Utilizing the Prospect of Transfer to Increase Academic Engagement in High School Equivalency Students within a Wicked Problems Framework

by

Greg Pereira

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Graduate Supervisory Committee:

Danah Henriksen, Chair
Elisabeth Gee
Rosary Joyce-Kennedy

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ABSTRACT

This study examined the influence of perceived transfer of learning on student engagement, completion rates, and attendance hours of high school equivalency (HSE) students within a Wicked Problems Framework. Local research had shown that over 30% of HSE students stopped attending HSE classes prior to completing 40 instructional hours, and many students cited a lack of relevant, "real-world" application, and the need to pursue employment as the two most common reasons that they stopped attending.

To address this issue, an innovation was developed and deployed for one semester at the Rio Salado College Avondale location. The innovation identified the individual career interests of each student in a treatment group, then worked with industry experts in those career fields to develop PowerPoint slides explaining how each HSE math lesson would directly transfer to the student's career of interest. In addition, hiring managers from each career field that the students expressed interest in visited the class to discuss the need for HSE math skills and to answer any questions about their career and the transferability of what the students were learning.

The treatment groups' attendance hours, completion rates, and self-reported engagement were examined and compared all other HSE math classes at Rio Salado College that took place during the same semester, as well as compared to the instructor of the innovation's previous math classes. The results showed that students who participated in the innovation had, on average, over 38 more attendance hours than students who did not receive the innovation during the same semester and over 44 more attendance hours than the instructor's previous classes at the same location. In addition, students who

participated in the innovation reported higher engagement and enjoyment in the class than in similar HSE classes that they had previously taken.

DEDICATION

Over 35 years ago, my father immigrated from Brazil to provide a better life for his wife and children. The transition was not easy, and he found himself working as a dishwasher and barely able to provide for his family. I cannot imagine the fear and anxiety that he must have felt as an immigrant with little knowledge of the English language and American culture, trying to keep his family from becoming homeless. I believe that he was sustained by his faith and by his belief that one day his children would not have to struggle like he did. Unfortunately, my father did not live to see this moment, but I hope that this dedication somehow finds its way to him and conveys that his struggles were not in vain. You did it, Dad. Your sacrifices were worth it, and your children have fulfilled your dreams. This is dedicated to you.

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CHAPTER 1

INTRODUCTION AND PURPOSE OF THE STUDY

Chapter Overview

This section will provide a comprehensive overview of my research topic by addressing the background information regarding what the problem is, the origin of the problem, the local and national contexts, and the specific purpose of this study to address the problem of practice.

Background

Outliers. If there is one word that adequately describes adults in a High School Equivalency (HSE) preparation program, it is outliers. High schools tend to view the HSE program as an alternative to their core mission and often argue against the merits of obtaining a HSE (formally referred to as GED©). Colleges and universities focus on degree and certificate completion, and often view HSE students as potential future students, but not part of the core educational mission of their institutions. As a result, these students are often forgotten or intentionally kept in the shadows because of the perception that they have made poor decisions.

While some poor decisions may have contributed to initially dropping out of high school, there are also many extenuating factors that may have contributed to their decision such as a lack of stability at home, lack of transportation, lack of income, or simply feeling disengaged in the classroom. Despite the reason for leaving high school, the decision to return to the classroom should be commended and supported. Yet, unlike high schools or colleges, there is very little support or regulation that provides structure and support to HSE students. The decision to return to the classroom and complete a

degree is often vital for employability and future success. It is clear there is a contradiction—wherein it is important and commendable that people complete their education, yet acknowledged that there is very little formal support for this. Thus, there exists a problem and a need to identify factors that support the success of such returning students. This is the overarching issue that will be addressed within the local context of this research. It is important to first begin with some broader context for understanding issues and history associated with HSE programs.

HSE test preparation instruction (HSE classes) can be provided by academic institutions, nonprofit agencies, advocacy groups, and any other organization that chooses to do so. The only regulations or standardization that exists comes from federal and state grants that institutions and organizations are not required to apply for. From a federal perspective, passing the HSE test is the benchmark of achievement; test preparation courses are merely a means to an end. However, very few students are able to pass the HSE test without participating in preparation courses. Further complicating this issue, in 2011, Pearson VUE trademarked the GED© test, essentially privatizing this educational option. All of these factors contribute to a unique situation where GED© started being referred to as HSE. While HSE classes are essential to student success, very little attention is paid to these courses, and most innovations in curriculum will need to take place at the local level.

HSE programs suffer from little standardized curricula and limited funding for instructional training (Tighe, Barnes, Connor, & Steadman, 2013). Yet, HSE credentials accounted for approximately 12% of all high school credentials that were issued in the U.S. in 2004 (NCES, 2005), which equated to over 300,000 HSE test completers. This is

a significant number of adult learners with unique challenges that traditional high school students rarely encounter. In many cases, these individuals are returning to the classroom as parents, sole-providers, and with many additional demands that traditional students do not face. In addition to personal challenges, these learners experienced educational failures prior to joining adult basic education programs and lack confidence in their ability to learn (Johnson & Frank, 2013).

According to the US Bureau of Labor Statistics (2014), individuals who did not complete high school are nearly three times more likely to be unemployed than individuals who graduated from college. A core reason most students return to school to complete their HSE is to enhance their employment and career opportunities. Thus, the goal for many of these students sits in contrast to what actually happens when they are unable to persist. Even when employed, high school dropouts earn about $8,000 a year less than high school graduates. Which means that high school dropouts are more likely to fall below the poverty line, utilize public assistance, and find themselves in a cycle of poverty.

Simply put, it is in the collective best-interest of the nation to ensure that high school drop outs return to the classroom and complete their HSE. So why is there not more emphasis placed on the need to complete the HSE and the infrastructure to support those pursuing this goal? The answer to that question may reside in the history of how the HSE was established.

History of the HSE

The General Education Degree (GED) test was developed during World War II (WWII) by Everett Lindquist and Ralph Tyler as a means of providing an opportunity for

returning war veterans to complete their high school education by utilizing an alternative format (Quinn, 1997). During the Second World War many high school students joined the military prior to completing their high school diploma, which presented unique challenges in finding employment after being discharged from the military at the conclusion of the war. The idea of having combat veterans return to their local high school years after leaving did not seem practical, so the GED was created as a realistic solution to the problem.

Almost immediately after the development of the GED, concerns were raised that young people would be more likely to drop out of high school in favor of the GED alternative. As a result of these concerns, the federal government imposed age restrictions and mandated that test-takers had to be at least 20 years old to discourage high school student from dropping out (Quinn, 1997). The 20 year-old HSE/GED© restriction has been lifted for present–day learners, yet the GED© test has changed very little since its inception over half a century ago (Quinn 1997).

