2016

Factors for Success in Community College Online Gateway Math

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2016

Abstract

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MA, University of South Florida, 2005

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Walden University

December 2016

Abstract

Researchers have found that student success rates in online classes are lower than in comparable face-to-face courses. Yet, the research is unclear as to whether student demographic and academic history variables are related to the lower success rates. At a large community college in Florida, low success rates for students in the online Intermediate Algebra course led to delays in the continuation of required coursework and graduation for many students and the factors associated with low success rates were largely unknown. The purpose of this quasi-experimental study was to examine the associations between several student variables and student success in online Intermediate Algebra at the research site. Guided by Tinto's interactionalist theory, key student demographic variables (age, gender, ethnicity, and veteran status) as well as an academic history of completing developmental math coursework were identified for investigation in this study. Archival data from all 731 online Intermediate Algebra students from Fall 2014 were included in the tests of associations among the variables. A random sample of 50 student transcripts was reviewed to test the association between developmental coursework and student success in the algebra course. Chi-square analyses showed that age and ethnicity were associated with online Intermediate Algebra student success; younger students and those of Asian and White ethnicity were more likely to be successful. Academic history, gender, and veteran status were not significant. In response to the findings, a professional development project was created to lead to social change by educating higher education professionals on the potential impact of student related variables when working with online students.

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Acknowledgments

I am deeply grateful to my family, friends, and mentors who have supported and guided me through my doctoral journey.

Joe, thank you for your support, your belief in my abilities, and your continual investment of time and energy into my dreams. Katy and Stephen, thank you for being my inspiration and my constant joy. You are the centers of my heart. Mom and Dad, thank you for guiding me throughout my life to reach for the stars (and for showing me how). Thank you for teaching me resiliency and perseverance through your words and your example.

To my committee: Dr. Braley, Dr. Harney, and Dr. Wilson; thank you for your continual guidance, support, wisdom, and thoughtful revisions. I have grown as a writer and a researcher due to your input and I am grateful. Dr. Braley, thank you for constantly pushing me to succeed and to get it done!

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Section 1: The Problem

Introduction

At a large Florida community college, lack of student success in online gateway mathematics courses was problematic. In this section, I define and describe this problem. In my review of the literature I found that a doctoral-level study of the problem was needed because of conflicting past results on the statistical significance of both demographic and academic variables relating to student success and retention. In the literature review section I provide background information on recent studies examining student success and retention, with associated statistically significant variables at other community colleges.

Definition of the Problem

Low success rates for the online gateway mathematics course, Intermediate Algebra, at a large public suburban community college in Florida concerned both faculty and administration. For this institution, and thus for this study, success in Intermediate Algebra, the first mathematics course for which students earn college credit, is defined as course completion with a grade of A, B, or C. The dean of mathematics at the college at my research site stated that student success in online Intermediate Algebra was lower than the same measure for the other instructional modalities (personal communication, May 14, 2015). The success rates for online sections of this course were lower than the success rates for the same course offered in the face-to-face instructional modality in the Fall 2014 semester. Because Intermediate Algebra is a high-enrollment course that is a pre-requisite for a large number of other courses, the low success rate in the online

instructional modality delayed continuation of required coursework and graduation for many students.

In recent years, the college's retention and success initiatives have been largely focused on student groups considered by the college to be at a higher risk for withdrawal or failure. The groups include, but are not limited to, first-time college students, Black males, and students earning low placement test scores. Low scores on the placement examination may require the students to complete one or more developmental courses. College success initiatives target these high-risk groups throughout the college, regardless of instructional modality. One such initiative is a college-wide early alert system, which allows professors to engage with student support personnel to reach out to students who are at risk of an unsuccessful outcome in their class or classes. In addition to these efforts, the mathematics department encourages teacher professional development training and course content redesign. However, despite the efforts of both the college and the mathematics department, a gap remained in success rates between online and face-to-face modalities for gateway mathematics courses, with online success rates consistently lower than face-to-face. In this study, I sought to determine if the gap remained, in part, because there was a difference in the groups of students who are at risk between the modalities. Such a difference in the success rates between groups of students may provide insight as to who would benefit most by outreach initiatives.

Community colleges throughout the nation use open-door policies to provide students with access to education in their local communities. Open-door policies provide access to students who have been out of school for quite some time, to students who were

not college-ready when they graduated high school, and to students who otherwise might not be accepted into institutions of higher education. Such efforts in the online instructional modality are especially beneficial to students who have other responsibilities beyond school such as parenting, caretaking, and full-time employment (Boston, Ice, & Gibson, 2011). While educational access provides opportunities, it is the diploma that proves successful completion of an accredited two-year degree program, and a certificate that proves successful completion of a planned learning exercise. Those certificates and degrees are the end goals for both the students and the higher education institution. Completers count for, and non-completers count against, the funding calculations state regents use to assign finances to public higher educational institutions (National Conference of State Legislatures, 2015). That is why success rates in required courses such as Intermediate Algebra are so important.

As a course with high online enrollment, Intermediate Algebra is of particularly great concern to the institution offering the course. Online courses represent a large proportion of the course offerings of many community colleges, a proportion that is increasing (Ashby, Sadera, & McNary, 2011). Moreover, because Intermediate Algebra is a required course for most students in the community college setting, its online enrollment can be expected to continue to increase. Nationwide, the success rates for online courses are lower than the success rates for the same courses in the face-to-face instructional modality (Brown, 2011). Institutions of higher education can thus expect to see a continual overall decline in success rates for Intermediate Algebra if online enrollment continues to grow and online success rates are not improved.

The population of online students who enroll in Intermediate Algebra is not a population that is necessarily considered traditional. Researchers have presented differing results as to the significance of demographic variables on success in that population (Boston et al., 2011; Harrell & Bower, 2011; Niemi & Gitin, 2012). Because there is not enough known about the groups that are at risk for failure or withdrawal among the population in the online instructional modality, community colleges are not necessarily able to assist their students in the best manner possible. Additionally, open-door institutions invest significant resources in their developmental courses, yet the effectiveness of such developmental courses as preparation for online Intermediate Algebra is unknown. Hence, further research was needed a) to determine the significance of demographic variables on student success in online Intermediate Algebra, and b) to determine the significance of successful completion of developmental mathematics courses taken at the same institution on student success in online Intermediate Algebra.

Rationale

Evidence of the Problem at the Local Level

Intermediate Algebra, the gateway math course, has high enrollment (Florida College System, 2010), and the course is a pre-requisite for a large number of other courses in a variety of academic departments (Florida Department of Education, 2001). Therefore, the lower success rate in the online instructional modality delays entrance into other coursework and delays graduation for many students. The online enrollment for Intermediate Algebra is already among the highest of any math course offered at my research site (Florida College System, 2010). Such enrollment is also expected to

increase in the coming years, due in large part to Florida Senate Bill 1720 (2013) which redefines the process by which Florida colleges place students into gateway mathematics courses. For students who received a standard diploma from a Florida public high school after they entered high school in 2003 or later, and for students who are active members of the military, the college is no longer permitted to require placement testing (Education Committee, 2014). Historically, the college used placement testing to determine if a student should begin his or her math coursework in one of the two levels of developmental mathematics, or if the student was sufficiently prepared to enroll in the gateway course.

Of the students tested in Florida, approximately 80% tested into at least one level of developmental math (Ross, 2015). A large number of those newly exempt students are now eligible to start their math coursework directly in the gateway level (Education Committee, 2014). In the online instructional modality, overall student success in the gateway math course is lower than the same measure in the face-to-face instructional modality for most courses at most institutions throughout the nation (Brown, 2011). With the combination of increasing enrollment and lower success in the online gateway mathematics course, challenges with low success rates in online Intermediate Algebra will intensify over time.

At my study site, those same challenges existed. Student success in Intermediate Algebra was a concern for instructors and the administration. At my study site, the success rate for Intermediate Algebra in 2010 was 53%. That included students throughout both the Fall and Spring semester in all instructional modalities (Florida

College System, 2010). In contrast, the success rate at that institution, as published on their website, for all courses in all instructional modalities for the 2011-2012 academic year was 73.9%. That shows that the success rate for students who took Intermediate Algebra at the institution in question was substantially lower than the average at that institution. Because national success rates are lower in the online instructional modality than face-to-face or blended instructional modalities, online Intermediate Algebra students were of particular interest to the institution. In recent efforts to improve success for all online math students, the institution has increased the availability and visibility of online tutoring. It has also instituted an early alert system for all developmental and gateway courses at the college. That system allows faculty to reach out to staff at the college to assist or guide a student when that student needs help or seems to be in danger or either withdrawal or failure. Despite those excellent endeavors, the dean of mathematics stated that student success in online Intermediate Algebra remains lower than the same measure for the other instructional modalities (personal communication, May 14, 2015). Because the enrollment in online Intermediate Algebra is so high at the institution, those lower rates of success are concerning. In this study, my intent was to obtain additional information about the groups of students for whom success rates were the lowest. Prior to embarking on this project, I determined that this information would be helpful to the institution for identifying students who are not being fully reached at this time. My goal was to provide the college information that it could use to better guide its efforts at student success and retention.

Evidence of the Problem from the Professional Literature

Several research studies have shown that success rates for first-level college math classes at community colleges are particularly problematic in the online instructional modality. In a study of Intermediate Algebra courses in a community college in the mid-Atlantic, Ashby et al. (2011) discovered that attrition was significantly higher in the online instructional modality than in other instructional modalities. Although their study was not specifically limited to math classes, Atchley, Wingenbach, and Akers (2013) later confirmed that attrition in online courses was significantly higher than attrition in face-to-face courses. In a developmental Florida community college, the dropout rate for students in online courses was twice that of those taking face-to-face courses (Zavarella & Ignash, 2009). Additionally, a study of all gatekeeper math and English courses in Virginia community colleges showed that attrition in both subjects was higher in the online courses than in the face-to-face courses. In that case the success rates were higher in the face-to-face courses for both math and English, and the difference was particularly pronounced in the math courses (Xu & Jaggars, 2011). In their more recent work, Xu and Jaggars (2013) found that the attrition rate continued to differ between the online instructional modality and the face-to-face instructional modality. They also found that grades were lower for students in the online instructional modality than in the face-to-face modality for all subjects included in the study. A similar study in California also showed that student success rates for all subjects are more than 10 percentage points lower in the online instructional modality than in the face-to-face instructional modality (Johnson & Mejia, 2014). In all these studies, success in online community college math

courses was a problem in the local school or state. By conducting research into the success rates for students from varying academic and demographic backgrounds, I hoped to provide direction to higher education institutions that offer online gateway mathematics courses.

Definitions

The following are definitions of terms used within this study.

Academic history: Previous academic experiences, successes, or failures (Trolian & Fouts, 2011). In this study, the term refers to whether or not a student has successfully completed at least one developmental mathematics course previously at the college under study.

Flexible placement student: A student who is neither required to complete placement testing, nor required to enroll in developmental courses upon entrance into a Florida public institution of higher education. This student may be the recipient of a standard Florida high school diploma after entering high school during or after the 2003-2004 academic year, or the student may be an active duty member of the United States military (Education Committee, 2014).

Gateway course: The first course within a discipline to provide transferable college credit (Bouck & Alexander, 2013).

Online course: A course in which a minimum of 80% of content is delivered online with no face-to-face meetings, and in which one to two proctored examinations may be required (Allen & Seaman, 2011).

Success: Course completion with a grade of A, B, or C. (as defined at the research site).

Significance

The purpose of the study was a) to determine the significance of demographic variables on student success in online Intermediate Algebra, and b) to determine the significance of developmental mathematics courses taken at the same institution on student success in online Intermediate Algebra. Although previous researchers have examined those demographics, their results were conflicting (Boston et al., 2011; Cassidy, 2012; Driscoll, Jicha, Hunt, Tichavsky, & Thompson, 2012; Harrell & Bower, 2011; Heaney & Fisher, 2011; Kupczynski, Gibson, Ice, Richardson & Challoo, 2011; Lee, Choi, & Kim, 2013; Niemi & Gitin, 2012; Ojokheta, 2010; Simmons, 2014; Wolfle & Williams, 2014, Zavarella & Ignash, 2009). Thus, specific research at my research site was needed. I conducted research to clarify the significance of demographic variables and of previous completion of developmental mathematics courses at the same institution on online gateway mathematics success for the specific population of students. Previous research has also indicated that past college academic experiences may impact future online course success (Boston et al., 2011; Hachey, Wladis, & Conway 2012; Harrell & Bower, 2011; Wolfle & Williams, 2013), although this has not been tested for courses at this institution. The data from this study could provide clarity as to the effectiveness of developmental math in preparing students for online gateway mathematics. Specifically, the data may serve to provide instructors and leadership better information as to whether

or not there are specific demographic groups of students needing more or different types of support in gateway online mathematics.

Research Questions

At the institution under study, there were uncharacteristically low success rates in the gateway mathematics course taught using the online instructional modality as compared to the same course taught in the face-to-face instructional modality. Results of previous research conflicted as to the significance of demographic characteristics such as age, gender, ethnicity, and veteran status. Although some researchers found that the impact of one or more of these demographic characteristics on online success was statistically significant (Niemi & Gitin, 2012; Wolfle & Williams, 2013; Simmons, 2014), others had shown that the impact of at least one of those demographic characteristics was not statistically significant (Boston et al., 2011; Cassidy, 2012; Driscoll et al., 2012; Harrell & Bower, 2011; Heaney & Fisher, 2011; Kupczynski et al., 2013; Ojokheta, 2010; Simmons, 2014). Although a variation in the findings was likely tied to the fact that such demographic groups consisted of individuals who were widely varied themselves, the significance of demographic variables also seemed to be impacted by the institution and the courses under study. Additional quantitative research was therefore needed to determine the significance of demographic variables for online gateway mathematics student success at my study site. It was also unclear whether previous developmental courses had any impact on online gateway math success. Those points led me to develop the following research questions and their associated null and alternative hypotheses. I obtained data to answer the research questions from my study

site's Department of Institutional Research and Effectiveness which maintains a database that stores data concerning student online course completion and demographic information. Those data were collected as a part of the normal course of business operations at the research site. The groupings for age and ethnicity are the standard categories used by the Department of Institutional Research and Effectiveness in its data collection and storage.

Research Question 1 (RQ1): Is there a significant difference in the relative frequency of students who were successful in the online gateway math course for students who have previously successfully completed at least one developmental mathematics course at the institution in question as compared to students who have not?

Null Hypothesis 1 ($H_0$1): There is no significant difference in the relative frequency of students who were successful in the online gateway mathematics course for students who have previously successfully completed at least one developmental mathematics course at that institution in question as compared to students who have not.

Alternate Hypothesis 1 (H_A1): There is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course for students who have previously successfully completed at least one developmental mathematics course at that institution in question as compared to students who have not.

Research Question 2 (RQ2): Is there a significant difference in the relative frequency of students who were successful in the online gateway mathematics course among the different demographic groups of (a) age, (b) gender, (c) ethnicity, and (d) veteran status?

Null Hypothesis 2_a ($H_0 2_a$): There is no significant difference in the relative frequency of students who were successful in the online gateway mathematics course among students in the following age groupings: $\leq$18, 19–21, 22–25, 26–35, and $\geq$36.

Alternate Hypothesis 2_a ($H_A 2_a$): There is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course among students in the following age groupings: $\leq$18, 19–21, 22–25, 26–35, and $\geq$36.

Null Hypothesis 2_b ($H_0 2_b$): There is no significant difference in the relative frequency of students who were successful in the online gateway mathematics course between male students and female students.

Alternate Hypothesis 2_b ($H_A 2_b$): There is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course between male students and female students.

Null Hypothesis 2_c ($H_0 2_c$): There is no significant difference in the relative frequency of students who were successful in the online gateway mathematics course among students classified in the following ethnic groups: American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latino, Multi-Ethnic, Native Hawaiian or other Pacific Islands, and White.

Alternate Hypothesis 2_c ($H_A 2_c$): There is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course among students classified in the following ethnic groups: American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latino, Multi-Ethnic, Native Hawaiian or other Pacific Islands, and White.

Null Hypothesis 2_d ($H_0 2_d$): There is no significant difference in the relative frequency of students who were successful in the online gateway mathematics course between veteran students and non-veteran students.

Alternate Hypothesis 2_d ($H_A 2_d$): There is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course between veteran students and non-veteran students.

Review of the Literature

Theoretical Framework

Literature abounds surrounding the question of who is at risk of non-success in higher education. The theoretical framework most often cited as central to such questions is Tinto's interactionalist theory. Tinto's theory addresses voluntary student departure from college (Tinto, 1993). In the longitudinal model of departure from institutions of higher education, Tinto (1993) listed three categories of "pre-entry attributes" that impact all other components of his theory: "family background, skills and abilities, and prior schooling" (p. 114). I drew on Tinto's work as I was developing my study, and his groupings proved instrumental in my decision to study demographic variables in conjunctions with students' academic history. The specific variables I ultimately chose to investigate within those categories were a result of my subsequent review of the literature.

Braxton, Hirschy, and McClendon (2011) list several further testable hypotheses that come from Tinto's theory. Among that list is the concept that initial student

characteristics may have a direct impact on that student's likelihood of persistence in college. Although Tinto's theory speaks to institutional persistence as opposed to persistence within a specific course, it is often cited as seminal work by those who seek to understand the roles of demographic variables or a student's specific academic history as they relate to the student's success and retention in college classes. In their work to revisit Tinto's model and relate it more directly to community colleges, Stuart, Rios-Aguilar, and Del-Amen (2014) stated that students look for the benefits of a degree to outweigh the cost of enrollment. Such cost might be in the form of money, time, or personal sacrifices. Although demographic groups are not monolithic, determination of success rate differences between those groups may give an insight as to the areas of focus needed by the institution. Additionally, by determining the significance of students' experiences in developmental math courses at the institution on their success in online Intermediate Algebra, my research may help guide efforts on the part of the institution to guide students toward success.

Findings on Online Student Success in the Literature

This review of the literature includes results from the recent literature covering the following topics: the success of students in the online instructional modality as compared to other instructional modalities; the differences between the populations of students taking online courses as compared to students taking courses on campus; student characteristics that may be risk factors or success predictors for students in math courses, particularly in the online instructional modality; and changes institutions can implement and practice based on the cited research. To find appropriate research, I utilized the

following educational databases: ERIC, Education Research Complete, SAGE, and Google Scholar. In the process of searching those databases, I utilized the following search terms in a variety of combinations, using the Boolean operators "and" and "or": *online, success, risk factors, higher education, college, community college, predictor, individual differences, Intermediate Algebra, gateway course, high risk,* and *demographic*. I also searched through the reference lists of all found articles for additional research. Finally, I searched for articles that referenced research I had already found using both Google Scholar and the Walden Library tools.

Success online. Several studies have compared student success in courses that use the online instructional modality to student success in courses that use the face-to-face instructional modality. Although some researchers have reported higher GPAs or percentages of students who had completed courses earning grades of C or higher in online courses as compared to face-to-face courses (Ashby et al., 2011; Driscoll et al., 2012; Long, Marchetti, & Fasse, 2011), each also noted that the pattern was only present when students who dropped or withdrew from the course were not included in the study. In a study of student scores in business statistics courses, Simmons (2014) did not find that scores were equivalent or higher in the online courses than in face-to-face courses. Rather, Simmons (2014) found that student performance was higher overall in face-to-face and blended courses than in online courses. That finding emerged from exam scores, and the difference increased (with online exam scores becoming increasingly lower than face-to-face or blended exam scores) as the semester progressed.

Scholars agree that attrition is higher with the online instructional modality than with the face-to-face instructional modality (Ashby et al., 2011; Xu & Jaggars, 2011). In one case, the difference in attrition was by a factor of two (Zavarella & Ignash, 2009). The difference in attrition was especially pronounced for math courses (Xu & Jaggars, 2011). A related issue is student satisfaction with courses. According to Bergstrand and Savage (2013), students rated online courses lower than face-to-face courses in both student perception of learning in the course, and student perception that their instructor respected the students. The researchers also noted that the difference varied among instructors (Bergstrand & Savage, 2013). In another study there was no significant difference in the student satisfaction ratings of courses by instructional modality (Driscoll et al., 2012).

Online student population. Many researchers assume that lower success rates in the online instructional modality may be due to differences in the student populations. Although there was no significant difference in student gender between the modalities in one recent study (Zavarella & Ignash, 2009), a more common result is that a larger proportion of the online instructional modality student population consisted of females (Driscoll et al., 2012; Xu & Jaggars, 2011). Researchers also noted that online students were older than their face-to-face counterparts (Driscoll et al., 2012; Xu & Jaggars, 2011; Zavarella & Ignash, 2009). Driscoll et al. (2102) also noted that online students tended to have more online education experience and worked more hours during the week outside of school.

In an analysis of enrollment trends in online courses that used data from several recent National Postsecondary Student Aid Survey reports, Radford (2011) reported that the student population was growing rapidly for online courses, and that the online student population differs from the face-to-face population. Radford also reported that the online student population is larger among public two-year colleges than private institutions and public universities. Furthermore, Radford reported that the concentration of students in online courses was higher for older students, students with a dependent or a spouse, students with full-time employment, and students with mobility disabilities. The students in online courses also centered on certain degree programs, such as general studies, education, business, computer and information science, and health care.

In their study of online community college courses throughout the state of Virginia, Xu and Jaggars (2011) found additional trends within the online student population. Career-technical students, White students, students fluent in English, students with lower concurrent course loads, students who had participated in dual enrollment, and students who had not participated in developmental courses in the corresponding discipline were all more likely to attend online courses than their peers. The authors theorized that the population group was, therefore, more prepared for college success than the average community college student population. They concluded that the lower success rates observed in the online instructional modality are due to failings on the part of the courses. However, such assumptions conflict with the findings of Wolfle and Williams (2014), who found that older students were significantly less likely to persist from semester to semester in the online instructional modality than their younger

counterparts. It is worth noting here that the analysis performed by Xu and Jaggars (2011) was missing crucial information that might relate to a student's ability to spend time specifically devoted to school such as job hours, family responsibilities, and dependents, factors that have been noted as risk factors for student withdrawal (Zavarella & Ignash, 2009). It is also significant that Wolfle and Williams (2014) were studying persistence between semesters, not within a single course.

Student characteristics. In the recent literature, several researchers have examined the risk factors for non-success among online students, and the predictors for online student success. The factors are highly varied, as are the methodologies used to test them. Themes within the research include demographic data, students' past academic experiences, student skills, and student choices. In each of these themes, there are several factors of interest, but the results are contradictory. Together, however, the results form an image of overall patterns that an institution may use to develop expectations for its students.

***Demographics*.** Many researchers have determined that the impacts of several demographic factors are not statistically significant. Such factors have included, but were not limited to age, gender, ethnicity, and economic indicators such as financial aid status, student's year in school, employment, children, marital status, in-state residency, and first generation student status (Boston et al., 2011; Cassidy, 2012; Driscoll et al., 2012; Harrell & Bower, 2011; Heaney & Fisher, 2011; Kupczynski et al., 2011; Lee et al., 2013; Ojokheta, 2010; Simmons, 2014). These widely varied studies were conducted in institutions of all types around the world. In most, the demographic variables were only

one of the factors under study for the research reported. For example, Boston et al. (2011) studied the demographic variables of gender, ethnicity, and age in their study of online student retention. They found these variables not statistically significant. In the same study, Boston et al. also studied several components of a student's academic history, which they did find statistically significant. Although their study had a large sample size, it was conducted at an exclusively online institution that has an unusually high percentage of students with a military background. Cassidy (2012) studied demographic variables as part of a research study of student achievement in higher education. Despite findings that showed age and gender as not statistically significant, Cassidy (2012) stated, "In any applied study exploring factors contributing to academic achievement, irrespective of the intended focus of the study, it would be both naïve and remiss to overlook age, gender and prior academic attainment as pertinent factors" (p. 796).

In other research, some of the same demographic factors were found to be significant. Niemi and Gitin (2012) found that married students and military students were both less likely to drop their online courses, but older students were significantly more likely to drop. The authors also determined that older students were at a statistically significant higher risk of withdrawal from their online courses. Stebleton and Soria (2012) found that first-generation students had significantly lower success chances than students whose families had college experience. Additional factors that require students to divide their focus, such as work and children, were risk factors as well (Niemi & Gitin, 2012; Zavarella & Ignash, 2009). Wolfle and Williams (2014) found that age, gender, and ethnicity were all significant factors in student attrition, with older students, males,

and Black students showing higher attrition rates than their peers in online courses. Although Simmons (2014) found gender not to have a significant impact on online students' statistics exam scores, age was statistically significant in that older students scored lower than their younger peers. Boston et al. (2011) suggested that further study is needed specifically on the significance of age, gender, ethnicity, and economic factors for online success. This inconsistency in the literature indicates that the significance of demographic variables may depend on the institution and environment, and thus shows a need to study these variables in specific environments separately.

Academic experience. In several recent studies of online success, researchers also studied factors related to students' past academic experiences. Scores showing knowledge or ability brought into the college experience from high school or previous college (as shown by high school GPA, ACT scores, and placement test scores) were consistently found not to have a statistically significant impact on online success and retention (Heaney & Fisher, 2011; Laskey & Hetzel, 2011; Zavarella & Ignash, 2009). Prior college experiences yielded less consistent results. Niemi and Gitin (2012) found that prior college experience was a risk factor for non-success in future online courses. For Driscoll et al. (2012), the number of credit hours a student has taken previously did not significantly alter online success. However, those results did not take into account the success or non-success of the students' previous academic experiences. Hachey et al., (2012) demonstrated that previous online experience was a strong predictor of future online course success, but prior non-successful experiences in online courses were a risk factor for non-success in future online courses. Overall college GPA, another measure of

previous college success, was also a significant predictor for future online course success (Driscoll et al., 2012; Harrell & Bower, 2011). In their analysis of data from Virginia community colleges, Wolfle and Williams (2014) found that previous experience in a developmental algebra course had a significant negative impact on student success in online college level mathematics course enrollment. Wolfle and Williams also reported that the success rate for students who had engaged in developmental courses was lower than for those whose first math class at the institution was at the college level. Simmons (2014), however, found that previous academic experience was not a statistically significant factor in online statistics exam scores. Similar to the results of demographic studies, the highly varied results seem to imply that the setting, students, and courses themselves have a role in the importance of previous academic experience to online student success.

Student characteristics and choices. Student choices and factors of student personality also have a varied impact on the success rates for online courses. Researchers found that factors such as time management skills, persistence, and asking for help or utilizing tutoring were beneficial to online success (Fair & Wickersham, 2012; Heaney & Fisher, 2011). One exception of note is that Lee et al. (2013) found that time and study environment management skills were not statistically significant in predicting dropouts versus persistors. It is noteworthy that one barrier to use of services such as tutoring is awareness of their availability. Russo-Gleicher (2013) found that members of the faculty are often unaware of the online services available to students; this drastically reduces student awareness and thus usage. Directly related to time management are the findings

that time on task is a strong predictor of persistence and success (Kupczynski et al., 2011; Smith, Lange, & Huston, 2012; Zimmerman, 2012). In addition, students' choices may be related to their perceptions of the class. Thus, student perceptions of online courses are different than their perceptions of face-to-face courses, particularly the level of difficulty, the support students feel they receive from the faculty, and students' feelings of connection to the instructor and their fellow students (Dabaj, 2009). Such student perceptions of the course may relate to their choices as they relate to engagement and time on task.

Research relations to informed practice. In most of the studies, no mention is made of the manners in which the data that were collected were then used to inform practice. That lack of information is likely due to the fact that much of the research was completed only recently and any outcome that would inform practice would take time to both implement and then publish. Some, however, did report changes at their institutions. For example, Boston et al. (2011) found that there was not a significant difference between demographic groups in the retention of their online students. After collecting and analyzing the data, their institution implemented new retention practices that focused on high touch and student centered contact. The researchers also used their results to create a new training regimen for their instructors. No results were reported for the outcomes of these changes at the time of publication. From their research into time management, Smith et al. (2012) reported that the institution where the research occurred instituted an early warning system. Although the system was successful in a small pilot, larger reproductions were not. The main difference between the early pilot and the later

larger system was the level to which the system was high touch with the student (Smith et al., 2012).

Implications

Based on the results of this research, I have a better understanding of the characteristics of online Intermediate Algebra students at risk for non-success in their online courses. The research has also helped to clarify the differences between students in terms of those who had or had not participated in developmental courses as well as success based on the demographic variables of age, gender, ethnicity and veteran status. Although those groups are not monolithic (in fact, there are high degrees of variability within them; one likely reason for the high variability within the findings of other researchers), the data show what groups of students may not being fully served by the online course in question. The data help to guide the development of a project to improve success rates for online Intermediate Algebra at the community college. Once the data were collected and analyzed, those outcomes guided determination of which project would be beneficial to the institution where the research was conducted.

Summary

The problem at the institution under study was that success rates were too low in gateway online mathematics courses, which was a national problem according to recent studies. Recent studies had indicated that demographic data and academic history might influence student success in online courses, yet the level to which they are impactful was debated within the literature, implying the need to further study the student population, institution, and courses. This paper describes two research questions to identify the

significance of demographic variables and academic history on student success at the institution under study. Further information as to methodology, results, conclusions, and the project emerging from the findings will be found in following sections.

Section 2: The Methodology

Introduction

In this section, I outline the methods through which I collected and analyzed the data to answer the research questions. First, I cover the research design. Next, I explain the setting for the research and the sample from which I collected my data. Third, I detail the materials and instrumentation that I used in my data collection. Fourth, I lay out my data collection and analysis methodologies. Fifth, I describe the reasons that this research was safe for the institution under study as well as for the students whose success data I used. Finally, I share the results of the analysis and the associated conclusions.

Research Design and Approach

For this study, I followed a quasi-experimental research design. Such a design was appropriate due, in part, to the fact that the students have already completed the course under study. In cases where numeric comparisons will be made between mutually exclusive groups but the researcher cannot reasonably control those groups or individual placement into those groups, a quasi-experimental research design is the logical choice (Triola, 2012). I analyzed the data from this research using statistics to perform numeric comparisons. For each set of hypotheses, there were mutually exclusive groups of students as was required for comparisons of the relative frequency of success between them. I organized those groups according to student characteristics of academic history, age, gender, ethnicity, and veteran status. In this study, there was no reasonable option to randomly assign treatments or groups. Students have the option to choose their instructional modality without input from the college or researchers, and students'

placements into Intermediate Algebra were based on their previous coursework, their placement test score, or their status as a flexible placement student as defined in Senate Bill 1720 (Education Committee, 2014).

Setting and Sample

I conducted the research using archival data from a large Florida community college that offers online gateway mathematics courses. The data were collected by the community college and were stored in a database by its Department of Institutional Research and Effectiveness. The population of interest for this study was all online Intermediate Algebra students at the community college during the Fall semester of 2014 (N=731). The population included all students who enrolled in Intermediate Algebra during the Fall semester of 2014 and remained enrolled after the first week, which was the period of time during which students might have dropped a class and received a refund for their tuition. Students who had dropped the class and received a refund during that first week were not included in the study. Students receiving a grade of W (withdrawing prior to the 60% point of the term), WF (withdrawing after the 60% point of the term or administrative withdrawals due to lack of participation in class), I (student was passing the class but did not complete due to extenuating circumstances and has agreed to complete the work at a mutually agreed upon later time), F, D, C, B, or A were included in the population for this study.

The academic history information required to test RQ1 was not available through the college's database in frequency or relative frequency form. To determine academic history for RQ1, it was necessary to individually review students' transcripts to determine

whether or not they successfully completed developmental mathematics courses previously at the college under study. As this was a highly time intensive process and the size of the population was large, it was not reasonable to include data from all 731 students in the population. Thus, I used simple random sampling to create a sample from the population, and I tested the size to ensure that the sample was of sufficient size for statistical validity. I began with a simple random sample of 50. To create that sample, I used a random number generator to select student records. The random sampling technique was to ensure that each member of the population was equally likely to be included in the sample, and thus to ensure that bias was not introduced into the study through sample creation. I then collected the data for each of those 50 students and stored them in a spreadsheet with identifying characteristics removed. For a sample to be sufficient in size for a χ^2 test, it must be true that the expected frequency for successes is at least 5, meaning that the number of students selected multiplied by the success rate for the whole population would need to be at least 5 (Triola, 2012). The sample produced was of sufficient size based on that standard. Once the required size of sample was met, I deleted the student numbers from the spreadsheet and replaced them with letter designations.

