their needs and expectations. The OEI website and CCC communications are excellent and need to be sustained along with conference

participation and road shows to the colleges to keep the stakeholders aware of the need for change and how the OEI will deliver on the needed changes.

Benchmark Against Blackboard

The survey participants were clear and consistent on the priority of the improvements the new LMS must deliver over the legacy systems to be embraced for adoption. The study also showed that the current LMS standard (most used system) is Blackboard. Blackboard is the current market-share leader for installed commercial LMS systems for institutions with 2,000 full-time-equivalent students (FTES) or more, with 42% market share of institutions and 44% of all online classes taught (Kroner, 2014). The OEI team must benchmark the new system against Blackboard versus the proposed change drivers and then clearly communicate the advantages of the new system over Blackboard and other legacy LMS systems. Table 25 provides an example format of how to create this case for change, using research done by Liaw (2008) on Blackboard users' e-learning satisfaction as a guide. The OEI team should survey stakeholders at California community colleges using Blackboard to gather more current and relevant data for California community colleges to build a credible case for change.

Proactively Mitigate Potential Implementation Risks

Once the case for change is established, the OEI implementation team must then address the greatest implementation risks to improve the speed of adoption and contributions of the OEI. Table 26 outlines a framework that the team should use to manage risk mitigation. The team should track the relative effectiveness of the different countermeasures used to mitigate implementation risks and determine if there are any

Table 25

Case for Changing LMS

Reason for change	Blackboard performance	New OEI performance
Increase user (students, faculty, or staff) satisfaction	Liaw (2008) found user satisfaction correlated with learners' self-efficacy, system quality, and interactive learning activities.	How will the new OEI address the end-user needs identified by Liaw (2008) better than Blackboard? Quantify.
Improve services for students, faculty, and staff	Blackboard is a framework but does not offer directly any services.	How will the new OEI system use data analytics to engage faculty, staff, and students in a timely, effective manner? Describe and explain.
Increase efficiency (e.g., reduce cost, improve speed of transactions/processes)	Benchmark Blackboard performance at existing installations in CCCs.	Benchmark the new system against Blackboard. Quantify the improvements and how those impact users.
Modernize the campus IT environment by replacing aging legacy (out-of-date) CMS		Compare the user interface, mobile friendliness, etc. of the new system to Blackboard. Why is the new system better?
Keep institution competitive in order to attract additional students, improve enrollment management	Blackboard has been losing market share for the last 3 years. It is not keeping up with the industry (Kroner, 2014).	How does the new system improve student success? What capabilities does it have that Blackboard and others do not?
Enhance accountability and regulatory compliance		How is the new system more compliant with California Ed. Code, disabled student accessible, etc. than Blackboard?
Provide better management tools for decision making and planning		How is the new system better for management, planning, and decision making with actual data?
Compete with proprietary online institutions		How cost effective for colleges and students is the new system compared to commercial systems?

interactions between risk factors and countermeasures that improve or hinder risk management efforts. The team can then adapt future implementation efforts based on

what they have learned. The opportunity is to create a learning organization that learns and adapts to constantly improve the OEI system and implementation process.

Sustain the Priority of OEI Implementation

The OEI leadership team must make the OEI implementation more than an event. The implementation and usage of the system must be an ongoing process and must become part of the adopting colleges' culture. For this to happen, the participants, in their recommended mitigation measures for the top 10 risks, repeatedly emphasized the need for sustained investment of funding for software, dedicated space, staff, and equipment. The state of California has committed $57 million to this program, but the colleges will need to also provide funding for faculty and staff to get release time and travel to attend training and learn the new system. The administration must make the adoption of the OEI a part of the strategic plan for each college and must communicate this and walk the talk. The OEI leadership team can provide support, but the colleges' leaders, both administrators and faculty, must step up and champion adoption, adaptation, and continued improvement of the OEI for it to truly transform students' success.

Recommendations for Further Research

This study offers a number of implications for both practitioners and researchers. Practitioners (e.g., the OEI leadership team and the folks at the colleges implementing the new system) have a checklist in priority ranking of the most significant risk factors that can be included in their project implementation plans and mitigation suggestions they can proactively implement to reduce those risks. Researchers can use the ranked risk factors and the suggested prioritized mitigation measures as a baseline for future research.

Table 26

Sample Implementation Risk Management Matrix

Implementation risk	Mitigation suggestions	Planned actions for mitigation
RF21: Underfunding of maintenance and support.	• The needs for training and support are often underestimated for all users (e.g., faculty, students). • Institutions should adopt a total-cost-of-ownership model that incorporates support staffing levels. • Provide funding. • This is a real fear. • 24/7 tech support required. • Must have on-campus CMS support staff who are not colocated with IT staff. • An exploratory committee should be formed to assess the options and costs associated with each option before a budget is set.	• Document research and plans for training and support; validate and communicate. • Create TCO model and share with all colleges; be transparent and update as more experience is gained. • Share the budget • Proactively address fears. • Provide and show ease of access. • Demonstrate need and plan to address on-site or remotely. Be clear. • Engage the adopting colleges as part of the planning and review process. Make sure budgets are realistic to meet their needs.
RF5: Lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s).	• Faculty input must be facilitated and faculty should be compensated for training time. • Faculty will have buy-in for the project if they receive training from an instructional designer. • Ongoing communication with and engagement of the faculty to participate in the implementation process. • Engage faculty to participate in choosing the CMS. • Top administrators need to make their expectations crystal clear. • Faculty and staff need to understand that online education is a growing segment of education. • Frequent information meetings and symposia; expressed commitment by governing bodies and faculty committees.	• Work with colleges to fund compensation for training. • Engage instructional designers and communicate process and results to all participating faculty. • Set up regular and multiple methods of communication with faculty. • Engage faculty in the vendor selection process. • Survey, reach consensus, and communicate administrator expectations. • Clearly communicate data on online trends and impacts to CCC education now and into the future. • Communicate and engage all stakeholders as much as possible.
Etc.	. . .	. . .

Online LMSs are complex, with implications that reach to the core mission of a college: knowledge transfer and learning. It is critical to understand the risks inherent in the implementation and maintenance of a public higher education online LMS. The work presented in this study is an incremental step in furthering the understanding of how to improve the success of large-scale technology-enabled LMS implementations. Hopefully, this study provides a compelling catalyst for further research to expand the knowledge of how to more successfully implement LMSs in public higher education. The following are some potential opportunity areas for future research and study:

- Comparative studies that include other colleges, such as 4-year public and private colleges, private 2-year colleges, and public 2-year colleges in other states that vary in size and demographic nature, to determine the extent to which the risk assessment priorities and recommended mitigation measures found in this study may be generalized.
- Confirmatory factor analysis to determine the degree to which the top 10 risk factors and suggested mitigation measures appear to be valid. This would be a good study to see how the various risk factors and mitigation interventions are related to each other. There may be some significant cross-correlation.
- In-depth qualitative case studies of selected colleges to explore the impact of institutional culture and politics on online LMS projects to identify what factors may account for success or when and how online learning management projects go awry.
- Ethnographic studies to assess and understand the impact and consequences of the adoption of a statewide LMS on the participants in a college culture, including administrators, faculty, staff, students, vendors, and the community.

- Application studies that would pair the risk factors with action plans and measure the costs and benefits. These studies could include information on contexts that impact the success of various action plans (e.g., a guide on the relative effectiveness of action plans depending on the context).
- Longitudinal research to track implementation risks and sustainability, in terms of initial cost and long-term maintenance, relative to fiscal resources that are subject to fluctuation due to political and economic changes for publicly funded colleges.
- Market research on existing (e.g., Blackboard and Moodle) and new LMSs (e.g., Canvas) to determine the impact of changes in software systems on institutions of higher education. The LMS business is projected to be a $7.8 billion business by 2018 (Kroner, 2014).

There are many research opportunities to improve the decision making and actions needed to enhance the probability of success of large-scale transformative changes like a new statewide LMS in a public higher education system. Further research is needed to understand LMSs in relationship to technology changes (e.g., mobile, predictive data analytics, etc.), institutional culture, fiscal policies, business processes, and the political environment, both internal and external to the institution. This research will help enable institutions like those in the CCC system to better reach the primary goal of more efficiently and successfully implementing new LMSs that enable greater student success for the 2.4 million students served by the system.

Concluding Remarks and Reflections

The American dream of a better standard of living for the middle class for the next generation is at risk. The global economy demands a higher level of education for

the workforce to be competitive. A higher level of education means the United States must improve college achievement and graduation rates to increase, or even maintain, our standard of living. More and more students in the United States are unable to attend a traditional 4-year college, as the costs rise and public subsidies shrink for higher education. Community colleges have grown in the United States to fill the needs of nontraditional college students by providing flexible, affordable higher education, but they have not achieved the results, in terms of degree completions, needed to meet the needs of the economy for the students to obtain higher paying jobs. The states funding the colleges are frustrated with the poor results and growing costs. The employers are frustrated by the lack of college-educated workers to meet their needs. The opportunity is to improve the success of students, both traditional and nontraditional, in attaining their higher education goals. One of the ways to do this is to apply technology to improve online courses to provide students with greater flexibility, more tracking, and intervention to improve their success.

The high cost of college in the United States requires many students, particularly community college students, to work and go to school at the same time. Working requires students to have more schedule flexibility, and these students need more support in nontraditional ways to be successful. The OEI being implemented in the CCC system attempts to address these needs to improve scheduling flexibility, the quality of online classes, and tracking and intervention to help students succeed. This program has tremendous potential to transform student success for 2.4 million students per year. The challenge is getting the colleges to accept, embrace, and make this program a success. The faster this program can be adopted and fine-tuned to assist students, the faster these

students can achieve their "American dream." The focus of this study was to improve the success of the implementation of this new LMS.

Currently, locally managed (commercial and/or homegrown) LMSs are the de facto standard throughout California community colleges. Implementing a new LMS in a college is a high-risk engagement for any institution, regardless of size. Implementing a statewide LMS to be used by all 112 California community colleges, either in addition to or instead of locally managed LMSs, is a large and potentially very disruptive change. There is huge potential to improve efficiency and availability of courses and support for students, but there is also great risk in having the very independent colleges with strong shared governance cultures adopt this new system. The results of this study indicated that there is consensus between administrators, full-time faculty members, and part-time faculty members as to the nature and priority of the implementation risks and mitigation suggestions to address those risks. In fact, the results of this study showed no statistically significant differences between the groups with respect to their opinions and assessments of risk factors and mitigation suggestions. The study also showed there were no statistically significant differences in risk factor assessments by job type, length of experience in job, college size, legacy LMS, or legacy LMS experience. The bottom line is that this study showed there is common ground on the perceived risks and actions needed to mitigate those risks. Hopefully, the results of this study can be used to help improve the success of the implementation of the new OEI system in the fall of 2015. The opportunity is to help more students achieve their dreams, the American dream, of attaining success in higher education to acquire a higher paying and more fulfilling job and to continue to grow the American economy and way of life at the same time.