While the GED© test provided a needed resource for veterans at the conclusion of WWII, the vast majority of current students in HSE programs have never served in the military, and dropped out of high school due to personal challenges that may still be present with that individual. This highlights the real problem which is that we are using an outdated tool for an unintended population, and there are few resources to make it better. However, there is one common theme that emerges from the history of the GED© test and its current state in 2017: employment. Returning combat veterans from WWII and modern-day high school dropouts both worked to complete their HSE so that they could increase their employability and earning potential. In both instances, employment

prospects and potential salaries increased for individuals who completed their high school equivalency. This is significant because the knowledge that HSE students are often motivated by how their classes can increase their career opportunities presents an opportunity to increase student engagement by demonstrating how the skills that they learn in HSE classes can transfer to their future careers.

Presently, HSE exams consist of five sections, Language Arts-Reading, Language Arts- Writing, Mathematics, Science, and Social Studies. Students are allowed to take each section at their own discretion and they are permitted to take different sections on different days to avoid test fatigue. However, they must pass all five sections to receive their high school equivalency. This research study will be specifically focusing on the math section of the HSE exam.

Larger Context

Nationally, 20% of community college students referred to developmental math and 37% of students referred to developmental reading complete a college-level course in that subject within three years (Bailey, Jeong, & Cho, 2010). That means that 80% of students in developmental math (equivalent to upper-end HSE math sections), drop out prior to completing a single college-level math course and 63% of students in developmental reading do the same. According to a research study sponsored by the Bill and Melinda Gates Foundation and conducted by Bridgeland, Dilulio, and Morison (2006), 81% of students who were interviewed after dropping out of high school stated that there should be more opportunities for practice, real-world learning and some respondents in the focus groups asked specifically for more experiential learning that connected to their long-term goals. The authors argued that students need to see the

meaningful connection or *transfer of learning* Adams (1987), between curriculum and its ability to provide them the resources to obtain employment. In short, the current curriculum did not often engage students in ways that connect to their interests, suggesting a problem with student engagement in HSE curricula. This is a significant problem, Marks (2000) found that students who are engaged with their education are more likely to learn, to find the experience rewarding, to graduate or complete their studies, and to pursue higher education, all of which are objectives for HSE students.

To develop a better understanding of what causes HSE students to persist and pass their tests, Comings et al. (1999) used force-field analysis, a comparative tool that allows a research to compare positive and negative forces related to decision making that was developed by Lewin (1999). Comings et al. (1999) explored the positive and negative forces that surround HSE students' decision to persist in their courses or drop out. They found that in the case of adult students:

> "There are positive forces (desire for a higher income, for example) that are helping support persistence in an adult education program. These forces help adults to continue their participation. On the other hand, negative forces (lack of free time to study, for example) are pushing adults to drop out. From the time adults enter programs to the time when they either achieve their goals or drop out, both positive and negative forces are acting upon them. Any intervention meant to increase persistence must help adults strengthen the positive forces and lessen the negative forces" (p. 6).

Drawing on the conclusion of Comings et al. (1999), HSE student learners must be presented with a meaningful reason to persist as a positive force, such as the prospect

of obtaining a better job from the new skills that they are learning, which occurs when they perceive the skills as transferring to employment. At the same time, they must be presented with reasons that decrease negative forces, such as a lack of engagement in the HSE class. While the innovation that I will propose in this action research project might not simultaneously find a better job for student learners that also increases their income, it may provide students with a pathway to accomplish both by providing more opportunities for transfer of learning and thus student engagement. This information is consistent with the findings and recommendations of Comings et al. (1999), using force-field analysis, and draws a direct parallel to the local observations that have been made at Rio Salado College, the context for this study, which will be discussed in the Local Context section as follows.

Local Research Context

The setting for my initial research was the Rio Salado College Lifelong Learning Center (LLC) in Surprise, Arizona. The LLC is the smallest of 10 satellite locations that Rio Salado operates throughout Maricopa County, and the location exclusively offers non-credit HSE and English Language Acquisition classes to nearly 400 students per year. When entering the location for the first time, guests are often surprised by how small the site is and how diverse the students attending classes are. The location is nearly four times smaller than the closest Rio Salado Location and staff and students can be found in any and every usable space. At various points in the location's history, students have ranged in age from 16-83 years old and have had national origins from as far away as Iraq and Turkmenistan.

Having nearly 400 students from such diverse backgrounds in such a small space creates incredible adult learning opportunities by gaining diverse perspectives, yet it also challenges instructors and administrators to develop inclusive curriculum that meets the needs of the students. Despite their differences, the one common thread connecting nearly all of these students is the reason why they are enrolled in HSE classes, which is to become more marketable to employers and meet the minimum qualifications that many companies have for employment, a high school diploma or HSE. The student demographics may have changed since the inception of the HSE, yet the reason why students enroll in HSE classes has remained the same.

When prospective students are interested in taking HSE classes, they travel to the location of their choice and fill out eligibility paperwork to ensure that they are lawfully present in the State of Arizona, and that they are not currently enrolled in high school- both of which are mandated eligibility criteria from the Arizona Department of Education. Once they complete their eligibility paperwork, they are admitted as students and scheduled to attend a two-week student success seminar that provides a comprehensive overview of the tools and resources that are available to students such as counseling, academic advisement, referrals to social service agencies, career aptitude assessments, and access to a computer lab.

These resources discussed at the success seminar are designed to provide additional support that students may need to be successful while taking HSE courses. In addition, the success seminar prepares students for the rigor of academia by discussing time management skills, note taking, test preparation, study guides, self-care, and how to transition to college or a career. The curriculum for the success seminars is consistent

across all Rio Salado satellite locations, yet the emphasis placed on each topic and the social service referrals vary according the needs of students and their geographic location.

After completing the success seminar, students complete an initial assessment that informs them and the staff about each student's readiness to take an HSE exam and the level of instruction that they will need. The assessment aligns to the math and language arts scores that students would need in order to pass the HSE exam, and enables the staff to determine if the student is prepared to join an existing class at the location, or if they should be placed in a 4-week foundations class that is designed to teach basic math and language arts skills prior to joining a math or language arts class. Students that score high on their assessment are placed directly into math and language arts classes and bypass the 4-week foundations class. Most students take math and language arts classes, but some students only need to take one of the subjects because their assessment showed that they are already prepared to take part of the HSE exam. For example, a student with a high assessment score in math and low assessment score in language arts would only take a language arts class at the location.

The structure of HSE math and language arts classes is quite different than K-12 or higher education. Students do not receive grades, can join a class throughout the semester, take the HSE test whenever they feel ready, and they are not penalized for missing class. This creates a unique situation where students must have a desire to persist in order to succeed. Without grades, transcripts, parental intervention, or punitive measure to worry about, students attend HSE classes because they choose to, not because they must. Because of this unique structure, student engagement is critical. Despite the

critical need to sustain student engagement, most classes are taught in a didactic lecture style with occasional learning activities. Learning activities vary by instructor both in design and frequency.