Unlike the data required for RQ1, the data required to test the hypotheses associated with RQ2 are available in both frequency and relative frequency format in the college's database. As such, it was not necessary to review student transcripts to gather these data. Therefore, it was feasible to utilize data from the entire population of 731 students to test the hypotheses related to student success by the demographic variables of

age, gender, ethnicity and veteran status for RQ2. I stored the data in a Microsoft Excel spreadsheet as frequency counts of success and non-success for each category of each identified demographic variable.

Instrumentation and Materials

For this study, I used archival data to perform statistical analyses in order to answer the research questions. For each of the research questions, I compared relative frequencies of student successes between the previously stated categories of demographic and academic history variables. For this study, I defined student success as a final grade of A, B, or C in keeping with the college's standards for success. Student grades had already been determined for the Fall 2014 semester in the course of normal college operations by instructors using online homework and quizzes along with proctored examinations (Midterm and Final). No additional instruments were used to collect the data.

To test the hypotheses associated with RQ1, I had to analyze specific student records to determine student success by the variable of previous academic history. I created a row for each student, labeling them only with the letters AA, AB, AC, and so on. I put the following data points in each row: yes or no for previous successful completion of developmental mathematics at the institution, and yes or no for successful completion of Intermediate Algebra in Fall of 2014. The data were stripped of all identifying information and only the required information was retained. Student names and student numbers were removed from any and all collections of data. From those data,

I counted frequencies and divided by their associated totals to create relative frequencies. The raw data are available in Appendix B of this publication.

The raw data for RQ2 were pulled from the college database. That information was collected as a standard function of normal operations at the college. For the variables of age, gender, ethnicity, and veteran status, I was only given frequencies of the entire population of students who were or were not successful in each of the categories. Those frequencies were not tied to specific student information using the reporting mechanism in the database from which I pulled the data. The raw data are presented with the findings below.

Data Collection and Analysis

I analyzed archival data to answer the two research questions. Given that the data for this study are archival data, they had already been collected during the course of normal business operations and were housed in the college's Department of Institutional Research and Effectiveness database. The Institutional Review Boards (IRB) at both Walden and the college where the data were held required approval to access those data for research purposes. To gain access to data from the college where I conducted my research, I was required to first receive IRB approval at that college by submitting my application to the committee for research review. To apply for IRB approval at the college where I collected the data, I was required to first attain IRB approval from Walden University. Once that document was approved, I submitted the application to the college where I collected the data. At that point, I received formal letters of approval from both the Walden IRB and the research review committee at the college where I

collected the data. My Walden IRB approval number is 10-29-15-0341346. The data collection process consisted of retrieving data from the database and organizing it for analysis. I then analyzed the data using manual calculations and Microsoft Excel. The results of that process allowed me to answer the research questions.

For each of the research questions and associated sets of hypotheses, I compared the relative frequency of student success between two or more mutually exclusive categories. The variables involved were student success (a nominal variable because results are yes or no), student's prior successful completion of developmental mathematics at the college under study (a nominal variable because the results are yes or no), student age (an ordinal variable), student gender (a nominal variable), student ethnicity (a nominal variable), and student veteran status (a nominal variable). In each case, the appropriate statistical test was the goodness-of-fit test using χ^2. The requirements for that test are randomly selected data, data consisting of frequency counts for each of the categories, and an expected frequency of at least five for each category (Triola, 2012). The data were pulled from the college's Department of Institutional Research and Effectiveness database in a manner such that the requirement of a random sample was satisfied, and the format was a set of frequency counts of success for each categorical variable.

For RQ2, the data available for each of the variables were already available in the form of frequency counts. These data were available for each variable related to the population as a whole. As such, random sampling techniques were not required to achieve an appropriate sample and an assumption of sufficient expected frequency was

appropriate. For RQ1, however, such frequency counts were not readily available. As such, I was required to create them from student records. I used a random number generator to ensure randomization. The final requirement for a goodness-of-fit test is that the expected value for frequency is at least 5 for each category included in the test. That was the case for all but the test for ethnicity in RQ2. I took appropriate steps in that case, as described in the statement of results for that hypothesis test. Thus, the requirements were satisfied to utilize χ^2 testing to analyze the data in all cases for this study.

To calculate the test statistic for the hypothesis tests, I used the following equation: $\chi^2 = \sum \frac{(O-E)^2}{E}$, where *O* is the observed value and *E* is the expected value (Triola, 2012). Observed value, *O*, represents the frequency of successful students for each category included in the test. Expected value, *E*, was a calculated value. The equation for *E* was $E = np$, where *n* was the number of students in the category for the test and *p* was the proportion of the population who were successful, 0.425. Values for *O*, *n*, and *p* were supplied by the college. I created the following tables using these calculations. For each category in each test, I calculated the value $\frac{(O-E)^2}{E}$. That value is called the magnitude of difference, and it quantifies the level to which that category varies in its success rates from that of the other categories included in the test (Triola, 2012). Once the magnitude of difference was calculated for each category, I then found the sum. That sum was the test statistic. The test statistic was then compared to the critical value for each hypothesis test. I obtained critical values using a Chi square distribution table (Triola, 2012). For cases where the critical value was lower than the test

statistic, the null hypothesis was rejected (Triola, 2012). Otherwise, there was not sufficient evidence to reject a null hypothesis. Each conclusion was also confirmed through the use of a *p*-value found in Microsoft Excel. In cases where the *p*-value was lower than the level of significance, $\alpha = 0.05$, the null hypothesis was rejected (Triola, 2012).

Assumptions, Limitations, Scope and Delimitations

This study contains some assumptions and limitations. For the purposes of this study, I made the assumption that the database contained accurate information from the Fall semester of 2014. I also made the assumption that every student who took Intermediate Algebra in the online instructional modality in the Fall semester of 2014 was included in the database. Such an assumption is reasonable in this situation as the data were collected in the course of normal business operations at the college. For each of the research questions, results from students who have repeated the course in question have been included in the data. That was due to my concern that removal of repeating students may impact demographic or academic history categories in disproportionate quantities, creating an unintended bias. Thus, one limitation of the study is that the impact of course repetition remained unknown and presents a direction for future research. Although the study includes information directly related to the college under study, another limitation of the study is that the specifics of the college may limit generalizability to other institutions of higher education. The college is a large suburban Florida community college with a large online student population; thus, institutions that do not fit that description should exercise caution in assumptions that the results of this

study will also apply to their students and institution. For example, in states without the restrictions of Florida Senate Bill 1720, the results that compare students who have taken developmental math with students who have not may differ.

The scope and boundaries of the study are defined by the variables included. The independent variables included in this study were previous developmental mathematics experience at the college under study, student age, student gender, student ethnicity, and student veteran status. The dependent variable was student success in online Intermediate Algebra in the Fall semester of 2014 at the college under study. Student academic history was one variable as listed above, but that was limited only to developmental math courses at the college under study. For students who did not successfully complete developmental courses at the college where I collected the data, there was no delineation as to the reason. Thus, it is unknown if the student was exempt due to placement tests or Senate Bill 1720 guidelines or of the student took at least one developmental course, but was not successful. The study did not include information as to the instructional modality of the course that the student completed previously or the students' previous developmental math experience at other institutions, as neither of those pieces of information were available on the student transcript. The study also did not address whether or not students have previously attempted Intermediate Algebra. That might provide an avenue for follow up research at a later date. Demographic characteristics other than age, gender, ethnicity, or veteran status were not included in the study.

Protection of Participants' Rights

Since I utilized archival data, I did not have any contact, direct or indirect, with the students whose data were used in this study. Throughout the process of data collection and data analysis, student names were kept separate from their data. That was done within the database from the college Department of Institutional Research and Effectiveness through the use of student numbers. Student numbers are assigned by the college and are not a reference to any known identifying marker. As I am an employee of the college where the research was conducted, I had access to student names as associated with student numbers. Therefore, I did not keep my data associated with student numbers. Once the data were collected, they were kept in a spreadsheet with no identifying information whatsoever, including the student number. Instead the rows of the spreadsheet showing individual information are labeled as AA, AB, AC, and so forth. Data were stored in a Microsoft Excel spreadsheet and included as Appendix B. The student numbers, collected originally to ensure that no student was included twice in the study (for RQ1) were kept in a separate Excel document that was password protected and deleted once data collection was complete, in compliance with regulations from Walden IRB. Transcripts were not saved, printed, or downloaded at any time in the research process. Instead, transcripts were only analyzed within the college database. In that manner, no maintenance, storage, or destruction was needed. Through those precautions, I ensured that the students were not identified once data had been collected. In that way, the students whose success rates are under study were provided complete anonymity.

Data Analysis Results

For research question one (RQ1), the expected value for student success frequency was not calculated from the population as a whole; as data were not utilized from the population as a whole. Instead, a random sample of 50 students who had been enrolled in online Intermediate Algebra in the Fall semester of 2014 was utilized. Among those students, 25 passed online Intermediate Algebra in the Fall semester of 2014 and 25 did not. Thus, the proportion of students in the sample who successfully completed online Intermediate Algebra in the Fall semester of 2014 was .50. That is reflected in Table 1 below.

Table 1

Calculations for Academic History

Category	Observed Frequency, O	Expected Frequency, $E = np$	$O - E$	$(O - E)^2$	Magnitude of Difference $\frac{(O - E)^2}{E}$
Did successfully complete developmental mathematics at the college where the research occurred	10	23(0.5) = 11.50	-1.50	2.25	0.20
Did not successfully complete developmental mathematics at the college where the research occurred	15	27(0.5) = 13.50	1.50	2.25	0.17

As shown in Table 1, the values for the magnitude of difference for the two categories were 0.20 for students who did complete a developmental course and 0.17 for students who did not. The sum of those two values was 0.37, the test statistic for the hypothesis test. The test statistic was then compared to the critical value at the $\alpha = .05$

level of significance of 3.84 (Triola, 2012). To verify the results, I also utilized Microsoft Excel to calculate the p-value for this hypothesis test. The p-value was .55. The test statistic was substantially lower than the p-value, and the p-value for the test was substantially larger than .05. Therefore, there was sufficient evidence to fail to reject the null hypothesis. The conclusion is that there was not sufficient evidence to support the claim that there was a significant difference between the relative frequency of students who were successful in the online gateway math course between students who have or have not previously successfully completed at least one developmental mathematics course at the institution in question.

For research question two (RQ2), there were four sets of hypotheses. For each of those sets of hypotheses, data were collected from the entire population of students who were enrolled in online Intermediate Algebra after the end of the drop/add period during the Fall semester of 2014 at the college where the research occurred. The data for RQ2 were pulled from the population as a whole through the college database. The probability of success for the population as a whole, p=.425, was used to calculate expected values.

The first set of hypotheses for RQ2 involved the effect of age on the frequency of success in online Intermediate Algebra. The data and calculations regarding age can be found in Table 2 below.

Table 2

Calculations for Age

Category	Observed Frequency, O	Expected Frequency, $E = np$	$O - E$	$(O - E)^2$	Magnitude of Difference $\frac{(O - E)^2}{E}$
≤18	69	0.425(118) = 50.15	18.85	355.32	7.09
19 – 21	74	0.425(206) = 87.55	-13.55	183.60	2.10
22 – 25	57	0.425(153) = 65.03	-8.025	64.40	0.99
26 – 35	70	0.425(155) = 65.88	4.125	17.02	0.26
≥36	41	0.425(99) = 42.08	-1.075	1.16	0.03

As shown in Table 2 above, the magnitudes of difference for each of the five categories were approximately: 7.09, 2.10, 0.99, 0.26, and 0.03. Thus, the sum was 10.47, the test statistic for the age hypothesis test. The test statistic was then compared to the critical value at the α=.05 level of significance of 9.49. To verify the results, I also utilized Microsoft Excel to calculate the p-value for this hypothesis test. The p-value was .03. Such a small p-value indicates that there is sufficient evidence to reject the null hypothesis. That is confirmed by the fact that the test statistic was larger than the critical value. Thus the conclusion is that there is sufficient evidence to support the claim that there is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course among students in the following age groupings: ≤18, 19-21, 22-25, 26-35, and ≥36.

Among the different age groupings, the magnitude of difference from the population varied as shown in the graph below.

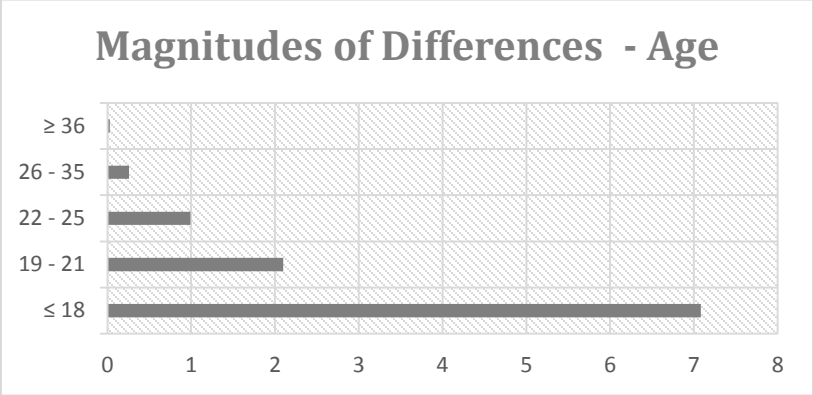

Figure 1. Magnitudes of difference: Age graph.

As shown in Figure 1 above, the largest magnitude of difference was in students aged 18 or under. In that case, the observed value was substantially higher than the expected value, indicating that the majority of difference from the population mean can be accounted for by the group of students aged 18 or under. That result may be accounted for by the several programs at the school intended to serve students still at high school ages. These programs include, Early College, Dual Enrollment, and the Collegiate High School. In each of those programs, students are given substantial additional support. Examples of such support include, but are not limited to: on campus study sessions, personalized support from advising and counseling, additional access to tutoring and/or instruction, and financial support for tuition and/or books. Additionally, the high success rates among the 18 and younger student population may be attributed to the students' recent experiences in high school math classes, their comfort with online learning, or their level of knowledge and skill (as these programs are selective admission). It is worthy of notation that such possible extenuating factors limit the generalizability of the results of this study. The next largest magnitude of difference was in students aged 19

through 21, followed closely by students aged 22 through 25. In both cases, the observed value was substantially lower than the expected value, indicating that students in these age ranges may be in need of additional assistance of support.

The second set of hypotheses for RQ2 asked if there was a significant difference in the frequency of successful students in the online gateway mathematics course between students from the two genders: male and female. The data and calculations regarding gender can be found in Table 3 below.

Table 3

Calculations for Gender

Category	Observed Frequency, O	Expected Frequency, $E = np$	$O - E$	$(O - E)^2$	Magnitude of Difference $\frac{(O - E)^2}{E}$
Male	114	0.425(274) = 116.45	-2.45	6.00	0.05
Female	189	0.425(440) = 187	2.00	4.00	0.02

As shown in Table 3, the magnitude of difference for males was 0.05 and the magnitude of difference for females was 0.02. These two values sum to 0.07, the test statistic χ^2 for the hypothesis test. The critical value for the hypothesis test at the α=.05 level was 3.84. I also obtained a p-value for the hypothesis test using Microsoft Excel. That p-value was .787. Together, as the p-value was large and the test statistic was smaller than the critical value, these calculations show that there is not sufficient evidence to reject the null hypothesis. Therefore, there is not sufficient evidence to support the claim that there is a significant difference in the relative frequency of students

who were successful in the online gateway mathematics course between male and female students.

The third set of hypotheses for RQ2 asked if there was a significant difference in the frequency of successful students in the online gateway mathematics course between students among students classified in the following ethnic groups: American Indian/Alaska Native, Asian, Black/African American, Hispanic/Latino, Multi-Ethnic, Native Hawaiian or other Pacific Islands, and White. As one requirement of a goodness of fit test is that each category has an expected value of at least five, the categories of American Indian/Alaska Native and Native Hawaiian or other Pacific Islands were both removed from the discussion. The population sizes for both groups were too small for test validity. In the case of American Indian/Alaska Native, the population size was 2, giving an expected value of 0.85. In the case of Native Hawaiian or other Pacific Islands, the population size was only 1, giving an expected value of 0.425. Tests were run both with and without these categories and the outcome was unchanged. The data and calculations regarding ethnicity can be found in Table 4 below.

Table 4

Calculations for Ethnicity with Groups of Small n Removed

Category	Observed Frequency, O	Expected Frequency, $E = np$	$O - E$	$(O - E)^2$	Magnitude of Difference $\frac{(O - E)^2}{E}$
Asian	7	0.425(12) = 5.1	1.90	3.61	0.71
Black/African American	25	0.425(118) = 50.15	-25.15	632.52	12.61
Hispanic/Latino	27	0.425(89) = 37.83	-10.83	117.18	3.10
Multi-Ethnic	11	0.425(24) = 10.2	0.80	0.64	0.06
White	224	0.425(459) = 195.08	28.93	836.66	4.29

As shown in Table 4, the magnitude of difference for each of the ethnicity categories were as follows: Asian, 0.71; Black/African American, 12.61; Hispanic/Latino, 3.10; Multi-Ethnic, 0.06; and White, 4.29. These values sum to 20.77, the test statistic χ^2 for the hypothesis test. The critical value for the hypothesis test at the α=0.05 level was 9.49. I also obtained a p-value for the hypothesis test using Microsoft Excel. That p-value was < .001. Such a small p-value indicates that there is sufficient evidence to reject the null hypothesis. That is confirmed by the fact that the test statistic was larger than the critical value. Thus the conclusion that there is sufficient evidence to support the claim that there is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course among students in the following ethnicity groups: Asian, Black/African American, Hispanic/Latino, Multi-Ethnic, and White. The magnitudes of differences varied substantially between the ethnicity groupings (see Figure 2).

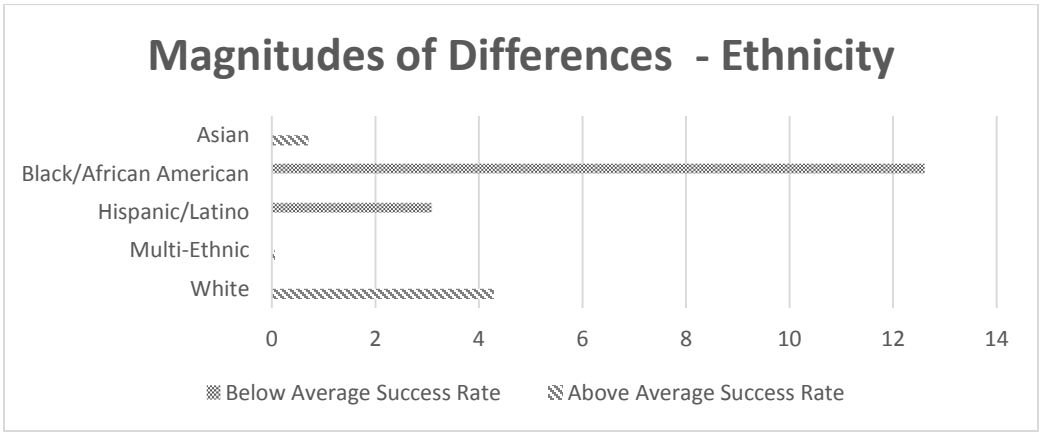

Figure 2. Magnitudes of difference: Ethnicity graph.

As shown in Figure 2 above, among the ethnicity groupings the highest magnitude of difference was for Black/African American students. At 12.61, that magnitude of difference was almost three times that of any other ethnicity. As the observed number of success was lower than the expected number of successes, the data show that students in this ethnicity category had substantially lower rates of success in the online gateway mathematics course during the Fall 2014 semester than other groups of students. The other ethnicity group with a large magnitude of difference where student success was below the population average was Hispanic/Latino with a magnitude of difference of 3.10. For the Hispanic/Latino student group, the observed number of successes was again lower than the expected number of successes. Again, this indicates that students in the Hispanic/Latino ethnicity category had substantially lower rates of success in the online gateway mathematics course during the Fall 2014 semester than other groups of students. For the White student group, however, the observed number of successes was higher than the expected number of successes, with a magnitude of difference of 3.10. Thus, students in the White ethnicity group had substantially higher rates of success in the online gateway mathematics course during the Fall 2014 semester than other groups of students. These results indicate that it would be of benefit to the college and to the success rate of the online gateway mathematics course to investigate methods to better support students in the Black/African American and Hispanic/Latino ethnicity groupings.

The final set of hypotheses for RQ2 asked if there was a significant difference in the frequency of successful students in the online gateway mathematics course between

veteran students and non-veteran students. The data and calculations regarding veteran status can be found below.

Table 5

Calculations for Veteran Status

Category	Observed Frequency, O	Expected Frequency, $E = np$	$O - E$	$(O - E)^2$	Magnitude of Difference $\frac{(O - E)^2}{E}$
Veteran	12	0.425(32) = 13.6	-1.6	2.56	0.19
Non-veteran	299	0.425(699) = 297.08	1.93	3.71	0.01

As shown in Table 5, the magnitude of difference for veterans was 0.19 and the magnitude of difference for non-veterans was 0.01. These two values sum to 0.20, the test statistic χ^2 for the hypothesis test. The critical value for the hypothesis test at the α=0.05 level was 3.841. I also obtained a p-value for the hypothesis test using Microsoft Excel. That p-value was .654. Together, as the p-value was large and the test statistic was smaller than the critical value, these calculations show that there is not sufficient evidence to reject the null hypothesis. Therefore, there is not sufficient evidence to support the claim that there is a significant difference in the relative frequency of students who were successful in the online gateway mathematics course between veteran students and non-veteran students.

Conclusion

I have collected and analyzed archival quantitative data from the college where the problem was first identified in an effort to respond to the research questions. In that analysis, I found that the successful completion of at least one developmental

mathematics course was not significant in predicting successful completion of the online gateway mathematics course. That would seem to indicate that students deemed exempt from the developmental mathematics course and students who are not exempt, and therefore are required to complete developmental mathematics courses prior to the gateway course, are prepared in a manner that is reasonably similar. I have also found that only some of the demographic variables are significant in student success in online gateway mathematics. The variables of gender and veteran status are not significant to success in online gateway mathematics at this institution, although they are both variables that have been found significant in other studies, and there are programs at the college for men, women, and veterans to enable success. That result would seem to imply that students from each gender, as well as veterans and non-veterans are prepared for the course and being served in a manner that is reasonably similar. The variables of age and ethnicity were significant in student success in online gateway mathematics courses. Amongst the categories of age, students aged less than 18 exhibited substantially higher likelihood for success in the online gateway mathematics course and students aged 19 to 21 and 22 to 25 exhibited a lower likelihood for success in the online gateway mathematics course. Students in the White ethnicity group exhibited higher likelihood for success in the online gateway mathematics course and students in the Black/African American ethnicity group and the Hispanic/Latino ethnicity group exhibited lower likelihood of success in the online gateway mathematics course. Although these are large groups that are not monolithic, these results would seem to indicate that there is an opportunity for the college staff and faculty to become better informed and to provide

improved support to these groups of students. The difference in results amongst the student groups may be due to insufficient preparation for the course by either previous academic experiences, insufficient support on the part of the college, extenuating circumstances outside of their academic experience, or a combination of those factors. Based on these results, a professional development aimed to help professors and student support personnel to better serve students found to be at risk of non-success in online gateway mathematics might help to increase student success in that course.

Section 3: The Project

Introduction

In this section I provide information about the project, a professional development seminar, which was approved by my committee. First, I describe the project and give an overview of the goals of the project. Next, I give information from the literature that provides background information on the variables I found to be significant in Section 2 and that provide justification for the content of the seminar itself. After that, I provide a plan for assessment and evaluation. Finally, I describe the implications of the project both in the local community and in the larger higher education community.

Description and Goals

The project is a professional development seminar designed for faculty and advisors working with online gateway mathematics students at the college where I collected the data. The project is designed to give educational professionals who work directly with online gateway mathematics students the knowledge necessary to understand how age and ethnicity impact communication with online students, and to allow those educational professionals to develop a plan to improve their own communications with online students while creating a community of practice to allow participants to continue their growth and development over time. The project addresses the problem I discussed in Section 1 because it gives faculty and advisors information about age and ethnicity, the variables at that institution that showed significance in my data analysis, as they relate to student success. The project also allows participants the

opportunity to develop an action plan to improve student success based on the data and the content of the professional development lectures.

Rationale

In Section 2, I reported that ethnicity and age were the two variables shown to be significant relating to student success in online gateway mathematics. As discussed in Section 2, the significance of age was largely due to the extremely high success rates among students under the age of 18. That group of students receives the benefits of several special programs such as Early College at the institution where the data were collected. Therefore, the significance of age may have been due to an outlier. Nonetheless, I have chosen to focus on both the variable of age and the variable of ethnicity for the project because they were both statistically significant.

I chose to create a professional development genre project because a professional development seminar allows me to update faculty and advisor understanding of the elements of ethnicity related to higher education and the relationship between ethnicity and student success in online gateway mathematics courses as found in my data analysis. The professional development genre of project allows the participants to increase their understanding (Malik, Nassim, & Tabassum, 2015) and use that knowledge to improve upon their communications with diverse online gateway mathematics students. Such improved knowledge and communication should lead to improved interaction between the student and support personnel or faculty members. Professional development also allows for improved communication between professionals serving the online student population (Curwood, Tomitsch, Thompson, & Hendry, 2015; Dell'Olio et al., 2014). My

hope is that such improved quality of interaction will have a positive impact on success rates.

Review of the Literature

In this review of the literature I include results from recent literature covering the following topics: the relationship between age and student success, the relationship between ethnicity and student success, critical race theory, and the design of a professional development seminar. To find appropriate research, I utilized the following educational databases: ERIC, Education Research Complete, SAGE, and Google Scholar. In the process of searching those databases, I utilized the following search terms in a variety of combinations, using the Boolean operators "and" and "or": *professional development, in-service teacher education, faculty development, seminar, online, success, higher education, college, community college, Intermediate Algebra, gateway course, age, race, ethnicity,* and *demographic*. I also searched through the reference lists of all found articles for additional research. Finally, I searched for articles that referenced research I had already found using both Google Scholar and the Walden Library tools.

Age and Student Success

In my analysis of student success in online gateway mathematics courses in a community college, I determined that age was a significant variable. Students in the age ranges 19-25 and 26-35 were significantly less likely to be successful in the online gateway mathematics course than the average for all students. For students aged 18 or under, or 36 or above, the likelihood of success was above the average for all ages. For student aged 18 or under, the magnitude of difference was large. For students aged 36

and above, however, the magnitude of difference was incredibly low. That indicates students in the age range of 36 and above did not have significant differences in success rates from the population as a whole. It is possible that the result for students aged 18 and below is an outlier. This is because the majority of students in that age range at the college where I collected the data are in one of the following programs: Early College, Early Admissions, Collegiate High School, or Dual Enrollment. In each of those cases, substantial support is given by college staff, the local school system, or both. Examples of support systems made available to students in these programs include but are not limited to: personalized advising, student cohorts, free textbooks, free materials, free courses, individualized tutoring, and additional access to faculty members in small group sessions. Such substantial support may have skewed the results for this particular group. Without data from the group aged 18 or under, I would not have considered the variable of age significant. It is equally true that students in the Early College, Early Admissions, Collegiate High School, and Dual Enrollment programs are likely to be particularly high performing students. It cannot be determined from the data analysis I performed in this study whether the support provided or the characteristics of the students themselves are the source of that group's high success rate.

In recent articles, authors have discussed differences between the age groups in students overall comfort with the online instructional modality (Johnson & Galy, 2013; Xu & Jaggars, 2013). In their research on the use of online tools to increase student performance for Hispanic students, Johnson and Galy (2013) found that there was a negative correlation between age and course grade in the courses that utilized the

additional online tools. Johnson and Galy, however, found that factors such as internet self-efficacy and anxiety with the subject or the online tools were among the variables with stronger connections to course grade, not student age. Alternatively, Xu and Jaggars (2013) found that older students had better adaptability to the online instructional modality than younger students. The results from Xu and Jaggars directly contradict the results from Johnson and Galy, and may seem counterintuitive to many educators who assume younger students will fare better than older students with the online instructional modality because of younger students' comfort with digital content and status as "digital natives" (Margaryan, Littlejohn, & Vojt, 2011). Time management skills are one possible explanation of the result from Xu and Jaggars.

Time management and time on task are important factors for student success that researchers have found to differ between student age groups (DiBiase & Kidwai, 2010; Johnson & Galy, 2013). Johnson and Galy (2013) found that both time management skills and the ability to work independently were variables with strong connections to course grade in the online instructional modality. When DiBiase and Kidwai (2010) researched the differences in student behaviors and attitudes toward online learning, they found that older students spent significantly more time engaging with the content and in discussion boards than the younger students. Although course grades were the same between the two groups of students, it is worth noting that the grading structure and requirement of proctored testing was not consistent.

Studies have shown that students of differing ages have differing preferences regarding online communication styles and course structure (DiBiase & Kidwai, 2010;

Simonds & Brock, 2014). In a study of online success by age and gender, DiBiase and Kidwai (2010) saw that older students in an advanced course spent more time studying and discussing course material than did younger students in a less advanced course. Although DiBiase and Kidwai determined that older students were more willing to spend time in an online class and were more motivated in their online class, the study was flawed. The students in the two age groups were also in two different course levels. The older students were in a graduate level course and the younger students were in a beginning undergraduate level course. Additionally, the faculty member spent more time interacting with the students in the graduate level course. Those additional factors may well have accounted substantially for the difference in time on task and associated signs of motivation. In a study on student learning style preferences in online courses by age, Simonds and Brock (2014) found that older students preferred to view lectures that had been recorded in advance. Alternatively, the younger students preferred to collaborate and communicate in live sessions.

A final variable regarding age and student success is the concept of motivational factors. In their study on motivational factors for online adult learners, Yoo and Huang (2013) found that motivational factors differed between students of different age groups. They found that students between the ages of 20 and 40 were highly motivated by short-term goals as they related to their current work or career goals. In another facet of their study, Yoo and Huang (2013) found that the responsibilities that students spent time on outside of education varied with age. For adult learners, responsibilities such as care for a family and the development of their career were substantial motivators and required a

substantial investment of student time. As such, components of a course that would visibly and quickly benefit a student's career or personal motivations were most highly appreciated by the adult learners.

Ethnicity and Student Success

In my analysis of student success in online gateway mathematics courses as delineated by ethnicity, I found that students who identified as Hispanic/Latino and Black/African American had significantly lower rates of success in online gateway mathematics as compared to students from other ethnicities in the same course at the same institution. My finding is consistent with that of other quantitative studies, as discussed in Section 1. My finding is also consistent with a report from the Western Interstate Commission for Higher Education (2013) that showed that college graduation rates are lower for Black and Hispanic students in Florida than for White and Asian students in the state. Similarly, Santiago and Soliz (2012) noted the same gap in degree attainment between Hispanic students and White non-Hispanic students. Although not the focus of their research, several recent articles also refer to the achievement gap in mathematics success between non-Asian minority students and White students as a known entity (Cordova, Ikeda, & Ramirez, 2009; Jackson & Wilson, 2012; Johnson & Galy, 2013; Martin, 2012; McGee, 2013; Wladis, Conway, & Hachey, 2015). Alternatively, Wladis et al. (2015) noted that ethnicity was not a significant factor in the difference between online and face-to-face success rates for community college students in science, technology, engineering, and mathematics (STEM) courses.

The effect of studies such as these has been debated in the literature. Cordova, et al. (2009) encouraged displaying student success by ethnicity in an effort toward "making inequitable outcomes visible because problems that are invisible cannot be resolved" (p. 17). Other scholars also stated that it is sometimes beneficial to study the differences in success rates and graduation rates between ethnicity groups to make educators aware of such gaps and thus encourage improvement or action (Jackson & Wilson, 2012; Martin, 2012; Wladis et al., 2015). Alternatively, several scholars have stated that by focusing too intently on the gap in achievement between ethnicities, we risk essentializing ethnicity and creating a situation where educators have an expectation of non-success for students who are Black or Hispanic, or where students develop negative self-perceptions of their own ability to succeed due to their ethnicity (Hammerness & Matsko, 2012; Jackson & Wilson, 2012; Martin, 2012).