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APPENDICES

APPENDIX A

Synthesis Matrix

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Student Success Accountability Measures	**AACC. (2012b).** *The voluntary framework of accountability: Developing measures of community college effectiveness and outcomes.* Retrieved from http://vfa.aacc.nche.edu/Documents/VFAOutcomesReportWebFINAL.pdf	AACC accountability study and measures for CCs. Issues of different measures for GED/basic skills mission, first 2 years of college, CTE certificates. Have hard copy.	Defines IPED data, 6 year cohort and data collection terms								
Key Paper-Econ Need for Change	Case for reform of higher ed to improve success grad rate of CC students	**AACC. (2012a).** *Reclaiming the American dream: Community colleges and the nation's future.* Retrieved from http://www.aacc.nche.edu/AboutCC/21stcenturyreport/21stCenturyReport.pdf	AACC's white paper on the case for change, employment trends and impacts, then outlines proposed changes to increase graduation rates and student success at CCs.	Suggestions	Stats on Amer Dream at risk. Decline in income 1972-2000, 7%. Need to change grad rates to meet the need.	Proposed national measures				Higher skill labor demand		
	Policy Delphi	**Adler, M., & Ziglio, E. (1996).** *Gazing into the oracle: The Delphi method and its application to social policy and public health.* London, United Kingdom: Jessica Kingsley.	History of Delphi method and applications including case study examples.					History of Delphi studies				

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Online education history and MOOCs and projections for future.	**Allen, E., & Seaman, J. (2013).** *Changing course: Ten years of tracking online education in the United States.* Retrieved from http://www.onlinelearningsurvey.com/reports/changingcourse.pdf	Lots of research stats on online education growth, results and future trends. Explores quality data, retention, completion.	Results of tech in online ed	Need for tech to compensate for cost pressures and need to improve student success	Results of online not where they need to be	Tech enables more accessibility to more students		Online ROI			
		Allen, I., & Seaman, J. (2014). *Grade change: Tracking online education in the United States.* Babson Survey Research Group and Quahog Research Group.	Survey results for online classes. Survey of college administrators in the US.						Online class acceptance survey by administrators			
	STS	**Alter, S. (2002).** The work system method for understanding information systems and information systems research. *Communications of the Association for Information Systems, 9*(6), 90-104.	Research paper on work systems approach to IT software project implementation. Project managers need to look at implementations as systems, not just as software projects.									STS critical to success

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		Amiti, M., & Wei, S. J. (2005). Fear of service outsourcing: Is it justified? *Economic Policy, 20*(42), 308-347.	Research on outsourcing impact on jobs growth primarily in the UK and the US. Net conclusion is # of jobs not reduced. Old industries get outsourced, new service industries like computer and financial services are insourced. Net skills needed tend to go up suggesting need for more educated work force.		New industries, mostly service in the UK and US, demand higher skills and yield higher wages. Technology making it easier to move jobs globally, esp. service jobs.					Outsourcing impacts		
	Transformational change	**Anderson, D., & Anderson, L. (2010).** *Beyond change management: Advanced strategies for today's transformational leaders*. San Francisco, CA: Pfeiffer.	The key reference book on transformational change theory and practice.		Organizational change theory and implementation.							Transforma tional Change
	Organizational change	**Anderson, D. L. (2011).** *Organization development: The process of leading organizational change.* Thousand Oaks, CA: Sage.	Excellent reference on organizational change theory and practice.		Organizational change theory and implementation.							Org change mgmt

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Transformational change	**Anderson, L., & Anderson, D. (2010).** *The change leader's roadmap: How to navigate your organization's transformation.* San Francisco, CA: Pfeiffer.	How to guide for transformational change in large organizations.		How to implement change							How to implement change
Key paper on cost reduction potential of technology in educ	How technology can change education value proposition	**Anderson, T., & McGreal, R. (2012).** Disruptive pedagogies and technologies in universities. *Journal of Educational Technology & Society, 15*(4), 380-389.	Article focuses on cost reduction without quality loss that new technology can bring to education. Uses examples of research to support case for change will be like music and video service industries. The economic case is too strong to ignore.		Educ opportunities with technology usage. Changing student expectations about technology at colleges.	Oppor to use tech to improve	Tech enables more accessibility to more students		Impact to improve effic.			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Key foundation paper	STS	**Appelbaum, S. H.** (1997). Socio-technical systems theory: An intervention strategy for organizational development. *Management Decision, 35*(6), 452-463.	STS theory foundation and overview and relevance to IT related projects implementation success or failure.									STS Theory foundation
	Technology impact to change industry-music and video	**Apple. (2014).** App store sales top $10 billion in 2013 [Press release]. Retrieved from http://www.apple.com/pr/library/2014/01/07App-Store-Sales-Top-10-Billion-in-2013.html	Press release on growth of iTunes app store in 10 years to a $10B business. Industry paradigm change.		Example of how tech changes service industries incl. education		Tech enables more accessibility to more students					
		Bailey, T., Jaggars, S., & Jenkins, D. (2012). *Strengthening student success in the community college.* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	Recommendations for CC reform to improve student success.		Recommendations based on research for changes	Goal to increase student success			Online and data analytics			All faculty engagement for success

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Technology projects in govt have not met expectations	**Bannister, F., & Connolly, R. (2012).** Forward to the past: Lessons for the future of e-government from the story so far. *Information Polity: The International Journal of Government & Democracy in the Information Age, 17*(3/4), 211-226.	Authors describe history of e-govt tech investment and results not meeting expectations but lessons learned to do better going forward.						Tech not always good ROI			
	Delphi	**Bardhan, T., Ngeru, J., & Pitts Jr, R. (2011).** A Delphi-multi-criteria decision making approach in the selection of an enterprise-wide integration strategy. *Proceedings of the European Conference on Information Management & Evaluation*, 24-37.	Case study on use of Delphi for deciding on public agency data integration enterprise software.					Case study of Delphi for ERP in public agency				
Good Ipeds data summary	Justification for more college educated workers in the US.	**Baum, S., Kurose, C., & Ma, J. (2013).** *How college shapes lives: Understanding the issues.* Retrieved from College Board website: http://trends.collegeboard.org/sites/default/files/education-pays-2013-how-college-shapes-lives-report.pdf	White paper summarizes iPeds data on college students and success. Research section on benefits to society of college success students (data). Data on earning premium of college education.		Data to support ROI on education	IPEDS data summary	Upward mobility with education			Data to support Higher ed need		

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Summary of benefits of a college education	**Baum, S., Ma, J., & Payea, K. (2013).** *Education pays 2013: The benefits of higher education for individuals and society.* Retrieved from College Board website: http://trends.collegeboard.org/sites/default/files/education-pays-2013-full-report.pdf	Summary of statistics on benefits of college education, employment, earnings, contribution to society. Good graphics summaries of iPeds and other data.		Stats on oppor. and benefits		Stats on oppor. and benefits			Stats on oppor. and benefits		
	Coding qualitative survey data	**Bazeley, P., & Jackson, K. (2013).** *Qualitative data analysis with NVivo.* Thousand Oaks, CA: Sage.	Book on qualitative analysis with the Nvivo software tool for analyzing data.					Using Nvivo for coding				
Key seminal research paper	Research results on behaviors needed for student success	**Bennett, R., Kottasz, R., & Nocciolino, J. (2007).** Catching the early walker: An examination of potential antecedents of rapid student exit from business-related undergraduate degree programmes in a post-1992 university. *Journal of Further and Higher Education, 31*(2), 109-132.	Seminal study on retention management summary. Tracked students via electronic turnstyle system. Students with specific goals more likely to succeed. Early intervention (first year success) very important to graduation success. Other key factors: age, tutorial attendance and other commitments (work and family).	Tech enables better accountability and success	Tech can yield high student success returns examples	Research summary of student behaviors that result in success.	Tech enables more accessibility to more students					

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Coding qualitative survey data	**Bergin, M. (2011).** NVivo 8 and consistency in data analysis: Reflecting on the use of a qualitative data analysis program. *Nurse Researcher, 18*(3), 6-12.	Good article on how to use Nvivo for coding qualitative research study data.					Using Nvivo for coding				
	Orgs need a digital business strategy	**Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013).** Digital business strategy: Toward a next generation of insights. *MIS Quarterly, 37*(2), 471-482.	Journal article about private sector organizations needing a digital business strategy for survival and growth.						Business and Tech investment strategies must be aligned			
	Research evidence 1:1 most effective learning method	**Bloom, B. S. (1984).** The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher, 13*, 4-16. doi:10.3102/0013189X013006004	Research study on alt teaching methods confirms 1:1 yields best results.			1:1 best						
Key STS IT success paper	STS	**Bostrom, R. P., & Heinen, J. S. (1977).** MIS problems and failures: A socio-technical perspective—Part I: The causes. *MIS Quarterly, 1*(3), 17-32.	Seminal work on STS and how the theory applies to the success and failure of software systems implementations									STS and Tech
	ERP failures due to project management failures	**Bradford, M. (2011).** North Carolina State University: Implementing ERP student modules. *Issues in Accounting Education, 26*(3), 507-520. doi:10.2308/iace-50037	ERP project failure due to poor project management.						Tech without good mgmt fails			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Implementing change in education	**Brower, R., & Balch, B. V. (2005).** *Transformational leadership & decision making in schools.* Thousand Oaks, CA: Corwin Press.	Good how to book on implementing transformational changes in schools.		Ho to make change in education							Change mgmt
	Job Trends and educ needs	**Bureau of Labor Statistics. (2014).** Employment projections: Earnings and unemployment rates by educational attainment. Retrieved January 8, 2014, from http://www.bls.gov/emp/ep_chart_001.htm	Current labor statistics on job trends.		Stats to support ROI of education					Jobs and wages		
	Educ reform movement	**Burke, L. M., & Butler, S. M. (2012).** Accreditation: Removing the barrier to higher education reform. Backgrounder. No. 2728. Executive Summary. Heritage Foundation.	Accreditation reform and the trends driving it. Colleges not meeting expectations, employment needs changing, technology (online and MOOCs) changing the business model.	Reform needed- case for change	Reform needed- case for change	Reform needed- case for change			Tech impact on educ			
Key data source	Data on CCC performance and enrollments	**California Community Colleges Chancellor's Office. (2014).** Retrieved January 30, 2014, from http://www.cccco.edu	Datamart CCC stats and other CCC information	Student Success Reports data	Data on ethnicity and other demographics success	Student Success Reports data	Data on ethnicity and other demographics success					

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Key reference work	Case for reform of higher ed to improve success grad rate of CC students	**Carnevale, A. P., Smith, N., & Strohl, J. (2010).** *Help wanted: Projections of jobs and education requirements through 2018.* Retrieved from Georgetown University, Center on Education and the Workforce website: https://georgetown.app.box.com/s/ursjbxaym2np1v8mgrv7	Detailed statistics on underperformance of higher ed to meet job demand.	Reform needed-case for change	Reform needed-case for change	Reform needed-case for change	Reform needed-case for change			Reform needed-case for change		
	BLS stats on educ level needs for new jobs	**Carnevale, A. P., Smith, N., & Strohl, J. (2013).** *Recovery: Job growth and education requirements through 2020.* Retrieved from Georgetown University, Center on Education and the Workforce website: https://georgetown.app.box.com/s/tll0zkxt0puz45hu21g6	Bureau of labor statistics summary of growing needs for higher educated work force.		Reform needed-case for change		Reform needed-case for change			Reform needed-case for change		
Key reference work	Job trends and educ needs	**Carnevale, A., & Rose, S. (2010).** *The undereducated American.* Retrieved from Georgetown University, Center on Education and the Workforce website: https://georgetown.app.box.com/s/tay6et6eorq6rkqta2av	Post great recession job growth trends and projections statistics and research findings. Lots of detailed information by industry segment. Bottom line growth in need of postsecondary ed and training from 28% in 1973 to 65% in 2020.		Reform needed-case for change					Reform needed-case for change		

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Technology disruptive potential for higher ed	Carr, N. (2012). The crisis in higher education. *Technology Review, 115*(6), 32-40.	Article opens with past postal service revolution and correspondence courses prediction of the demise of universities, didn't pan out but lots more people accessed college classes. MOOCs are the new change bubble enabled by the Internet and high speed communications. Collecting big data on student behavior can be used to improve educational outcomes and revolutionize the cost and effectiveness of education maybe? "Whether massive open courses live up to their hype or not, they will force college administrators and professors to reconsider many of their assumptions about the form and meaning of teaching. For better or worse, the Net's disruptive forces have arrived at the gates of academia."		Educ opportunities with technology usage. Changing student expectations about technology at colleges.	Online success not as good as face to face yet			ROI on Tech, risk of bubble			
	IT Portfolio management	Cho, W. J. (2010). *IT portfolio selection and IT synergy* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3452063)	IT portfolio management research. Authors indicate Fortune 100 firms do not consistently apply IT portfolio management methods. Yet only 29% of IT projects meet objectives. IT typically 20-22% of operating costs. Needs better portfolio management looking at risks and synergies.						ROI on tech, lower than expected			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		Chou, C. (2002). Developing the e-Delphi system: A web-based forecasting tool for educational research. *British Journal of Educational Technology, 33*(2), 233-236. doi:10.1111/1467-8535.00257	Authors describe an e-Delphi system they built.					Custom online e-Delphi tool				
		Collegeboard. (2013). Trends in college pricing 2013. Retrieved from http://trends.collegeboard.org/sites/default/files/college-pricing-2013-full-report-140108.pdf	College board statistics on cost of college for 2013		Rising college costs							
		Collegeboard. (2014). The completion arch: Measuring community college student success. Retrieved March 28, 2014, from https://completionarch.collegeboard.org/completion/graduation-rates	Statistics on college enrollment and completion rates including job placement and earnings after leaving college.	Data on results	Case for reform of higher ed					Statistics on results		
		Collins, M. (2012). *College: Ready or not?* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	K-12 failure to prepare students for college level work and suggested reforms.	Growing number of students not college ready	Growing number of students not college ready	Growing number of students not college ready						