Because of the diverse populations that each location serves within their assigned community, all ten Rio Salado satellite locations (including the LLC) operate as a loosely coupled system (Weick, 1976), meaning they share overarching objectives and an explicit vision while enjoying autonomy on how to execute that vision. For the purpose of my research project, this system is ideal because it provides me with the flexibility and autonomy to implement and test the innovation within the unique populations while minimizing the potential of harming the larger system.

Issue of Concern

I have had the opportunity to examine the challenges and opportunities of the HSE from multiple perspectives. I currently serve as the Interim Vice President of Academic and Student Affairs where I oversee all 10 of Rio Salado's satellite locations. Yet, it was during my time as a director at the LLC satellite location that I discovered a major program deficiency: despite the support that was being provided to students and the additional resources that they had been informed of during the success seminar, 31% of all students enrolled at the LLC stopped attending classes before reaching 40 hours of classroom instruction. Perhaps even more troubling, the majority of students that stopped attending were between the ages of 18-44 – which includes prime employment years. This conclusion was consistent with the findings of other researchers who discovered that younger adult students with children, who needed employment, were more likely to stop attending school (London, 2006).

After discovering this issue, I engaged in a preliminary cycle of action research in which I interviewed students who had recently stopped attending classes to try and identify why they had stopped attending. The most common reasons provided by those students were "I need to find a job," and "the classes do not help me to find a job." Clearly, employment was a specific motivation for many of our students and they did not see that what they were learning would be a benefit to their careers. This feedback from students who left the program was consistent regardless of age or national origin—it had identified a problem that signaled a need for demonstrating how HSE curriculum could transfer to future employment. One of the most significant factors associated with class persistence and HSE test completion was students not being engaged in their studies due to their perceived lack of relevance (or transfer) to their future career goals. Thus, a core aspect of the problem can be summed up by the ways that HSE studies have failed to promote student engagement, through real-world significance for students' needs.

Purpose of Study

The purpose of this study was to address the identified need to support HSE students and increase engagement by demonstrating how the skills that they are learning in the HSE classroom can transfer to future employment opportunities that they are interested in. A key piece to this is to determine the nature of the relationship between perceived transfer of learning and student engagement, as measured by classroom attendance and HSE completion rates. Studying this topic is critical due to the fact that Rio Salado's historical student data has shown that the likelihood of a student passing the HSE test is directly linked to classroom attendance according to 2016 internal reporting on student attendance and outcomes. The more consistently a student attends, the more

likely they are to pass the test. This should come as no surprise because classroom time provides direct instruction on the topics that are covered on the HSE exam, and the more that a student attends class the greater their understanding of the test materials. In addition, consistently attending class can improve the retention of information that is covered throughout the course and provide learners with a greater opportunity to ask questions and engage and participate in classroom learning.

This study sought to determine if the innovation of demonstrating how student learning in HSE classes can transfer to their desired careers affects student engagement and the likelihood of passing the HSE test by answering the following research questions:

1. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence HSE math section completion rates and how does it compare to a standard HSE cohort?
2. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence student attendance as compared to a standard HSE cohort?
3. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence students' perception of their level of engagement?

CHAPTER 2

THEORETICAL PERSPECTIVE AND RESEARCH GUIDING THE PROJECT

Chapter Overview

There are three prevailing theories or contexts within my research, which include wicked problems, engagement, and transfer of learning. This section will provide an overview of each theory and describe how the theories relate to my research and the situated context. Additionally, this section will provide a brief overview of the limited initial reconnaissance research that was conducted at the LLC in the early phases of the research process. This initial research was not part of the proposed dissertation research in this study but is being reported because it helped to provide background on the problem in the Rio Salado context, to guide the research and develop a theoretical framework for the study.

Theoretical Perspectives Overview

HSE students face diverse challenges that may inhibit their ability to persist and succeed in their studies. This research study acknowledges a wicked problems framework that states that any proposed solutions are expressed as "better or worse" as opposed to "right or wrong" (Rittel & Webber 1973). This framework is critical to the research in that it states that any proposed holistic solution would be unable to solve the problem of low HSE attainment and completion rates because it is highly improbable if not impossible to ever solve a wicked problem (Jordan, Kleinsasser & Roe, 2014). It is also critical because wicked problems often contain nearly all public policy issues (Rittel & Webber, 1973) and become too complex for a single proposed solution to address the problem.

Local research within the LLC has shown that there are many factors outside of institutional control that can cause a student to stop pursuing their HSE including childbirth, loss of income, addiction, relocation, lack of transportation, or family obligations. These factors demonstrate why a wicked problems framework is necessary, there is not a single solution that could solve the problem, and most proposed solutions would be subjective to the individual. Churchman (1967) states that "deception becomes an especially strong moral issue when one deceives people into thinking that something is safe when it is highly dangerous" (p. B-142). This study acknowledges that it is incapable of "fixing" many of the factors listed above, but that it can improve specific areas.

While it may not be possible to find a comprehensive solution for all students failing to pass the HSE test, this study will seek to improve outcomes for students who may have been at risk of dropping out of HSE classes based on a lack of engagement. Understanding what specific factors motivate students to engage and shape their constructs is critical to education, and this section will explore the prospect of learning transferring from the classroom to a future career, and how this might impact learner engagement, within a wicked problems contextual framework.

Wicked Problems

Wicked problems are inherently complex and do not provide definitive solutions. Unlike a complex problem, wicked problems are essentially unique in that they cannot be solved, only improved. Jordan, Kleinsasser & Roe (2014) state:

> Rittel and Webber (1973) coined the term 'wicked problems' to distinguish the kinds of difficulties that typify design and social science arenas from those in the hard sciences. They define 'wicked' as 'akin to that of "malignant" (in contrast to

> "benign") or "vicious" (like a circle) or "tricky" (like a leprechaun) or "aggressive" (like a lion, in contrast to the docility of a lamb)' (Rittel & Webber 1973, 160)" (p. 416).

Educating adults who have dropped out of a high school presents a wicked problem. Despite the best efforts of educators and policy makers, society is yet to find a comprehensive way to remove the educational inequalities that exist between high school drop outs and those who earned a high school diploma. While the HSE test presents an alternative to a high school diploma, adult learners often have unique personal challenges that can impede or prevent them from passing the HSE test. Rittel & Webber (1973) state that:

> The problems that scientists and engineers have usually focused upon are mostly "tame" or "benign" ones. As an example, consider a problem of mathematics, such as solving an equation; or the task of an organic chemist in analyzing the structure of some unknown compound; or that of the chess player attempting to accomplish checkmate in five moves. For each the mission is clear. It is clear, in turn, whether or not the problems have been solved. Wicked problems, in contrast, have neither of these clarifying traits; and they include nearly all public policy issues whether the question concerns the location of a freeway, the adjustment of a tax rate, the modification of school curricula, or the confrontation of crime (p. 160).