There is no one factor that individually determines student success in any educational situation. To assume that any factor, without the involvement of other factors, is sufficient to predict or control a student's success in any course or program would be short sighted. There is inherent risk in looking at demographic variables such as age or ethnicity without including context. In the case of ethnicity, it is not the physical characteristics associated with ethnicity that contribute to success or failure for a college student. Nor is it a link between ethnicity and intelligence. Instead, it is a combination of factors. Some factors may relate to racism and microaggressions, or the students history of experiencing racial microaggressions that may have led to stress, stereotype threat, negative perceptions of educators or even negative perceptions of self and one's own

ability to succeed; as described above. Others may relate to resource availability or socioeconomic status (Grooms & Williams, 2015; Johnson & Galy, 2013, Western Interstate Commission for Higher Education, 2013; Wladis et al., 2015), support from the community or home environment (Noel-Levitz, 2012), first generation status as a college student (Noel-Levitz, 2012), or even gaps in education or reduced confidence from previous institutions of education (Jackson & Wilson, 2012; McGee, 2014; Noel-Levitz, 2012), sometimes from previous educators unwillingness to provide opportunities for advanced learning (Martin, 2012).

One theory cited by many authors and researchers as a possible explanation for the relationship between ethnicity and student success is critical race theory (Delgado & Stefancic, 2012; Dell'Olio et al., 2014; Jackson, Sealey-Ruiz, & Watson, 2014; Jackson & Wilson, 2012; Johnson & Galy, 2013; Martin, 2012; McGee, 2013; McGee, 2014; McGee, Alvarez, & Milner, 2015; Petty, 2010; Prince-Embury, 2015; Solórzano, Ceja, & Yosso, 2000). Critical race theory is a movement that studies how race relates to power and privilege throughout many facets of society (Delgado & Stefancic, 2012). McGee (2014) cited critical race theory as a guiding force in her work discussing racial microaggressions that occur throughout the course of education for Black students. McGee described critical race theory as "a discourse that explores how race operates in school and society" (p. 2). In doing so, critical race theory rejects the idea that some authority figures, for this context educators, are colorblind or that the idea of White privilege is no longer applicable by identifying racism as a problem that is not isolated or occurring only in infrequent or unusual circumstances (McGee, 2014). In their seminal

work, Critical Race theorists Solórzano, Ceja, and Yosso (2000) defined racial microaggressions as "subtle insults (verbal, nonverbal, and/or visual) directed toward people of color, often automatically or unconsciously" (p. 60) and gave varied examples of student experiences with microaggressions in American Higher Education. Although not specifically citing critical race theory as an underlying theory or framework for their research, several other studies discussed racial microaggressions and gave examples from both student and teacher perspectives of racism in modern education (Dell'Olio et al., 2014; Jackson, Sealey-Ruiz, & Watson, 2014, Jackson & Wilson, 2012; Martin, 2012; McGee, 2013; McGee, Alvarez, & Milner, 2015; Petty, 2010). These microaggressions may be intentional or unintentional on the part of the aggressor and sometimes the aggressor may not even know that they have been offensive. Even so, the impact of these microaggressions is summative and often leads to stress and/or discomfort for many students of minority ethnic backgrounds (McGee, 2014; Petty, 2010).

One example of stress for students of minority ethnicity backgrounds that stems from racism in modern culture is stereotype treat. McGee (2013) defines stereotype threat as "a type of confirmation bias in which the risk of being viewed through the lens of a negative stereotype, or the fear of doing something that would inadvertently confirm that stereotype" (p. 256). Stereotype threat can manifest itself in stress during standardized testing (McGee, 2013) student discomfort in addressing real or perceived inequities (McGee, 2013), and even psychological stress leading a student to choose a school where they are not in the ethnic minority (Johnson & Galy, 2013). In other instances, a student may respond to stereotype threat by seeking to improve themselves or prove the

stereotype wrong. That coping strategy, known as stereotype management, leads to increased resiliency and motivation for some students (McGee, 2013). Within the literature, authors have suggested that students who succeed in academics despite the stress of racism and stereotype threat have displayed such an increased resiliency (Martin, 2012; McGee, 2013; McGee 2014). Resiliency is a well-documented predictor of student success in all modalities, but this is particularly true in the online modality and in the field of mathematics (Prince-Embury, 2015). Thus one question that arises from this field of research is this: how can we as faculty members and advisors help or guide students toward such resiliency?

Design of a Professional Development Seminar

Malik et al. (2015) described professional development as support for employees in acquisition of knowledge necessary for their work. Petty (2010) suggested professional development relating to culture and providing a strategic relation to the current workplace is necessary. Throughout this section of literature review, I will outline descriptions from the literature regarding professional development. Within the following pages, I will outline information from the literature regarding structure, content, methodology, and assessment.

Within the literature, authors have presented differing statements about the presentation of data regarding demographic variables such as age and ethnicity. Some authors have stated that it is important to begin with a presentation of data to allow participants to understand the current state of student success based on the demographic variables (Clench & King, 2014; Cordova et al., 2009; Malik et al., 2015; Wager &

Foote, 2013). Cordova et al. (2009) stated that professional development must begin with a presentation of the data that identified the need for professional development because "problems that are invisible cannot be resolved" (p. 17). Wager and Foote (2013) stated that the content of a professional development should be based in research and supported by both that research and literature. As an alternative perspective, other authors have warned that a focus on data showing a connection between demographic variables and student success leads to an increased risk of essentializing (Hammerness & Matsko, 2012; Jackson & Wilson, 2012; Martin, 2012). Within several recent articles, authors have suggested that the key to a successful presentation of demographic data related to student success in a professional development lies in the manner in which it is presented (Cordova et al., 2009; Jackson & Wilson, 2012; Malik et al., 2015; Martin, 2012; McGee, 2013; Santiago & Soliz, 2012). Malik et al. (2015) suggested that the professional development should start with a statement that outlines the problem to be addressed, and that it should be based in research and literature. Cordova et al. (2009) stated that when a problem based on data is presented in a professional development, it should be presented in such a way to avoid a deficit mindset; and that the problem should be presented along with appropriate solutions.

Another topic explored within the literature is the audience of the professional development. Amro, Mundy, and Kupczyniski (2015) suggested including both student services staff working with demographic variables. Other authors that wrote about professional development focused their work on faculty (Curwood, et al., 2015; Malik et al., 2015; McGee et al., 2016; Wager & Foote, 2013). Both groups of educational

professionals work directly with online gateway mathematics students. As such, both groups of educational professionals should be included in the professional development.

The structure of a professional development was widely included in the literature. Some authors suggest the importance of collaboration between participants (Clench & King, 2014; Malik et al., 2015; Shabbir et al., 2016; Suleiman, 2014). Jennings (2012), however, reminded readers that, although collaborative activities give excellent learning opportunities to participants, lecture is still a viable and critical component of professional development. Collaboration between participants is crucial to deep learning and personal growth (Clench & King, 2014; Suleiman, 2014). Jennings (2012), however, noted that lecture has its place in the process of sharing knowledge. Therefore, the professional development will be a seminar that includes several short lectures on major topics with substantial collaborations and discussion between participants.

To further that collaboration, there will be discussion that lasts for one year after the 3 days of professional development seminars. Such long term collaboration is particularly beneficial in creating a deep connection between the content and the participant (Clench & King, 2014). Further, the professional development seminar is designed to create a community of practice. A community of practice is a group of "people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Dell'Olio et al, 2014, p. 15).

The content of the collaborations and discussions is also important and should be student focused (Malik et al., 2015; Wager & Foote, 2013) and directly applicable

(Clench & King, 2014). Topics regarding both ethnicity and age will be included based on the literature and the results of data analysis. Throughout the professional development seminar and the accompanying continued conversations, there will be opportunities for participants to open themselves to difficult conversations age and the differences regarding age and ethnicity and the impact of inequality in education. Such conversations are critical in guiding higher education professionals to learn to better communicate with diverse students (Suleiman, 2014). Another important component of professional development content is the opportunity for participants to engage in personal reflection (Ma & Singer-Gabella, 2011; Malik et al., 2015; McGee, 2014; McGee et al., 2016; Wager & Foote, 2013). It is important to examine why we as educators make choices that we make and work toward making more informed decisions in our policies and communications (Ma & Singer-Gabella, 2011) and why we make the recommendations to students that we make (Wager & Foote, 2013). Such critical reflection, combined with lectures to provide information and collaboration, provide an opportunity for professional development participants to develop an improvement plan (Cordova et al., 2009).

A final component of a good professional development is assessment. Proper assessment allows facilitators to ensure that content was properly conveyed and to allow for continual improvement. Clench and King (2014) described participant surveys as beneficial forms of assessment for professional development. In their article, they listed important components within such a survey as knowledge of specific content items and the achievement of facilitator goals. Thus, this professional development will include

daily participant surveys to ensure participants feel they understand the material of the day and to measure the level to which the daily goals were accomplished.

Project Description

Potential Resources and Existing Supports

One existing support at the institution at which the problem was first observed and at which the professional development could be implemented is a deep appreciation for data and for decisions based in data and literature. That current appreciation may provide an opening for buy in for this professional development and the learning within. Another existing support for the professional development seminar could be that all professors and advisors are expected to complete substantial professional development each year. That requirement may create buy in for professionals to appreciate the time they are spending. One final resource for the professional development seminar could be that there are facilities centrally located with sufficient space and physical resources available to facilitate the professional development seminar.

Potential Barriers

The topics of conversation within the professional development seminar are often emotionally charged. For the professional development seminar to be successful, there would need to be buy in from several levels at the college. At the executive level, leadership would need to buy in enough to provide access to facilities, provide monetary resources to pay for materials and refreshments, and express their perception of the importance of the work being done. The dean of the department and the director who supervises the advisors would need to provide approval for a large number of

professionals to be absent from their desks and their classrooms for a substantial time period. The participants would need to begin the work on the professional development with an open mind and a willingness to learn. If any of those are not in place, the professional development would be difficult at best.

Proposal for Implementation and Timetable

The proposed professional development seminar would occur over the course of 3 days of face-to-face training. The sessions should occur over the course of three weeks, with one session per week to allow for reflection on each day of training between sessions. Ideally, these sessions would occur on Fridays; as there are fewer classes on campus on Fridays and this would, therefore, minimize interruption to normal business of the college. A three month timetable should be allowed from approval by executive leadership prior to the first session. Those three months would ensure that there is time to advertise the seminar (thus maximizing participation as much as possible), confirm food orders and facility size, and ensure that coverage is planned for any professional who will be away from their classrooms or offices during the time of the seminar itself.

Roles and Responsibilities of Student and Others

There may be several expectations for participants in the professional development seminar. One would be that participants come with an open mind and time cleared to allow for full participation. Such an expectation may be a barrier to participation because participants may feel uncomfortable with such openness. It would be the responsibility, however, or participants to ensure that the professional development has the full opportunity for impact. It would also be a responsibility for the facilitator to

create an environment where such open mindedness is encouraged. The second is that participants would complete writing activities, surveys, and other assessments as requested. The final expectation would be that all participants (including the facilitator) would stay active on the discussion board for at least one year after the sessions, sharing lessons learned and what did and did not work.

The facilitator would be expected to thoroughly review all materials in the appendix that makes up the project, and come to each session prepared. The facilitator would also be expected to ensure that all discussions remain scholarly, professional, and rooted in the empowerment mindset. The department would be expected to provide support to the facilitator and the participants. The department would also provide support by providing refreshments, facilitating reservations of seats in the seminar, facilitation of reservations of facilities, and by helping professors to find substitutes for class as appropriate.

Project Evaluation Plan

All educational opportunities should be in a process of constant evaluation and improvement. For this professional development seminar, there are several sources of information through which I may be able to evaluate how effective the seminar has been and how much the participants are benefiting from the seminar, to allow for continual improvement. In Appendix A, please find a list of all activities and assessments for the professional development. For each day there are assessment surveys, found in Appendix A, that have been created to assess participant satisfaction and comfort with the content from that day.

The hope of the professional development seminar is that participants will leave better prepared to lead student groups based on their increased knowledge regarding age and ethnicity, with the eventual goal being an increase in success rates for all age and ethnicity groups in online Intermediate Algebra. The daily surveys will assess the level to which participants feel ready to engage with students. The final assessment will occur when grades are submitted the semester after the yearlong discussions have ended. That final assessment will be to collect and analyze student success data by age and ethnicity for faculty members who participated in the professional development seminar. If the overall success rates have increased and the gap between success rates by ethnicity have increased, that will be the ultimate show of success for the professional development seminar. If not, the seminar will need to be revised as discussed above. Also, if the success rates are not improved, additional work should be commenced to determine other factors in need of remediation. Such ideas are discussed in the recommendations for remediation of limitations section in Section 4.

Project Implications Including Social Change

Local Community

The professional development seminar will impact the local community in several ways. First, it will lead to increased knowledge regarding age and ethnicity as they relate to student success for participants. Such knowledge may help to improve student success rates within the gateway mathematics course in the online instructional modality. Finally, due to the fact that gateway mathematics is a required course for most degrees and the high number of courses that include successful completion of gateway mathematics as a

prerequisite, that improved success rate in the online gateway mathematics course will, over time, improve graduation rates for diverse students taking online gateway mathematics.

Far-Reaching

The professional development seminar has the potential to have an impact on the larger educational community. That impact could come from publication of the success of the seminar in one of the following journals: Journal of Interactive Learning, Journal of Educators Online, American Journal of Distance Education, or Community College Review. That impact could also come from sharing the content of the seminar with other institutions of Higher Education through presentation at the American Mathematical Association of Two-Year Colleges (AMATYC) or the National Institute for Staff and Organizational Development (NISOD). If the seminar shows to improve faculty readiness in working with students by age and ethnicity, and eventually positively impact success rates; it could be modified to impact students in a wider variety of courses and in a wider variety of settings and thus begin a larger conversation regarding online students.

Conclusion

In this section, I have covered the project content and its roots in the literature. I have also covered the implications of the project both in the local community and in the larger context of Higher Education, and the potential impact the project may have on social change. The next section will include the strengths and limitations of the project. The next section will also include my analysis of my own skills as a scholar, a

practitioner, and a project developer along with my growth through the creation of this paper and this project.

Section 4: Reflections and Conclusions

Introduction

In this section, I reflect on the doctoral capstone process, the project itself, and my personal growth and development from endeavoring in this work. First, I discuss the strengths of the professional development project. Next, I discuss any limitations I see to the project and offer recommendations for supplemental work that might be of benefit in remediation of those limitations. After that, I discuss my understanding of scholarship, leadership, and change based on what I have learned in the process of creating the doctoral capstone project. I then offer an analysis of myself as a scholar, practitioner, and project developer. Last, I present my expectations of the project and its potential for social change, followed by its implications, applications, and my suggestions for future research based on my work.

Project Strengths and Limitations

This professional development project was based on the results of data analysis I outlined in Section 2. In that data analysis, I determined that the two variables whose connection to student success in online gateway mathematics at the institution where the professional development may occur were age and ethnicity. Thus, I designed this professional development project to inform both professors and advisors who work with students taking online Intermediate Algebra about age and ethnicity as they relate to student success. Further, this professional development was designed to help those educational professionals create action plans and collect ideas to improve their communications with online students. Finally, I designed this professional development

project to facilitate these educational professionals in forming a community of practice, giving participants a group of similarly concerned professionals with whom they can share results and expertise. That community of practice will provide support to faculty and advisors as they seek to continue the improvement and growth they started in the professional development. Limitations to the project come from the structure. The project only focuses on the variables included in the original study, thus potentially ignoring other valid variables. The study also focuses solely on the variables I found to be statistically significant. The project is also not designed to address the factors that likely impact student success prior to student enrollment at the institution or in the course in question, such as prior school opportunities.

Recommendations for Alternative Approaches

The data and reviews of the literature show that the problem of success in online gateway community college math courses is complex. In the data analysis, I showed that both age and ethnicity were significant at the institution where the data were collected. Further research determining if age is significant without the potential outlier of students under the age of 18, who receive substantial support from special programs at the college and who may not represent the college population effectively, would help to determine the impact of such support on student success between the generations.

As a supplement to the professional development, or as an alternative, it may also be beneficial to have a researcher conduct a qualitative study of students who were not successful in their first attempt in online Intermediate Algebra at the college where I collected the data. Such a study would give professors, advisors, student service

personnel, and executive leadership at the institution a much clearer picture of the challenges and struggles that online Intermediate Algebra students' face, the reasons they withdraw or fail, and the support they believe would be most beneficial.

It is clear that age and ethnicity in and of themselves are not sufficient to cause a decreased success rate for online gateway mathematics students. Given this, another alternative approach may be to study the intervening factors on a deeper level. For example, a study on the different methodologies being used to teach and explain mathematics in the K-12 system as compared to the current approach used by college professors might shed light on differences in success between age groups. In the same fashion, a study on the differences in resource allocation in feeder schools that serve students from differing ethnicities may provide an opportunity for the college to intervene and provide support through faculty action and/or grant work where appropriate.

Scholarship

Throughout the process of creating this doctoral capstone project, I have learned a great deal about scholarship. Through the initial requirements prior to collection of data, I learned about the many ways in which a researcher must work to ensure that participants are protected when gathering data. Through the process of writing and revising my proposal, I learned about effectively using the standards of APA. I also learned the importance of consistency in my work. It seemed to me, prior to beginning the process of writing my proposal, that consistency would be natural. In fact, consistency requires quite a bit of intentionality when creating a document or project of this scope. The importance of consistency is so high, though, that this intentionality creates a final product that is of

much better quality. My future endeavors will be more professional, and thus well received, due to that increase in quality.

The revision process for the proposal helped me to develop a much higher level of attention to detail. Attention to detail is important in a final written product because it lends credibility and allows the reader of my work to take the conclusions therein far more seriously. Without the detailed facets of scholarly writing such as grammar, paragraph structure, and APA documentation, a written document is easily ignored. Another set of important details that I have become increasingly aware of is the detailed setup and procedural requirements for preparing a quantitative study. Prior to this process, I was entirely comfortable with the mathematics associated with analysis of the data because of my previous schooling. The process of designing a study and attaining appropriate approval, however, has given me substantial additional readiness to develop and potentially publish a study in the future.

Due to this process--and particularly due to the series of revisions I undertook to improve my work--I have also become a better writer and a better consumer of research, with a much clearer view of the necessity of recent peer reviewed literature. Finally, I have become a better researcher, with far better background and readiness to create a study of my own. All of these components together leave me far more prepared for scholarship opportunities that may become available in the future.

Project Development and Evaluation

In the process of creating this professional development seminar, I have worked to create objectives, activities, and assessments. I have also worked to create the support

needed for a facilitator other than myself to successfully lead such an event, and the support needed for participants to follow along and get the full impact of long days of learning. I have worked to develop activities and assessments that thoroughly support and enrich the goals that I determined from my data analysis and second review of the literature. From this process, I learned that a professional development seminar must be grounded in data and scholarly literature. I also learned that a clear plan and set of goals must be the first part of creating a professional development project.

As for the assessment of a professional development project, this process has led me to explore methods of assessment beyond that which were in my comfort zone previously. As an instructor of mathematics, assessment in the classroom is generally a matter of testing that a student is able to obtain correct answers to a series of questions and problems. In the setting of a professional development project, such assessment techniques would be incomplete at best. That realization has led me to seek to attain comfort with assessment techniques such as surveys, writing activities, and discussion boards.

Leadership and Change

Leadership is more than a position or a job title. Instead, leadership is about bringing people together to work toward a common goal. Leadership requires listening to people about what is needed, what needs to be changed, and ideas on how to go about doing so. Leadership requires collaboration to ensure that ideas and thoughts are heard, and to allow the best plan to be implemented. Leadership also requires the leader to be knowledgeable about problems, solutions, and the workings of the institution. The most

important thing I have learned about leadership, though, is that leadership is a matter of carefully balancing issues and viewpoints that are all more complicated than they appear on the surface. That requires listening thoroughly and sharing your perspectives, along with sharing the reasons behind your decisions. By making more people feel a part of the work of decision making, leaders are better able to make sound choices and follow through with the support they need.

Change and change management are critical parts of leadership. Any institution of higher education must be constantly changing and adapting to the requirements of students and society. In the case of a community college, the institution must also constantly reassess the level to which it is serving the community and change accordingly. In an environment that requires change to be a regular part of business, a leader must collaborate to create vision and to create buy in among the many people who will be responsible for making the change a success.

Analysis of Self as Scholar

I am still relatively new to scholarly research and scholarly writing. By completing this doctoral capstone project, I have gained critical skills that I need to go forward with future research. With that said, I will go forward carefully. I have the background and knowledge necessary to review literature and to design an appropriate quantitative design for data collection. As a mathematician, I had all the necessary knowledge to analyze data prior to this degree. However, I have learned a great deal in my coursework about qualitative design, and I have learned a great deal in my coursework and in the process of writing this capstone project about scholarly writing.

Some of the best results of this project, however, came from feedback from my committee and my resulting revisions. Therefore, if I were to plan for scholarly research and writing in the future, I would plan to work with a team of peers to help recreate that experience. Over time, I may feel more comfortable in this work individually. At this time, however, I am far more able to participate and contribute in a truly meaningful way than I was prior to this process. Furthermore, I am more aware now of what I have left to learn and practice than prior to beginning my doctoral degree.

Analysis of Self as Practitioner

As a leader in higher education, I have substantial experience working with groups of faculty to facilitate change and make important decisions. I have been fortunate to lead a group of faculty for several years, and that has made me a better instructor and a better leader. By going through the process of designing and implementing a plan for data collection and analysis and then creating a project based on that work, I have increased my confidence in my skills and my knowledge as a leader. As I have been working as a leader in higher education throughout my doctoral journey, I can definitively say that I am far more able to perform well in my position because of what I have learned.

As I move forward in leadership after the completion of this project and this degree, I will do so with an open mind. In the course of the creation of this capstone project, I have learned (several times over) the importance of collaboration. Collaboration with my classmates in discussion boards often led to my increased ability to express my thoughts, and my peers' thoughtful critical questions provided an opportunity to improve my stance on particular topics. Collaboration with my committee has led to revisions of

my proposal and my project which improved the professional quality of the outcome in both cases. I will continue to seek mentors and peers with whom I can collaborate as I lead in the professional environment. I will also seek to demonstrate the value of collaboration with my peers and staff by example.

Analysis of Self as Project Developer

I have created several professional development projects prior to the beginning of this doctoral process. In all of those cases, I have relied on my ability to speak extemporaneously on topics with which I was completely familiar. For this professional development, however, I relied on careful planning and intentional formatting. That experience has improved my skill in leading groups and helped me to learn and collaborate, and to make my work as a developer of other forms of projects far more successful.

Importance of the Work

The original problem that led to the project was student success in online gateway mathematics at the community college where I collected the data. As I have discussed several times elsewhere in this project, success rates are important to both the student and the institution of higher education. Success rates are especially important in the gateway mathematics course under study, Intermediate Algebra, because the course is required for students to reach college level mathematics, and it is a prerequisite for a large number of other courses in other departments at the college.

The social impact of the professional development project that I have created, however, is even greater. This project is meant to inform faculty and advisors of age and

ethnicity as they relate to student success, and to support professors and advisors as they seek to create action plans to improve success based on their increased knowledge. Through the creation of a community of practice, the impact of this project may be intensified. As the professors and advisors who participate in the professional development seminar continue to work together to improve, the impact can be made more long term, and will therefore be more valuable.

Given some modifications, higher education professionals in other disciplines could use this professional development seminar at the college where the data were collected. Additionally, this professional development seminar could be shared with other institutions of higher education that contain a substantial presence in the online instructional modality. Such sharing of information and learning could allow the social impact of the professional development seminar to go beyond the institution where I conducted my study.

Implications, Applications, and Directions for Future Research

The project is important because it addresses the problem of low success rates in online Intermediate Algebra courses from Section 1 in a way that can be replicated for other disciplines and at other institutions which may find that age and ethnicity are significant in their online student success rates. Potential venues for publication may include the *Journal of Interactive Learning*, the *Journal of Educators Online*, the *Journal of Distance Education*, and *Community College Review*. Future opportunities for me to share the project results may include AMATYC and NISOD. After the professional development seminar has concluded, further research to determine if the impact was

significant would be beneficial to determine the level of efficacy of the project itself. Future qualitative research to determine the most substantial challenges among diverse online students, by age and ethnicity, may also be beneficial. Once that research has been completed, this project could be tweaked to provide a benefit to many disciplines and higher education institutions.

Conclusion

The project outlined in this paper provides an opportunity for faculty members and advisors to improve their knowledge of age and ethnicity as they relate to student success in online gateway mathematics at the community college level, and to improve their leadership of online gateway mathematics students. In this section, I have highlighted the strengths and weaknesses of the project and provided direction for future research and applications.

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Appendix A: Professional Development Project

Daily Agenda

Day One: The objectives for day one are as follows: present the research and findings on age to the participants to provide a background understanding, present recommendations based on the research and findings

- Welcome, greeting, registration, and breakfast: 8 am – 9 am
- Background and overview of the research: 9 am to 10:30 am
    - Problem statement and description
    - Data collection and analysis methodology
    - Overview of the results for age
- Presentation: Student Success by age 10:30 – 12 noon
    - Comparison of findings in the data to studies in other settings
    - Factors impacting student success that are impacted by age
    - What is different about this institution?
- Lunch Break: noon – 1 pm
- Group Discussion: Student Success by age: 1 pm to 2:30 pm
- Presentation: Best Practices and Recommendations: 2:30 – 3:30 pm
    - Overview of best practices at other institutions based on the literature
    - Recommendations for changes to the online course and communications with online students based on the findings and the literature
- Group Discussion: Best Practices and Recommendations: 4 – 4:30 pm
- Assessment/Survey: 4:30 – 5 pm

Day Two: The objectives for day two are as follows: present the research and findings on ethnicity to the participants to provide a background understanding, present recommendations based on the research and findings

- Welcome, greeting, check-in, and breakfast: 8 am – 9 am
- Background and overview of the research: 9 am to 9:30 am
    - Overview of the results for ethnicity
- Presentation: Student Success by ethnicity 9:30 – 11 am
    - Comparison of findings in the data to studies in other settings
    - Factors impacting student success that are impacted by ethnicity
- Group Discussion: Student Success by ethnicity: 11 am to noon
- Lunch Break: noon – 1 pm
- Presentation: Best Practices and Recommendations: 2:30 – 4 pm
    - Overview of best practices at other institutions based on the literature
    - Recommendations for changes to the online course and communications with online students based on the findings and the literature
- Group Discussion: Best Practices and Recommendations: 4 – 4:30 pm

- Assessment/Survey: 4:30 – 5 pm

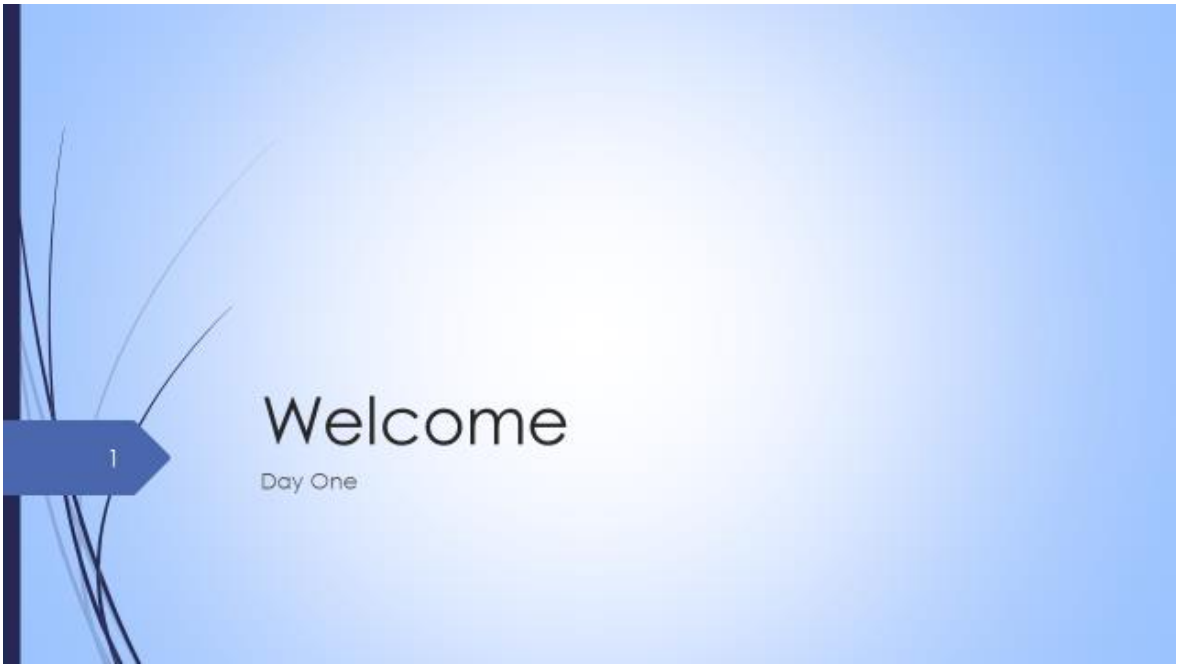
Day Three: the objectives for day three are as follows: work collaboratively to develop action items to improve communication with students and course structure based on the presentations and discussions in days one and two

- Welcome, greeting, check-in, and breakfast: 8 am – 9 am
- Creation of a list of action items from Days one and Two (an individual brainstorming exercise): 9 am to 9:30
- Table Discussions 9:30 – 10
    - Sharing ideas and coming up with a list that hits all the participants ideas
- Presentations of lists: 10 – 10:30
- Group Discussion: 10:30 – 11:30
- Survey of priorities: 11:30 – noon
- Lunch Break: noon to 1 pm
- Creation of an action plan: 1 – 2:30
    - Communication and interaction
    - Course policies
    - Course design
- Discussion of Timeline and implementation: 2:30 – 3:30
- Next steps and plans for the ongoing discussion, collaboration, and assessments: 3:30 – 4:30
- Assessment/Survey: 4:30 – 5

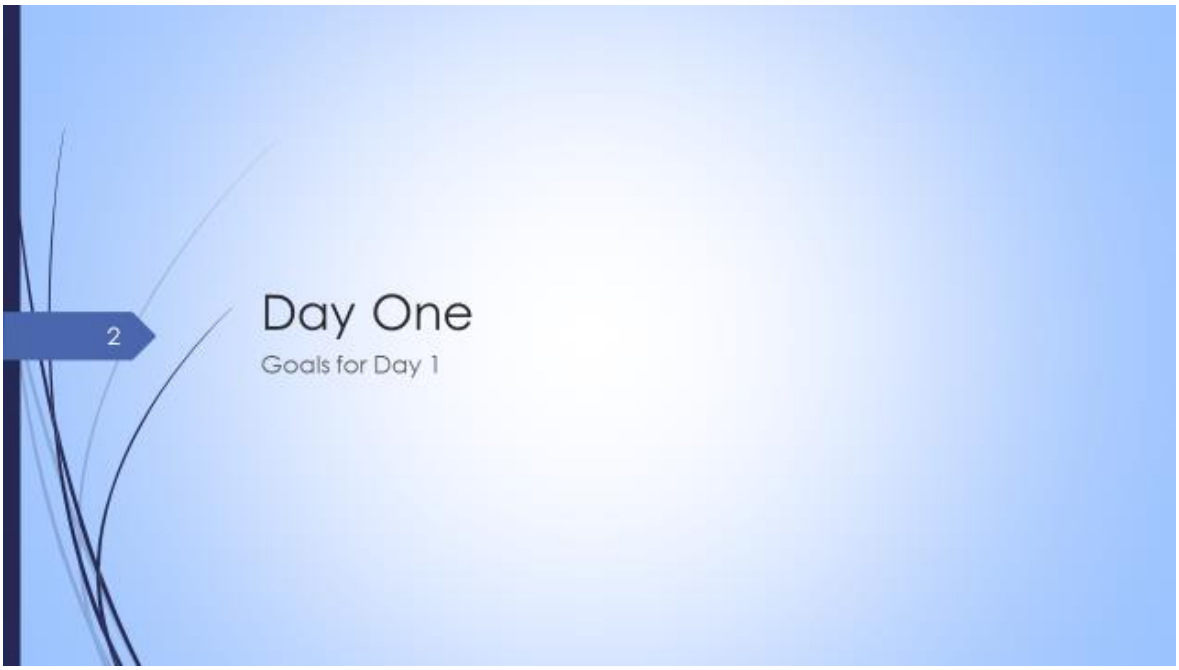
PowerPoint Slides with Facilitator Notes – Day One

Professional Development Facilitator Notes (by slide) – Day One
The following are notes to benefit the facilitator of the professional development along with the slides to use. Note that the professional development is meant to be highly engaging and collaborative. At all points in the professional development, the facilitator should pause regularly to engage with participants, elicit comments and feedback, and allow for questions and discussion.