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		Core Data Service Almanac. (2013). Retrieved from Educause Core Data Service website: https://net.educause.edu/ir/library/pdf/CDA1202.pdf	Summary statistics for 2013 for colleges IT spending and categories based on national survey.	IT spending at colleges					IT spending at colleges			
	Qualitative research design	**Creswell, J. W. (2012).** *Qualitative inquiry and research design: Choosing among five approaches.* Thousand Oaks, CA: Sage.	Qualitative research methods reference book.					Qualitative research methods				
		D'Aurora, S. (2013). *Systematic technologies that enhance at-risk students progression in developmental coursework in the West Virginia Community and Technical College System* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3565044)	West Virginia CC study. Talks about increasing graduation rates, incr persistence, AACC and WV goal to increase completers by 15,000 in 5 years. See reference to ANDERSON 2011. Open access vs completion vs funding conflict. At risk students-- DEFINE. Good references to check. Authors conclusion with small sample snow ball survey is that tracking and e-notice to students helps (technology definition weak). Good definition of at risk students and statistics.	AACC meas applied	Tech can yield high student success returns examples	Case study of success	Use tech to help at risk students		Good ROI			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Student technology preferences	**Dahlstrom, E., Walker, J. D., & Dziuban, C. (2013).** *ECAR study of undergraduate students and information technology, 2013.* Retrieved from EDUCAUSE website: https://net.educause.edu/ir/library/pdf/ERS1302/ERS1302.pdf	Survey results of undergraduates usage and preference for technology over time.		Student demand for tech				Student demand for tech			
	How technology can change education value proposition	**Dede, C. (2013).** New technology-based models for postsecondary learning. *Educause Review*, 33-52.	Educational models need to change to optimize use of technology to deliver better results of student success.		Tech can yield high student success returns	Tech to help			ROI			
		Dossani, R. (2013). *Higher education in the online world.* Retrieved from Wipro Technologies website: http://www.wipro.com/Documents/insights/whitepaper/higher_education_in_the_online_world.pdf	Article on spending on technology in higher education. Good stats on spending dollars and where money is being spent.		Data on results	Case for reform of higher ed			Spending			
		Education, T. N. C. f. P. P. a. H. (2011). Affordability and transfer: Critical to increasing baccalaureate degree completion. *Policy Alert*. Retrieved from http://www.highereducation.org/reports/pa_at/PolicyAlert_06-2011.pdf	Independent research publication on degree completion and college affordability.									

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Technology impact to change education outcomes	**Edyburn, D. (2011).** Hamessing the potential of technology to support the academic success of diverse students. *New Directions for Higher Education,* (154), 37-44. doi:10.1002/he.432	Excellent article on technology use examples to improve student success.		Examples of how tech can increase student success				Examples			
	Technology impact to change education outcomes	**Ehrenberg, R. G. (2012).** American higher education in transition. *The Journal of Economic Perspectives, 26*(1), 193-216. doi:10.2307/41348812	Article outlines the rising tuition and transition to more part time faculty is having on higher ed and how these pressures will increase adoption of technology to improve student outcomes and reduce costs.	Tuition costs rising faster than inflation, not sustainable	Need for tech to compensate for cost pressures and need to improve student success	Tech to help			Demand to reduce costs			
		Ellis, R. K. (2009). *Field guide to learning management systems.* Alexandria, VA: ASTD Learning Circuits.	Definition of learning management system.								Description	
		Engagement, C. f. C. C. S. (2012). *Contingent commitments bringing part-time faculty into focus.* Retrieved from http://www.ccsse.org/docs/PTF_Special_Report.pdf	Research data on part time faculty and recommendations for improvements to improve student success.		Part time faculty reforms needed	Pt time faculty not committed, reduces student success						

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Student Success failure statistics and recommendations	Engle, J., & Tinto, V. (2008). *Moving beyond access: College success for low-income, first-generation students.* Retrieved from Pell Institute for the Study of Opportunity in Higher Education website: http://www.pellinstitute.org/downloads/publications-Moving_Beyond_Access_2008.pdf	Lots of statistics on the failure rates of at risk community college students and recommendations on program changes based on research to improve their success. Technology will be needed to implement these changes in a cost effective way.		Stats to support ROI of education reform	Show needs	Show needs		Oppor to help			
	Student Success Accountability Measures	Ewell, P. T. (2011). Accountability and institutional effectiveness in the community college. *New Directions for Community Colleges,* (153), 23-36. doi:10.1002/cc.434	Accountability needs for CC's explained as they have evolved over time. Key players driving accountability: Federal and State government, Accreditation, Employers, Press & 3rd Party special interest groups, e.g., Gates Foundation. Technology of data collection and aggregation with IPeds and Clearinghouse allows longitudinal data analysis and tracking of students, regardless of where they transfer. Next step is link to employment tracking. Big data is enabling this transformation. Data is also being used to track students achievement of milestones and early intervention to improve success.	Data driven	Use data to make better decision and improve					Track educ to jobs		

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	IT project implementation enhancement for colleges	**Garcia, P. M. (2013).** *An integrated model for the adoption of information technologies in U.S. colleges and universities* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3556162)	Doctoral thesis on technology project implementation enhancement for colleges. The thesis proposes an integrated model to improve the adoption of information technologies by higher education faculty, staff, students and administrators leveraging four drivers: legal and policy instruments, diffusion of innovation dynamics, economic incentives, and technical elements.						How to implement tech at a college successfully case study			
	Global labor market trends- higher skills = greater pay	**Geishecker, I., & Görg, H. (2013).** Services offshoring and wages: Evidence from micro data. *Oxford Economic Papers, 65*(1), 124-146.	This paper investigates the effects of services offshoring on wages using individual level data combined with industry information on offshoring. Our results show that services offshoring affects the real wage of low and medium skilled individuals negatively. By contrast, skilled workers benefit from services offshoring in terms of higher real wages. Hence, offshoring has contributed to a widening of the wage gap between skilled and less skilled workers.								Offshore impact on jobs and need for incr educ.		

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	LMS acceptance	**Giannakos, M. N., & Vlamos, P. (2013).** Educational webcasts' acceptance: Empirical examination and the role of experience. *British Journal of Educational Technology, 44*(1), 125-143. doi:10.1111/j.1467-8535.2011.01279.x	Research on acceptance of webcasts for learning. Prior experience increases acceptance. Ease of use and relevance to learning objectives also important. Builds on prior research studies.		Familiarity with webcasts increases successful adoption						LMS acceptance	
		Gill, F. J., Leslie, G. D., Grech, C., & Latour, J. M. (2013). Using a web-based survey tool to undertake a Delphi study: Application for nurse education research. *Nurse Education Today, 33*(11), 1322-1328. doi:10.1016/j.nedt.2013.02.016	E-Delphi using survey monkey.				e-Delphi using Survey Monkey					
Seminal research summary	Case for reform of higher ed to improve success grad rate of CC students	**Goldrick-Rab, S. (2010).** Challenges and opportunities for improving community college student success. *Review of Educational Research, 80*(3), 437-469. doi:10.3102/0034654310370163	Excellent summary of research on CCs, how they are failing in terms of student outcomes and what research shows can be done to reverse the trend, particularly for at risk students.	All efforts to enhance student success should be rigorously evaluated. We need to know what works and why.	Data to support ROI on education reform at CCs	Data to support need for change	CCs educate most minority students					Change will be resisted

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Good examples and implications	Technology application trends in higher education	**Grajek, S. (2013).** Top-ten IT issues, 2013: Welcome to the connected age. *EDUCAUSE Review, 48*(3). Retrieved from https://net.educause.edu/ir/library/pdf/ERM1333.pdf	The top-ten IT issues reflect the interconnections among external forces, institutional strategic priorities, and the transformation of higher education information technology. Education technology adoption is being influenced more by the rest of the world, consumer devices (BYOD), cloud computing software as a service, big data, mobile and security, MOOC's etc. Author discusses survey results, trends and impacts.						Tech trends in educ			
	Change management	**Grant, A. M. (2012).** Leading with meaning: Beneficiary contact, prosocial impact, and the performance effects of transformational leadership. *Academy of Management Journal, 55*(2), 458-476.	Excellent article on how to implement transformational leadership.		How to implement transformational change							
	New faculty hiring and need for technology adaption for learning	**Green, D. W., & Ciez-Volz, K. (2010).** Now hiring: The faculty of the future. *New Directions for Community Colleges,* (152), 81-92. doi:10.1002/cc.430	Article articulates the pending shortage and turnover of CC faculty due to retirement of baby boomers. Many factors regarding faculty hiring are discussed including the need for new hires to be technology savy. By harnessing the power of technology, teachers must at once individualize the learning experience for their students and build the academic social networks so vital to success and retention.		Need to change how we teach to be more effective.				Tech to help teachers and students			

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Good on loss of Amer. Dream without college ed	Student success failure statistics and recommendations	**Greenstone, M., Looney, A., Patashnik, J., & Yu, M. (2013).** *Thirteen economic facts about social mobility and the role of education.* Retrieved from The Hamilton Project, Brookings Institution website: http://www.hamiltonproject.org/files/downloads_and_links/THP_13EconFacts_FINAL.pdf	Article outlines statistics on the fading of the American Dream for lower income families. Authors offer detailed statistics of how the system is failing and that social mobility in the US is only middle of the road on a global scale. Then the authors outline potential solutions for early intervention, etc.		Case for reform of higher ed	Case for reform of higher ed	Case for reform of higher ed					
	Student success failure statistics and recommendations	**Habley, W., Valiga, M., McClanahan, R., & Burkum, K. (2010).** *What works in student retention? Report for all colleges and universities.* Iowa City, IA: ACT.	Student retention statistics, especially for minorities and recommended best practices to improve success.		Higher edu failing at risk students		Higher edu failing at risk students					
Good article on CC history and evolution of online ed	Online education history and MOOCs and projections for future.	**Hachey, A., Conway, K., & Wladis, C. (2013).** Community colleges and underappreciated assets: Using institutional data to promote success in online learning. *Online Journal of Distance Learning Administration, 15*(1). Retrieved from http://www.westga.edu/~distance/ojdla/spring161/hachey_wladis.html	Excellent journal article including a brief history of the rise of CC's to be the dominant deliverer of postsecondary ed and still growing. The authors then talk about the rise of online ed due to student demand and cost efficiency but poor student success. Authors cite research that shows early intervention using student information system data can improve student success.		History of CC and higher ed and why reform needed	Data on failure						

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		Hackbarth, S. (1996). The educational technology handbook: A comprehensive guide: process and products for learning: Educational Technology.	Definition of educational technology						Definition			
		Hansson, B., & Charbonnier, E. (2010). *Education at a glance 2010.* Retrieved from Organisation for Economic Co-operation and Development website: http://www.oecd.org/education/skills-beyond-school/45926093.pdf	EU college statistics, enrollment, persistence, cost and public benefit by country.		EU compared to US	EU compared to US						
		Hardy, D. E., Katsinas, S. G., & Bush, V. B. (2007). Tidal Wave II, community colleges, and student financial aid. *Enrollment Management Journal, 1*(1), 23-48.	Research data on the growth of community college enrollment, rising tuition and rising financial aid. Student success is higher at higher funded districts. Lower funded districts students take loans and don't get degrees, growing problem.		Growing number of students, growing tuition, growing fin aid and loans liability but no increase in success.							
	CCC Student Success Data	**Harris, B. (2014).** *Student success scorecard: 2013 state of the system report.* Sacramento, CA: California Community Colleges Chancellor's Office.	Summary of CA CC student success for 2013- results statistics and trends.	CA student success scorecard data		CA student success scorecard data						