As with many wicked problems, educators have struggled with how to help nontraditional adult students who need to complete their high school diploma. Perhaps the reason why completion rates for HSE preparation students at Rio Salado College has

remained low despite numerous attempts to improve outcomes in because there is not a single solution, but rather a complex network of potential improvements based within a wicked problems framework? While the context varies for proposed solution of the past, the reality remains that some problems are too complex to solve and must be viewed as wicked problems and Murgatroyd (2010) states that:

> The challenges faced by communities are so substantial and the demands for the solution so demanding that we cannot assume that 'doing what we always do' (but slightly better) will produce different results. It is time for bold, imaginative change which embraces a new view of learning as a process founded upon a different understanding of the focus of the curriculum and the nature of knowledge process (p. 276).

Tenets of wicked problems. Rittel & Webber (1973) found that there were ten main tenets of a wicked problem: (1) There is no definitive formulation of a wicked problem. (2) Wicked problems have no stopping rule. (3) Solutions to wicked problems are not true-or-false, but good-or-bad. (4) There is no immediate and no ultimate test of a solution to a wicked problem. (5) Every solution to a wicked problem is a ‘one-shot operation’; because there is no opportunity to learn by trial-and-error, every attempt counts significantly. (6) Wicked problems do not have an enumerable set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan. (7) Every wicked problem is essentially unique. (8) Every wicked problem can be considered to be a symptom of another problem. (9) The existence of a discrepancy representing a wicked problem can be explained in numerous

ways. The choice of explanation determines the nature of the problem's resolution. (10) The planner has no right to be wrong.

All ten tenets contribute to a deeper understand of wicked problems, and further justify a wicked problems framework within the problem of practice stated in this paper. For example, consider tenet number three and the assertion that solutions to wicked problems are not true or false, but rather, good or bad; it would not be a true or false statement to say that increasing engagement in HSE preparation classroom would increase HSE completions. As was stated earlier, many extenuating circumstances and intricate contextual variables, such as transportation, lack of childcare, learning disabilities, and or a lack of income could prevent an HSE student from completing their HSE. Therefore, it would not be a true or false statement that increased engagement along would increase completions. However, when evaluated through a wicked problems framework and that assertion of tenet three (good or bad as opposed to true or false), increased engagement in HSE classes in good or "better" than the alternative. Morris (2002) states that there is a strong positive relationship between engagement and performance, demonstrating that increased engagement is good and clearly better than disengagement, while not proving a "true solution" to low completion scores for HSE students.

Another example of Rittel & Webber's (1973) tenets as examined through the context of HSE students would be tenant number eight, every wicked problem can be considered to be a symptom of another problem. It could be argued that the relatively low number of HSE completions is a symptom of a greater problem. Jordan, Kleinsasser & Roe (2014), found that there are often multiple interpretations within numerous contexts

for social problems because framing social problems is subjective. Some may interpret low completion rates as a symptom of the failure of the K-12 system, while others may interpret the same problem as a symptom of a lack of affordable childcare and the reality that many individuals drop out of classes due to a lack of childcare. Neither perspective is wrong nor right, they simply demonstrate the complexity of a wicked problem and the need to examine potential "wicked solutions" through the context of better or worse.

Framing. Within the wicked problems framework of the problem of practice stated in this paper, low HSE student retention and completion rates are examined as a symptom of a lack of engagement within HSE preparation classes at Rio Salado College. While I acknowledge that there are many other reasons that also affect completion rates, engagement is one specific area in which I can tangibly make improvements as an educator, and that could increase completions without attempting to solve a low completion problem, which is, like most wicked problems not a problem to be solved, but a dilemma to be managed (Bullough, 2012). This approach endorses a wicked problems framework by acknowledging that this is not a solvable problem, but that specific actions can improve the situation. This framing also acknowledges the role and limitations of the researcher to present actionable "solutions" within the context of my problem of practice, as opposed to presenting solutions based on additional childcare, improved transportation systems, or other areas that are outside of my immediate scope as a researcher and practitioner.

While this study specifically focuses on engagement as a potential improvement to a wicked problem, it also acknowledges that engagement is one of many issues related to HSE attendance and completion rates that will also need to be addressed in the near

future. While wicked problems are subjective, there are often multiple aspects that must be addressed to make meaningful improvements. Rittel & Webber (1973) provided the following example:

> If we recognize deficient mental health services as part of the problem, then--trivially enough--"improvement of mental health services" is a specification of solution. If, as the next step, we declare the lack of community centers one deficiency of the mental health services system, then "procurement of community centers" is the next specification of solution. If it is inadequate treatment within community centers, then improved therapy training of staff may be the locus of solution, and so on (p. 161).

Engagement may be the locus of a solution, yet it may also be a sub construct of broader issues of concern that will need to constantly be evaluated through constant, collective and distributed sense-making since wicked problems are never solved, but only resolved and revisited again and again (Rittel & Webber, 1973). Framing HSE completion and retention rates as a wicked problem and focusing on one specific aspect of the problem to attempt to improve (engagement) is a starting point in a much greater dialogue that will need to continue. In addition to the outcomes from the research being conducted in this paper, creating a healthy dialog regarding an often-overlooked population provides a specific benefit and acknowledges the assertions of Jordan, Kleinsasser & Roe (2014) that “an important disposition to develop in creating wicked responses is supporting and nurturing conversation, dialogue and debate.”

Engagement

Within the established wicked problems framework of this research, there is a population of students who choose to not attend classes or who do not complete their HSE due to a lack of engagement. This is a subsect of the broader HSE student population and within the context of my research, this is defined as the individuals who do not persist or complete primarily because of a lack of engagement in the classroom as compared to specific life events. While these students may share the same societal challenges as their counterparts such as a lack of transportation or a lack of childcare, the primary reason that they do not succeed is due to a lack of engagement or a perceived lack of relevancy in the curriculum that causes them to disengage. This section will define engagement within the context of this research project, discuss educational strategies for promoting engagement, and specifically focus on the perceived connection between *prospect of transfer* and student engagement.

Engagement Context.

Engagement is defined in this study as the occurrence of high concentration, participation, enjoyment, and active interest in learning activities simultaneously occurring (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003). Engagement is a critical component within any educational setting, but HSE students may be less inclined to engage as a result of early educational struggles that they many have experienced. Lawson & Lawson (2013) found that:

> Students who do not experience early school success are thought to experience different educational (and engagement) trajectories. Although early student success is thought to help students identify with and participate in school, early school difficulty is thought to contribute to a cumulative cycle of student

> frustration, low self-efficacy, and low self-esteem. Thus, when students do not achieve early school success, they are thought to gradually withdraw from active participation (including engagement) in school activities (Lawson & Lawson, 2013, p. 442).