Slide 1: Welcome and greeting for day 1. This slide should also be up through registration and breakfast, which will last from 8 am to 9 am



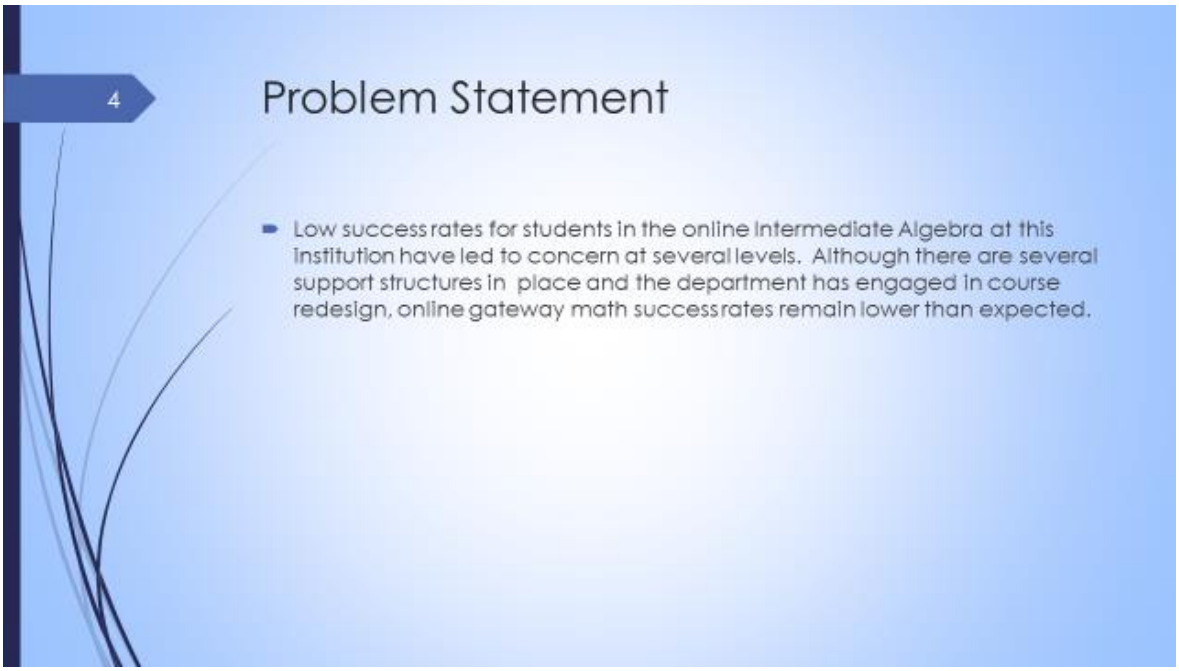
Slide 2: the goals for day one are to present the research and findings on age to the participants to provide a background understanding, present recommendations based on the research and findings. Note that we will start with an overview of the research itself and a brief overview of the background behind the research.



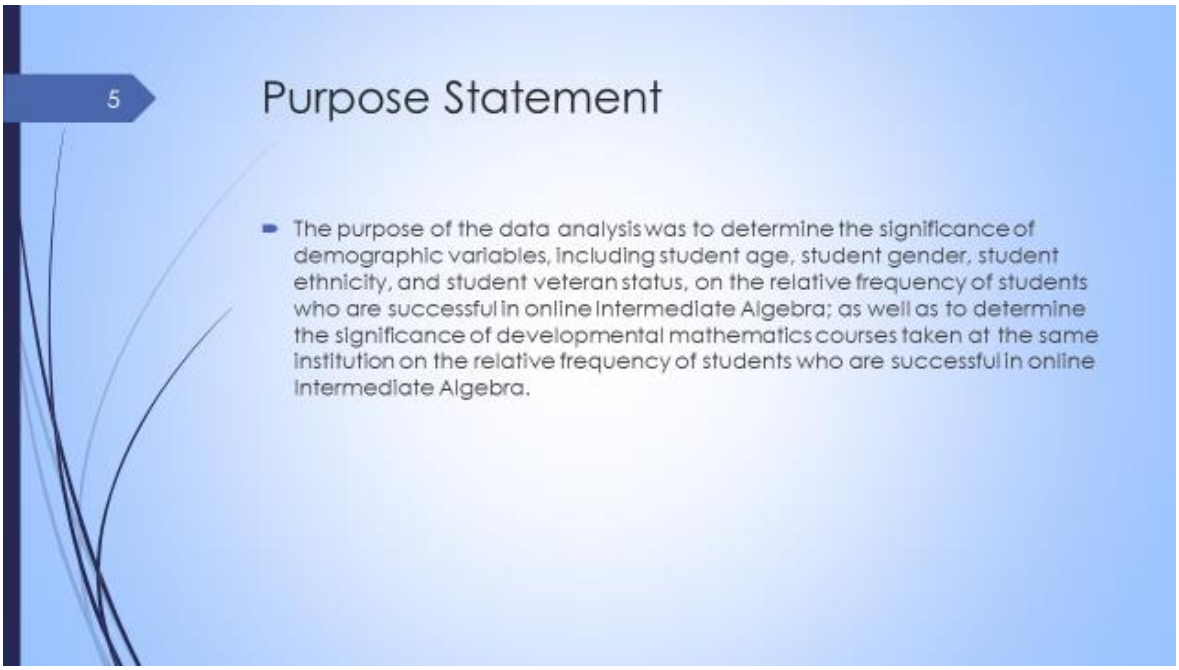
Slide 3: this slide marks the beginning of the review of the research, methodology, and results


3
Background and Overview of the Research
Problem statement and Description, data collection and analysis methodology, and an overview of the results

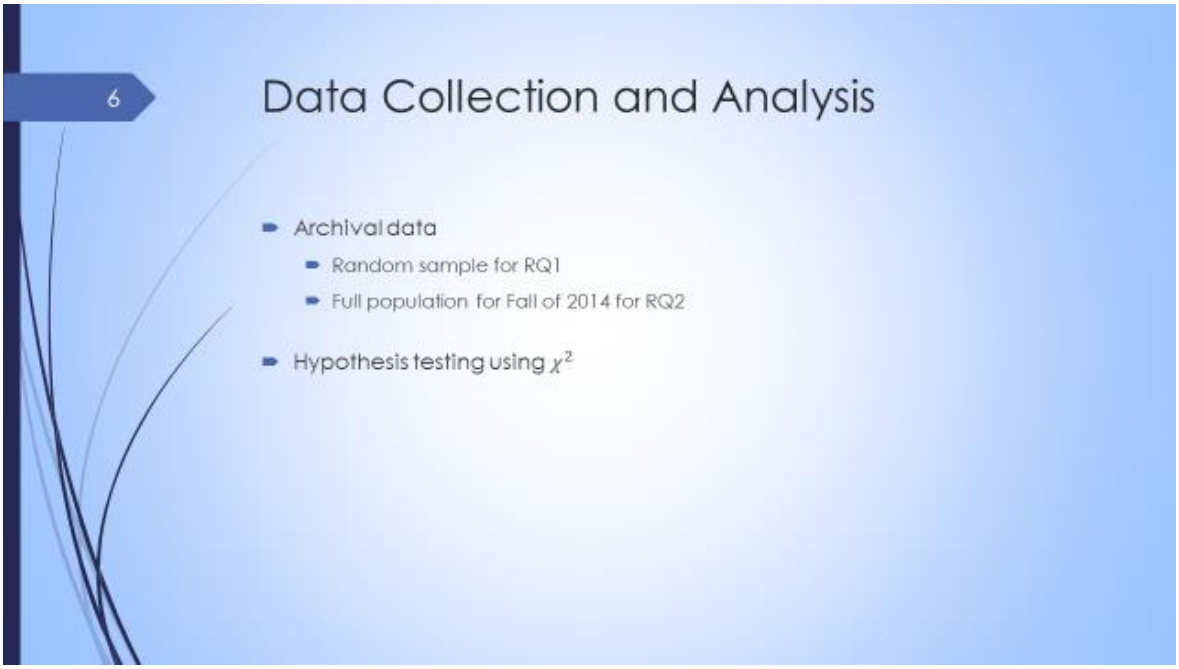
Slide 4: a basic overview of the problem at the institution that led to the research itself. This can be brief as all participants are already well aware of this problem (as it has been the topic of several meetings previously)



Slide 5: purpose statement for the collection and analysis of data

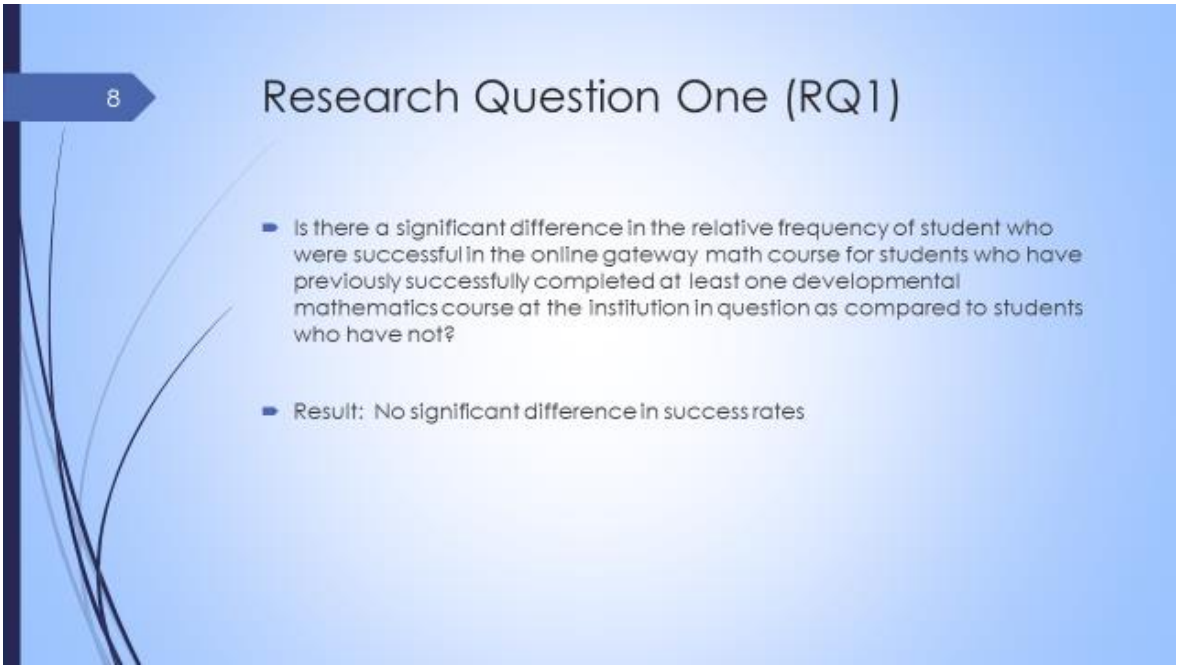


Slide 6: information about data collection and analysis. See Section 2, Data Collection and Analysis, for additional details as needed to explain the procedures used to the participants

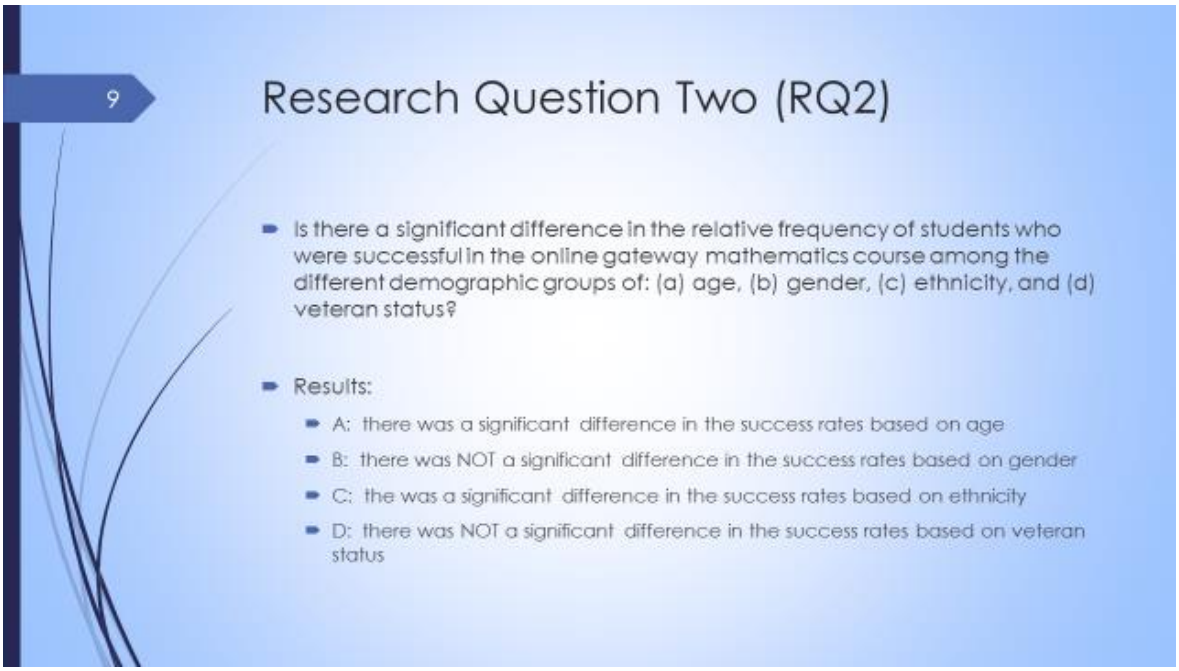


Slide 7: this slide marks the beginning of discussion of results

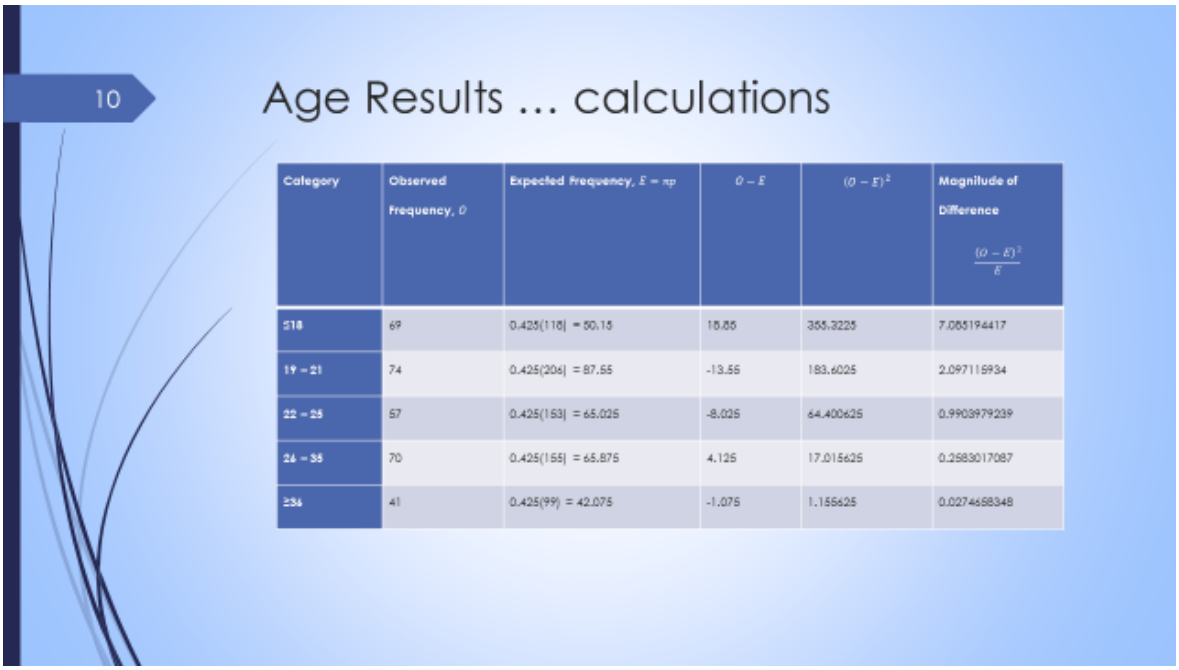
Slide 8: Results for RQ1 (not significant). Be sure to point out that this means that advising staff have been providing sound guidance to students who were not required (due to SB 1720) to take placement testing, in getting those students into the correct courses.



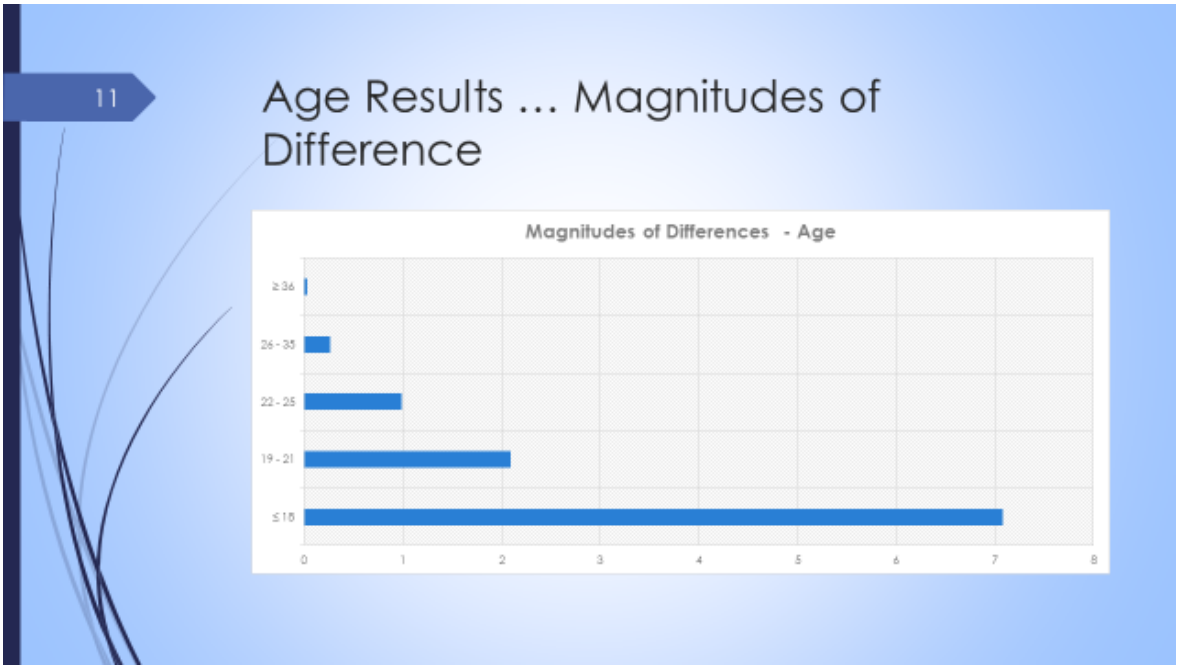
Slide 9: Results for RQ2. Note that only age and ethnicity were significant in this study. We will discuss age in detail during day one and we will discuss ethnicity in detail during day two.



Slide 10: breakdown of the results by age (calculations)



Slide 11: breakdown of the results by age (magnitudes of difference)

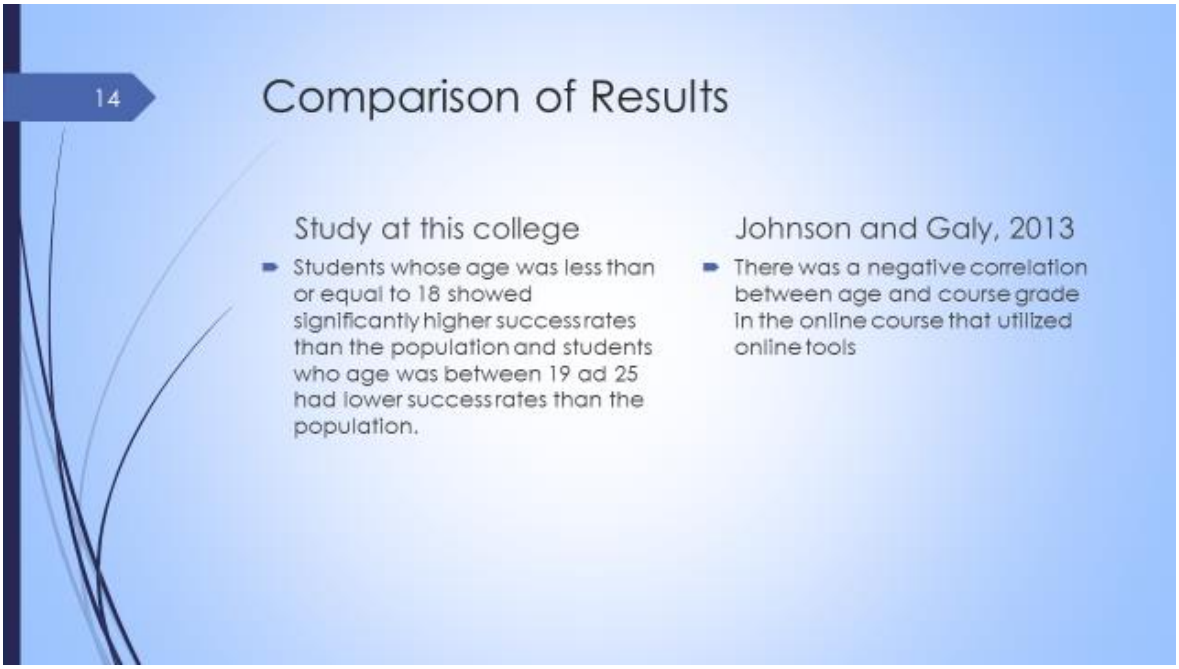


Slide 12: This slide marks the beginning of the presentation on Student success by age

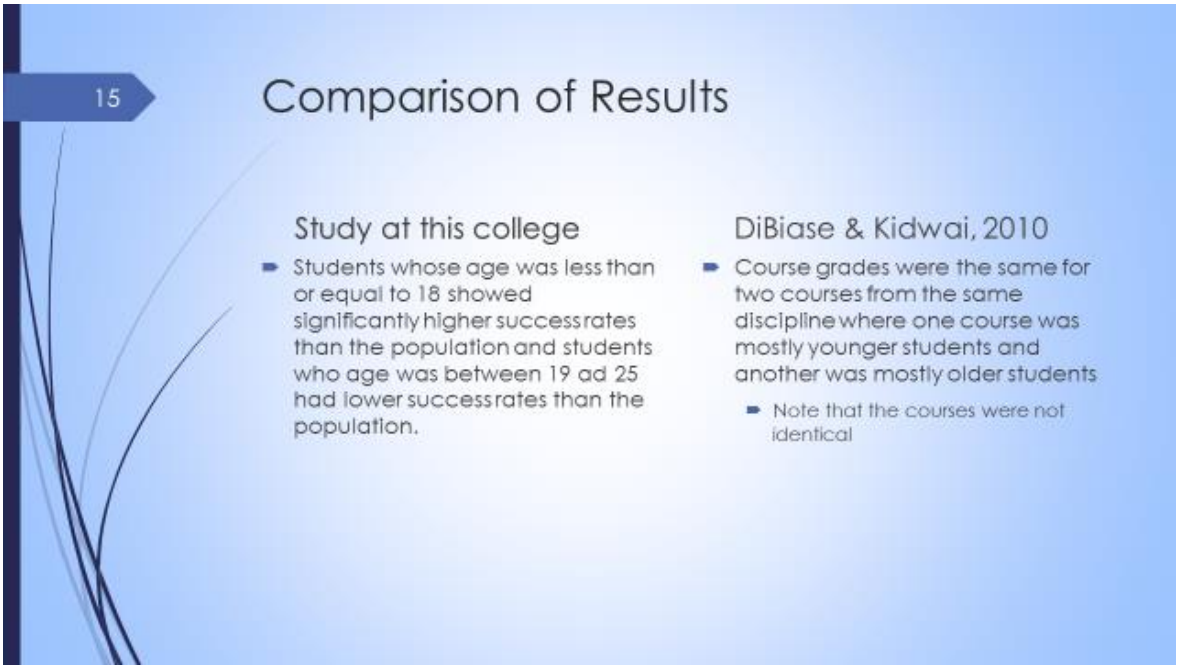
Slide 13: The first component of this presentation is a comparison of the results from my study at the institution where the professional development would take place to results from studies outlined in the literature. It is important to note that only studies that showed age as statistically significant in relation to some component of student success (success

rates, grade, course completion, attrition, or persistence) were included in these slides. It is also worth noting that in several studies, age was not a significant factor at all. Those studies were outlined in my original review of the literature in Section 1 of the doctoral capstone.

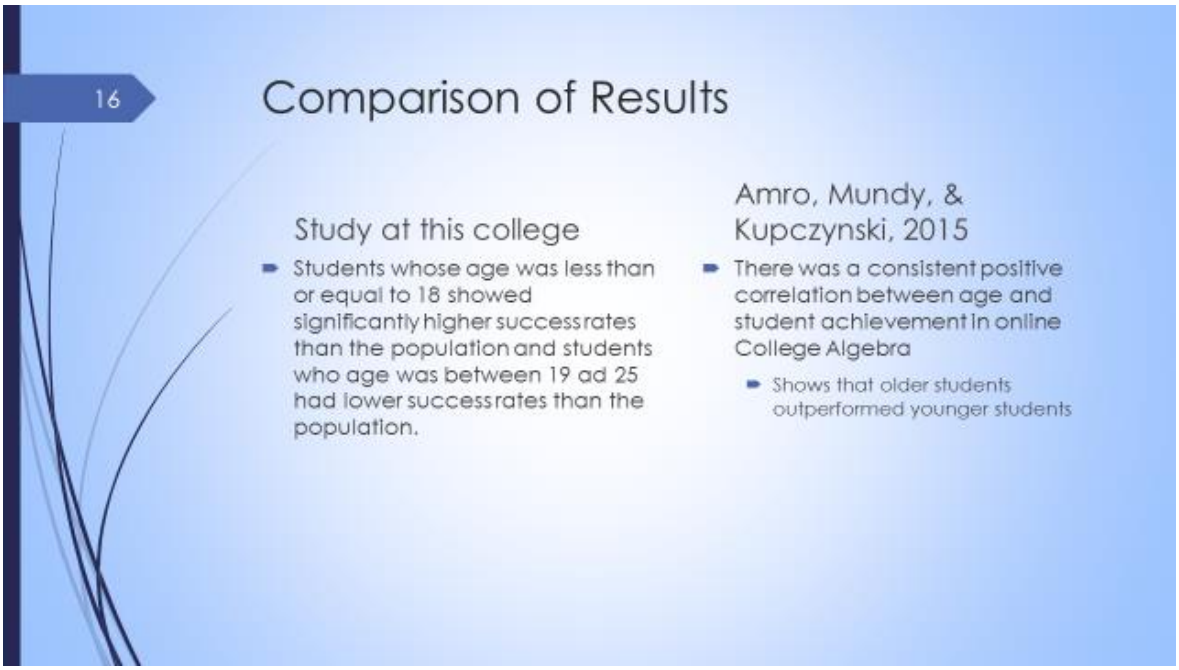
Slide 14: this first comparison slide compares the results from our study at this institution to one from a study by Johnson and Galy in 2013. In that study, there was a negative correlation between age and course grade. That result showed that the older students earned lower grades in the course under study than younger students. The study from Johnson and Galy was different from our study in that focus was on grades, not on success rates. Although direct comparison opportunity is therefore limited, the study seems to have shown that older students were more at risk than younger students. In contrast, success rates of students increased as age increased (with the exception of the group aged 18 or under).



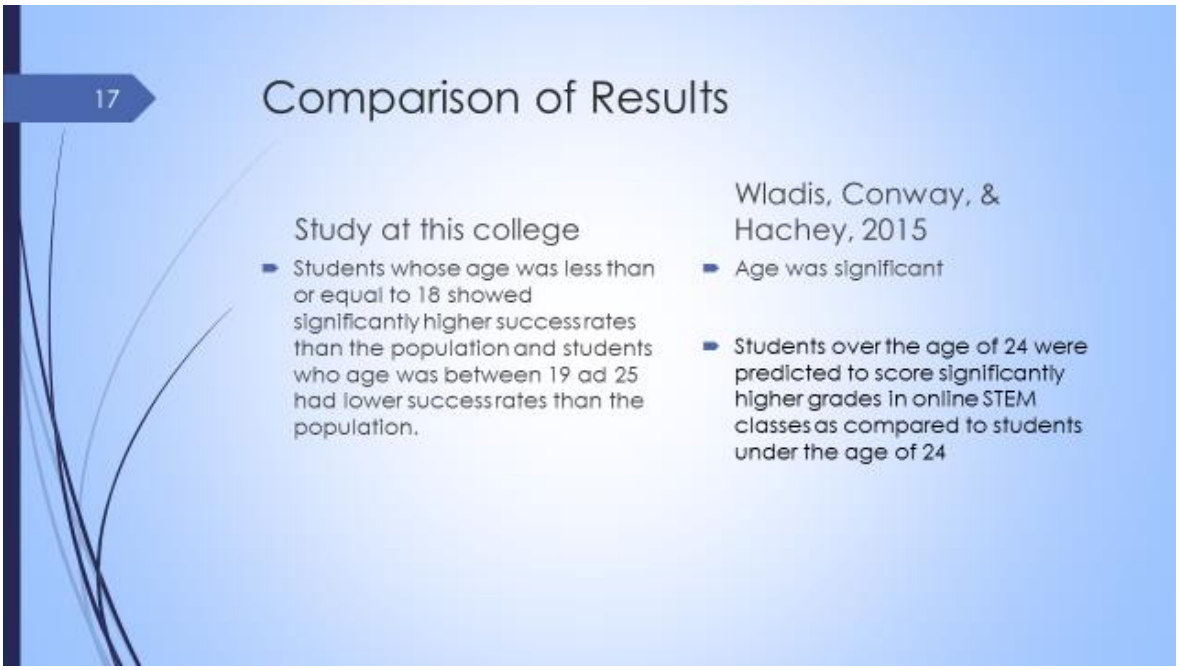
Slide 15: this second comparison slide compares the results from our study at this institution to one from a study by DiBiase and Kidwai in 2010. In that study, the authors compared course grades for two courses in the same subject area taught by the same professor. The courses covered much of the same content, but were taught at different levels and were therefore not identical. In one course (the course taught at the lower level), the majority of the students were younger or traditional aged students. In the other course (taught at the graduate level), the majority of the students were adult or returning students. The outcomes, in terms of grades, were equivalent in that study between the two courses and the two age groupings. Interestingly, however, there were significantly more cases of academic dishonesty in the course with the younger students.