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	Technology application trends in higher education	**Hazen, D. d. f. h. e. (2011).** Lost in the cloud: Research Library Collections and Community in the Digital Age (Vol. 55, pp. 195-204).	Research libraries and college libraries in general are changing with technology. Information access costs to best collections are rising faster than inflation. New online library information priced like cable tv subscription bundles.						Tech change impact to libraries			
	Delphi	**The HERO e -Delphi system: Overview and implementation. (2001).** Penn State University.	Paper on a proprietary e-Delphi system developed at a UK university for automating and improving the Delphi research method.					e-Delphi tool				
	Nvivo for qualitative data analysis	**Hilal, A. H., & Alabri, S. S. (2013).** Using Nvivo for data analysis in qualitative research. *International Interdisciplinary Journal of Education, 2*(2), 1-3.	Good article on use of Nvivo for qualitative research coding and interpretation of data.					Qualitative data analysis				
Key reference work	Technology application examples to improve student success	**Hill, P., & Feldstein, M. (2013).** *The right to educational access: Using online education to address bottleneck courses in California*. Retrieved from Twenty Million Minds Foundation website: http://www.20mm.org/wp-content/uploads/2013/10/The-Right-to-Educational-Access.pdf	Authors indicate opportunity to target "bottleneck courses" to help more students graduate faster. Cite examples of success in using technology, especially online classes to reduce cost, increase access and success of student outcomes. Good research examples of success.		Use tech to improve student velocity-time to degree and reduce cost and increase flexibility	Use tech to improve student velocity-time to degree and reduce cost and increase flexibility			Use tech to improve student velocity-time to degree and reduce cost and increase flexibility			

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	Technology disruptive potential for higher ed	**Holpuch, A. (2013).** Netflix and YouTube make up majority of US internet traffic, new report shows. *The Guardian.* Retrieved from http://www.theguardian.com/technology/2013/nov/11/netflix-youtube-dominate-us-internet-traffic	Article citing current internet bandwidth trends, e.g., that NetFlix and YouTube are over 50% of all internet traffic in the US.						Tech change impact to video industry			
	Technology align with strategy	**Hoque, F., Walsh, L. M., Mirakaj, D. L., & Bruckner, J. (2011).** *The power of convergence: Linking business strategies and technology decisions to create sustainable success.* New York, NY: American Management Association.	From technology giants to major airlines to government agencies, the landscape is littered with the shells of once-promising enterprises that failed to do one thing: Converge their impressive technology initiatives with their business strategies. With countless opportunities lost and billions wasted, these examples provide a much needed wake up call that it is time to institutionalise a set of repeatable management practices to successfully run an organization.		Converge bus strategy with technology for success				Mgmt of tech is critical to success of change			
		Horn, L., Nevill, S., & Griffith, J. (2006). *Profile of undergraduates in U.S. postsecondary education institutions: 2003-04: With a special analysis of community college students* (Report No. NCES 2006-184). Retrieved from U.S. Department of Education, National Center for Education Statistics website: http://nces.ed.gov/pubs2006/2006184a_rev.pdf	Profile statistics on community college students.			Student success statistics by state						

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	LMS and social networking merge	**Hustad, E., & Arntzen, A. A. B. (2013).** Facilitating teaching and learning capabilities in social learning management systems: Challenges, issues, and implications for design. *Journal of Integrated Design & Process Science, 17*(1), 17-35. doi:10.3233/jid-2013-0003	Research study on merging of social networking technologies and LMSs. Need is to evolve LMSs to leverage social media, train instructors to use it properly and convince students to use social media for than just entertainment. 85-90% of college students use social media over 100 minutes per day.			Improve student success					LMS and social networking merge	
	Qualitative research design	**Isaac, S., & Michael, W. B. (1971).** *Handbook in research and evaluation: A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences.* Los Angeles, CA: RR Knapp.	Qualitative research methods reference text.					Qualitative research methods				
	American Dream at risk	**Jarratt, L. (2013).** The American dream starts with a quality education [Web log post]. Retrieved from http://grayslake.patch.com/groups/lennie-jarratts-blog/p/bp--the-american-dream-starts-with-a-quality-education	Picture of little girl regarding American Dream = education		Picture		Picture of Hispanic child with sign about the American Dream = Education					

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	New technology impacting educ	**Johnson, L., Adams, S., Cummins, M., Estrada, V., Freeman, A., & Ludgate, H.** (2013). *The NMC horizon report: 2013 higher education edition.* Retrieved from New Media Consortium website: http://www.nmc.org/pdf/2013-horizon-report-HE.pdf	Report on emerging new technologies and likely adoption and impacts to higher education including data analytics, gamification, etc.						New tech emerging			
	Technology procurement	**Kauffman, R. J., & Tsai, J. Y.** (2009). The unified procurement strategy for enterprise software: A test of the "move to the middle" hypothesis. *Journal of Management Information Systems, 26*(2), 177-204.	Authors describe how enterprise software industry has consolidated. Remaining large vendors like Oracle, SAP, Elucian, etc., offer complete one stop shopping for integrated big data solutions. Customers are finding picking one vendor to be less expensive, less risky and better for sustained business results.						Big data and consolidated vendors in ERP, less choices			
	Educ reform movement	**Kazis, R (2012).** *Policy visions: Creating the conditions for community college effectiveness.* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	Policy brief for AACC on recommendations to CC's to enable education of more students, faster and more cost effectively. Goal: improve student persistence, completion and success.		Reform proposals							
	Org change	**Kezar, A. (2001).** Understanding and facilitating organizational change in the 21st century. *ASHE-ERIC Higher Education Report, 28*(4), 147.	Excellent article on implementing large organizational changes.		Org change mgmt							

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	LMS and feedback to improve student success in online classes	**Kim, R., Olfman, L., Ryan, T., & Eryilmaz, E. (2014).** Leveraging a personalized system to improve self-directed learning in online educational environments. *Computers & Education, 70*, 150-160. doi:10.1016/j.compedu.2013.08.006	Research on impact of motivation is success of self-directed learning. How coaching and training can be used with the LMS to improve learning outcomes success.			LMS and student coord to improve online success					LMS to aid student success	
	Technology changing education	**King, A. (1993).** From sage on the stage to guide on the side. *College Teaching. 41*(1), 30-35. doi:10.2307/27558571	Famous article about the flipped classroom concept with the role of teacher changing to being a learning guide for students instead of a sage on the stage.		Tech changing teaching paradigm				Tech changing teaching paradigm			
	Success rates	**Krymkowski, D. H., & Mintz, B. (2011).** College as an investment: The role of graduation rates in changing occupational inequality by race, ethnicity, and gender. *Race and Social Problems, 3*(1), 1-12. doi:10.1007/s12552-011-9038-2	A college education is a ticket to higher earnings and the middle class. Minorities not attaining degrees and success as well as whites. The gap is closing a little but much more work needs to be done.		Need to use tech to help disadvantaged cost effectively		Need to use tech to help disadvantaged cost effectively		Need to use tech to help disadvantaged cost effectively			
	Mobile technology impact on education	**Kukulska-Hulme, A. (2013).** Limelight on mobile learning. *Harvard International Review, 34*(4), 12-16.	Mobile is changing how users access and consume education. Lots of money being spent, is it appropriate?						ROI on mobile tech?			

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	Technology changing education	**Lacro, E. L. (2013).** *Enhancing student learning and success through the use of social networking technologies, a design-based research approach* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3572434)	Author researched how embedding social media in the curriculum can improve student success outcomes.			Using social media to improve student success			Using social media for teaching			
	Delphi	**Laick, S. (2012).** Using Delphi methodology in information system research. *International Journal of Management Cases, 14*(4), 261-268.	Excellent overview of Delphi research method in information systems research. Excellent references and clear explanation of the technique, history and limitations.					Delphi applied to IT research				
Good research and references about IT investment	Technology changing industries. IT investment must be aligned with strategic priorities	**Liu, F.-C. (2013).** *Value creation in the knowledge-based economy* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3595661)	Dissertation research on impact of IT in the banking industry where technology has changed the business model and is critical for competitive success. IT investment must align with business strategy.		Tech can change educ like it has changed other service industries like banking.				Tech invest must align with bus strategy			
Example	Technology changing education	**Long, K. (2014).** Sleek new online tools on the way for community college system, Seattle Times. Retrieved from http://blogs.seattletimes.com/educationlab/2014/01/06/sleek-new-online-tools-on-the-way-for-community-college-system/	Example of $1M technology investment to improve student success outcomes using the web for a statewide system in WA.		Tech can yield high student success returns example in WA state	Tech can yield high student success returns example in WA state			Good ROI			

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Good reference on lack of student success	Student success failure statistics and recommendations	**Lumina. (2013).** A stronger nation through higher education. Retrieved January 25, 2014, from http://www.luminafoundation.org/stronger_nation	Research report on the failure of current college system to generate enough college graduates (lots of statistics) and proposals on changes to increase success including using technology.	Need to use	Data to support need for change and reform	Propose using AACC model	Not meeting goals			Needs not being met		
Good data on education needs	Employment trends	**Manpower. (2013).** *2013 Talent Shortage Survey research results.* Retrieved from http://www.manpowergroup.com/wps/wcm/connect/587d2b45-c47a-4647-a7c1-e7a74f68fb85/2013_Talent_Shortage_Survey_Results_US_high+res.pdf?MOD=AJPERES	Manpower annual global survey results on employment trends and needs.							Needs not being met		
		Matthews, D. (2012). *The case for college completion.* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	Case for the need to increase workforce educated with college degrees, impacts to economy and middle class life style without reform.		Reform recommendations					Middle class at risk. Need more educated labor		

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		McClenney, K., Marti, C. N., & Adkins, C. (2012). *Student engagement and student outcomes: Key findings from CCSSE validation research.* Retrieved from Community College Survey of Student Engagement website: http://www.ccsse.org/aboutsurvey/docs/CCSSE%20Validation%20Summary.pdf	Summary of community college statistics and recommendations of best practices for success based on research.		Need more student engagement for success	Need more student engagement for success						
		McKillip, J. (1987). *Structured groups. Need analysis.* Thousand Oaks, CA: Sage.	Definitions of qualitative research methods including Delphi.					Definition of Delphi				
	Qualitative research design	**McMillan, J. H., & Schumacher, S. (2009).** *Research in education.* Essex, United Kingdom: Pearson Education.	Education research qualitative and quantitative reference book.					Qualitative research methods				
		Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* Retrieved from U.S. Department of Education website: https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf	Meta-data analysis of online learning studies and their outcomes.		Online success stats	Online success stats			Online success stats			
Key policy Delphi reference	Policy Delphi	**Meskell, P., Murphy, K., Shaw, D. G., & Casey, D. (2014).** Insights into the use and complexities of the policy Delphi technique. *Nurse Researcher, 21*(3), 32-39.	Delphi pros and cons for policy consensus. Uses healthcare as prime example. Good references.					Policy Delphi example				