There are many specific theories within education that examine engagement and methods to increase the level of engagement with learners. While these theories provide valuable insights that are critical to learning strategies, selecting a specific theory would not be appropriate within the context of this research study because engagement is being studied as a byproduct of perceived transfer of learning, not as a method to increase transfer. In other words, "does a student's perception that their learning will transfer to their future career increase engagement"? This is a significant difference from many studies that examine the exact opposite, "does increasing engagement increase transfer of learning? Existing studies have consistently demonstrated a strong positive relationship between engagement and academic success in diverse populations (Finn, 1989, 1993; Finn & Rock, 1997, Marks, 2000).

Engagement is, in some sense, a broader construct that frames the work of this study and sheds light on one core aspect of the problem. Lawson & Lawson (2013) state that student engagement may directly lead to improvements in students' performance; which furthers the argument that increasing engagement with HSE students can be critical to successful outcomes. Within the context of engagement and HSE students, an engaged HSE student will be more likely to continue attending class, interact with classroom learning, and obtain their HSE.

Strategies for Promoting Engagement. While it has been established as noted that there is often a direct link between engagement and outcomes, the dilemma that a researcher is left with is how to determine the most effective strategy for promoting engagement within HSE classes. Jordan, Kleinsasser and Roe (2014) state that:

> "Mandated shifts in teachers' practices will most likely change teachers' behavior with the overall and important goal of improving students' literacy achievement. After all, teachers risk a heavy price for not attending to them. However, attempts to insert a simple response to a complex and a wicked problem will most likely fall short" (p. 421)

This creates a delicate challenge of balancing actionable ways to promote engagement while also providing enough depth and complexity to actually affect student engagement within the wicked problem context of this study.

Lawson & Lawson (2013) state that "student investment may result from students' perceptions that activity engagement will result in future benefits or rewards" (p. 450). This assertion has been supported by numerous studies that have found that student engagement may be influenced by the perceived relevance of instruction in the classroom (Shernoff, Csikszentmihalyi, Shneider, & Shernoff, 2003, Newmann, Wehledge, & Lamborn, 1992). This concept is especially true for HSE adult learners who are seeking to improve their marketability and financial stability through education that prepares them for employment (Bridgeland, Dilulio, and Morison (2006). When examining the research through the context of HSE students at Rio Salado College, the core question becomes, "what is the most effective way to increase meaningful engagement in HSE classrooms"?

Prospect of Transfer and Engagement. Adult students present unique challenges that often require unorthodox solutions. Multiple studies have found a direct correlation between focusing adolescent students on career opportunities as a means to increase engagement (Lawson & Lawson, 2013). So called "cradle-to-career" systems focus on the individual students' aspirations and then aligns their educational pathways to coincide with their career objectives. In addition, cradle-to-career systems may serve to enhance the engagement of the most vulnerable students within an educational framework by reminding them that postsecondary education completion and career objectives hinge on active, consistent, and persistent engagement (Lawson & Lawson, 2013). Cradle-to-career concepts often begins in early or primary education, hence the term cradle-to-career; yet adult HSE learners are not attending school in their adolescence and are therefore unable to adopt a cradle-to-career system. While the specific cradle-to-career model may not work for an HSE population, the central principal of demonstrating how learning will transfer to a future career may be highly effective in increasing engagement.

The challenge in addressing engagement through perceived transfer of learning is personalization. Standard curriculum does not differentiate between the career interests of each student, nor would it be feasible to create personalized or contextualized curriculum for each student based on their specific career goals. Lawson & Lawson (2013) found that:

> "One key is whether students perceive these pathways as facilitative of their preferred identities and/or futures. The other key is a horizontally configured improvement framework that enables educators and their partners to better utilize

students' external (non-school) ecologies for positive learning and development." (p. 465).

In the context of adult HSE learners, the non-school ecologies are often career interest along with the increased marketability that has prompted them to return to the classroom. This presents the challenge of demonstrating how content being taught in the classroom can transfer to a multitude of diverse careers and in convincing students that a remedial math concept is critical to a veterinarian, a police officer, and a nurse. While this is a challenge, it is essential to successfully increasing engagement and will be covered in great detail within chapter 3.

Transfer of Learning

Local and national research has indicated that demonstrating a transfer of learning from an educational environment to a career can provide additional motivation for many students. As was stated in chapter one, 81% of high school dropouts in a National study indicated that there should be more opportunities for real-world learning that transfer to a future career (Bridgeland, Dilulio & Morison 2006), and informal surveys at the LLC showed a similar frustration from existing HSE students that did not see how what they were learning would be used within their future careers. These findings prompted the need for imploring strategies for transferring learning, and the adoption of transfer of learning as a guiding theory within this research.

The history of transfer research is over a century old, with researchers trying to determine the context, nature, and the prevalence of transfer (Barnett & Ceci, 2002). Adams (1987) defined *transfer* as the extent to which learning of a response in one situation or task influences the response within another situation or task. This concept is

central to the challenges that educators continually face in developing pedagogy that provides required instruction while also connecting that instruction to its potential application in future settings. While the application of transfer has been researched in great depth regarding education, researchers have also adapted the study of transfer to improve the application of workplace training (Goldstein, 1974). Considering the implications that this theory has within education as well as vocational skills training, the two central themes within this research study, transfer of learning serves as the central theory of learning for the pedagogy of this study.

The lack of transfer of skills acquired within a learning context to an actual job environment is not a new problem. With a rapidly changing job market, transfer of learned skills has become a critical issue (Sonntag, 1997). The HSE preparation classes at Rio Salado College experiences the challenge of attempting to prepare students to pass the HSE test, but rarely ventures outside of that objective to ensure that transferable skills are being taught to students. Hesketh (1997), found that there are multiple factors that can contribute to the disruption of learning transfer, but that those factors could be mitigated by designing an appropriate training setting that emphasizes cognitive perspective while linking them to basic concepts. Sonntag (1997) further developed this concept by establishing two principles for enhancing transfer, (1) improving the representations and descriptions of reality in the task that has to be learned and (2) shaping the learning environment (p. 345).

Improving the representations and descriptions of reality within the HSE preparation courses at the Lifelong Learning Center required a thoughtful analysis of how the content could connect to future careers. Shaping the environment as Sonntag (1997)

described, required a new pedagogical approach that emphasizes the realities of the modern workforce and how student learning directly connects to the skills that are needed to function within the workforce. The learning objectives of the curriculum had to be expanded to also address students' perceived vocational skills training and those skills would benefit their ability to pass the HSE test, as well as their career skills. Nijof & Mulder (1989) argued that:

> Learning tasks have to be chosen and organized; goals and contents of learning have to be formulated. Thus, additional transformations are necessary in order to shape the elements of analysis according to principles of learning theory (as cited in Sonntag, 1997, p. 346).

Professionals currently working in an industry have first-hand knowledge of the daily realities within their respective fields and can provide students with a realistic overview of the skills that are needed to obtain and thrive within their profession. As described in the methods of this study, these individuals will be invited into the classroom as guest speakers to discuss their careers and the skills that are necessary within their field which will also contribute to shaping the learning environment. The instructor could then draw parallels between the skills that were stated and the skills that are being taught within the curriculum. This practice not only provides a clear reality of how the curriculum prepares students to transfer their knowledge to the workforce, it also educates them about the realities of a given industry and expands their knowledge of potential career options. As Hogan (1995) contended in his research on career awareness, the more that students know about the realities of work, the more likely they will be to make satisfying decisions regarding their future careers.