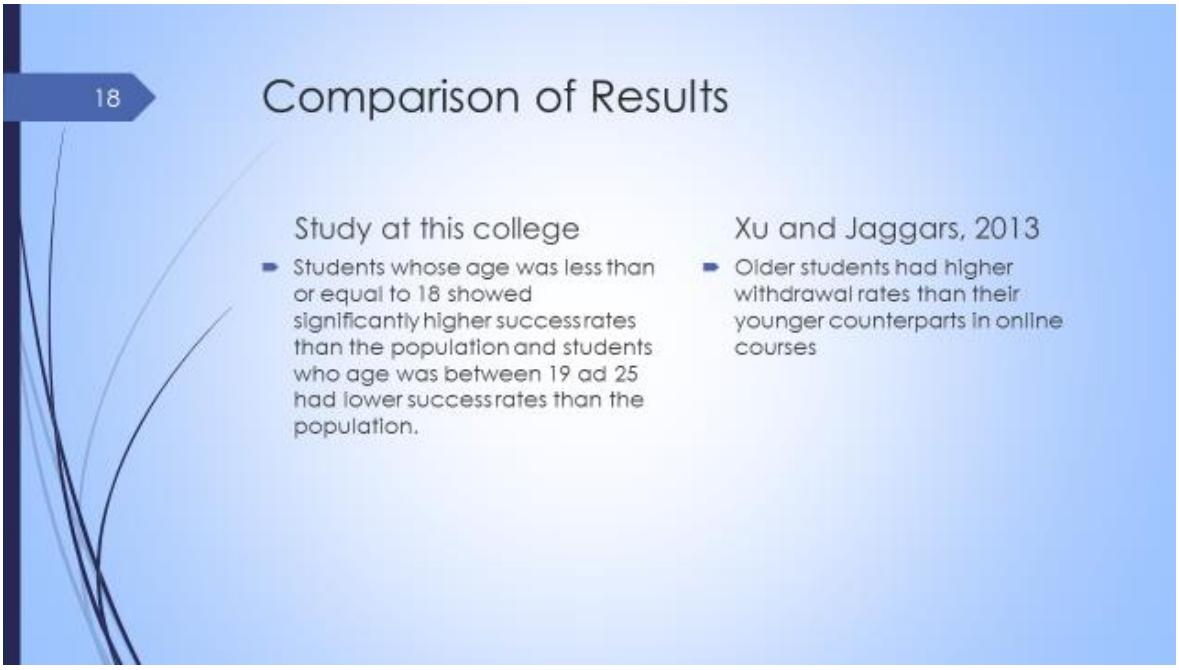
Slide 16: this third comparison slide compares the results from our study at this institution to one from a study by Amro et al. in 2015. In this study, age and student achievement had a positive correlation. That means that older students were more successful in the course than younger students. Other than the group aged 18 and under, that result matches with the results from our study.



Slide 17: this third comparison slide compares the results from our study at this institution to one from a study by Wladis et al. in 2015. Their study compared results in online STEM courses between students aged under the age of 24 and students aged over the age of 24. Their data based prediction was that students aged over the age of 24 were predicted to score significantly higher grades in online STEM courses as compared to students aged under the age of 24. Again, their study was different from ours in that it studied grades not success rates. It is important to note that only final grades (not persistence in the course) were included in the study results. Still, it is worth noting that the study results matched relatively well with ours … with the notable exception of students aged 18 or under.



Slide 18: this final comparison slide compares the results from our study at this institution to one from a study by Xu and Jaggars in 2013. In their study, Xu and Jaggars chose to look specifically at withdrawal rates in online courses by age (instead of grades in the course). Xu and Jaggars found that older students (those labeled as not of a traditional age) were significantly more likely to withdraw from online courses as compared to younger students. In our study, the students who would be considered traditionally aged were included in two age groupings. Those who were 18 years old were included in the grouping labeled less than or equal to 18 years old, and those just over 18 years old were in the grouping labeled between 19 and 21 years old. In our study, those were the age groupings with the lowest success rate and the highest success rate, respectively.

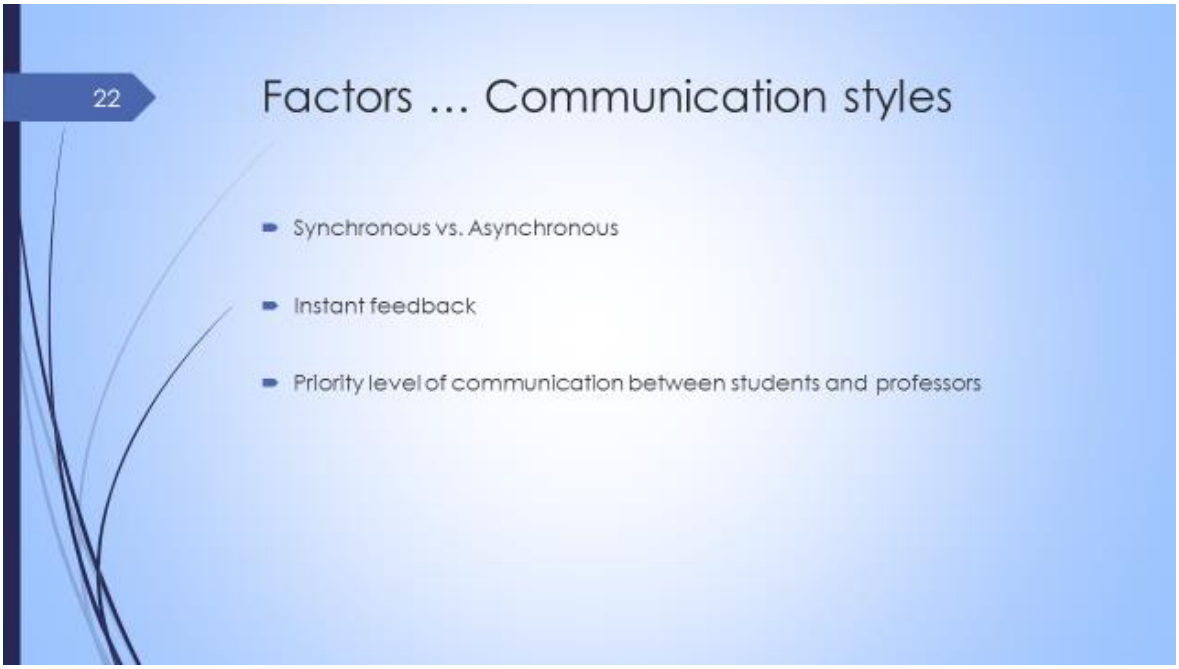


Slide 19: this slide represents an opportunity for the group to discuss what the results of our study, along with the comparisons from the literature, tell us about age and the impact of age on success rates in our online courses. Allow for open conversation, focused on the data.

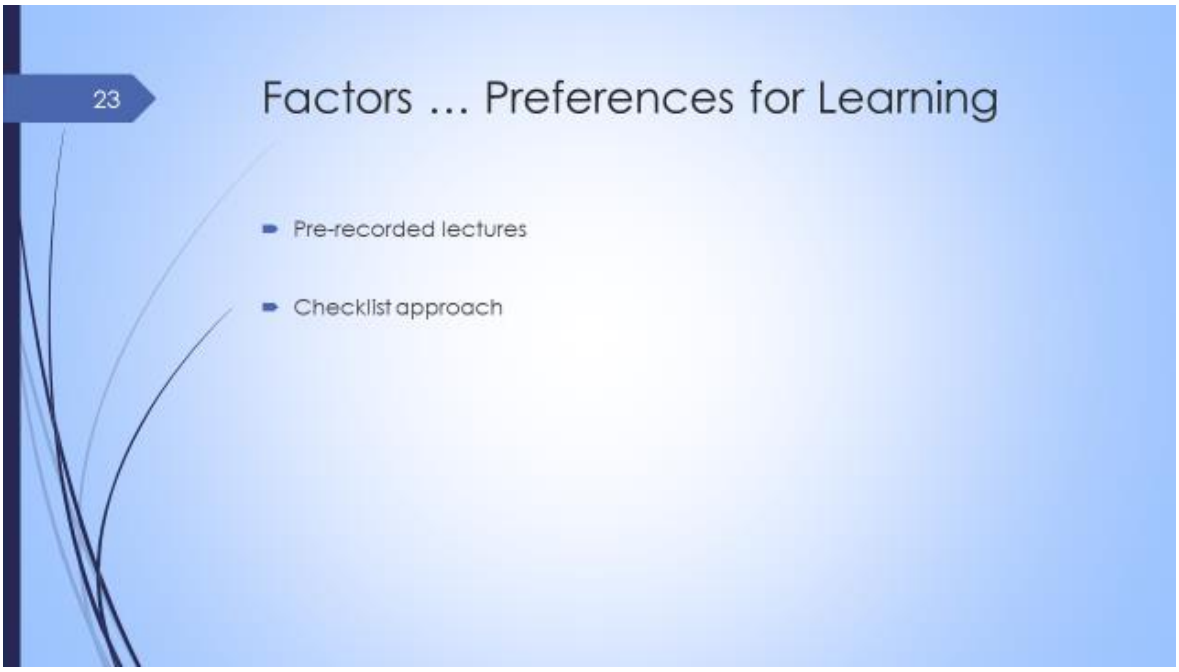
Slide 20: The next component of this presentation is a discussion of factors that impact student success related to age.

Slide 21: The first factor of student success related to age is time. This includes time on task, time spent communicating between students and students, time spent communicating between students and faculty, and the time restrictions required outside of class. Studies have shown that younger students spent less time on task and less time in communications (either with other students or with members of the faculty). In other studies, restrictions on time availability for students who are older were much higher than those for traditional aged students. This could include family responsibilities, employment, medical responsibilities, or other adult responsibilities.

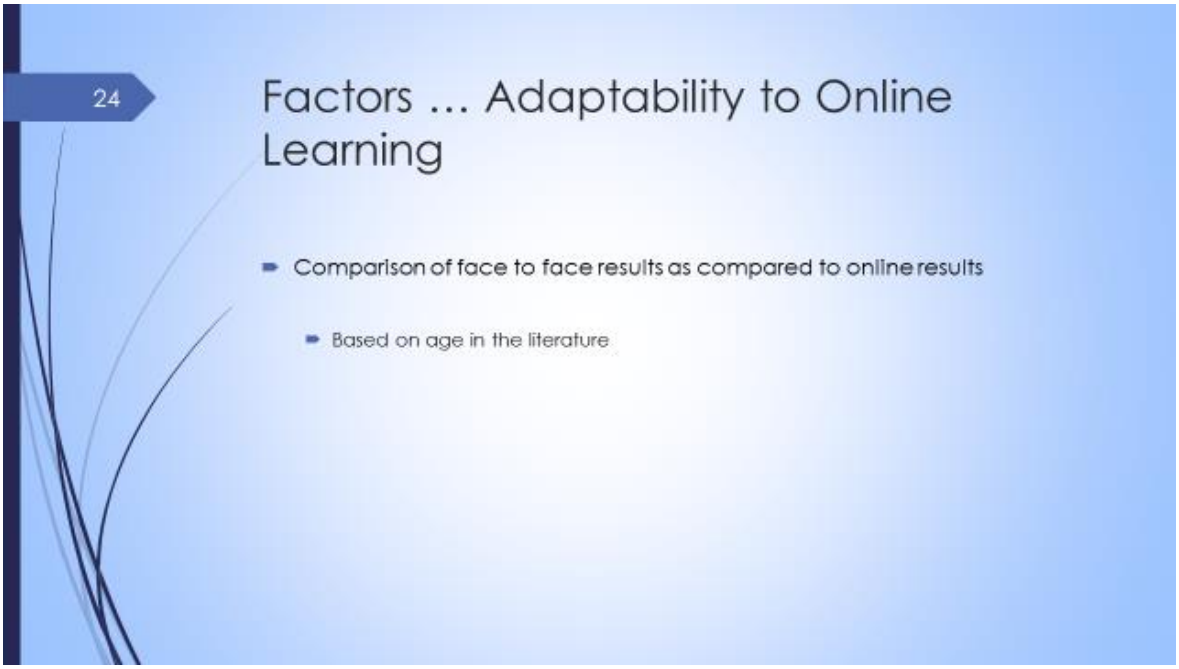
Slide 22: The second factor of student success related to age is preferred communication style. On average, younger students seemed to prefer instantaneous communication, communication that was initiated by the professor, and communication that mirrored social media. Older students generally were satisfied with more traditional online communication such as email and discussion board, and were more satisfied with a response time of 24 hours.



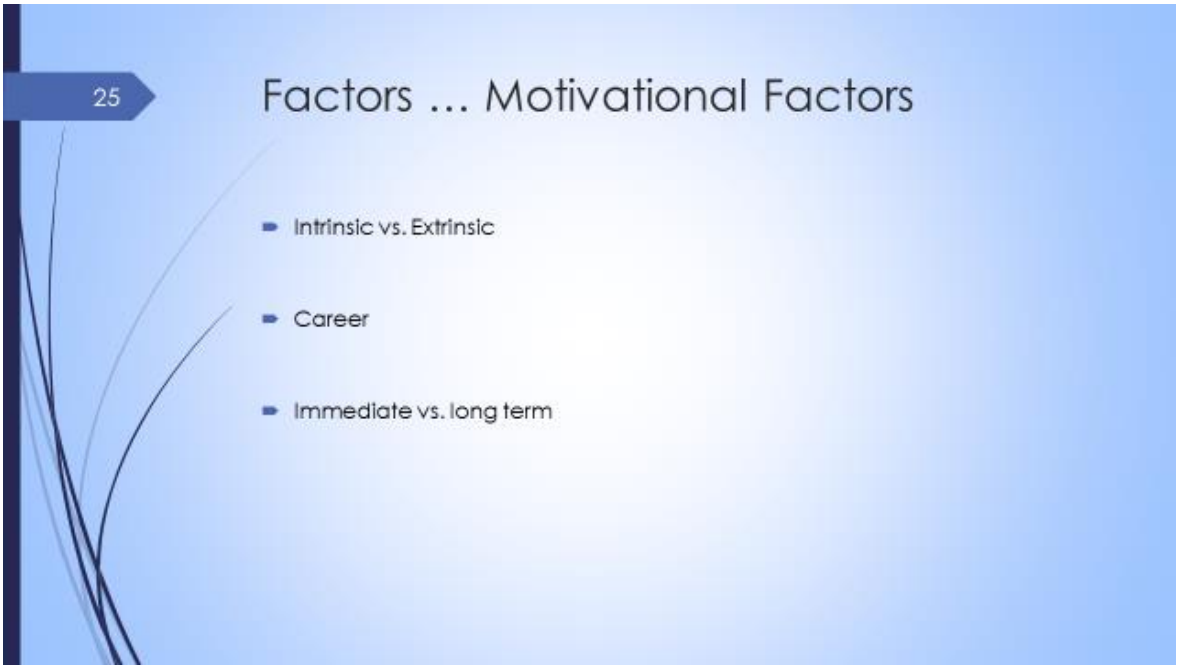
Slide 23: The next factor of student success related to age is the student's preference for learning. Studies differed in student preferences for learning in synchronous vs asynchronous modes. In one study by Simonds and Brock in 2014, younger students preferred pre-recorded lectures and communication that was asynchronous (such as email and discussion boards) while younger students preferred synchronous learning and immediate feedback on communication. In another (DiBiase & Kidwai, 2010), younger students expressed that they preferred to work independently with minimal communication or restrictions on their time and availability.



Slide 24: This slide shows another factor of student success related to age, adaptability to online learning. In a study by Xu and Jaggars in 2013, students of all ages were less successful in the online instructional modality than in the face-to-face instructional modality. Older students, however, showed a smaller impact from the difference in modality than younger students. This showed that older students are more able to adapt to learning in the online instructional modality.

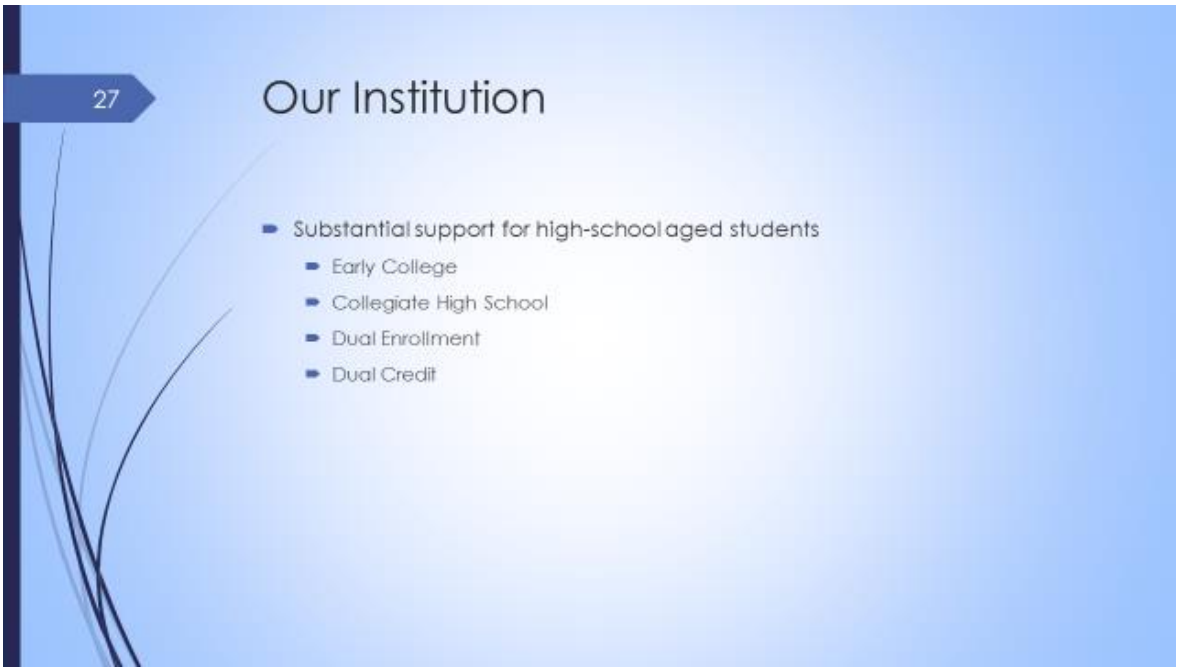


Slide 25: This is the last slide showing factors of student success related to age, motivational factors. A study by Yoo and Huang in 2013 showed differences in the factors that motivate students between students of different age groups. They defined extrinsic motivation as "the performance of an activity in order to attain some separable outcome" (Yoo & Huang, 2013, p. 153) and intrinsic motivation as "doing an activity for the inherent satisfaction of the activity itself". In their findings, students of all ages were motivated by both intrinsic and extrinsic motivational factors. Students of all ages also experienced both short term motivations (such as passing the class, graduation, or getting into a class for whom their current course was a prerequisite), and long term motivations (such as a career or other major change in their life or life circumstances). The nature of those factors changed, however between the age groups. Much of that change seemed related to career and career goals.



Slide 26: this slide starts the portion of the presentation discussing differences between our institution and other institutions of higher education that might have contributed to our specific results.

Slide 27: During this slide, discuss the several different programs that support the specific student population that had such significantly high success rates; the 18 and younger student group. Although not all students who are 18 or younger are served by one of the following programs, many of them are. As the data show very unusual results for that student age grouping at our institution, it is logical to assume that there may be some connection to the programs that serve that population. Note: this is not to imply causation, this is simply to imply that these initiatives are worthy of additional interest. The student groups are listed on the slide, and the services that they provide include (but are not limited to): supplemental tutoring, supplemental support and advice from advising staff, mentoring, and cohort status with fellow students, free tuition and/or books, and space on the campus to work and study. Note that not all of the students in each group receive all of these forms of assistance, as this is a relatively comprehensive list from the four student groups.



Slide 28: Lunch break will last from noon to 1 pm. Food will be provided in the back of the room by the math department. Although lunch break can provide an opportunity for participants to catch up on email and phone messages, encourage participants to stay together and enjoy social time together as much as is feasible. That social interaction is beneficial to our goal of the creation of a community of practice.

Slide 29: This group discussion will last from 1 pm to 2:30 with the following breakdown of time:

- 1 to 1:30: table discussions – individual reflections and table discussions
- 1:30 to 2: table discussions – table presentations to the group
- 2 to 2:30: group responses – group discussion and reflection on similarities and differences between the table presentations

During the discussion time, the facilitator should circulate throughout the room and ensure that each table and group is staying on task and on topic.

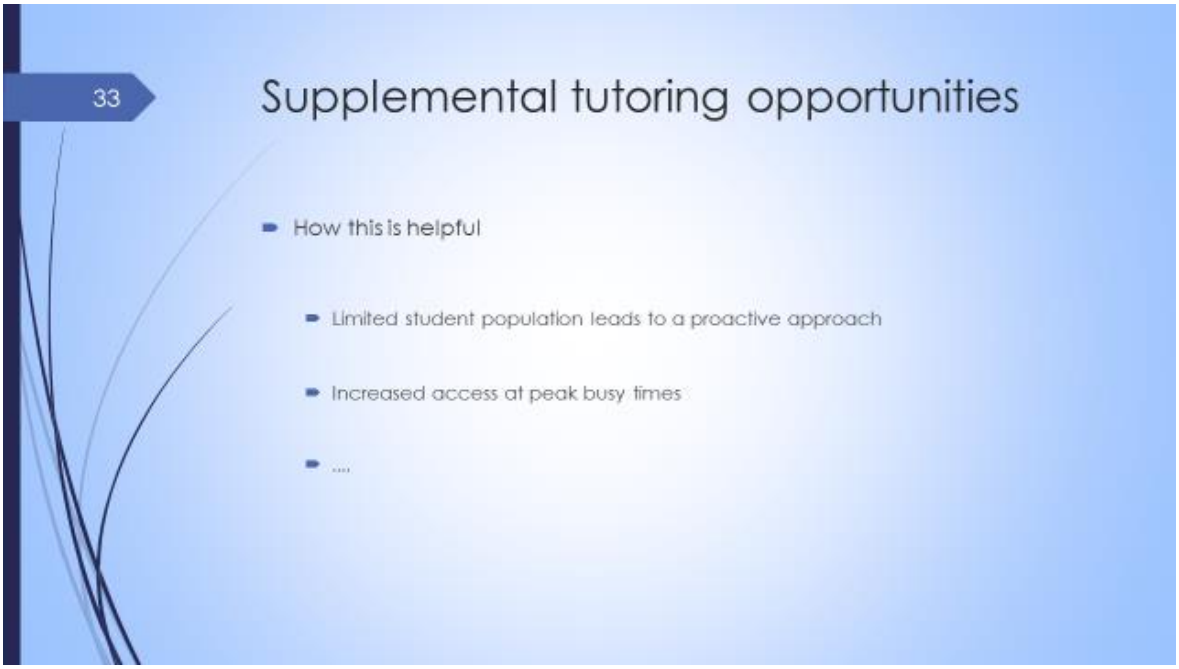
Slide 30: This slide marks the beginning of the presentation on Best Practices and Recommendations

Slide 31: The first part of this presentation is an overview of the best practices at our institution.

Slide 32: go over each of the forms of supplemental support and discuss how they might be of benefit to the students in this age group of students. Make sure to focus on each of them and discuss as a group. For example, supplemental tutoring opportunities are

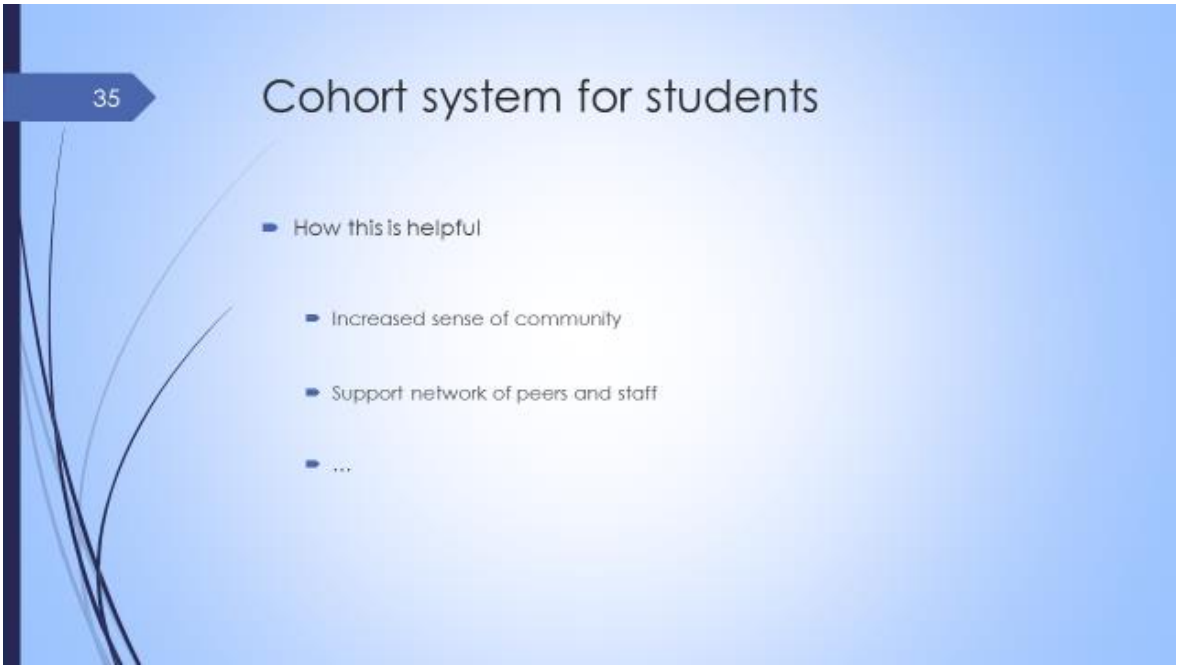
helpful to students in this age-based subgroup because it makes it easier for them to get the assistance they need at peak times (such as right before proctored exams). It is also beneficial for the students to have supplemental tutoring opportunities because it is an opportunity available specifically to the students in this group (as cohorts). That means that the students are more familiar with the tutors and may, thus, be more comfortable seeking out assistance. It is also worth mentioning that these supplemental opportunities help to create a sense of community for the students in these online courses … a known success factor as described in the literature (Tinto, 1993)

Slide 33: Supplemental Tutoring Opportunities: Two ways that supplemental opportunities for tutoring are beneficial to students are listed on this slide. The first is that a limited student population leads to a more proactive approach. When a tutor has the ability to get to know each of the students with whom they are expected to work, they have the ability to reach out to a student who has not seen them recently and to check on students they remember have struggled in the past. That proactive approach can make students feel more comfortable working with a tutor. The second is that the supplement opportunities give students increased access to a tutor a busy or peak times. That way, students can still get the help they need without waiting for long periods of time when there is a rush … like right before midterms. Take a moment to allow participants to discuss other reasons that supplemental tutoring opportunities are beneficial to students based on their own experiences.


33
Supplemental tutoring opportunities
How this is helpful
Limited student population leads to a proactive approach
Increased access at peak busy times
....

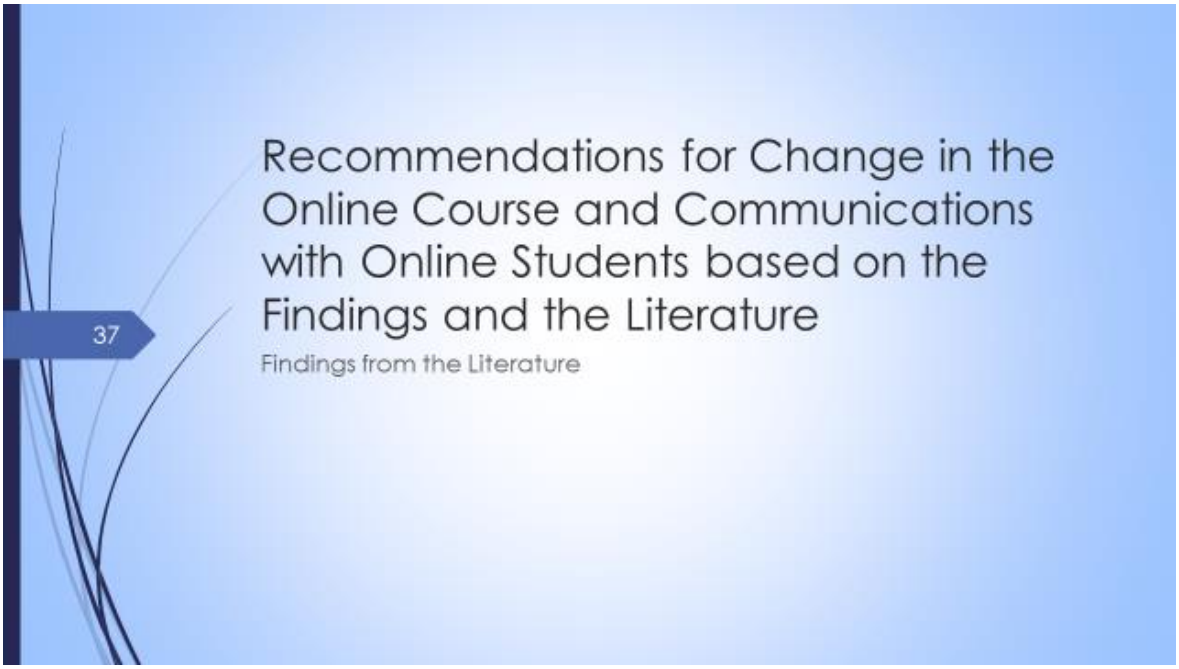
Slide 34: Supplemental staff guidance and support: Two ways that supplemental staff guidance and support are beneficial to students are listed on this slide. The first is that this increased access to college staff leads to an increased sense of community for the students, known to increase engagement with both the college and their courses. The second is an increased sense of security and clarity of expectations. Students who receive this increased support and guidance have a safety net of sorts. They have someone to go to when they feel confused, don't understand expectations, or don't know how to move forward (or self-advocate) in a difficult situation. Take a moment to allow participants to discuss other reasons that supplemental tutoring opportunities are beneficial to students based on their own experiences.

Slide 35: Cohort System for students: Two ways that a cohort system for students can be beneficial to students are listed on this slide. The first is that there is an increased sense of community. Students in a cohort system can feel connected to their peers on a much higher level than students who encounter entirely new students in each course they take at the college. That increase sense of community can lead to increased engagement and an increased sense of accountability. The second is a support network of peers, faculty, and staff. Such a support network allows students to find assistance when needed. Take a moment to allow participants to discuss other reasons that supplemental tutoring opportunities are beneficial to students based on their own experiences.

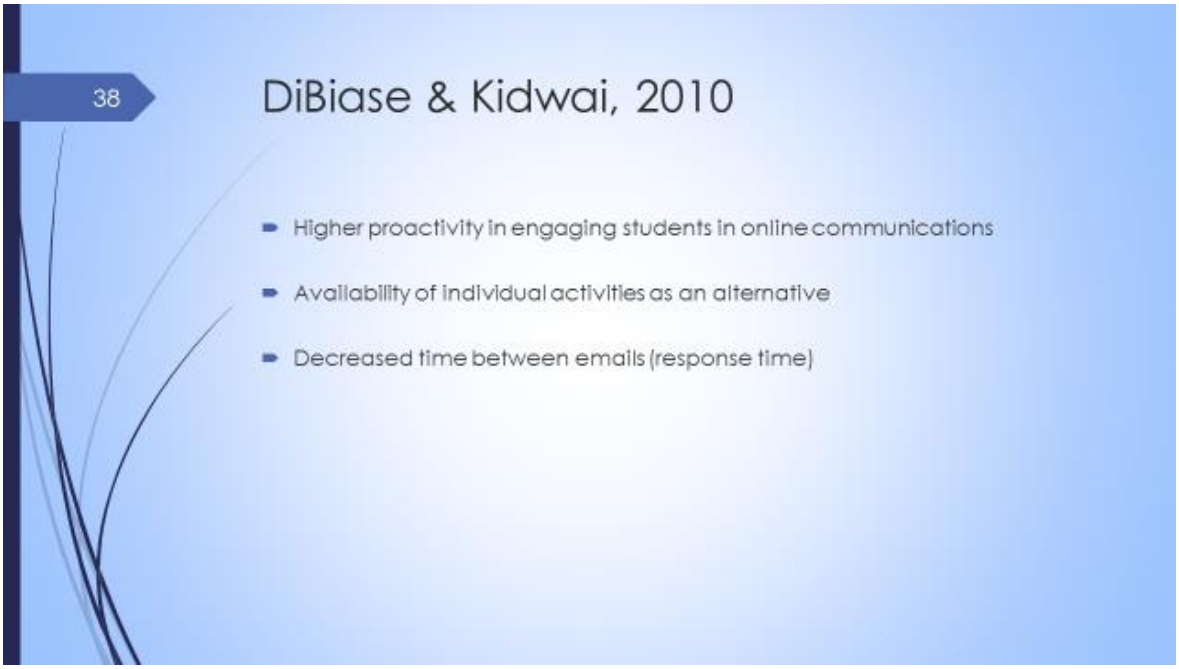


Slide 36: The second part of this presentation is a set of recommendations for changes to the online course and communications with online students based on the data and the literature.