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How to plan good proposal	Technology changing education	**Mitchell, R. L. G. (2011).** Planning for instructional technology in the classroom. *New Directions for Community Colleges,* (154), 45-52. doi:10.1002/cc.445	Excellent article on questions that need to be asked and considerations for technology investment success at a college. Need to provide training, engage all stakeholders in the planning and provide funding for sustained support.						Ques to ask re tech investing at a college			
	Technology implementation in higher ed	**Molina, P. G. (2013).** *An integrated model for the adoption of information technologies in U.S. colleges and universities* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3556162)	Doctoral thesis on technology project implementation enhancement for colleges. The thesis proposes an integrated model to improve the adoption of information technologies by higher education faculty, staff, students and administrators leveraging four drivers: legal and policy instruments, diffusion of innovation dynamics, economic incentives, and technical elements.		Technology implementation in higher ed				Technology implementation in higher ed			
CCC data summary	Student success rates in CCCs	**Moore, C., & Shulock, N. (2010).** *Divided we fail: Improving completion and closing racial gaps in California's community colleges.* Retrieved from California State University, Sacramento, Institute for Higher Education Leadership & Policy website: http://www.csus.edu/ihelp/PDFs/R_Div_We_Fail_1010.pdf	Summary of student success statistics for CCCs and recommendations of using data to improve student success results. Some CCCs do much better than others, share and adopt best practices!	CCC results	Data to support need for change and reform	CCC results	Key to maintain in CA					

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Key initiative to be studied	Tech change to improve student success	**Moreau, J. (2013).** *California Community College Online Education Initiative grant RFA Specification No. 13-082.* Retrieved from http://ccconlineed.org/downloads?download=5:online-education-initiative-grant	Grant application for CCC online education initiative grant.		Proposed statewide online course management syst	Tied to SS	Easy access for all				New statewide LMS	
	Technology to support education evolving	**Mukerjee, S. (2012).** Student information systems – implementation challenges and the road ahead. *Journal of Higher Education Policy & Management, 34*(1), 51-60. doi:10.1080/1360080X.2012.642332	Article about SIS and need for an SIS that is adaptable to change, e.g., built to change, not built to last as a static system for years. The SIS must be agile and responsive to the growing business process changes in education to serve the business needs of the college.		Data needs changing faster				ERP must be flexible for colleges			
Great stats on CC value	Economic contribution of CCs despite budget cuts	**Mullin, C. M., & Phillippe, K. (2013).** *Community college contributions* (AACC Policy Brief No. 2013-01PB). Retrieved from American Association of Community Colleges website: http://www.aacc.nche.edu/Publications/Briefs/Documents/2013PB_01.pdf	AACC policy brief on contributions of CC's to economy, attendees wage and tax contributions and lower unemployment. Excellent statistics on results, local graduates stay local. Great chart on declining funding of higher ed over the last 20 years.		case for reform of higher ed					Econ impact of CC graduates		

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Org change	**Nadler, G., & Hibino, S. (1990).** *Breakthrough thinking: Why we must change the way we solve problems, and the seven principles to achieve this.* Rocklin, CA: Prima.	Excellent book on transformational change theories and implementation.									Change mgmt
	Technology changing education	**Noer, M. (2012).** One man, one computer, 10 million students: How Khan Academy is reinventing education. *Forbes*. Retrieved from http://www.forbes.com/sites/michaelnoer/2012/11/02/one-man-one-computer-10-million-students-how-khan-academy-is-reinventing-education/	Khan Academy impact on education 1:1 with technology.		Adopt Khan style educ more broadly	Adopt Khan style educ more broadly			Free and works			
		O'Banion, T. (2012). *Learning, teaching, and college completion.* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	Recommendations for reforms and change to colleges to improve student success including staff development, community building, and focus on student success.		Change and reform need and proposal	Change and reform need and proposal						Change and reform need and proposal
	Amer dream and CCs to the rescue-educate workers	**Obama, B. (2013).** Building American skills through community colleges. Retrieved January 6, 2014, from http://www.whitehouse.gov/issues/education/higher-education/building-american-skills-through-community-colleges	Work with businesses to id needed job skills, use technology to track students to success. US must increase college graduate numbers to shore up the middle class and help lower socioeconomic folks move up economically.		Need to improve CC success		College as stepping stone to middle class			Need for more college graduates		

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		Obama, B. (2014). The state of the union fact sheet: Opportunity for all [Press release]. Retrieved from www.whitehouse.gov/the-press-office/30013/01/28/state-union-fact-sheet-opportunity-all	Barack Obama state of the union address Jan 2014 regarding higher ed		President's case for higher ed reform							
		Office, C. C. C. C. s. (2013, June 16, 2013). California Community Colleges Chancellor's Office. Retrieved from http://www.cccco.edu	Datamart CCC stats and other CCC information	Student Success Reports data								
		Palys, T., & Atchison, C. (2012). Qualitative research in the digital era: Obstacles and opportunities. *International Journal of Qualitative Methods, 11*(4), 352-367.	Journal article on using digital search tools and software to assist in qualitative and quantitative research.					Data analysis tools				
		Patten, M. L. (2007). *Understanding research methods: An overview of the essentials.* Glendale, CA: Pyrczak.	Excellent reference book on quantitative and qualitative research methods.					Research methods				
		Patton, M. Q. (2005). Qualitative research. In *Encyclopedia of statistics in behavioral science*. New York, NY: John Wiley & Sons. doi:10.1002/0470013192.bsa514	Excellent reference book on qualitative research methods.					Research methods				
		PennState. (2001). The HERO e -Delphi system: Overview and implementation. Penn State University.	Paper on a proprietary e-Delphi system developed at a UK university for automating and improving the Delphi research method.					e-Delphi program				

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Technology changing education	**Peterson, R. (2013).** *Tools for success: Understanding the efficacy of technology in Iowa community college English composition instruction* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 1540112)	Dissertation on impact of technology for teaching English in a community college and potential impact of new emerging technology.		Tech assist for success	Tech assist for success			Tech assist for success			
Excellent stats and research results	Student success failure statistics and recommendations	**Porchea, S. F., Allen, J., Robbins, S., & Phelps, R. P. (2010).** Predictors of long-term enrollment and degree outcomes for community college students: Integrating academic, psychosocial, socio-demographic, and situational factors (Vol. 81, pp. 680-708): Ohio State University Press.	Excellent research on CC success and failures and factors leading to failure. Good statistics on job needs for CC graduates.		Data to support need for educ reform at CCs	Data to support need for educ reform at CCs	Data to support need for educ reform at CCs					
	LMS- legacy issues	**Porter, G. W. (2013).** Free choice of learning management systems: Do student habits override inherent system quality? *Interactive Technology and Smart Education, 10*(2), 84-94.	Dissertation study of student preferences of webct (legacy) vs Moodle (new). Students preferred what they know, legacy system. This study indicates that institutions should look beyond student usage patterns in making LMS choices, and that LMS quality is sometimes, and perhaps unfortunately, overshadowed by student habit and familiarity.								LMS Legacy issues	

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		Pourzanjani, O. A. (2011). *Leadership crisis in California community colleges* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3486550)	Overview of market need for more educated workers unmet, lack of student success and preparedness, and need for reforms at CA community colleges.	Need more accountability	Statistics on need for change	Stats on lack of success	Open access must be maintained but need better results					Challenge to change bureaucracy
	Technology helping student success	**Pryor, B. W. (1992).** *Streams of knowledge, streams of action: The river of research and development at technology based learning and research, Arizona State University.* Paper presented at the meeting of the Association of Management, Las Vegas, NV.	Excellent article on examples of real world applications of technology to improve student success in higher ed.		Examples of how tech can increase student success	Tech can help			Examples of successful tech in higher ed			
	Longitudinal student success stats 6 year study of 2 and 4 year colleges	**Radford, A. W., Berkner, L., Wheeless, S. C., & Shepherd, B. (2010).** *Persistence and attainment of 2003-04 beginning postsecondary students: After 6 years. First look.* NCES 2011-151. National Center for Education Statistics.	Longitudinal research results of six year study of college student persistence in the US over 6 years starting in 2003/4. 2 year public broken out separate from 4 year results. Good statistics, large sample size.	Data driven	Data to support need for educ reform at CCs	Data to support need for educ reform at CCs						

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		Roueche, J. E., American Association of Community and Junior Colleges, W. D. C., & et al. (1989). *Shared vision: Transformational leadership in American community colleges.* Washington, DC: American Association of Community and Junior Colleges.	Excellent research article on successful strategies for implementing community college changes.		How to implement CC changes successfully							How to change CCs
Survey instrument	Delphi	**Schmidt, R., Lyytinen, K., Keil, M., & Cule, P. (2001).** Identifying software project risks: An international Delphi study. *Journal of Management Information Systems, 17*(4), 5-36.	Software project risk factors identified and prioritized with three round, three country Delphi study of large software projects.					SW risk factors Delphi				
	ERP improves business agility	**Seethamraju, R., & Krishna Sundar, D. (2013).** Influence of ERP systems on business process agility. *IIMB Management Review, 25*(3), 137-149. doi:10.1016/j.iimb.2013.05.001	Article on evolution of ERPs to process improvements, cost savings to integrated data systems enabling the culture and agility of business organizations to be more competitive. Could the same be done in education?		Data needed for responding agily to mkt changes				Data needed for responding agily to mkt changes			
Survey instrument	Policy Delphi	**Schmidt, R., Lyytinen, K., Keil, M., & Cule, P. (2001).** Identifying software project risks: An international Delphi study. *Journal of Management Information Systems, 17*(4), 5-36.	Seminal policy Delphi research study on defining large software project risks.					Software project survey instrument				

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
		Shields, C. M. (2011). *Transformative leadership: A reader (Counterpoints: Studies in the Postmodern Theory of Education, Vol. 409).* New York, NY: Peter Lang.	Transformational leadership changes in higher education.		Org change mgmt							Org change
	CC Success poor ROI	**Shulock, N., Offenstein, J., Esch, C., California State University, S. L. f. H. E. L., & Policy. (2011).** *Dollars and sense: Analysis of spending and revenue patterns to inform fiscal planning for California higher education.* Retrieved from California State University, Sacramento, Institute for Higher Education Leadership & Policy website: http://www.csus.edu/ihelp/PDFs/R_Dollars_and_Sense.pdf	Summary of longitudinal (IPEDS and CCC Chancellor's office) data on spending and revenue trends of CA higher ed vs national averages. CCC's lowest cost tuition, most heavily subsidized. CCC's highest cost per degree due to low success rate.	great quote on $/degree> in CCs due to high fail rates	Data to support need for change	Data					

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Delphi	**Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007).** The Delphi method for graduate research. *Journal of Information Technology Education, 6*, 1-21.	The Delphi method is an attractive method for graduate students completing masters and PhD level research. It is a flexible research technique that has been successfully used in our program at the University of Calgary to explore new concepts within and outside of the information systems body of knowledge. The Delphi method is an iterative process to collect and distill the anonymous judgments of experts using a series of data collection and analysis techniques interspersed with feedback. The Delphi method is well suited as a research instrument when there is incomplete knowledge about a problem or phenomenon; however it is not a method for all types of IS research questions. The Delphi method works especially well when the goal is to improve our understanding of problems, opportunities, solutions, or to develop forecasts.					Definition of Delphi for IT related studies				
Good Purdue research reference and Rio Salado CC results	Technology changing education	**Smith, V. C., Lange, A., & Huston, D. R. (2012).** Predictive modeling to forecast student outcomes and drive effective interventions in online community college courses. *Journal of Asynchronous Learning Networks, 16*(3), 51-61.	Article reviews the Rio Salado, Tempe AZ online community college with over 60K students creation of a custom LMS and then used the student data to do predictions on success (model). They then implemented feedback and interventions to improve success.	AZ example of success using online and big data	AZ example of success using online and big data	AZ example of success using online and big data			AZ example of success using online and big data			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
LMS	LMS selection process	**Spelke, K. A. (2011).** *Factors affecting selection of learning management systems in higher education institutions* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3503700)	Dissertation on selection process for LMS purchase at universities. Key point is selection process usually jointly done by faculty and administration. Key issues: migration of IP, easy of use, training, remote vs. local hosted, cost. 90's home grown, 2000-2005 commercial dominated by Blackboard, post 2005, open source like Moodle and Sakai growing fastest. Bigger schools/systems more risk averse, tend to go commercial. IP fight between Blackboard and Desire2Learn caused CIO's to look more favorably on open source and have less trust for commercial vendors.								LMS selection criteria	
LMS	LMS use tracking correlation with student success	**Stamm, R. L. (2013).** *An examination of faculty and student online activity: Predictive relationships of student academic success in a learning management system (LMS)* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3574716)	Disseration studied instructor LMS activity and student activity correlation with student success. Instructor no correlation, student yes, consistent with past research. This study done with Moodle in Idaho.			LMS usage correlates with student success prediction.					LMS use	