The incorporation of new learning tasks and guest speakers within a career skills-focused learning environment provides students with a learning experience that is focused on instructional designs that are considered to be supportive for transfer: authenticity, situatedness, multiple contexts and perspectives, and social context (Sonntag, 1997). This design will work to foster the students' understanding of how their learning will transfer from education to their career, and to support the research questions in this study, by determining the nature of the relationship between teaching vocation skills training in HSE preparation programs and student retention and completion.

Local Research

An initial cycle of research, prior to this proposed study, took place at the Lifelong Learning Center took place in September 2016, and produced 10 individual interviews with students in HSE preparation classes. The 10 students all participated in morning classes on Mondays, Tuesdays, and Wednesdays and vary in age from 19-41 years old. The original objective of the research was to conduct 10 individual interviews to gain student perspectives on vocational skills training and how they could be implemented within HSE classes. This was based on the informal interviews that I had conducted with students who dropped out (stated in Chapter 1), and the premise that contextualized curriculum may be an effective way to demonstrate the potential for transfer if it were embedded in their HSE curriculum. I also hoped to understand the extent to which students believe that a modified curriculum that included vocational skills training would potentially affect their retention or success rates.

It was critical to get the perspective of students to ensure that a potential innovation would be accepted by the students in the program, and to examine whether or not the

original vision for developing contextualized curriculum integrating vocational skills was feasible. To obtain this information, each participant was asked seven questions:

1. What are your career goals?
2. Have you learned vocational skills this semester?
3. If so, were those vocational skills connected to a job or industry that you would be interested to work in? Can you give me a specific example?
4. Do you believe that learning vocational skills would affect your overall impression of the class? If so, how? If not, why not?
5. Would learning vocational skills affect your attendance in class? If so, why?
6. Do you or would you feel more prepared to find employment as a result of learning vocational skills in an HSE class? Please explain, using a specific example.
7. Do you or would you feel more prepared to pass the HSE test as a result of learning vocational skill? If so, how?

Results from the individual interviews revealed four significant findings in the answers that were shared during the interviews. These findings include: 1) half of the *students felt that they were currently learning vocational skills*; 2) *some current students contradicted my initial interviews with students who had dropped out*; 3) all *participants wanted to learn transferrable/vocational skills*; 4) and all *participants did not want to extend the time it took to get their HSE*.

The first significant finding that emerged from the preliminary analysis of the data was that five of the ten students interviewed stated *that they had learned vocational skills during their time in HSE classes at the Lifelong Learning Center*. This was an

unexpected result due to the fact that the curriculum had not been designed to contain any specific vocation skills training and it contradicted the informal interviews that I had previously conducted with students who dropped out. However, all five participants that indicated that they had learned vocational skills were also able to provide specific examples and even share their cursory ideas as to how those skills could transfer to their career. When asked if they had learned vocational skills in their HSE classes, Participant Three stated "oh yes, the math skills will be very important. I want to go into a nursing program, and there is a lot of math. I also think that just learning how important it is to show up on time is important for a job."

The statements from Participant Three were similar to four other participants who all found specific content within their HSE classes that they believed would transfer to their future careers. The second finding showed that these responses directly *contradicted the informal student interviews* that I had conducted with former students who had dropped out of the program. Those participants had overwhelmingly stated that they did not see a connection between what they were learning in the classroom and how it could apply to their future career. This created an important distinction that would later change the design of my research, many of the students who were still engaged (actively attending HSE classes) could identify transfer of learning, while the students who were no longer engaged could not. This finding would eventually change the design of my research from writing contextualized curriculum based on career skills, to demonstrating how the existing HSE curriculum will provide transferable skills to diverse career fields.

The third finding that emerged was that students *wanted to learn transferable skills* and stated that there could be immediate academic benefits as well as long term career

benefits from obtaining transferable skills. All of the ten respondents stated a benefit that they believed could come as a result of learning skills that would transfer from the classroom to employment. Their answers ranged from improved performance on the HSE test to a better career trajectory in their current job. The implications for this were somewhat challenging in that all respondents reported a perceived benefit from transferable skills but the benefits varied by individual participants.

Some respondents felt as though transferable skills would benefit them in one area but did not believe that it would benefit them in a different area. For example, one respondent stated that "learning job skills would be great, I want to get a better job." That same respondent also stated "I don't believe that it (learning transferable skills) would make any difference on whether or not I pass the (HSE) test." Other respondents stated the exact opposite and thought that learning transferable skills would be more beneficial to them in the classroom than it would in their careers because it would make the academic concepts seems more "real-life," but that they had a specific career interest that those skills might not help in. However, in all cases students believed that they would benefit from learning transferable skills in at least one area of their life.

Finally, the fourth theme that emerged was that *students did not want any changes to the curriculum or program to extend the amount of time that it takes to be prepared for taking the HSE test.* All ten respondents expressed apprehension about "adding" to the curriculum and had reservations about how any curriculum changes could prolong the HSE process. This is significant because any innovation that was created needed to function within the current timeframes at the Lifelong Learning Center or risk alienating the students taking part in the innovation. This information also shows that there were

high levels of concern regarding the time commitments of the classes and that students' time will need to be taken into consideration while designing an innovation.

Summary

HSE students often have unique challenges that can impede or prevent them from passing the HSE test. Some of the challenges are outside of the scope of an educator and are indicative of broader social issues that make up a wicked problem, yet some of the challenges (such as engagement), can be influenced and or improved. Through the research that was presented in this chapter, increasing engagement became the central objective of my innovation because it was a tangible way to positively affect a sub population of HSE students who do not complete their HSE due to a lack of engagement. The theoretical tools were applied in the design of the intervention and used to aim to increase engagement is transfer of learning—by demonstrating to all students that their learning in HSE classes will directly connect to their individual career interests in order to answer the research questions, stated in chapter one:

1. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence HSE math section completion rates and how does it compare to a standard HSE cohort?
2. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence student attendance as compared to a standard HSE cohort?
3. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence students' perception of their level of engagement?

CHAPTER 3

METHOD

Chapter Overview

This chapter will discuss the setting and participants involved in the research study, the innovation that will be implemented to potentially increase student engagement, as well as the research methods that will be utilized, the specific tools within the research methods, and how the data will be collected and analyzed to inform the research.