Slide 37: This first section of the recommendations is a set of recommendations for several different studies found in the literature. We will discuss them by reviewing one study at a time.



Slide 38: The first study we will be discussing is a study by DiBiase and Kidwai in 2010 entitled "Wasted on the young? Comparing the performance and attitudes of younger and older US adults in an online class on geographic information". In that study, they compared student interaction and student grades between two sections of geography courses. Although both courses covered material from the same discipline and even covered much of the same information, they were not identical courses. One course (labeled as mostly younger students) was taught at the undergraduate level. The other course (labeled as mostly older students) was taught at the graduate level. In this study the authors found that students who were in the older cohort were more engaged in the content (especially discussion boards) than the students in the younger cohort. The author suggested based on their results that the older students were more willing to engage in the course despite the professor's reactive approach to student discussions, but that a more proactive approach may increase engagement for younger students. I would note that this would seem to be less related to age and more related to experience as a learner (as the younger students were undergraduates and the older students were graduate students). The authors recommended that for some students, the availability of individual activities as an alternative to collaborative activities may be of benefit (for students who wish to engage in the material using an alternative schedule, for instance). The other recommendation that came from this study was for a decrease in the response time between emails. Although the older group of students seemed satisfied with the 24 hour response time that the professor gave in this class, the younger students expressed frustration with such a time frame. Alternative approaches to communication such as texting and social media were also preferred among many of the younger students.

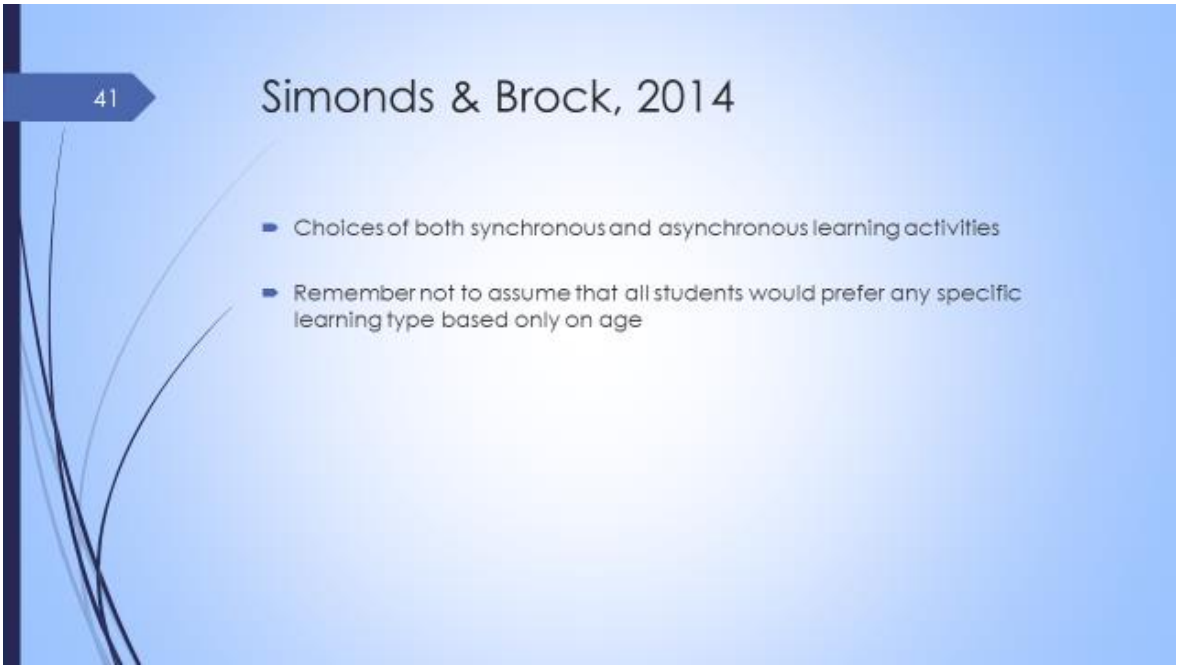


Slide 39: In 2013, Johnson and Galy published a study entitled "The use of e-learning for improving Hispanic students' academic performance". In that study, the authors/researchers found that time management skills were crucial to the success of students in the online modality. They also found that the student's ability to manage their time was the variable with the strongest ability to predict student outcome. As other studies have found that time management skills are often related to age (and experience as both a student and a worker), support for time management skill development would be beneficial to students. Additionally, this tells us that organizational tools that help to model time management skills would be of benefit to students. These tools may include calendars with deadlines and suggestions on when to work ahead (and on what), checklists, and reminders for important activities. Allow the participants a moment to discuss time management strategies they have found beneficial for their students in their classes.

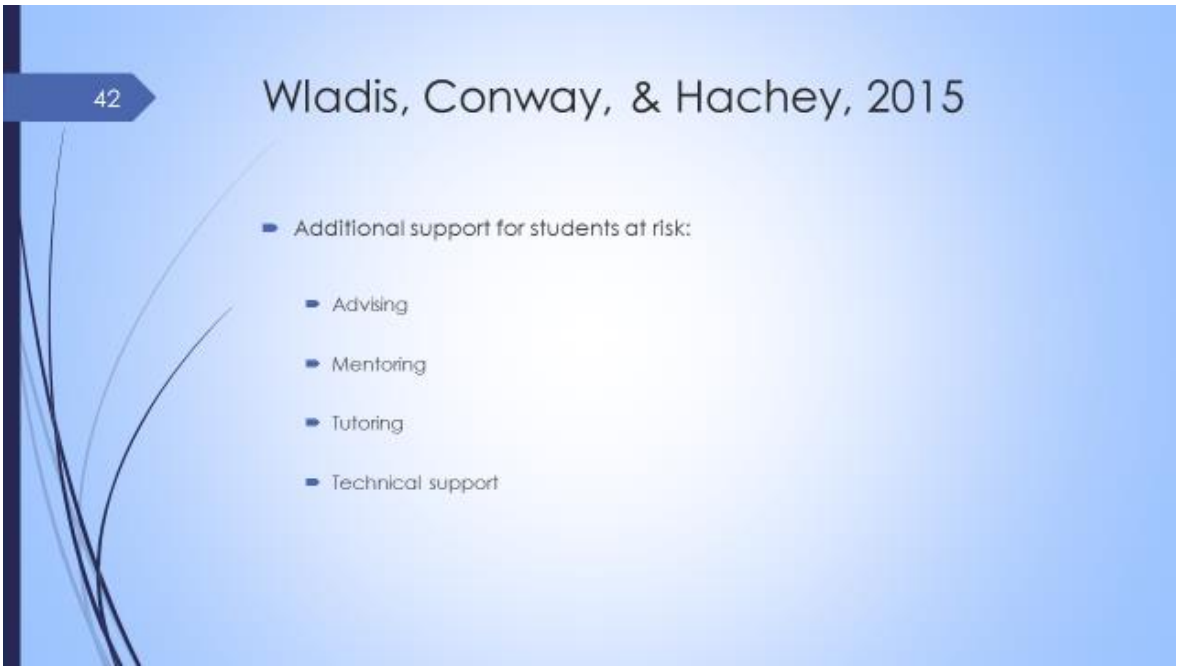
Slide 40: In their study "Using online collaboration applications for group assignments: The interplay between design and human characteristics", Koh and Lim (2012) found that younger students preferred online communication more than older students. This could include traditional forms of online communication such as email and discussion boards, but younger students were drawn more strongly to newer forms of online communication such a chat and social media. In contrast, professors showed comfort almost exclusively in the more traditional forms of online communication. An increase in online communication using a variety of online tools may increase engagement for some students.


40
Koh & Lim, 2012
Online communication options
Email and discussion boards
Chat and Social Media as preferred forms of communication

Slide 41: In their article “Relationships between age, experience, and student preference for type of learning activities in online courses”, Simonds and Brock (2014) found that asynchronous activities such as viewing pre-recorded lectures were appealing to the older students in the study while more synchronous activities such as chat rooms and live interaction. The authors pointed out that their results should encourage course designers to make both options available to students, allowing students to choose the learning style that best fits both their preference and their needs. The authors also suggested that we remember that any result such as theirs should be taken with caution. Not all younger students will wish to learn through interaction and not all older students will prefer to learn through pre-recorded lectures. These results simple give a picture of the majority of student preferences per group.



Slide 42: In their 2015 study, “the online STEM classroom – who succeeds? An exploration of the impact of ethnicity, gender, and non-traditional student characteristics in the community college context”, Wladis et al. (2015) found that younger students had substantially lower success rates in their online STEM courses than they did in their face-to-face STEM courses. Based on their findings, they suggested that younger students should be considered at risk in online STEM courses and that colleges should reach out proactively with support systems such as the ones mentioned on this slide.

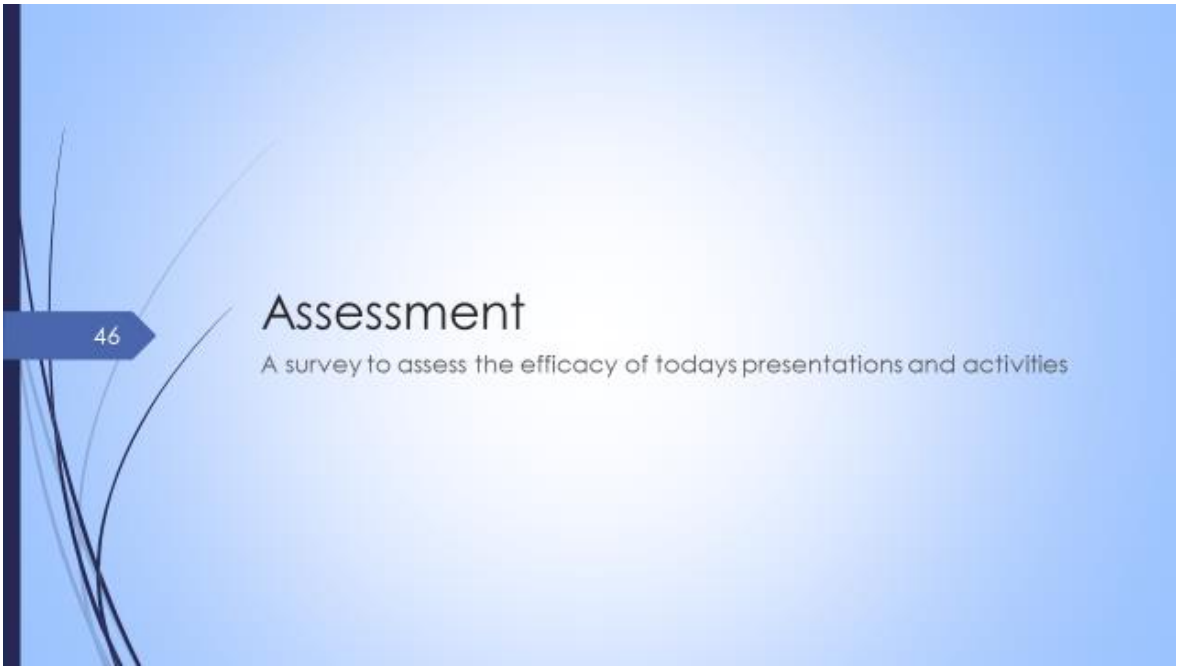


Slide 43: In their 2013 study "Adaptability to online learning: Differences across types of students and academic subject areas", Xu and Jaggars found while older students were less successful in the online instructional modality than younger students, the gap in performance between younger and older students was smaller in the online instructional modality than in the face-to-face instructional modality. They concluded that older students adapt more successfully to the online modality. Based on their results, the authors suggested the four strategies to increase student success in online courses. Their first suggestions was screening, which would only make online courses available to students who the college deems as having a high probability of success. Such a strategy risks disallowing a student from taking online courses who could take courses in no other manner, and also risks disallowing a student from taking online courses who would be successful based on generalizations. As such, this is not my recommendation. Their second recommendation is scaffolding: "incorporating the teaching of online learning skills into online courses in which less-adaptable students tend to cluster". Such a strategy would be highly appropriate in a course such as online Intermediate Algebra due to the fact that Intermediate Algebra is a gateway course and will be taken by a large number of relatively new online students. This more positive approach is worth investigation on day three when we develop our action plan. The next suggestion from these authors is an early warning system. Such an early warning system is in place at this institution in this course. The final suggestion from these articles was improvement of the course. Take a moment and allow participants to discuss what forms of improvement come to mind based on these results.

Slide 44: In their 2013 study "Engaging online adult learners in Higher Education: Motivational factors impacted by gender, age, and prior experiences", Yoo and Huang found that student motivation changed by age, but was highly impacted by their ability to see how the content in the course would relate to their short term and long term goals. Increased visibility of the benefits of the content toward those specific goals might be of benefit to student engagement and retention. For example, a student may have a short term goal of taking a course in the next semester for which Intermediate Algebra is a prerequisite. By connecting content items to courses that students will be taking in the future, students may be more able to see the reasons for learning algebraic concepts. A long term goal that a student may be working toward might be a certain career or acceptance into specific bachelors programs. Again, connections between the algebraic concepts covered in this course and these goals may help students to see the benefits of learning the content (other than just passing this class).

Slide 45: This group discussion will last from 4 pm to 4:30. Each table should discuss recommendations from the literature that they believe may have impact on student success and how they might go about implementation. Each table will then present their top idea or ideas (based on time).

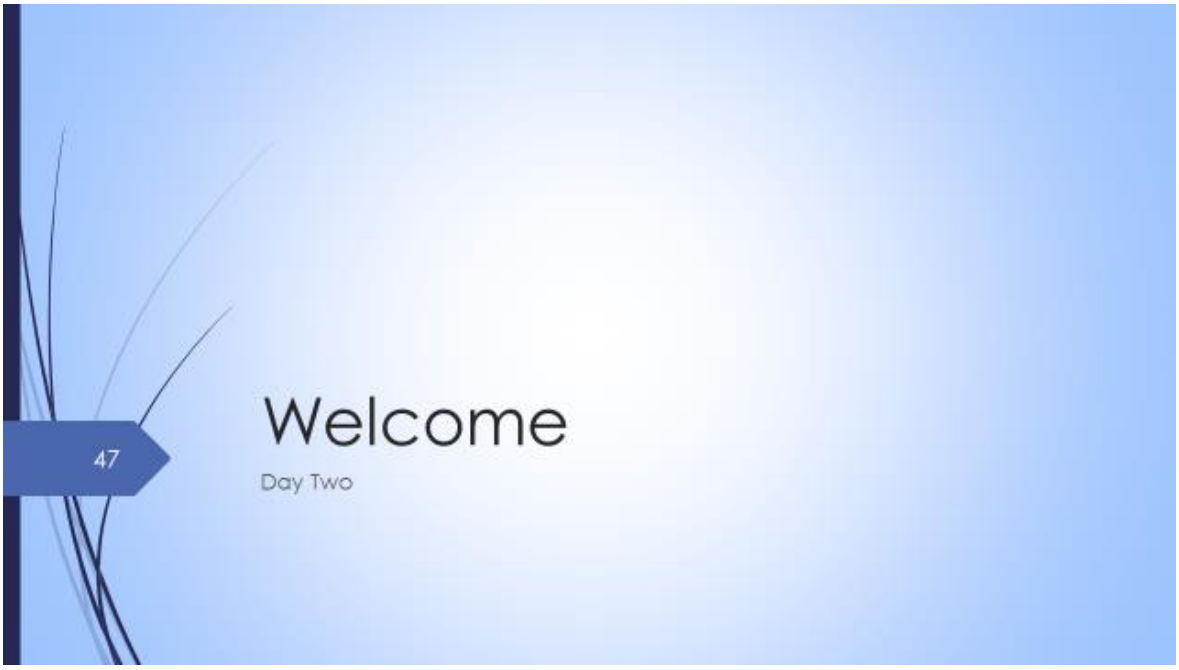
Slide 46: This last activity of the day is an assessment to allow for improvements to the professional development in the future and to ensure that participants are benefitting from the day's activities as designed. Be sure to thank participants for their participation throughout the day and remind them of the start time for the next day.



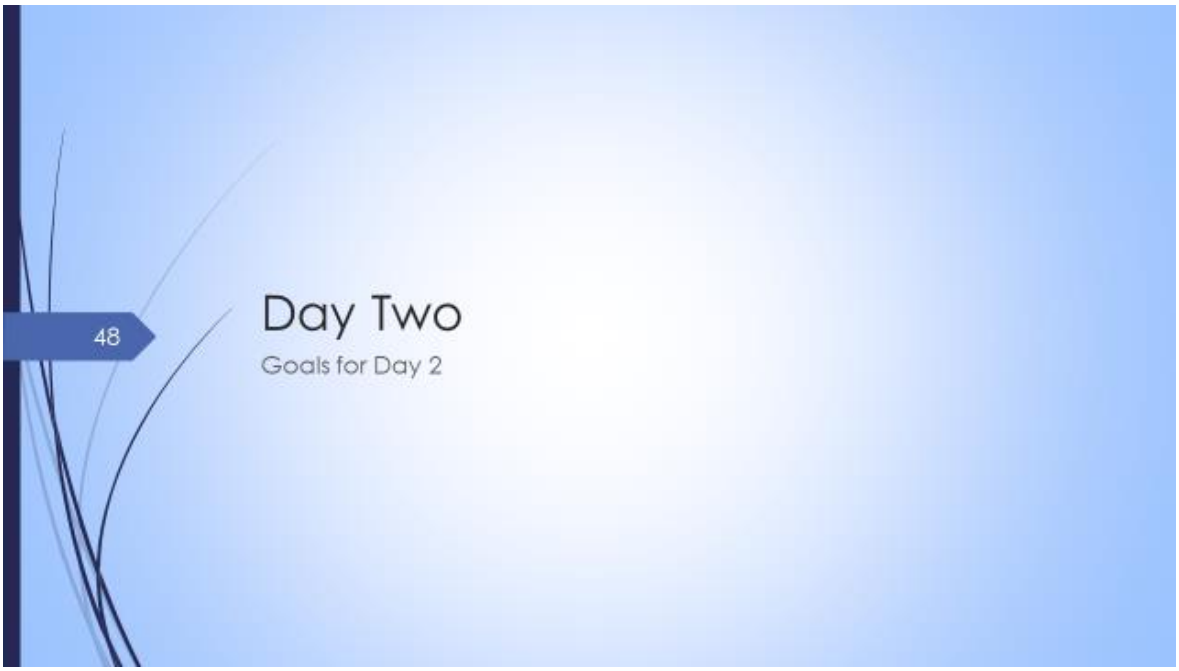
PowerPoint Slides with Facilitator Notes – Day Two

Professional Development Facilitator Notes (by slide) – Day Two
The following are notes to benefit the facilitator of the professional development along with the slides to use. Note that the professional development is meant to be highly engaging and collaborative. At all points in the professional development, the facilitator should pause regularly to engage with participants, elicit comments and feedback, and allow for questions and discussion.

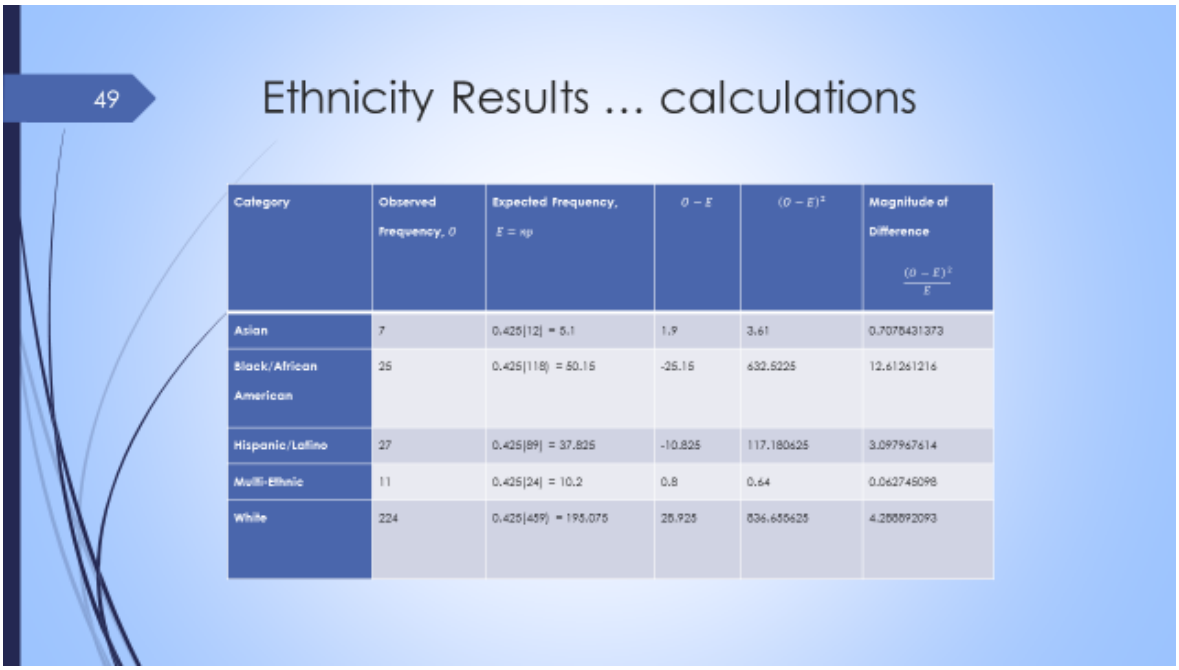
Slide 47: Welcome and greeting for day 2. This slide should also be up through registration and breakfast, which will last from 8 am to 9 am.



Slide 48: The goals for day two are to present the research and findings on ethnicity to the participants to provide a background understanding, present recommendations based on the research and findings.

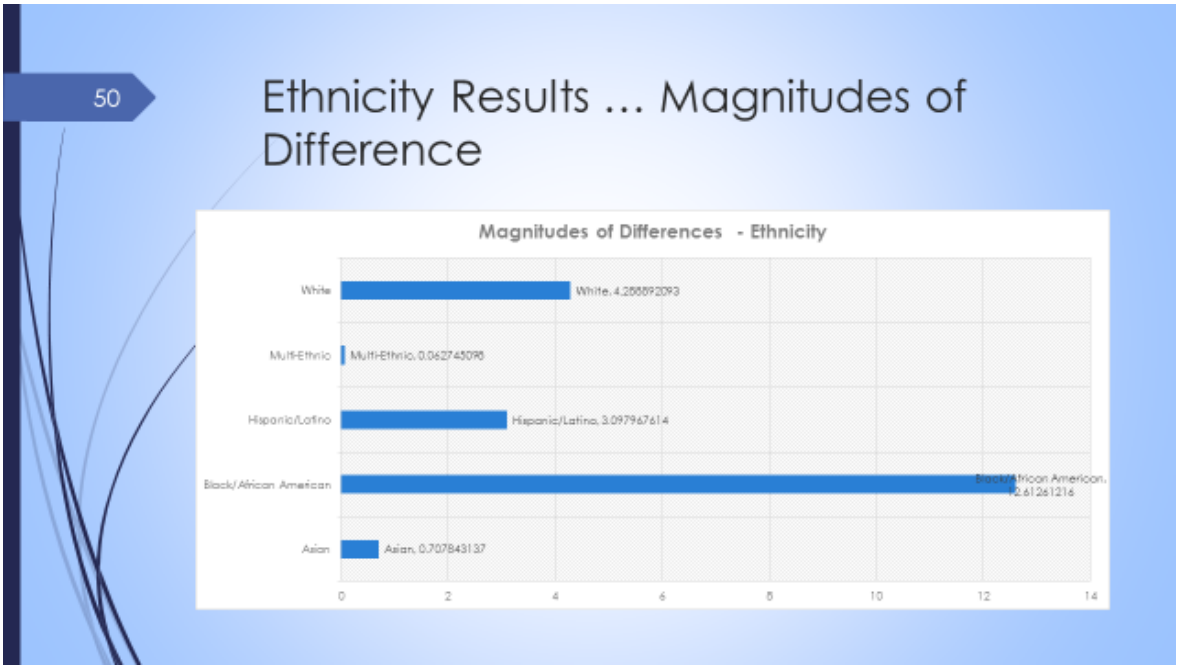


Slide 49: breakdown of the results by ethnicity (calculations)



Category	Observed Frequency, O	Expected Frequency, $E = np$	$O - E$	$(O - E)^2$	Magnitude of Difference $\frac{(O - E)^2}{E}$
Asian	7	0.425(12) = 5.1	1.9	3.61	0.7078431373
Black/African American	25	0.425(118) = 50.15	-25.15	632.5225	12.61261216
Hispanic/Latino	27	0.425(89) = 37.825	-10.825	117.180625	3.097967614
Multi-Ethnic	11	0.425(24) = 10.2	0.8	0.64	0.062745098
White	224	0.425(459) = 195.075	28.925	836.655625	4.288892093

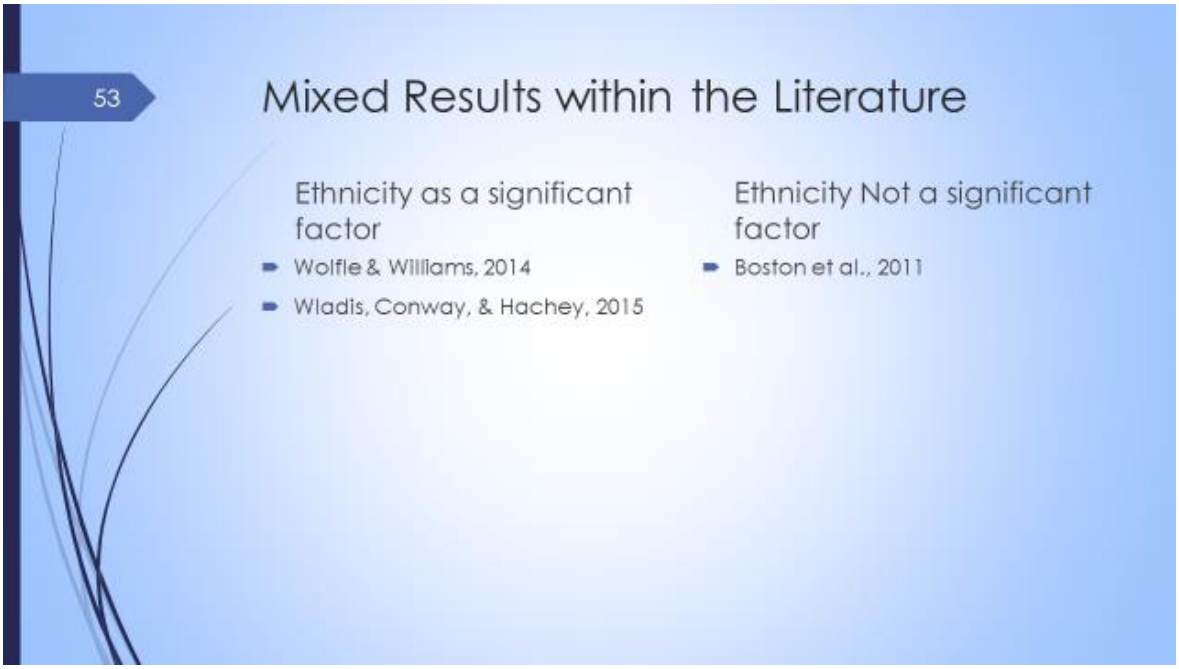
Slide 50: breakdown of the results by ethnicity (magnitudes of difference)



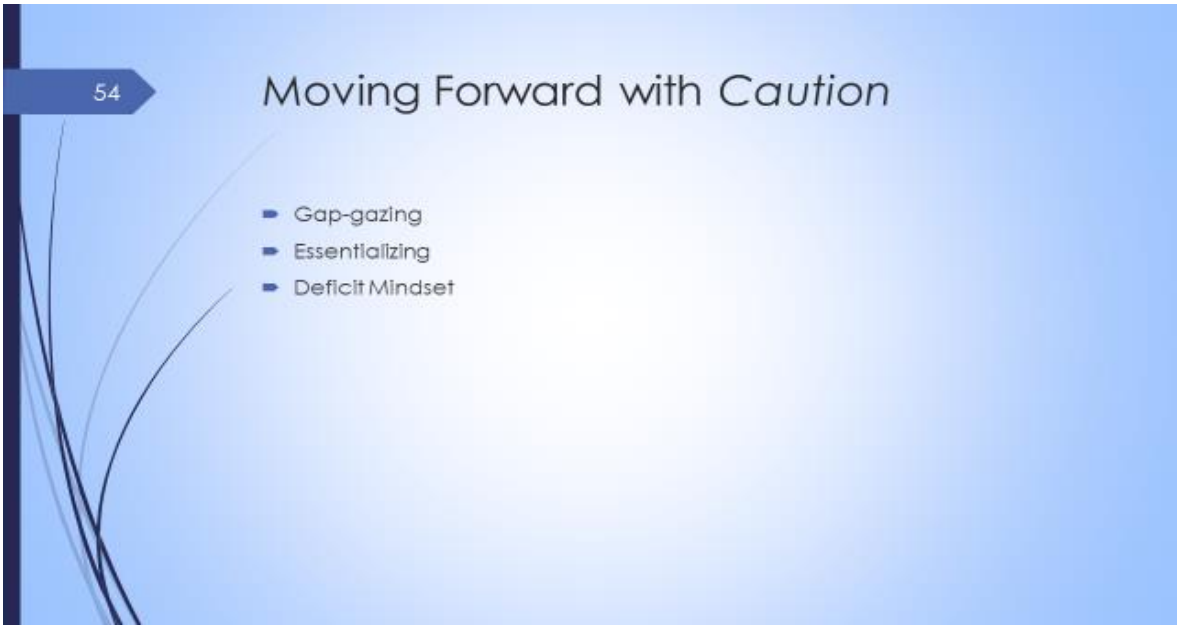
Slide 51: This slide marks the beginning of the presentation on Student Success by Ethnicity

Slide 52: As we did yesterday with our discussion on age, the first component of this presentation is a comparison of the results from my study at the institution where the professional development would take place to results from studies outlined in the literature.

Slide 53: Although some authors state that statistics show significant differences in student outcomes between students of different ethnicities as if it were a known common statement (Cordova et al., 2009), studies in the literature have produced mixed results. In their 2014 study "The impact of developmental mathematics courses and age, gender, and race and ethnicity on persistence and academic performance in Virginia community colleges", Wolfle and Williams found that ethnicity was a significant factor in persistence for community college students in Virginia. In their 2015 study "the online STEM classroom - who succeeds? An exploration of the impact of ethnicity, gender, and non-traditional student characteristics in the Community College context", Wolfle and Williams found that there was a significant difference in student success between students of different ethnicities in face-to-face and online courses. Interestingly, however, the authors found that the online modality did not significantly reduce success rates by ethnicity. They concluded that there was no difference in adaptability to the online instructional modality between students of different ethnicities. Alternatively, in their 2011 study "Comprehensive assessment of student retention in online learning environments", Boston et al. found no significant difference in retention of students in online courses between students of different ethnicity.