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Good reference on UK research to apply data analytics to improve student success	Technology changing education	**Stephens, C., & Myers, F. (2013).** Signals from the silent: Online predictors of non-success in business undergraduate students. *Business and Management Education in HE, 1*(1), 47-60. doi:10.11120/bmhe.2013.00005	Article from researcher at Open University in the UK. Increased focus on retention, especially in online classes. As universities increase online offerings to appeal to broader demographic of students and geography of students, so the high fixed costs to create an online course can better be recovered, they need to improve completion. Collecting data on student demographics coupled with tracking activities/usage on line colleges can do better monitoring and early intervention to improve success. Definition of ICT-information and communications technology ==> content of materials, capacity to store teaching materials, finding and retrieving dispersed resources, communications. Could track students with the GPS in their phones when on campus to detect patterns, e.g. attending classes, staying to the end? Students with goals do better, electronic prompts to set goals and monitor progress to goals. Purdue signals project 20% increase in retention! Early warning and intervention is the key.	UK and US examples of using data to intervene early and improve success	UK and US examples of using data to intervene early and improve success	UK and US examples of using data to intervene early and improve success			UK and US examples of using data to intervene early and improve success			
		Stout, K. A. (2007). The role of IT in student success at community colleges. *Educause Review*, 6-7.	Author defines the role of IT in the success of a community college.		Tech role in reform and success				Tech role in reform and success			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Excellent stats and research results on technology impact for CCs	Technology to improve CC student success	**Sudhakar, S. (2013).** *Examining the potential of information technologies to improve cost control in community colleges* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3537687)	Excellent dissertation on Technology investment in CC's reality and potential. According to the survey administered in this study, investment in IT has helped institutions grow online enrollments (87.5%), improved efficiency (98.3%), and improved productivity (98.3%). 90% of the survey responders said that IT has enhanced their internal and external communications and 99.2 % responded that IT provides a good return on investment (ROI) at their institution. It is recommended that CC officials make an institutional commitment to using IT as a tool to improve their teaching and learning environment, and enhance their recruitment, retention and completion rates. . By embracing IT, CC's can continue to be enterprises of relevance and significance by providing students the training and skills necessary for today's economy.		Data on impacts of educ investments in tech at CCs	Data on impacts of educ investments in tech at CCs			Data on impacts of educ investments in tech at CCs			
	Technology to improve CC student success	**Tally, S. (2013).** Purdue software boosts graduation rate 21 percent [Press release]. Retrieved from http://www.purdue.edu/newsroom/releases/2013/Q3/purdue-software-boosts-graduation-rate-21-percent-by-data-mining-academic-behviors.html	Press release and information from the chief researcher, Pistilli, on the Signals program that uses data mining and analysis software		Purdue success with tracking data and intervention	Purdue success with tracking data and intervention			Purdue success with tracking data and intervention			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Key paper	Technology to improve CC student success	Thille, C (2012). *Technology: Conducive and disruptive roles in improving student success and college completion.* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	Research paper on recommendations for colleges to focus technology research and investments on "How technology can be used to increase student progress and completion.". Includes examples and references.		Examples of how tech can increase student success	Examples of how tech can increase student success			Examples of how tech can increase student success			
		Thille, C. (2012b). *Technology: Conducive and disruptive roles in improving student success and college completion.* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	Great article on using technology to improve educational productivity by combining data, learning theory and technology.		Using technology to improve higher ed productivity and student success.	Using technology to improve student outcomes.			Using technology to improve higher ed productivity .			
		Thille, C., & Smith, J. (2011). Cold rolled steel and knowledge: What can higher education learn about productivity? *Change*. Retrieved from http://www.changemag.org/Archives/Back%20Issues/2011/March-april%202011/cold-rolled-steel-full.html	Article comparing higher education's need to become more about productivity and data, just like mfg steel in the 21st Century.		Case of need for higher ed productivity improvement				Use tech to improve productivity			Change challenges

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Technology to improve CC student success	**Thompson, C. (2011).** How Khan Academy is changing the rules of education. *Wired Magazine, 126.* Retrieved from http://www.wired.com/2011/07/ff_khan/all/	Article on Khan academy, research shows 1:1 most effective way to teach, however, too expensive. So YouTube videos to the rescue. Custom 1:1 short videos, drills, gaming theory rewards and multi-lingual, 100% English and Spanish, and more languages. Good for Basic Skills quant learning, not yet that great for writing or history. Khan wants to change how people learn, make it fun, customized, cheap and accessible to anyone, literally anywhere, anytime.		Using Khan academy model to reduce costs and increase educ success	Using Khan academy model to reduce costs and increase educ success	Using Khan academy model to reduce costs and increase educ success		Using Khan academy model to reduce costs and increase educ success			
Key author and paper	Student Success and applying technology to address	**Tinto, V. (2012).** Enhancing student success: Taking the classroom success seriously. *International Journal of the First Year in Higher Education, 3*(1), 1-8.	The classroom attributes he describes, such as clear expectations, timely support, feedback on assessment, engaging pedagogies and enhancing teaching skills, though drawn from the United States experience, are universal and as such are transferrable across national boundaries and applicable to higher education educators, leaders and policy makers globally. Tinto advocates using technology to improve assessment, monitoring, early alert and intervention to improve student success, cites the Purdue Signals project as best case example.	Use tech to improve CC accountability	Use tech to improve CC accountability	Use tech to improve CC accountability	Use tech to improve CC accountability		Use tech to improve CC accountability			

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Key authors and paper on Delphi history, definitions, applications	Delphi	**Turoff, M., & Linstone, H. A. (1975).** *The Delphi method: Techniques and applications.* Reading, MA: Addison-Wesley.	Excellent reference on history of the Delphi Technique for research and applications.					Delphi technique history and variations				
	ERP success factors in CCs	**Valente, M. M. (2011).** *Enterprise resource planning systems: Assessment of risk factors by California community college leaders* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3473567)	Research on factors leading to failure and/or less than expected ERP implementation results in CA CCs.						ERP risk factors for CCs			
	Student Success and applying technology to address	**Vuong, B., Hairston, C. C., & Institute for Higher Education, P. (2012).** *Using data to improve minority-serving institution success.* Retrieved from Institute for Higher Education Policy website: http://www.ihep.org/sites/default/files/uploads/docs/pubs/mini_brief_using_data_to_improve_msi_success_final_october_2012_2.pdf	Lumina model for collecting and applying data to improve student success outcomes. Outlines what data to collect and what to do with it for Minority Serving Institutions (MSIs). Uses the Lumina foundation advocated model and cites example CC's using the model successfully.	Proposed measures using AACC and Lumina recommendations	Proposed measures using AACC and Lumina recommendations	Proposed measures using AACC and Lumina recommendations	Proposed measures using AACC and Lumina recommendations					

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	LMS Moodle	**Wald, R. J. (2013).** *Understanding the use of social constructivist Moodle activities within the North Dakota University System* (Master's thesis). Available from ProQuest Dissertations and Theses database. (UMI No. 1545130)	NDUS Moodle is designed and utilizes activities that are based on a learning theory called social constructivism. This research studies the usage of these activities, perceived instructor effectiveness, and the use of alternate tools outside the NDUS Moodle environment by surveying instructors of online-only NDUS Moodle courses for spring 2012. Most instructors use Moodle but not most of its features.								Faculty use of Moodle capabilities and social constructivist learning	
	Tech to improve student success	**Wankel, C., & Wankel, L. A. (2011).** *Higher education administration with social media: Including applications in student affairs, enrollment management, alumni relations, and career centers*. Bingley, United Kingdom: Emerald.	Examples of using social media and other tech data tools to improve enrollment and student success in the US and UK.		Examples of how tech can increase student success	Examples of how tech can increase student success	Examples of how tech can increase student success		Examples of how tech can increase student success			
		Watson, W., & Watson, S. (2013). Exploding the ivory tower: Systemic change for higher education. *TechTrends: Linking Research & Practice to Improve Learning, 57*(5), 42-46. doi:10.1007/s11528-013-0690-9	Change is difficult in higher ed. Need to take a systems approach to implementing change.		Need for change to improve student success	Need for change to improve student success			Need for change to improve student success			Higher Ed change mgmt

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
	Online participation stats and growth	**Weko, T., & Radford, A. W. (2011).** *Learning at a distance: Undergraduate enrollment in distance education courses and degree programs* (Report NO. NCES 2012-154). Retrieved from U.S. Department of Education, National Center for Education Statistics website: http://nces.ed.gov/pubs2012/2012154.pdf	Student participation in online growing, highest with CC students, disabled students and older students.						Growth in online			
		Wilson, C. (2012). *Coming through the open door: A 21st-century community college student profile.* Washington, DC: American Association of Community Colleges. Retrieved from http://www.aacc.nche.edu/AboutCC/21st_century/Pages/working_briefs.aspx	Statistical profile of typical community college students today.		Need to change to better support changing students needs.	Need to change to better support changing students needs.						

Relevance	Primary Topic	Reference	Summary Notes	Accountability Meas	Case for Higher Education Reform	Student Success	Open Access	Delphi	Technology	US Labor Mkt Needs	Learning Mgmt Sys	STS and Change
Good recent data on student online success	Online student success data	**Xu, D., & Jaggars, S. (2013).** *Adaptability to online learning: Differences across types of students and academic subject areas* (CCRC Working Paper No. 54). Retrieved from Columbia University, Teachers College, Community College Research Center website: http://ccrc.tc.columbia.edu/media/k2/attachments/adaptability-to-online-learning.pdf	Using a dataset containing nearly 500,000 courses taken by over 40,000 community and technical college students in Washington State, this study examines how well students adapt to the online environment in terms of their ability to persist and earn strong grades in online courses relative to their ability to do so in face-to-face courses. While all types of students in the study suffered decrements in performance in online courses, some struggled more than others to adapt: males, younger students, Black students, and students with lower grade point averages. In particular, students struggled in subject areas such as English and social science, which was due in part to negative peer effects in these online courses.			Online learning success data	Online success lower for unprepared and minority students		Online learning success data			
	Fund based on student success	**Zarkesh, M., & Beas, A. M. (2004).** UCLA community college review: Performance indicators and performance-based funding in community colleges. *Community College Review, 31*(4), 62-76.	Research study on the case for college reform to fund for success not enrollment.		Need to pay for student success							

APPENDIX B

OEI Implementation Risk Assessment Surveys

Round 1 Survey Instrument

Survey Instrument Hosted and Administered by SurveyMonkey
Assessing Risk Factors When Implementing Online Education Initiative in California Community Colleges

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Page One - Perceived Success Level

1.) Are you an Administrator or a Faculty Member?

Administrator: *Chancellor, Superintendent/President, College President, Vice-Chancellor, Vice-President, Deans and Directors overseeing areas such as Admission and Records, Counseling, Financial Aid, Finance, Purchasing, Human Resources, Information Technology, etc.*
( )

Faculty: *Full or part-time instructor of credit community college courses.*

( ) Full Time Contract

( ) Adjunct

2.) Please enter the number of years in the position.

_____

If you have experience with multiple course management or learning management systems (LMS), please select the one you consider to be the most significant in your experience. In responding to the rest of this survey, please use that LMS experience and corresponding institution as your reference point.

3.) Select the LMS system that in your experience was most significant.

( ) Blackboard

( ) Moodle

( ) Sakai

( ) Other Commercial Vendor

( ) Home grown

4.) Years of experience with selected LMS system?

( ) Less than 2 years

( ) 2 to 5 years

( ) 5 to 10 years

( ) More than 10 years

5.) In which phase of implementation is/was the LMS?

( ) Planning and not purchased

( ) Installation and not in production

( ) In production use for less the 2 years

( ) In production use between 3 to 5 years

( ) In production use for more than 5 years

6.) District size in Full Time Equivalent Students (FTES).