Setting and Participants

The setting for this study was Rio Salado College's Avondale location in Avondale, Arizona. Avondale is one of the smallest satellite locations in regards to physical space, yet it is one of largest in regards to student population. It is one of 10 satellite locations that Rio Salado College operates throughout Maricopa County, and the location offers non-credit HSE test prep classes (referred to as HSE classes) and English Language Acquisition classes to nearly 750 students per year. The HSE classes are split into two subjects, math and language art,s and students are able to take math classes exclusively, language arts classes exclusively, or take both classes during the same semester by taking math classes two days per week and language arts classes two other days during the same week.

This location was selected due to its large student population, as opposed to the Lifelong Learning Center that was referenced in chapter 1. The Lifelong Learning Center provided early "reconnaissance" inquiry to provide background and contextual information only to the action research process (Mertler, 2012). Low enrollments at the

Lifelong Learning Center would not have allowed for a treatment group and a control group to be studied simultaneously due to a limited number of students. As a result, Rio Avondale was selected and the entirety of the dissertation research took place at Rio Avondale.

The city of Avondale is located approximately 30 miles west of downtown Phoenix and is mainly compromised of working-class and low-income families, many of which are ethnically diverse. 2010 U.S. Census data shows that over half of the population within the City of Avondale (50.3%) identified as Hispanic or Latino. Several of the cities surrounding Avondale share similar demographic characteristics and also house many residents who are in need of HSE courses or English language proficiency classes and take classes at the Avondale location.

All ten Rio Salado satellite locations (including Rio Avondale) operate within a loosely coupled system (Weick, 1976). This means that they share overarching objectives and vision while enjoying independent autonomy on how to execute that vision; and they enjoy an actual casual independence which is established through decentralized procedures and independent leadership (Weick, 1973). This structure is primarily in place due to the diverse populations that each location serves within their community and is ideal for research due to the autonomy to implement and test the innovations while minimizing the potential of harming the larger system. It also means that each location is different in how it actualizes the shared objectives of the college.

Rio Avondale is a very supportive location. Unlike some of the other locations, many of the walls at Rio Avondale are filled with pictures of recent graduates, inspirational quotes, and artwork and many students and employees casually refer to their

"Avondale family," implying that there is a family-like atmosphere. While Rio Avondale has specific traits that may differ from other Rio Salado Locations, functioning within a loosely coupled system of shared objectives with individual autonomy presents a significant opportunity in that an innovation can be piloted at one location and then potentially scaled to others if it is successful.

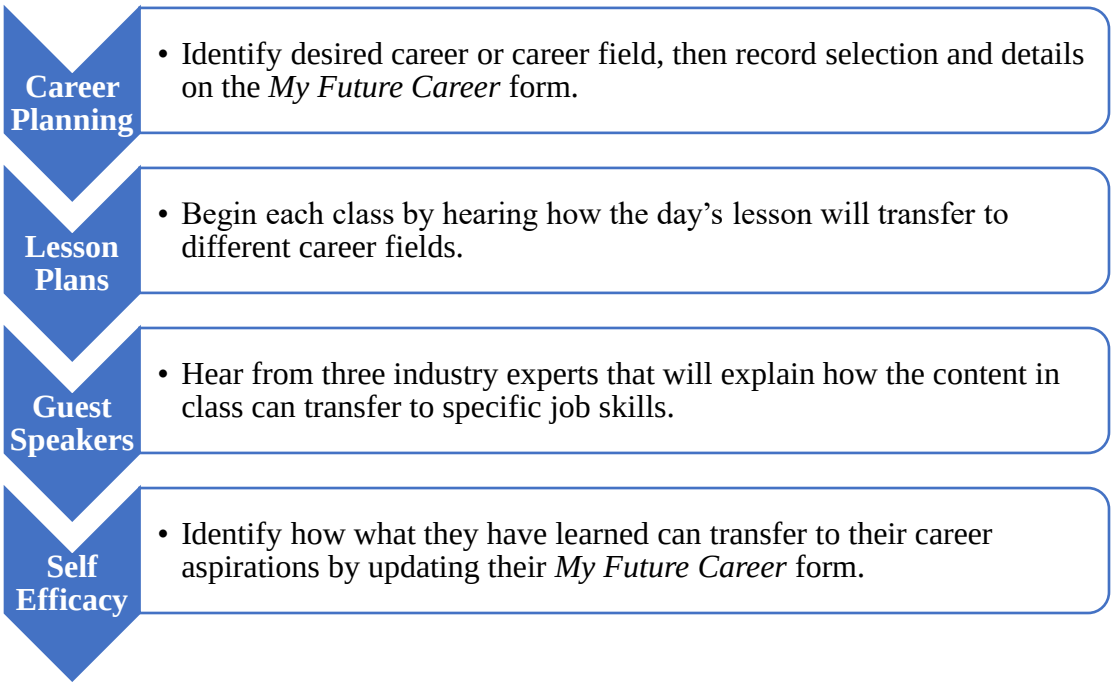
The participants in this research study from the Rio Avondale location were comprised of 17 HSE math students who voluntarily signed up for the morning HSE math class at the Rio Avondale location. The treatment group took part in all phases of the innovation that are described in detail throughout this chapter. The control groups consisted of previous math courses that were taught by the instructor of the treatment group as well as all other HSE math classes being offered at Rio Salado College while the treatment took place. Both control groups took part in HSE classes that did not incorporate any aspects of the innovation. Thus, the treatment group received standard HSE courses with additional framing of the curriculum aimed at helping students understand how learning in the class transfers to career and work considerations.

Innovation

My innovation was designed to answer my research questions and increase student retention and HSE completion rates within the theoretical frameworks, around transfer of learning and engagement that were provided in chapter two. The innovation consisted of four components that were designed to increase awareness of transfer and increase student engagement within the HSE program at Rio Salado Avondale, as evidenced by classroom attendance and HSE attainment. The four components were: career planning, explicit lesson plans, industry experts, and self-efficacy. Figure 1

describes the specific steps that students experienced in the innovation. As follows, I provide details on how each of these four components were instantiated in the innovation for this study.

Figure 1: Connecting integration strategy of sequential innovation components



Career planning. In order to test the effects of transfer on student success, students first needed to identify a career field that their skills could transfer to. While many skills taught in HSE classes are transferable to nearly any career, it could be argued that students feel more ownership in a career pathway that they have selected. It could also be argued that visualizing transfer is much more meaningful when it is part of a students' overall career plan. In their paper on motivational factor and transfer, Pugh & Bergin (2006) stated that:

> Research indicates that when students experience increased individual interest, they are more likely to learn content using cognitive strategies and persistence associated with deep-level processing (Ainley et al., 2002; Hidi, 1990; Schiefele,

1991). As a result, they may also be likely to develop the deep-level, connected knowledge structures needed for transfer (p. 150).

On the first day of class, all students were asked to identify the career or career field that they want to eventually have. Students were given the option of noting a career or a career field, because many students in early research cycles had identified that they wanted to "work at a hospital," or wanted to "work in an office setting," but they did not know what specific job they wanted or would qualify for. For the purpose of this research, students were asked to identify a career or a general career field that they are interested in.