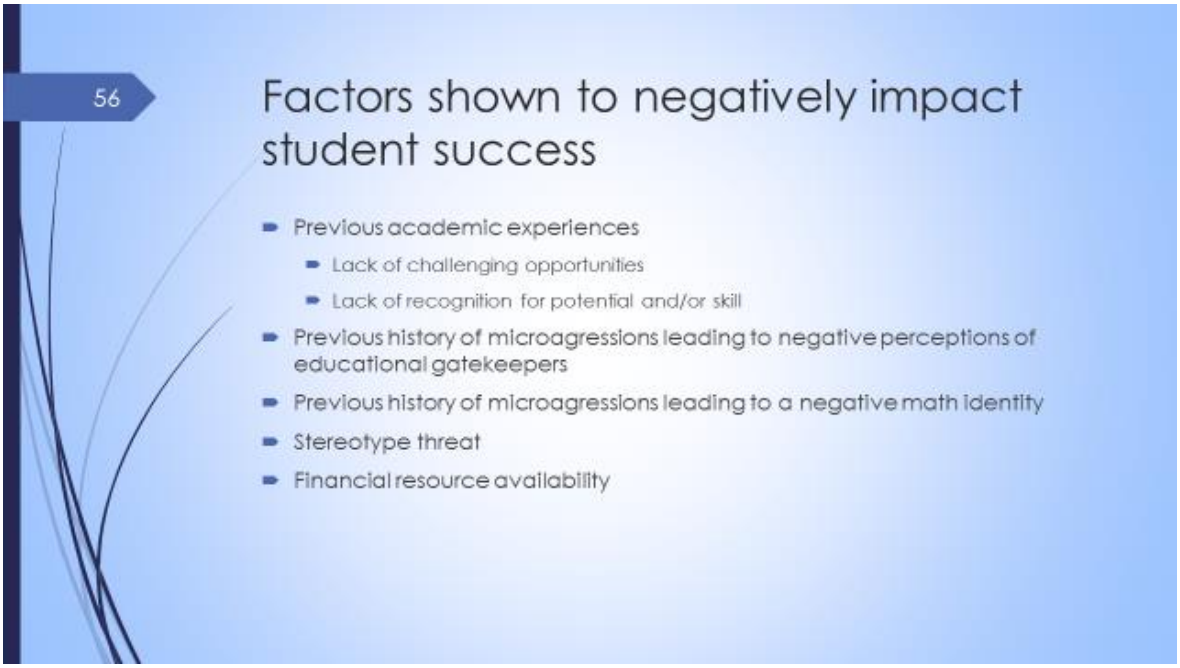


Slide 54: before we go further in our discussion of ethnicity as it relates to student success, let us first discuss some points of caution. Within the literature, there is great debate as to the benefits and potential harm of publishing and discussion of data regarding success by ethnicity. Some authors point out that it is imperative to discuss student success by ethnicity because it is only through discussion and increased awareness that we can make strides toward improvement (Cordova et al., 2009; Jackson and Wilson, 2012; Martin, 2012; Wladis et al., 2015). In 2012, Jackson and Wilson urged readers to exercise extreme caution in the discussion of such success rates as there is the danger of gap gazing or the mistaken view that the difference in success rates or other achievement measures comes from some innate deficiency caused by race or ethnicity. Not only is such a view inaccurate, it stops progress toward improvement. Another mindset that requires intentional caution when viewing and discussing results such as the ones presented in this seminar is the trap of essentializing. It would be a faulty premise to assume that a student can be fully defined by any one characteristic or that a single characteristic can predict their success in courses. As a group we must intentionally avoid this trap by remembering that race and ethnicity are but one of many variables that define a person and that no two people are alike. We therefore cannot assume that any finding for one group of people (age, ethnicity, or any other variable) will truly apply to all students in that group (this would be a good moment to share a personal story about a time when you had someone incorrectly assume a finding based on your gender, age, ethnicity … would apply to you and then allow participants to discuss some of theirs). A final trap we must collectively avoid is that of the deficit mindset. The deficit mindset is simply viewing the situation from a standpoint that emphasizes what is lacking or not successful. Such a mindset can lead to focus on the negative instead of focusing on student strengths and opportunity for growth and improvement.

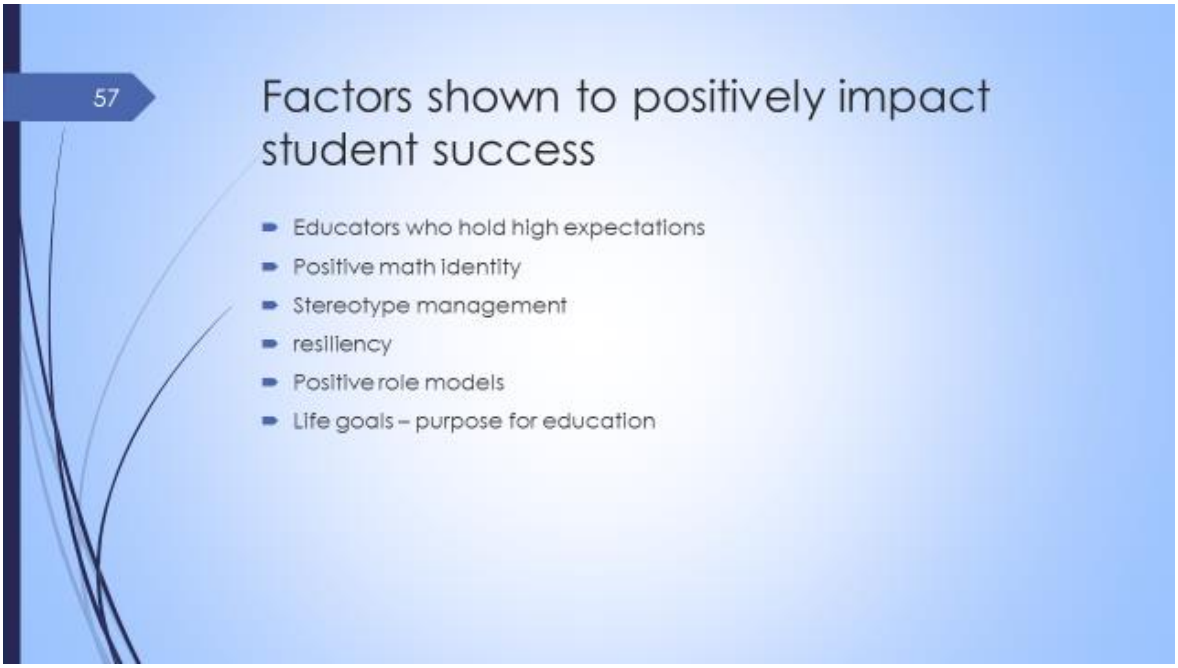


Slide 55: The next component of this presentation is a discussion of factors that impact student success related to ethnicity, as found in the literature.

Slide 56: This slide shows a list of factors that have been found to negatively impact student success in studies that included ethnicity as a variable related to student success, retention, or online grades. The first listed is a broad category, that of previous academic experiences. Challenging opportunities are critical to a young student's success in academia, and several studies have described young students who are Black or Hispanic having substantially diminished access to such challenging opportunities in their educational past. Critical Race Theorists have posited that such diminished opportunities may have come from academic gatekeepers thinking from a deficit perspective or ignoring the potential in young students who were Black or Hispanic. Similarly, microaggressions are described by critical race theorists as "subtle insults (verbal, nonverbal, and/or visual) directed toward people of color, often automatically or unconsciously" (Solórzano et al., 2000, p. 6). Such events, magnified over time and repetition (particularly by educators … even well-meaning educators) can lead to a mistrust of educators. Such a mistrust or disconnect makes support from a professor more challenging to obtain. If internalized, such microaggressions can also have a negative impact on a student's math identity (the way a student views their own ability to understand and utilize math). Stereotype threat is also a topic discussed by critical race theorists. In 2013, McGee defined stereotype threat as "a type of confirmation bias in which the risk of being viewed through the lens of a negative stereotype, or the fear of doing something that would inadvertently confirm that stereotype, suppresses academic performance …" (p. 256). Dr. McGee went on to describe the additional stress that stereotype threat adds to students in situations such as standardized testing. The final factor described in the literature as having potential to negatively impact student success is financial resource availability. In 2012, Noel-Levitz reported in the "Addendum by Race/Ethnicity: National Freshman Attitudes Report" that Black and Hispanic student responses displayed less financial stability and heightened financial insecurities. Such financial insecurities can lead to more time working (and less time available studying) and less access to resources such as computers and expensive supplemental software.



Slide 57: Authors and critical race theorists also have given substantial focus to the many factors that positively impact student success, retention and grades. Several of the items listed on this slide are the flip side of items on the previous slide and should be discussed as such when going through the list on the slide. Educators who hold high expectations are a positive influence on all students. Whether such educators are current professors or were influential for students in their younger years, such educators have lasting impact in not only teaching a student to work hard to achieve their goals, but also in showing a student their own vast potential. Such a realization of potential is one of the many factors that will help a student develop a positive math identity. A positive math identity gives a student inner confidence in their ability to succeed in a math course and to then utilize that ability in their life after school. Stereotype management is described by critical race theorists as the response to stereotype threat that shows resiliency and strength, positively impacting success and self-image for the student. Several authors celebrated the increased resiliency students demonstrated who were successful after being raised in situations where there were less financial resources, opportunities for challenging growth, or support from society or the community. Such resiliency is largely listed as a positive factor in retention in online courses. Several authors who studied ethnicity and student success, retention, and grades also discussed the positive impact of positive role models (family, educators, or in the community) and a well-defined goal in their education.


57
Factors shown to positively impact student success
Educators who hold high expectations
Positive math identity
Stereotype management
resiliency
Positive role models
Life goals – purpose for education

Slide 58: This group discussion will last from 1a am to noon with the following breakdown of time:

- 11 to 11:15: table discussions – individual reflections and table discussions
- 11:15 to 11:30: table discussions – table presentations to the group
- 11:30 to noon: group responses – group discussion and reflection on similarities and differences between the table presentations

During the discussion time, the facilitator should circulate throughout the room and ensure that each table and group is staying on task and on topic.

Slide 59: Lunch break will last from noon to 1 pm. Food will be provided in the back of the room by the math department. Although lunch break can provide an opportunity for participants to catch up on email and phone messages, encourage participants to stay together and enjoy social time together as much as is feasible. That social interaction is beneficial to our goal of the creation of a community of practice.

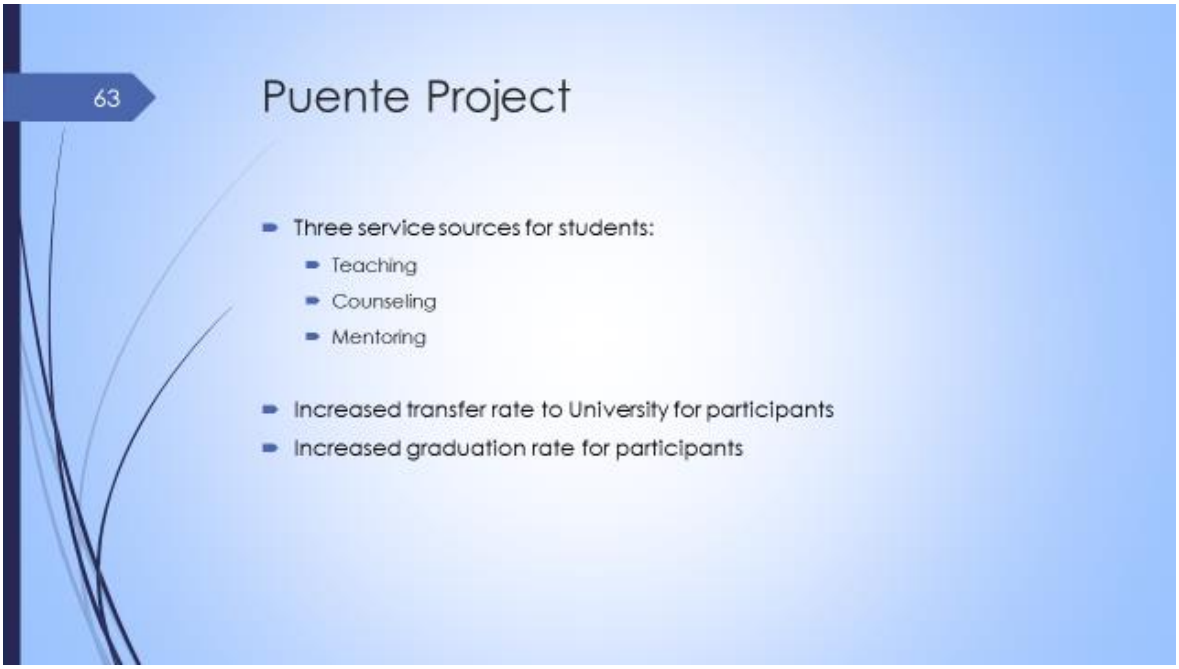
Slide 60: This slide marks the beginning of the presentation on Best Practices and Recommendations

Slide 61: The first part of this presentation is an overview of best practices and the recommendations that come from the literature

Slide 62: We will begin with a discussion of several projects and programs at other institutions as described in the literature

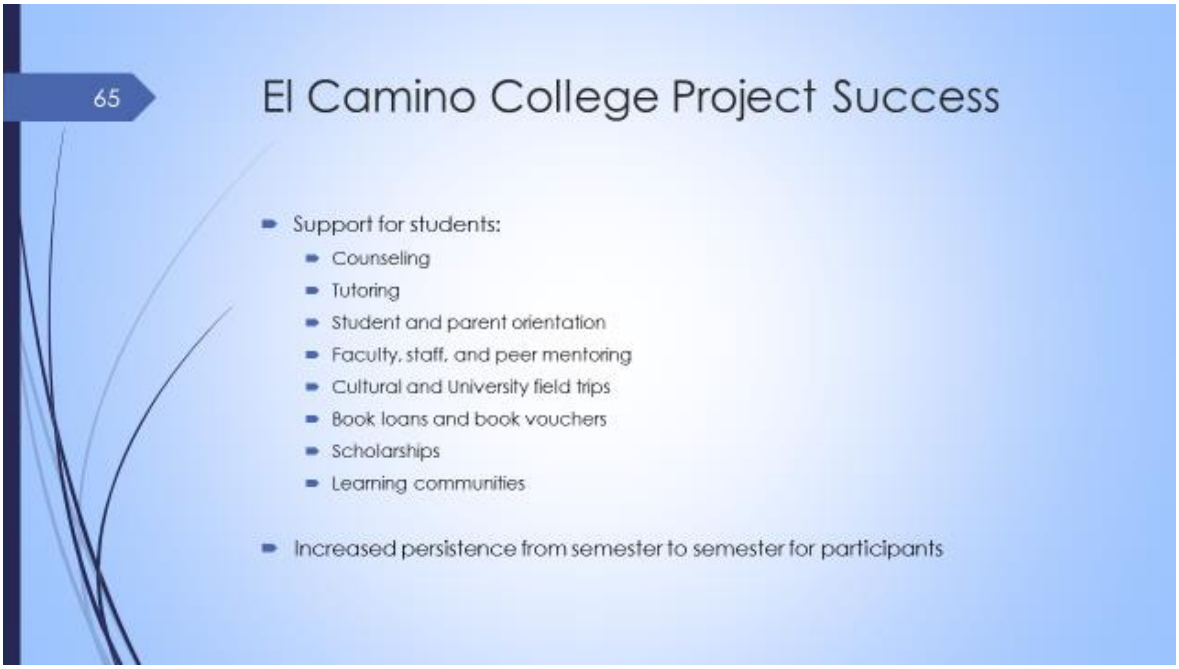

62
Projects and Programs
As Described in the Literature

Slide 63: The first program we will discuss is the Puente Project. In this project students are supported through teaching, counseling and mentoring. The project has increased transfer rates for participants by over 20% (compared to similar students who are not enrolled in the voluntary program) and has increased term to term retention for participants to approximately 30% higher than those of similar students who are not enrolled in the program.

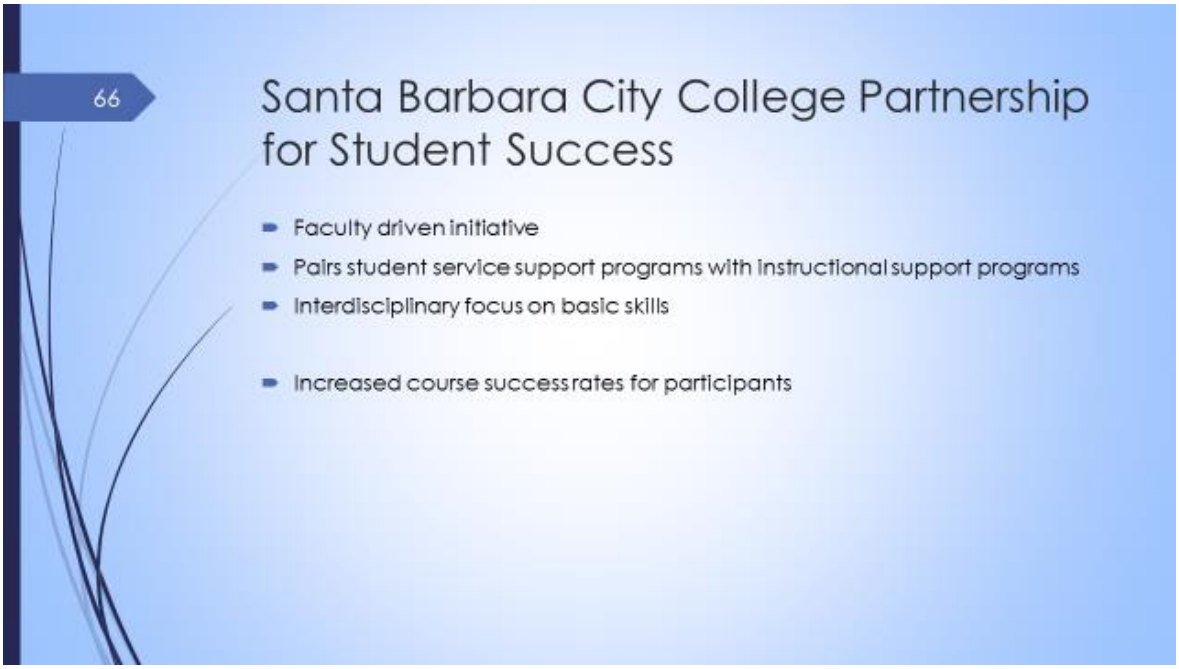


Slide 64: the second program we will discuss is Grossmont College Extended Opportunity Programs and Services. This program takes students deemed to be high risk for non-success and pairs them with counseling staff. Together, the student and counselor create an individual success plan. The creation of the plan is then followed by follow up and intervention as necessary as the counselor and student develop a relationship of accountability and support. The students who are eligible for this program are considered at risk due to a combination of factors including probation status. The retention rate for students in this program (as compared to similar students from the population) is over 50% higher.

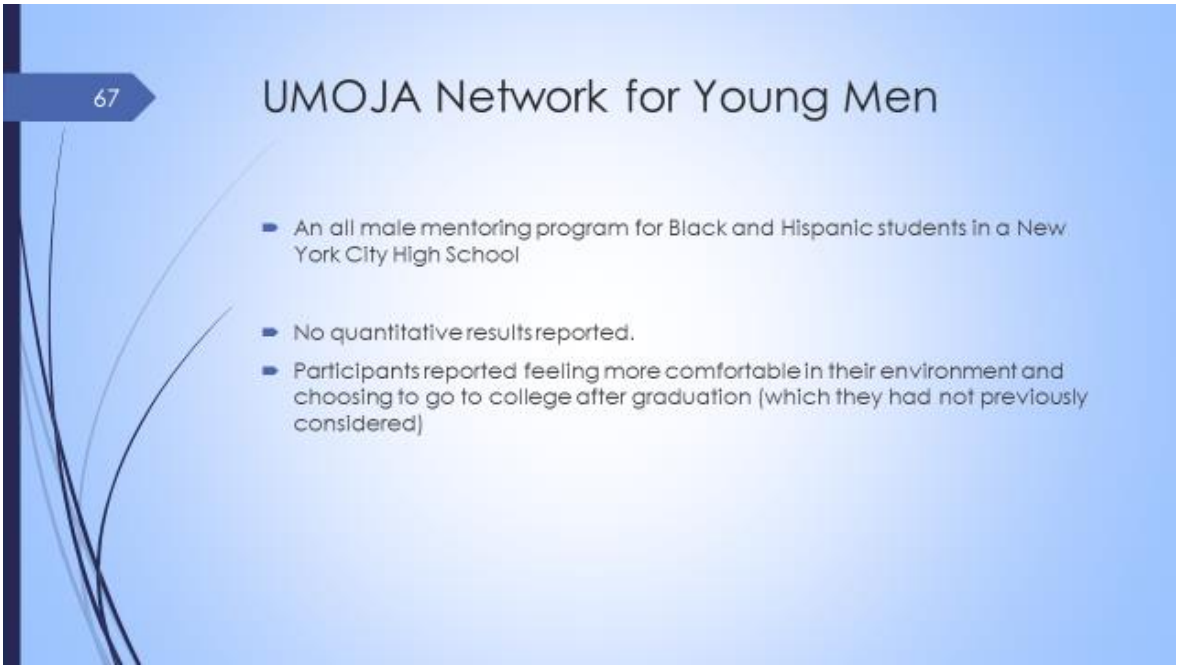
Slide 65: El Camino Project Success is the third program we will discuss. This program is intended for African American students, but is open to all students at the institution who are recent High School Graduates and serious and motivated. Student support services supplied through this program are listed on this slide. Student persistence (semester to semester) has increased for participants in the program to 90% as compared to 50% for comparable first year students at the same institution.



Slide 66: The Santa Barbara City College Partnership for Student Success is a faculty driven initiative that focuses on basic skills from an interdisciplinary perspective. The initiative uses a team approach, pairing student support services (such as advising and mentoring) with instructional support programs (such as tutoring). Students who choose to participate in this program have showed course level success rates 15 to 20% higher than other students in the same classes at the same institution.



Slide 67: The final program we will be discussing in this section of the presentation is the UMOJA Network for Young Men. Although this program runs in a New York High School, its applicability to Higher Education is worth discussion. This program is specifically for male Black and Hispanic students. As a group, students are paired with a teacher and given the opportunity to support each other through an "ethos of care" including inclusion, emotional support and guidance, and personal support. Although quantitative data were not provided to measure the efficacy of this program, participants described participation in the program as their greatest inspiration and source of support as they prepare for transfer to Universities.



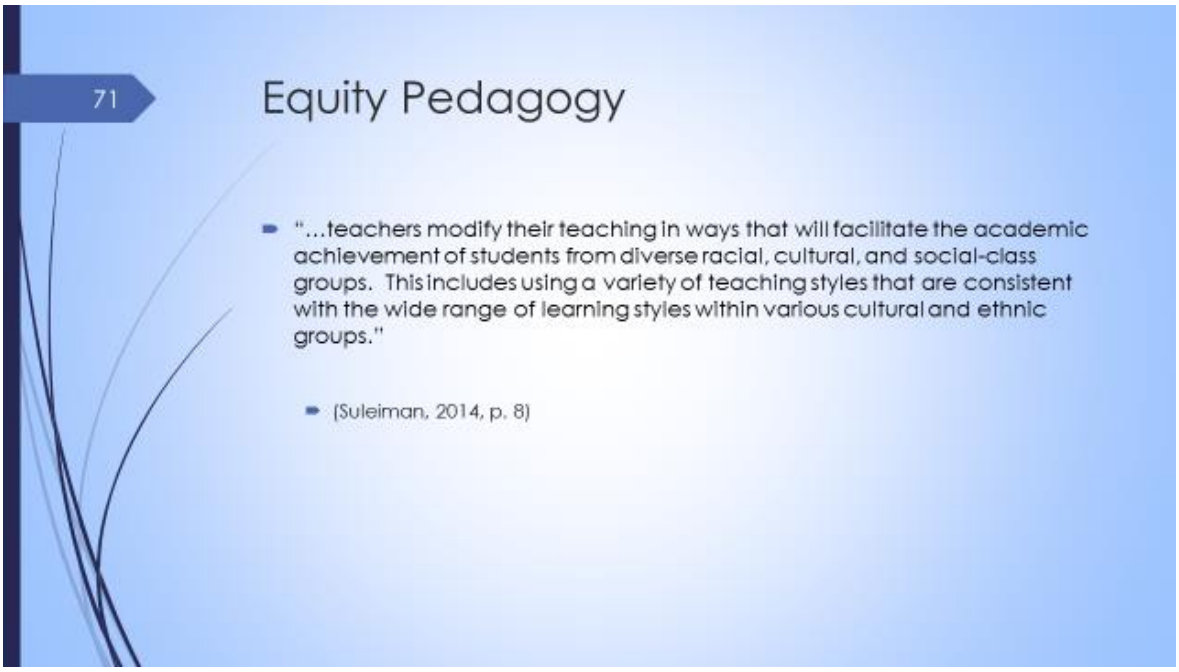
Slide 68: The next section of the presentation is a list of several recommendations and best practices for faculty to keep in mind based on the literature.


68
Additional Best Practices
As Described in the Literature

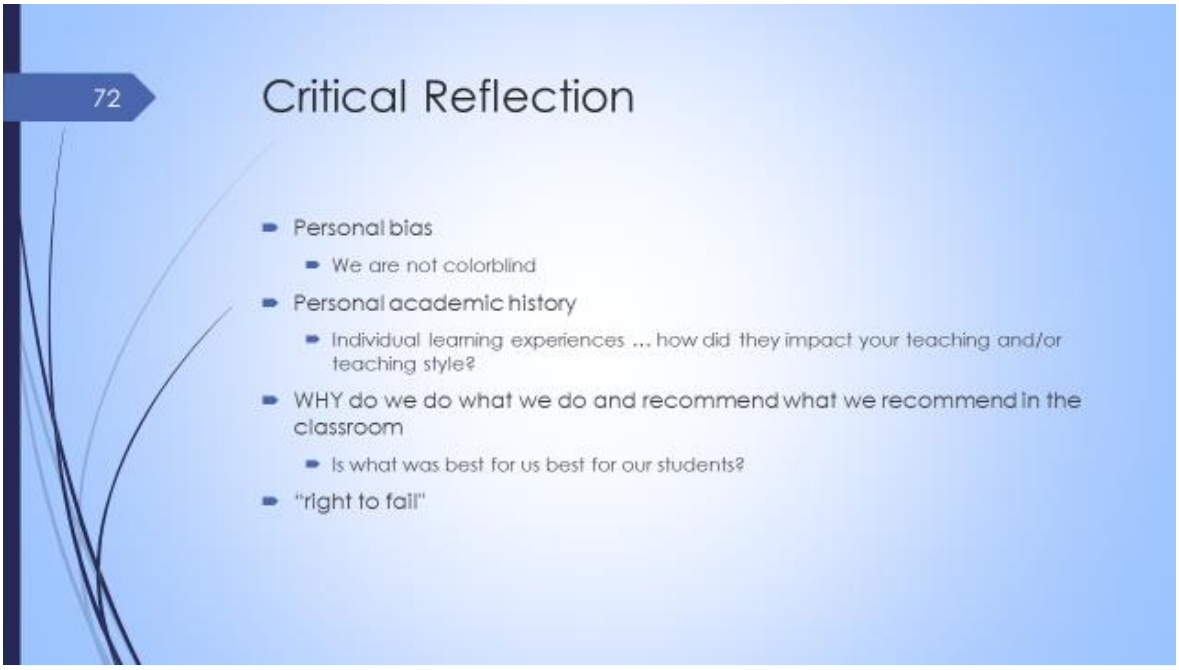
Slide 69: universal design is a concept that is familiar to most faculty and staff, but take a moment and make sure that everyone in the room understands the point of universal design. Then discuss the many ways that universal design provides guidance to faculty and staff. For example, one danger in viewing data by demographic variable is to assume that everyone in a demographic group will fit any given stereotype. Instead, though the use of universal design, a member of the faculty or staff can find several practices that work for different people and provide options to students after knowing them individually.

Slide 70: Cultural competence can be seen as an individual or institutional goal. Based on the audience for this professional development, we will be focusing on that which can be accomplished by an individual member of the higher educational institution.

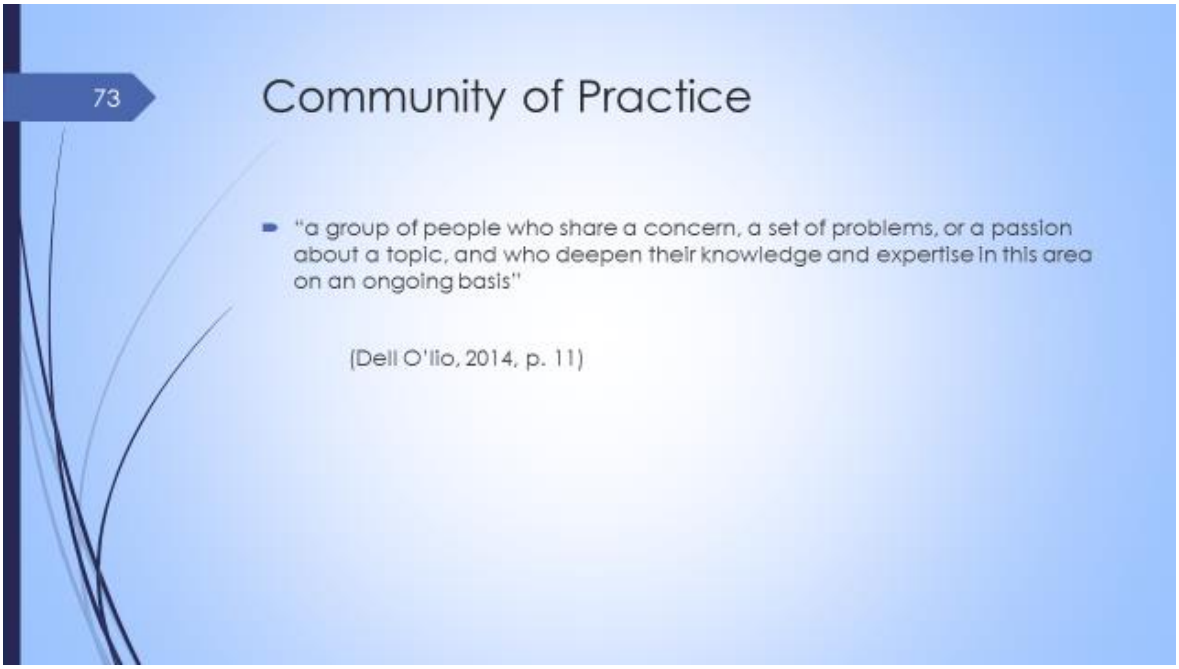
Slide 71: Equity Pedagogy is an alternative to equality pedagogy. Read the definition on the slide, but also discuss what this means. For example, equality pedagogy requires that everything provided to each student is the same. Instead equity pedagogy requires the educational professional to gauge what will work best to support each student individually. This requires heightened attention to the needs of each individual student and extreme flexibility on the part of the faculty or staff member. Encourage the participants to take a few moments and discuss the ways that this may apply to their teaching and/or support of students.



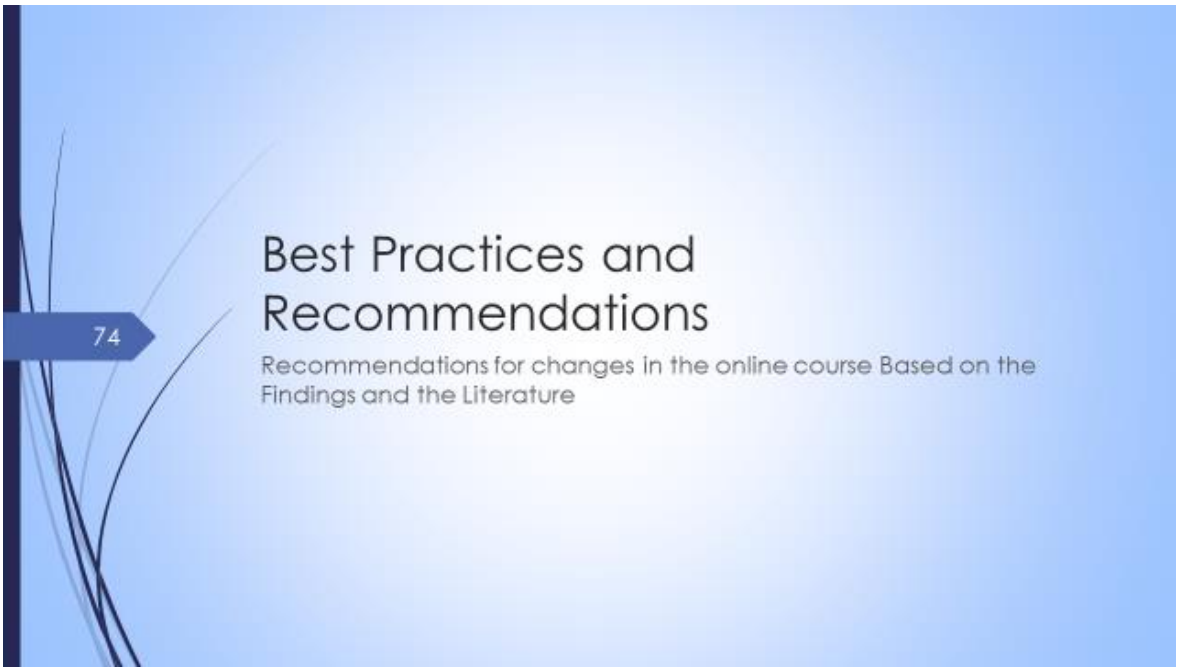
Slide 72: Growth and improvement often require some form of critical reflection. Several suggestions are listed on this slide. The first is often the most difficult, but is highly necessary for any educational professional. Everyone has some form of personal bias, and through reflection growth is possible. It is not uncommon to hear educators (particularly in the field of mathematics) claim to be colorblind. For the gran majority of people, that is simply not accurate; and the claim is not helpful. Critical race theorists describe a claim of colorblindness as a form of microaggressions as it negates a student's experiences. The second form of critical reflection suggested on this slide is to review one's own personal academic history and experiences. What shaped you as a student? How does that impact you as an educator now? How do those experiences and perspectives benefit your students, or do they? That reflections leads nicely into the next form of critical reflection, asking ourselves WHY we do what we do and make the recommendations we do … and is it for our comfort or their success. For example, why do we set the deadlines that we do? Give the participants a moment to discuss if they wish. The final critical reflection recommended on this slide is to think critically about the popular concept of a student's right to fail. Do we ascribe to this thought process? If so (or if not), why?