( ) Less than 5,000 FTES

( ) 5,000 to 10,000 FTES

( ) 10,000 to 20,000 FTES

( ) 20,000 to 50,000 FTES

( ) More than 50,000 FTES

7.) In your opinion, how would you rate the institution's overall satisfaction with the selected LMS?

(Blackboard, Moodle, Sakai, home grown etc.)

( ) NA

( ) Poor

( ) Fair

( ) Good

( ) Very Good

( ) Excellent

8.) In your opinion, how would staff characterize the outcomes of the selected LMS project?

( ) NA

( ) Poor

( ) Fair

( ) Good

( ) Very Good

( ) Excellent

9.) In your opinion, how would faculty characterize the outcomes of the selected LMS project?

( ) NA

( ) Poor

( ) Fair

( ) Good

( ) Very Good

( ) Excellent

10.) In your opinion, how would the executive management team (EMT) characterize the outcomes of the selected LMS project?

( ) NA

( ) Poor

( ) Fair

( ) Good

( ) Very Good

( ) Excellent

11.) In your opinion, how would the students characterize the outcomes of the selected LMS project?

( ) NA

( ) Poor

( ) Fair

( ) Good

( ) Very Good

( ) Excellent

Page Two - Reasons to Change

Below are factors that colleges might consider when choosing a new online learning management solution, LMS. Please rate the importance of each factor based on your overall experience with LMS systems.

12.) Modernize the campus IT environment by replacing aging legacy (out of date) systems.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

13.) Increase efficiency (e.g., reduce cost, improve speed of transactions/processes).

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

14.) Provide better management tools for decision-making and planning.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

15.) Increase user (students, faculty or staff) satisfaction.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

16.) Enhance accountability & regulatory compliance.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

17.) Improve services for students, faculty & staff.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

18.) Keep institution competitive in order to attract additional students, improve enrollment management.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

19.) Compete with private proprietary online institutions.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Page Three - Assessing Risk

Please categorize the Risk Factors (Threats) you would consider when adopting the new Online Education Environment, a new LMS to your college. For risks you perceive to be a 9 or 10, please suggest one or two risk mitigations you would recommend.

20.) Risk Factor 1:
A climate of change in the institution and organizational environment that creates instability in the project.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

21.) Risk Factor 2:
Mismatch between institutional culture and required business process changes needed for new system. A mismatch between the culture and the changes required by the new system.

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

22.) Risk Factor 3:
Change in CEO or senior management:

(New president, vice president and/or managers set new direction that causes mismatch between institutional needs and project objectives.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

23.) Risk Factor 4:
Lack of top management commitment to the project.

(This includes oversight by executives and visibility of their commitment, committing required resources, changing policies as needed.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

24.) Risk Factor 5:
Lack of client responsibility, ownership, and buy-in of the project and its delivered system(s). Failure to gain user commitment.

(Laying blame for "lack of client responsibility" on the project leader rather than on the users.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

25.) Risk Factor 6:
Conflict between user departments.

(Serious differences in project goals, deliverables, design, etc., calls into question concept of shared ownership.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

26.) Risk Factor 7:
Failure to manage end-user expectations.

(Expectations determine the actual success or failure of a project. Expectations mismatched with deliverable — too high or too low — can cause problems. Expectations must be correctly identified and constantly reinforced in order to avoid failure.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

27.) Risk Factor 8:
Lack of adequate user cooperation and involvement.

(Functional users must actively participate in the project team, and commit to their deliverables and responsibilities. User time must be dedicated to the goals of the project.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

28.) Risk Factor 9:
Failure to identify all stakeholders.

(Tunnel vision leads project management to ignore some key stakeholders in the project, affecting requirements definition, implementation, etc.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

29.) Risk Factor 10:
Lack of appropriate experience of the user representatives.

(Users assigned who lack necessary knowledge of the application or the organization.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

30.) Risk Factor 11:
Growing sophistication of users leads to higher expectations.

(Users are more knowledgeable, have seen sophisticated applications, apply previous observations to existing project.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

31.) Risk Factor 12:
Not managing change properly. Poor or nonexistent controls.

(Each project needs a process to manage change so that scope and budget are controlled. Scope creep is a function of ineffective change management and of not clearly identifying what equals success.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

32.) Risk Factor 13:
Lack of effective LMS project management skills.

(Project teams are formed and the project manager does not have the power or skills to succeed. Project management must be properly addressed.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

33.) Risk Factor 14:
Improper definition of roles and responsibilities.

(Members of the project team and/or the organization are unclear as to their roles and responsibilities. This includes outsourcers and consultants.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

34.) Risk Factor 15:
Unclear/misunderstood initial scope/objectives.

(It is impossible to pin down the real scope or objectives due to differences or fuzziness in the user community.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

35.) Risk Factor 16:
Scope creep, changing scope and objectives during the project.

(Not thoroughly defining the scope of the new system and the requirements before starting, consequently not understanding the true work effort, skill sets and technology required to complete the project.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

36.) Risk Factor 17:
Project not based on sound institution's requirements.

(Users and developers ignore business/institutional requirements, develop system for sake of technology.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

37.) Risk Factor 18:
Misunderstanding the start-up requirements.

(Not thoroughly defining the requirements of the new system before starting, consequently not understanding the true work effort, skill sets and technology required to complete the project.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

38.) Risk Factor 19:
New and/or unfamiliar subject matter for both users and developers.

(Lack of knowledge of the field, requirements, terminology, and functionality of the software leading to poor requirements definition.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

39.) Risk Factor 20:
Underfunding of development.

(Setting the budget for a development effort before the scope and requirements are completely identified and defined.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

40.) Risk Factor 21:
Underfunding of maintenance and support.

(Support for products in the maintenance phase. If the institution is unprepared or does not budget for this, the project can be judged a failure even if successful in all other aspects.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

41.) Risk Factor 22:
"All or nothing"/Full implementation all at once.

(Requires budgeting entire project at the outset, leading to underfunding in later years of project.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

42.) Risk Factor 23:
Scheduling - Artificial deadlines.

(Presence of unrealistic deadlines or functionality expectations in given time period.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

43.) Risk Factor 24:
Lack of required knowledge/skills among project personnel.

(For example, technology, business knowledge, and experience.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

44.) Risk Factor 25:
Lack of "people skills" in project leadership.

(Project Manager lacks the management skills in dealing with people on the team.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

45.) Risk Factor 26:
Poor project team relationships.

(Strains existing in the team due to such things as burnout or conflicting egos and attitudes.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

46.) Risk Factor 27: Insufficient staffing.

(Not enough skilled people assigned to the project.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

47.) Risk Factor 28: Staffing volatility.

(At some point in the project, losing the key staff such as project manager, analysts or technicians, especially in new technology.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

48.) Risk Factor 29:
Excessive use of outside consultants.

(Can lead to a conflict of interest, for example, billable hours vs. budget, or resulting in the internal staff not having significant involvement and insufficient knowledge transfer.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

49.) Risk Factor 30:
Introduction of new technology.

(Using new, or "bleeding edge," technology or major technological shift occurs during the project.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

50.) Risk Factor 31:
Stability of technical architecture.

(Such as computer hardware, software and network.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

51.) Risk Factor 32:
External dependencies not met.

(Consultants or vendors do not deliver or go out of business.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

52.) Risk Factor 33:
Multi-vendor projects complicate dependencies.

(Integration of packages from multiple vendors hampered by incompatibilities and/or lack of cooperation between vendors.)

Least Important									Most Important
1	2	3	4	5	6	7	8	9	10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

53.) Risk Factor 34:
Lack of control over consultants, vendors, and subcontractors.

(Could lead to schedule or quality problems beyond control of project manager. No legal recourse due to poor contract specification.)

Least	2	3	4	5	6	7	8	9	Most

Important									Important
1									10
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

Risk Mitigation Recommendations:

1.

2.

Thank You!

Thank you for taking our survey. Your response is very important for this research.

Round 2 Survey Instrument

Survey Instrument Hosted and Administered by SurveyMonkey
Assessing Risk Factors When Implementing Online Education Ecosystem in California Community Colleges

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Consent Form

Brandman University
Study Information Sheet

Assessing Risk Factors When Implementing Online Education Ecosystem in California Community Colleges

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- **This is the second of two surveys as part of this policy Delphi doctoral dissertation research project to assess the most significant implementation risks for the OEI CMS project.**
- **You are asked to complete an online survey to rank the top ten OEI CMS project implementation risk factors identified and rank the recommended mitigations. This survey will take approximately 10 minutes and can be completed at your convenience by December 15, 2014.**
- **This study involves no more than minimal risk. There are no known harms or discomforts associated with this study beyond those encountered in**

normal daily life. The survey will be completed anonymously and the researchers will not know your identity. Due to only seven colleges and 6 to 9 participants per college in the survey group, there is some risk that individuals may be individually identifiable.

- **There are no direct benefits from participation in the study. However, analysis of the data generated by this study is intended to advance the knowledge and understanding of how a successful OEI CMS implementation can be facilitated and a poor implementation avoided by identifying, reducing or eliminating risk factors and threats. Additionally, lessons learned from this research can be adapted to span and include other large technology projects in general.**
- **Participation in this study is voluntary. There is no cost to you for participating, and you will not be paid for your participation. You may refuse to participate or discontinue your involvement at any time without penalty. You may choose to exit the study at any time.**
- **All research data collected will be stored securely and confidentially on a secure server that is password protected. No identifiable information will be collected about you. Because you will complete the survey anonymously, your name or other identifying information will not be used in reports or publications. Only the research team may have access to study records to protect participants' safety and welfare.**
- **If you have any comments, concerns, or questions regarding the conduct of this research, please contact the researchers listed at the top of this form. If you are unable to reach the researchers and have general questions, or you have concerns or complaints about the research, or questions about your rights as a research subject, please contact Brandman's Office of Institutional Research Brandman University, 16355 Laguna Canyon Road, Irvine, CA 92618, BUIRB@brandman.edu.**

1.) Do you agree to participate in this second phase of the study?

( ) Agree

( ) Do Not Agree

Experience/Demographic Information

2.) Are you an Administrator or a Faculty Member?

Administrator: *Chancellor, Superintendent/President, College President, Vice-Chancellor, Vice-President, Deans and Directors overseeing areas such as Admission and Records, Counseling, Financial Aid, Finance, Purchasing, Human Resources,*

Information Technology, etc.
( )

Faculty: *Full or part-time instructor of credit community college courses.*

( ) Full Time Contract

( ) Adjunct

3.) Please enter the number of years in this current position (round to whole number).

_____

If you have experience with multiple course management or common course management systems (CMS), please select the one you consider to be the most significant in your experience. In responding to the rest of this survey, please use that CMS experience and corresponding institution as your reference point.

4.) Select the CMS system that in your experience was most significant.

( ) Blackboard

( ) Moodle

( ) Sakai

( ) Other Vendor _____

( ) Home grown

5.) Years of experience with selected CMS system?

( ) Less than 2 years

( ) 2 to 5 years

( ) 6 to 10 years

( ) More than 10 years

Reasons to Change Validation

6.) Below is the rank ordered list of factors that colleges might consider when choosing a new online common course management system, CMS, in the order of most to least important from the first survey. Please rank

order the list from your perspective. If you agree with the survey outcome, please rank 1 to 8 from the top.

Rank Order 1 to 8	Ordered Results from Survey #1, Highest to Lowest Ranked
	Modernize the campus IT environment by replacing aging legacy (out of date) CMS.
	Increase efficiency (e.g., reduce cost, improve speed of transactions/processes).
	Provide better management tools for decision-making and planning.
	Increase user (students, faculty or staff) satisfaction.
	Enhance accountability & regulatory compliance.
	Improve services for students, faculty & staff.
	Keep institution competitive in order to attract additional students, improve enrollment management.
	Compete with private proprietary online institutions.

Assessing Risk

7.) Below is a table of the top 10 risk factors identified in the first survey. Please rank them from 1 to 10 from your point of view.

Rank Order 1 to 10	Ordered Results from Survey #1, Highest to Lowest Ranked
	Underfunding of maintenance and support. (Support for products in the maintenance phase. If the institution is unprepared or does not budget for this, the project can be judged a failure even if successful in all other aspects.)
	Lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s). Failure to gain user commitment. (Laying blame for "lack of faculty/staff responsibility" on the project leader rather than on the users.)
	Underfunding of development. (Setting the budget for a development effort before the scope and requirements are completely identified and defined.)
	Lack of top management commitment to the project. (This includes oversight by administrators and visibility of their commitment, committing required resources, changing policies as needed.)
	Lack of adequate user (faculty, staff and student) cooperation and involvement. (Functional users must actively participate

	in the project team, and commit to their deliverables and responsibilities. User time must be dedicated to the goals of the project.)
	Insufficient staffing. (Not enough skilled people assigned to the project.)
	Lack of required knowledge/skills among project personnel. (For example, technology and teaching experience online).
	Lack of effective CMS project management skills. (Project teams are formed and the project manager does not have the power or skills to succeed. Project management must be properly addressed.)
	Failure to manage end-user (faculty and student) expectations. (Expectations determine the actual success or failure of a project. Expectations mismatched with deliverable – too high or too low – can cause problems. Expectations must be correctly identified and constantly reinforced in order to avoid failure.)
	New and/or unfamiliar subject matter for both users and developers. (Lack of knowledge of the field, requirements, terminology, and functionality of the software leading to poor requirements definition.)

Below are the top ten risk factors identified in the first survey and the list of recommended mediations. Please rank order the mediations for each risk factor, 1 to N, with 1 being the most important. The current order is chronological, not ranked in any way.

8.) Risk Factor 1:
Underfunding of maintenance and support. (Support for products in the maintenance phase. If the institution is unprepared or does not budget for this, the project can be judged a failure even if successful in all other aspects.)

Risk Mitigation Recommendations, please rank 1 to 7:

Rank Order 1 to 7	Recommended Mitigations from First Survey
	The needs for training and support are often underestimated for all users (e.g., faculty, students). Factor into costs from the beginning.
	Institutions should adopt a total cost of ownership model that incorporates support staffing levels, a SLA with integrated satisfaction levels, and ongoing training costs.
	Provide funding
	This is a real fear. Will the college be responsible to pay for support and maintenance or will the OEI pay for these fees.

	24 - 7 tech support required
	Must have on campus CMS support staff who are not co located with IT staff.
	An exploratory committee should be formed to assess the options and costs associated with each before a budget is set. This includes the costs associated with maintenance and support.

9.) Risk Factor 2:
Lack of faculty and staff responsibility, ownership, and buy-in of the project and its delivered system(s). Failure to gain user commitment. (Laying blame for "lack of faculty/staff responsibility" on the project leader rather than on the users.)

Risk Mitigation Recommendations, please rank 1 to 8:

Rank Order 1 to 8	Recommended Mitigations from First Survey
	Top administrators need to make their expectations crystal clear. Faculty and staff need to understand the reasons for change. They need to be well trained and empowered. Appropriate rewards and consequences need to be identified and shared as the project begins.
	Faculty input, compensation for training.
	On-going communication with and participation of faculty.
	Having faculty be a part of choosing the CMS
	Frequent information meetings and symposia; expressed commitment by governing bodies and faculty committees; one-on-one contact with faculty to answer "how will this affect me?"
	Faculty will buy-in of the project if they receive training from an instructional designer. Faculty need some kind of incentive to transition from one CMS to another. Faculty will have ownership if they see success and improvement in their classes. If the interface was easier to use.
	Faculty and staff need to understand that online education is a growing segment of education, and the fact that established faculty may not have grown up with online education themselves does not mean that they should not be required to adapt to the student's needs. Part of the resistance may lie in a fear of learning the new technology. Mitigation would be to ensure that faculty and staff training opportunities are funded, robust, and mandatory.

10.) Risk Factor 3:
Underfunding of development. (Setting the budget for a development effort before the scope and requirements are completely identified and defined.)

Risk Mitigation Recommendations, please rank 1 to 5:

Rank Order 1 to 5	Recommended Mitigations from First Survey
	And underfunding of implementation/deployment. The needs of a new LMS rollout are often underestimated. Budget what you think are adequate resources and add 10 or 20% for the "oops, we didn't anticipate that' events that will occur.
	This factor is why I am not so sure of the development of a public CMS system. I have worked in the public sector for many years and I have seen the development and later failure of government developed computer systems. These systems failed because they were inadequate and funding to correct them was not feasible. Thus the system was scrapped. At the same time the private sector has valid computer systems.
	An exploratory committee should be formed to assess the options and costs associated with each before a budget is set for a development effort.
	Decrease scope/upstart.
	Make sure the budget is defined commiserate with needs.

11.) Risk Factor 4:
Lack of top management commitment to the project. (This includes oversight by administrators and visibility of their commitment, committing required resources, changing policies as needed.)

Risk Mitigation Recommendations, please rank 1 to 8:

Rank Order 1 to 8	Recommended Mitigations from First Survey
	Top administrators need to acknowledge the change is significant and commit reasonable resources ($ and personnel) to manage/ease the transition.
	Frequent information meetings; back channel conversations with lots of listening; working through details of how the project would benefit the college.
	We have a formed task force but we have not met. We do get

	updates in our online committee. The larger campus and faculty are not aware of the OEI project.
	Assign someone to be the point person prior to the changes taking place.
	Again, my former community college did not support online instruction from a Dean and Chairs aspect. Must change college policy to encourage online instruction.
	A CMS cannot be implemented successfully without oversight, in terms of guidelines, policies, and training.
	Reason for change needs to come from the top down. Have clear procedures published.
	Need strategic plan authored through participatory governance that drives decisions and institutional commitment.

12.) Risk Factor 5:
Lack of adequate user (faculty, staff and student) cooperation and involvement. (Functional users must actively participate in the project team, and commit to their deliverables and responsibilities. User time must be dedicated to the goals of the project.)

Risk Mitigation Recommendations, please rank 1 to 5:

Rank Order 1 to 5	Recommended Mitigations from First Survey
	Again, administrators must make expectations clear to all stake holders, and they must provide appropriate resources, rewards, and consequences to match the situation.
	Ensure participatory governance project sponsorship; including academic senate sponsorship and Student Government sponsorship
	If you give the faculty a choice to use the old CMS or the new CMS you will not have faculty buy-in or cooperation. If you said we are required to use the new CMS then faculty will be obligated to use the new tool. They would be required to cooperate because this tool would enable them to teach online.
	Development of college CMS support staff and ongoing training for faculty.
	Accountability is critical to the success of the CMS. The CEO/senior management needs to communicate that online education is important, and hold all parties accountable for their part in that success.

13.) Risk Factor 6:
Insufficient staffing. (Not enough skilled people assigned to the project.)

Risk Mitigation Recommendations, please rank 1 to 7:

Rank Order 1 to 7	Recommended Mitigations from First Survey
	Top administrators should trust user (faculty and staff) opinions on what will be required for roll out. They are usually correct in my opinion.
	Institutions should adopt a total cost of ownership model that incorporates support staffing levels, a SLA, and ongoing training costs.
	Provide sufficient staffing
	The support staff needs to be in place prior to implementation.
	Develop a staffing plan and a budget to support the staffing plan.
	The distance education technical advisory committee and those responsible for faculty training are a critical part of the success. The budget should take this into consideration, because lack of staffing means lack of support, and this leads to attrition.
	Assign skilled and knowledgeable people to the project.

14.) Risk Factor 7:
Lack of required knowledge/skills among project personnel. (For example, technology and teaching experience online).

Risk Mitigation Recommendations, please rank 1 to 4:

Rank Order 1 to 4	Recommended Mitigations from First Survey
	Institutions should adopt a total cost of ownership model that incorporates support staffing levels, a SLA with integrated satisfaction levels, and ongoing training costs.
	Provide training
	Require project personnel to have experience in teaching online and or technology experience relating to online learning. Keep administrators who do not have a clue or desire out of the process.
	A mandatory faculty certification program and mandatory student orientation program are critical to faculty and student success in online education.

15.) Risk Factor 8:
Lack of effective CMS project management skills. (Project teams are

formed and the project manager does not have the power or skills to succeed. Project management must be properly addressed.)

Risk Mitigation Recommendations, please rank 1 to 4:

Rank Order 1 to 4	Recommended Mitigations from First Survey
	Yes, number 1, the organization must understand this is a big PROJECT that must be managed. They must assign a person or group to manage the project and make their roles and responsibilities are very clear. Top administrators should delegate appropriate authority to the project manager(s).
	Timely periodic evaluations of project manager; creation of "early warning" criteria that may indicate process of off track; participation of advisers, faculty and staff
	Insure that project management includes all user representation. Create a local steering committee.
	Excellent project manager is needed. One who has authority to make people accountable to meet deadlines, provide resources, stick to timeline, etc.

16.) Risk Factor 9:
Failure to manage end-user (faculty and student) expectations. (Expectations determine the actual success or failure of a project. Expectations mismatched with deliverable — too high or too low — can cause problems. Expectations must be correctly identified and constantly reinforced in order to avoid failure.)

Risk Mitigation Recommendations, please rank 1 to 5:

Rank Order 1 to 5	Recommended Mitigations from First Survey
	Need to continually communicate with end users during selections and implementation
	Ongoing evaluations and reworking of expectations is needed.
	information sharing key
	I have been involved with some textbook CMS systems that were not user friendly. Students will immediately become frustrated and drop the course. Again, work with faculty and college CMS staff in the expectations of the delivery system.
	End-user expectations are going to vary across the board and there is little anyone can do, other than require training, to mitigate this. Mandatory online educational training (from a technology standpoint and a pedagogical standpoint) is

	essential to ensure that the end result meets the expectations of the faculty and the student.

17.) Risk Factor 10:
New and/or unfamiliar subject matter for both users and developers. (Lack of knowledge of the field, requirements, terminology, and functionality of the software leading to poor requirements definition.)

Risk Mitigation Recommendations, please rank 1 to 5:

Rank Order 1 to 5	Recommended Mitigations from First Survey
	Make sure to have CMS experts on the team.
	Allow long time online faculty training to make the transition between the old CMS and the new CMS. These faculty may have fears of change.
	People can be trained if training is available on an ongoing basis.
	Keep to the basics. Do not try to develop some high level CMS system which Community college students will not understand.
	A mandatory faculty certification and student orientation is the best way to mitigate for lack of knowledge with online education and CMS requirements.

Thank You!

Thank you for taking our survey. Your response is very important for this research.

APPENDIX C

Informed Consent Form

The purpose of this research project is to assess the perceived implementation risks to the implementation of the online education initiative and to collect suggestions and priorities for mitigations for the risks. This is a research project being conducted by Scott Conrad at Brandman University as part of his Ed D dissertation. You are invited to participate in this research project because you are part of the initial cohort of first users of the new online education initiative.

Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time. If you decide not to participate in this study or if you withdraw from participating at any time, you will not be penalized.

The procedure involves filling out an online survey that will take approximately 30 minutes. Your responses will be confidential and we do not collect identifying information such as your name, email address or IP address. The survey questions will be about your assessment of the implementation risks to the adoption of the new online education initiative.

We will do our best to keep your information confidential. All data is stored in a password protected electronic format. To help protect your confidentiality, the surveys will not contain information that will personally identify you. The results of this study will be used for scholarly purposes only and may be shared with Brandman University representatives, RP Group and the CCC Online Initiative Consortium.

If you have any questions about the research study, please contact. Scott Conrad at conr4103@mail.brandman.edu. This research has been reviewed according to Brandman University IRB procedures for research involving human subjects.

ELECTRONIC CONSENT: Please select your choice below.

Clicking on the "agree" button below indicates that:

• you have ready the above information

• you voluntarily agree to participate
• you are at least 18 years of age

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

ELECTRONIC CONSENT: Please select your choice below. Clicking on the "agree" button below indicates that:

- you have ready the above information
- you voluntarily agree to participate
- you are at least 18 years of age

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

O Agree

O Disagree