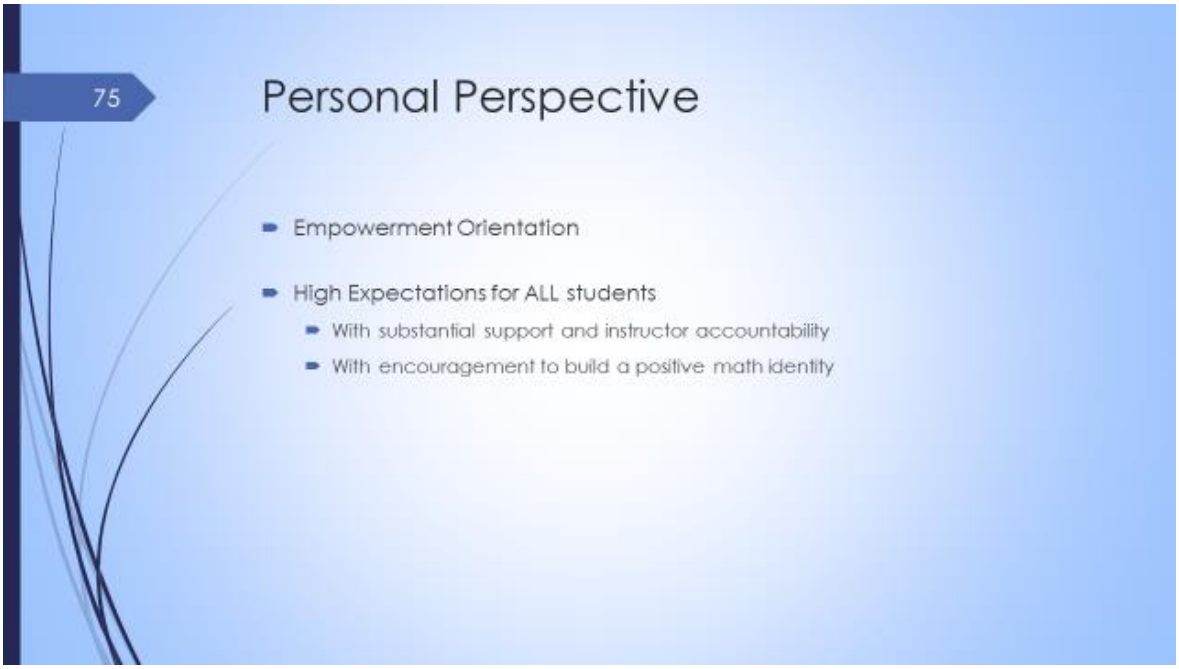
Slide 73: The final slide in this section of the presentation is the concept of a community of practice. As participants in this professional development we are showing that we share a common concern or passion about a topic. The data show that we share a common problem. Thus, we are ideally set to begin (or, for many of us, continue) our work as a community of practice as defined on this slide. Discuss how this will require us to work together long after the end of this seminar.



Slide 74: The final section of today's presentation is a discussion of some recommendations for changes in the online course based on much of what we have already discussed.

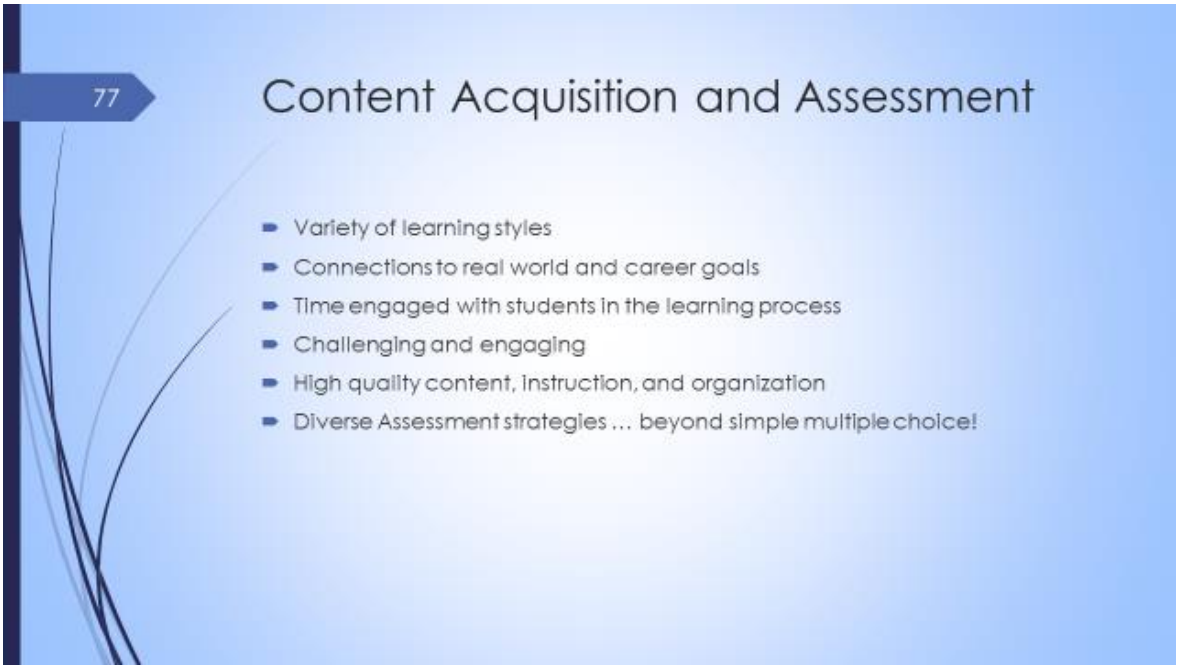


Slide 75: The first recommendation is to review the course with a renewed personal perspective asking the question all along does this show high expectations for all students? Does this provide support for students as they challenge themselves to attain high levels of success? How does this activity help promote the growth of a positive math identity for all students in the course? These are all examples of viewing the educational process from an empowerment orientation as opposed to a deficit mindset.

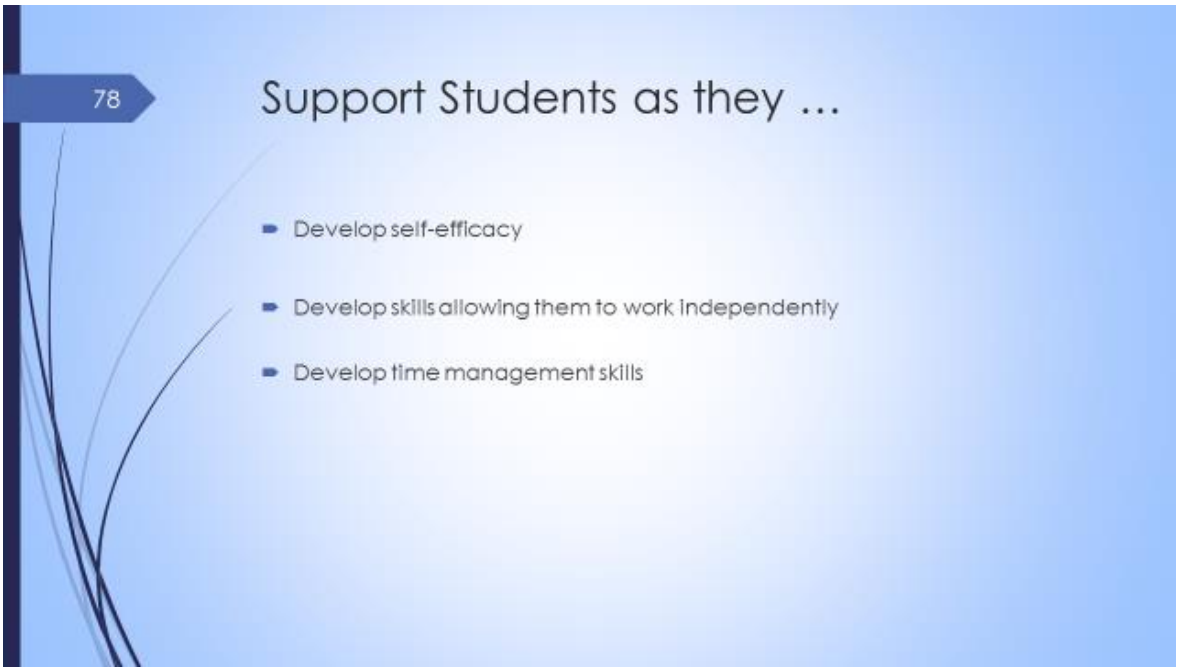


Slide 76: one topic of conversation that comes up frequently when discussing the success of a course is the flow of the course and the deadlines associated with the course. When considering the flow of the course, are there sufficient opportunities for students to choose learning activities that are best for their learning style or preference? Are the deadlines surrounding professorial convenience or student success? How do you know? These are not quick questions to answer, but critical reflection and a constant willingness to change from semester to semester will benefit our students.

Slide 77: Several suggestions throughout the literature related to content acquisition and assessment. Again, the suggestion is to critically review the online course and our engagement and communication with our online students to ensure that each activity and communication provides each of the items listed as thoroughly as feasible.

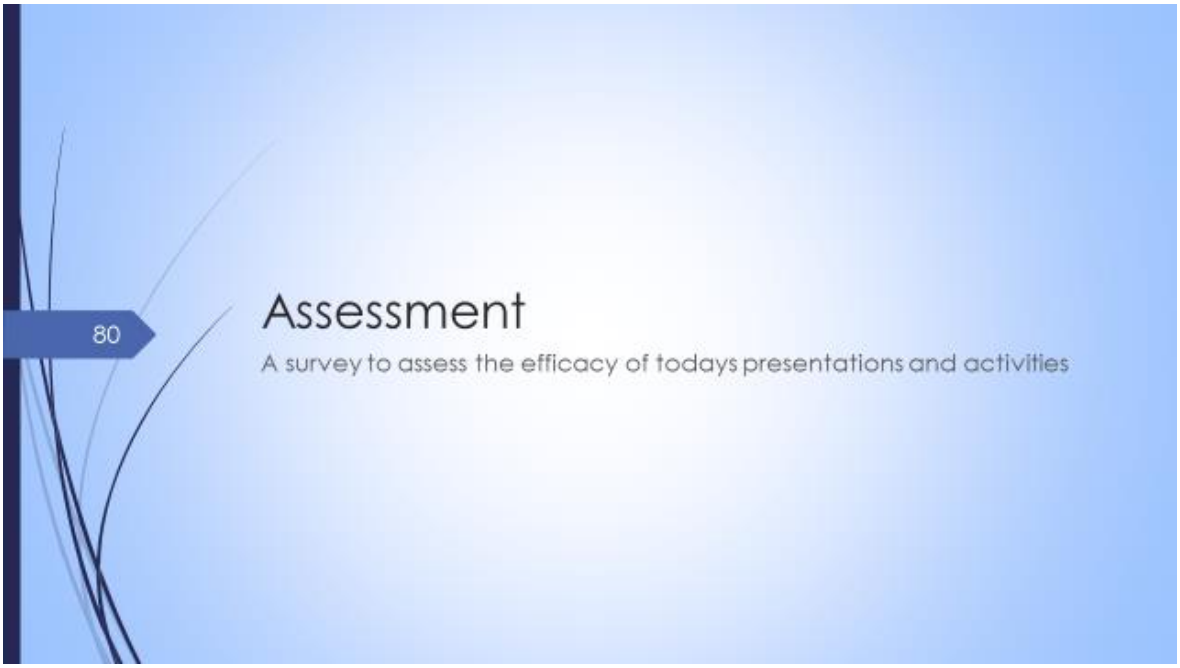


Slide 78: Finally, I suggest that we work to incorporate activities and communication that support these highly important goals for new online students. Allow the group to brainstorm ideas that might be of benefit here.



Slide 79: This group discussion will be a large group brainstorming exercise of ideas and takeaways that each participant believes might be impactful based on the previous presentation. Keep notes of the responses as they will be used again during day 3.

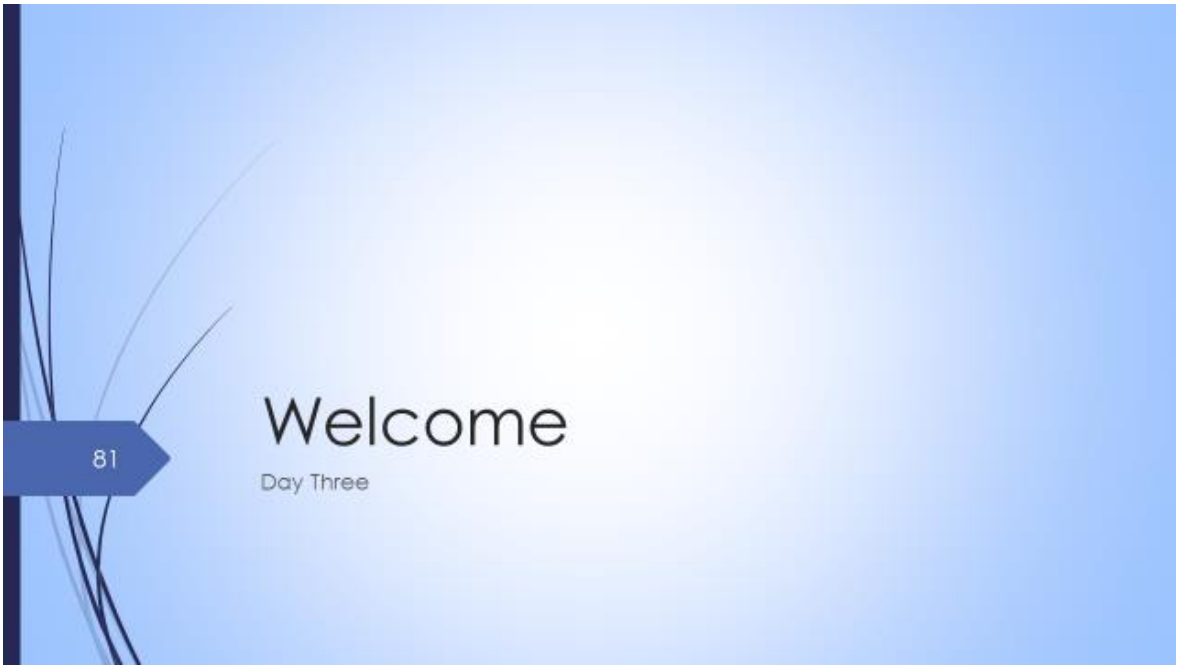
Slide 80: This last activity of the day is an assessment to allow for improvements to the professional development in the future and to ensure that participants are benefitting from the day's activities as designed. Be sure to thank participants for their participation throughout the day and remind them of the start time for the next day.


80
Assessment
A survey to assess the efficacy of todays presentations and activities

PowerPoint Slides with Facilitator Notes – Day Three

Professional Development Facilitator Notes (by slide) – Day Three
The following are notes to benefit the facilitator of the professional development along with the slides to use. Note that the professional development is meant to be highly engaging and collaborative. At all points in the professional development, the facilitator should pause regularly to engage with participants, elicit comments and feedback, and allow for questions and discussion.

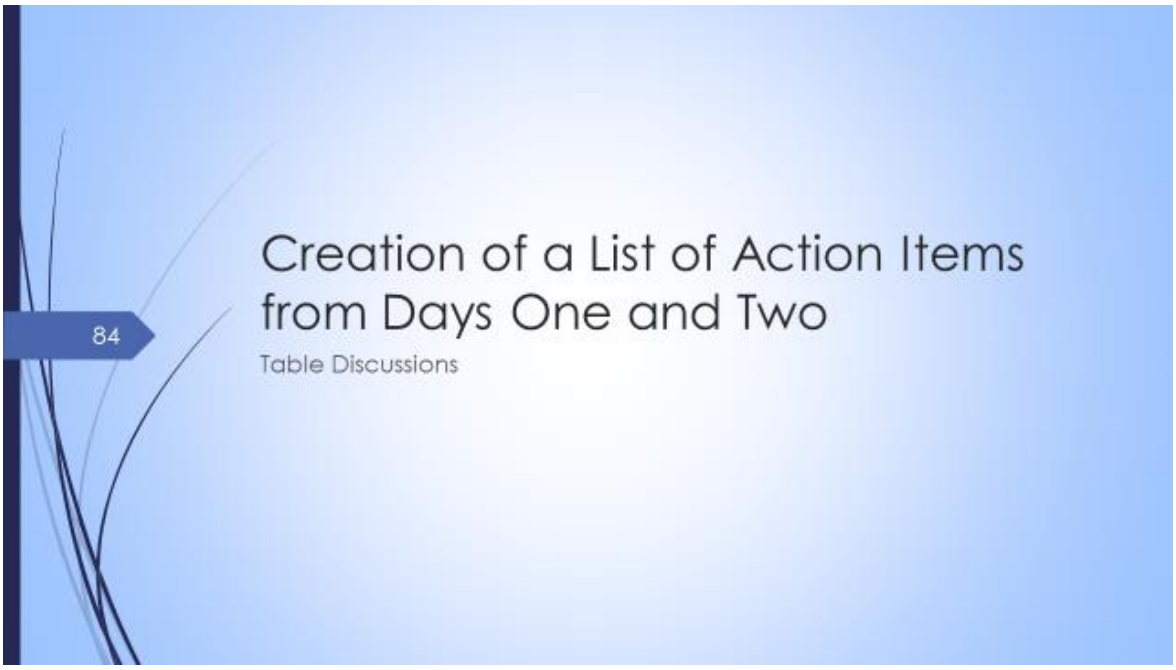
Slide 81: Welcome and greeting for day 3. This slide should also be up through registration and breakfast, which will last from 8 am to 9 am.



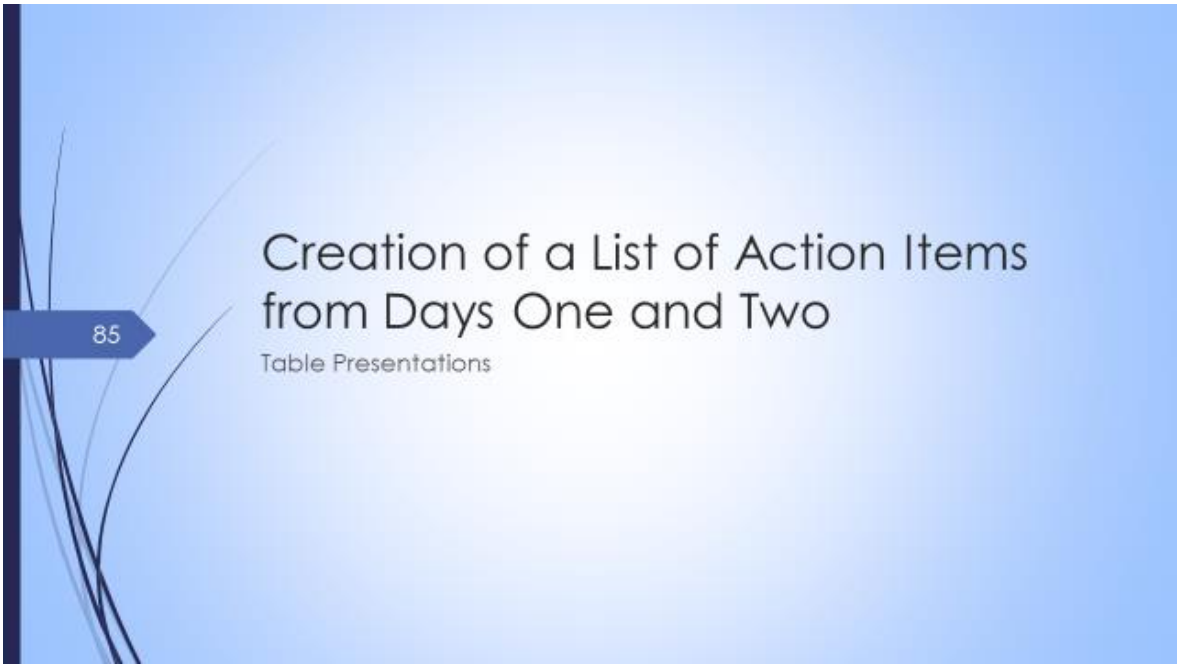
Slide 82: The goals for day three are to work collaboratively to develop action items to improve communications with students and course structure based on the presentations and discussions in days one and two.

Slide 83: this individual activity should last from 9 am to 9:30 am. Encourage participants to include ideas based on both days of discussion and to think freely (do not limit yourself with the college wouldn't pay for that or I don't know how to do that … this will be a team effort and we are creating goals and action items. As the president always says … if it is not on the list it does not exist).

Slide 84: Table discussions should last from 9:30 to 10 am. During this time, participants at each table should share their ideas, write a list of ideas that incorporates the thoughts of everyone, and come up with additional ideas collaboratively as appropriate.



Slide 85: From 10 am to 10:30, participant volunteers from each table should present the list of ideas from their table to the group as a whole. During this time, a volunteer should be taking notes to create a list that includes all ideas from the group as a whole.


85
Creation of a List of Action Items from Days One and Two
Table Presentations

Slide 86: This group discussion should last from 10:30 until 11:30 and should be an opportunity for participants to note similarities and differences between the ideas presented by each group. If there are gaps (minimal attention to either day, for example), this time will also provide an opportunity for the facilitator to engage the participants in a guided discussion to elicit ideas to fill any perceived gaps.

Slide 87: From 11:30 until noon, the participants should work to survey priorities from the list created earlier in the day. From 11:30 until 45, participants should work individually to create their own view of prioritizations (number 1 as least critical up to number of items on the list as the most highly critical). From 11:45, participants will vote on the prioritizations. Items will then be prioritized by the number of points they received.


87
Survey of Priorities
Based on group discussions

Slide 88: Lunch break will last from noon to 1 pm. Food will be provided in the back of the room by the math department. Although lunch break can provide an opportunity for participants to catch up on email and phone messages, encourage participants to stay together and enjoy social time together as much as is feasible. That social interaction is beneficial to our goal of the creation of a community of practice.

Slide 89: From 1 pm to 2:30 pm, participants will work together to create an action plan. That plan will have three parts: communication and interaction, course policies, and course design. Each item in the action plan should be SMART: specific, measurable, attainable, realistic, and timely

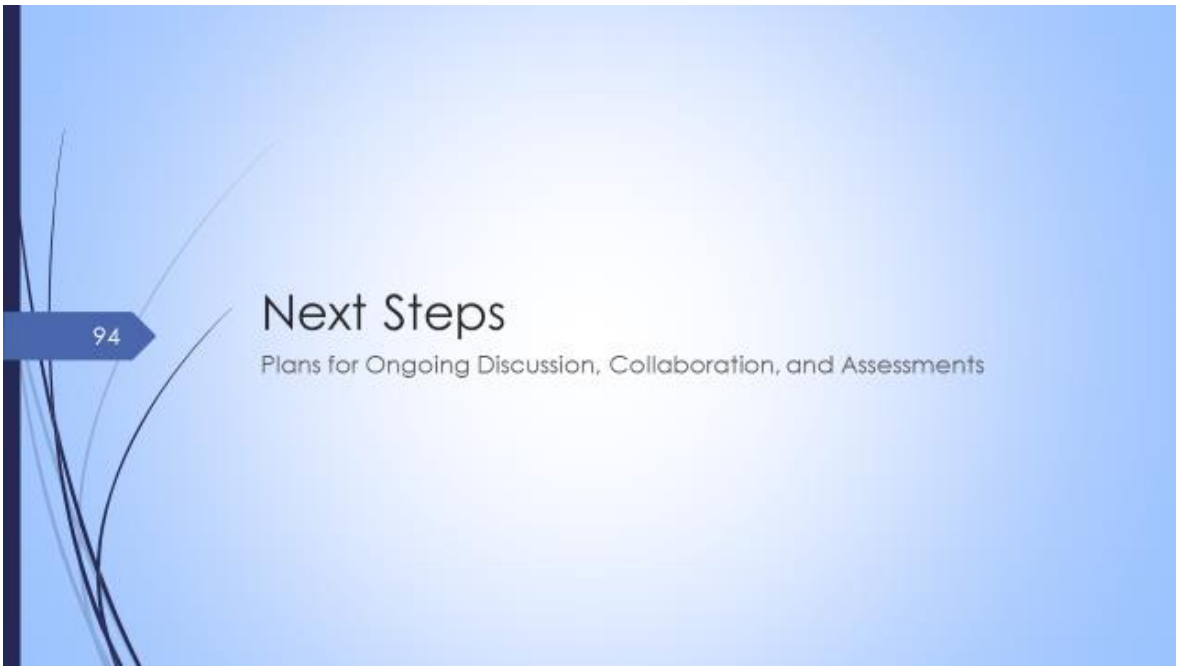
Slide 90: From 1 to 1:30 participants should look at the highest priority ideas from the priority list created before lunch that relate to communication and interaction with and between students and work to create SMART action items

Slide 91: From 1:30 to 2, participants should continue to create SMART action items with course policies

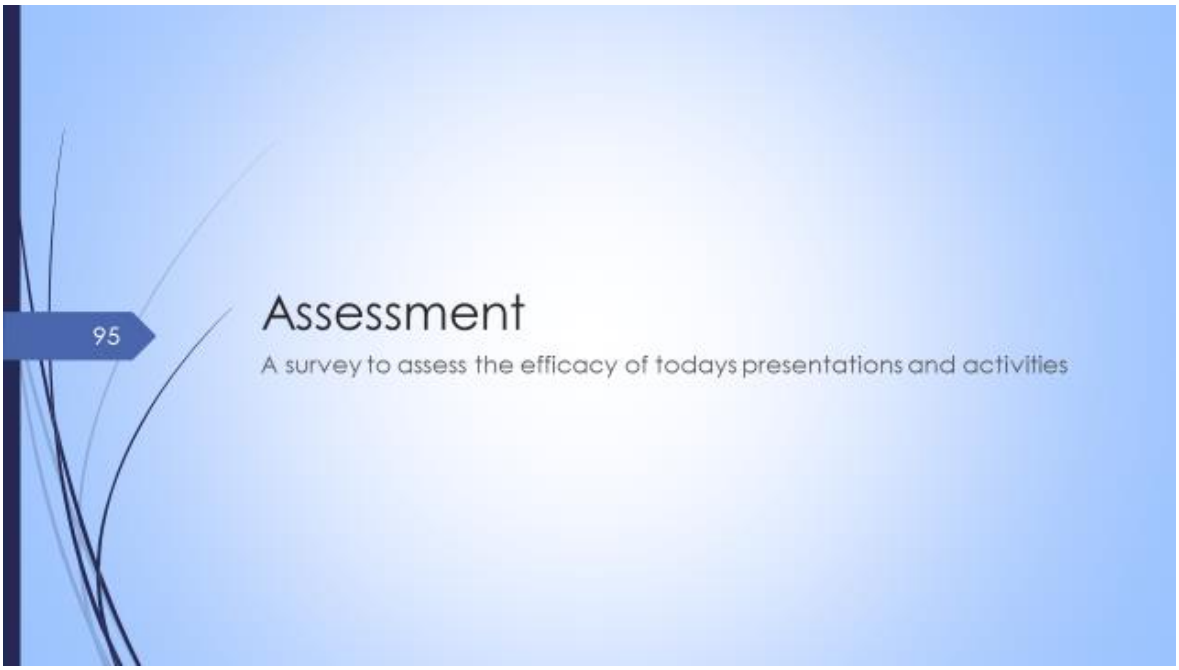
Slide 92: From 2 to 2:30, participants should continue to create SMART action items with course design

Slide 93: From 2:30 to 3:30, participants can finish their list of SMART action items as needed and then discuss plans for implementation including a timeline and key stakeholders to bring into the conversation.

Slide 94: from 3:30 to 4:30, participants will discuss the discussion and collaboration they feel will be necessary for their SMART action plans to be successful. This includes writing discussion board prompts, exchanging contact information, and discussing how they will assess the efficacy of their actions going forward (and what they will do with those assessments).



Slide 95: This last activity of the day is an assessment to allow for improvements to the professional development in the future and to ensure that participants are benefitting from the day's activities as designed. Be sure to thank participants for their participation throughout the seminar and remind them the importance of their continuation of the work we started here.



Assessment Surveys

Assessment Survey for Day One

To be administered anonymously at the end of the day one of the professional development seminar.

1. To what degree do you feel that you understand the nature of the problem that led to the research?
   1 – not at all 2 3 4 5 – very
2. To what degree do you feel that you understand the methodology, calculations, and results of the research?
   1 – not at all 2 3 4 5 – very
3. To what degree do you feel that you learned new information about student success by age from the first presentation?
   1 – not at all 2 3 4 5 – very
4. To what degree do you feel that you learned new information about best practices and recommendations related to age and student success from the second presentation?
   1 – not at all 2 3 4 5 – very
5. What was your biggest takeaway or aha moment today?

   _____

   _____

   _____

6. Describe one improvement you would suggest to the activities from today if applicable.

   _____

   _____

   _____

Assessment Survey for Day Two

To be administered anonymously at the end of the day two of the professional development seminar.

1. To what degree do you feel that you understand the results of the research?
   1 – not at all 2 3 4 5 – very
2. To what degree do you feel that you learned new information about student success by ethnicity from the first presentation?
   1 – not at all 2 3 4 5 – very
3. To what degree do you feel that you learned new information about best practices and recommendations related to ethnicity and student success from the second presentation?
   1 – not at all 2 3 4 5 – very
4. What was your biggest takeaway or aha moment today?

   _____

   _____

   _____

5. Describe one improvement you would suggest to the activities from today if applicable.

   _____

   _____

   _____

Assessment Survey for Day Three

To be administered anonymously at the end of the day one of the professional development seminar.

1. To what degree do you feel that you had the opportunity to collaborate on the action plan created today?
   1 – not at all 2 3 4 5 – very
2. To what degree do you feel that the action plan you created today will lead to improvement in student success?
   1 – not at all 2 3 4 5 – very
3. To what degree do you feel that you understand next steps for this action plan?
   1 – not at all 2 3 4 5 – very
4. To what degree do you feel that you will participate in the action plan and collaboration going forward?
   1 – not at all 2 3 4 5 – very
5. What was your biggest takeaway or aha moment today?

   _____

   _____

   _____

6. Describe one improvement you would suggest to the activities from today if applicable.

   _____

   _____

   _____

Appendix B: Raw Data for RQ1

Student Designation	Developmental course passed: y or n	Passed online gateway mathematics in Fall of 2014: y or n
AA	y	y
AB	y	y
AC	y	n
AD	n	y
AE	y	y
AF	y	n
AG	n	n
AH	y	y
AI	n	n
AJ	y	n
AK	y	n
AL	n	y
AM	y	n
AN	y	n
AO	y	n
AP	y	y
AQ	n	y
AR	n	y
AS	y	n
AT	n	y
AU	n	n
AV	y	n
AW	y	n
AX	n	y
AY	n	n
AZ	y	n
BA	y	y
BB	y	n
BC	n	n
BD	n	y
BE	y	y
BF	y	y
BG	y	n
BH	y	y

BI	n	n
BJ	n	n
BK	n	y
BL	n	y
BM	n	n
BN	y	y
BO	n	y
BP	n	y
BQ	n	n
BR	n	y
BS	n	y
BT	n	y
BU	n	n
BV	n	n
BW	n	y
BX	n	n