Not all students were able to identify what career or career field they are interested in, and they needed additional assistance in thinking about or identifying possible future careers. To meet this need, students were provided access to the Maricopa Career Planning System (MCPS) via the computer lab at Rio Salado Avondale. MCPS is an interactive portal that is available to all Maricopa County Community College students, including HSE students from Rio Salado College. MCPS allows student to browse employment data, take career assessments to help find a match for their interests/skills, develop an individualized career plan, and learn more about high-demand industries. Students who accessed MCPS were then asked to identify their desired career or career field prior to the beginning of the next class, which provide 48 hours to make their selection.

At the beginning of the second day of class, all students completed the *My Future Career Plan* form (appendix A) which asked them to identify their name, their class, desired career or career field, and why they selected that career or career field. The form

was then be collected by the instructor and photocopied. The original form was returned to the students and the copies were stored in a locked office so that students would have a "backup form" in case they lost their original form. Students were then informed that they can update their form at any time if their interests or desired career change as the semester progresses, but they will be asked to inform the instructor of any changes so that a photocopy can be made and stored.

Explicit lesson planning. One of the earliest challenges that became apparent in cycle 0 and cycle 1 research was that students had incredibly varied career interests. In cycle 1, 10 student interviews produced career aspirations ranging from pharmacy technician, to parole officer, to entrepreneurship. The wide variety of desired careers posed instructional challenges in identifying transfer opportunities for each career or career field that students stated.

My Future Career Form. On the first day of class, each student was asked to complete a *My Future Career* form that would capture their career interest. This information was then used to identify which career fields needed to be represented in the innovation to ensure that the slides and guest speakers provided examples of transfer that were meaningful to each student. All students were provided with a *My Future Career* form and asked to fill it out and return it by their next class session. 12 of the 17 students returned their completed *My Future Career* form as they were requested to do, and they provided the following responses:

Student 1: "Nursing"

Student 2: "Microbiologist"

Student 3: "Personal Trainer"

Student 4: “Amazon”

Student 5: “Nurse”

Student 6: “UPS Driver”

Student 7: “C.N.A.”

Student 8: “Pharmacy Tech”

Student 9: “Start my own business”

Student 10: “Something medical”

Student 11: “IT”

Student 12: “Furniture repair”

I reviewed each response and asked several specific follow-up questions to ensure that I accurately understand each student’s desired career. Student 4 was asked to clarify his answer or provide additional detail. He stated that he wanted to work at Amazon and was open to different opportunities. Student 7 was asked if “C.N.A” referred to becoming a Certified Nursing Assistant and the student responded “yes.” Student 10 was asked if they could give an example of what they meant when they said “something medical,” and they responded “maybe X-ray.” Student 12 was asked to clarify what they meant by “furniture repair,” and the student explained that they currently repair furniture for a restoration company, but that they want to move into an “office role.” Student 12 was then asked if they could elaborate on “office role,” and they stated “taking the orders, organizing the shop, shipping them (completed furniture) back, giving quotes.”

Coding and grouping the careers that were indicated on the *My Future Career* form was a bit of a challenge due to the broad career interests that were presented and the challenge of selecting one career group when several might be appropriate. For example,

Student 12 referenced wanting to move into a role that provided quotes and coordinated shipping. Despite some overlap, the responses were group into three career categories, healthcare, business, and logistics/technology. Seven responses were coded as healthcare, two responses were coded as business, and three responses were coded as logistics/technology. These results were used to identify the industries that should be represented by industry experts to inform students about how their learning can transfer to their future careers.

Curriculum. The existing HSE curriculum and lesson plans that all students use was not changed in any way, yet how it was presented was modified to specifically include several additional framing elements that explicitly connected how the learning materials for each day could transfer to real-world overall career skills, in terms of business skills, healthcare skills, and logistics/IT skills (appendix B). The instructor began each class by discussing the learning objectives for the class session which were projected in a PowerPoint slide in front of the entire class, and then stating and discussing how the materials could transfer to each of the three career fields. As a new concept or activity was presented to students, the potential transfer to all three career fields was also presented. In addition, each handout provided to students as part of the day's lesson plan included a discussion of how the materials could transfer to the three career fields.

In order to create the examples of transfer, the lesson plan topics (such as calculating surface area or graphing fractions) were sent to subject matter experts in each industry and the subject matter experts were then asked to provide specific examples of how the classroom learning could transfer to their industry. The subject matter experts included three industry experts, two of whom also presented in-person to the students at

Rio Salado Avondale: Debbie Flores and Tony Sherman, and Joshua Peters. Debbie Flores and Joshua Peters both presented in-person in addition to providing materials for how the course content could transfer. Each expert was provided with an overview of the innovation and asked to share at least one example of transfer for each topic that would be covered during the semester. Subject matter experts were then asked to respond by email prior to the beginning of the semester so that their responses could be included in the lesson plans for this innovation and in the printed materials that students will receive for each class session.

Industry experts. Instructors are powerful proponents for transfer, yet students do not always see their instructor as being knowledgeable enough about a career field to make definitive statements regarding how their learning can transfer to careers. To address this, three industry experts were brought in to speak with the class regarding their industry and how the concepts that students are learning will be critical to career success in their industry. The industry experts were selected based on their expertise in the career fields of interest to students (healthcare, business, and logistics/technology), their proximity to the Rio Salado Avondale location, as well as their influence in that field. Proximity and influence were taken into account so that students could view the experts as credible within their community, and to potentially provide students with networking opportunities to influential leaders in their communities.

Each industry expert was asked to attend one hour of a class session and to spend 20 minutes discussing the critical skills needed in their industry, as well as how the students' learning in HSE classes could transfer to their career field of expertise. One of the industry experts, Tony Sherman, was unable to visit the class, but provided written

materials for students explaining how their learning could transfer. To prepare for these sessions, industry experts were provided with a comprehensive list of the transfer items that have been listed in the lesson plans, as well as an overview of the innovation and definition of transfer. Each expert was then asked to provide additional, or more in-depth examples of transfer related to the HSE content that was being covered. Experts were then asked to allocate 40 minutes after their presentation for a question and answer session with students. Industry expert session were scheduled one month a part and students were provided with advanced notice so that they could prepare questions in advance.

The first industry expert presenter was Debbie Flores, CEO of Del Web Hospital. Del Web is the closest hospital to Rio Salado Avondale and features all major services that one would expect to find at a major hospital, such as emergency, laboratory, pharmacy, oncology, maternity, etc. As CEO, Debbie has foundational knowledge of all areas within the hospital as well as a clear understanding of staff positions and the job skills necessary to succeed. Debbie was also able to provide clear guidance on how student learning can transfer to medical careers, as well as what she looks for in employees when making personnel decisions. Debbie provided a 20-minute overview of the skills needed to succeed in healthcare, and how students at Rio Salado Avondale are currently learning the foundational skills that could transfer in to that field. She also answerer student questions for 40 minutes.

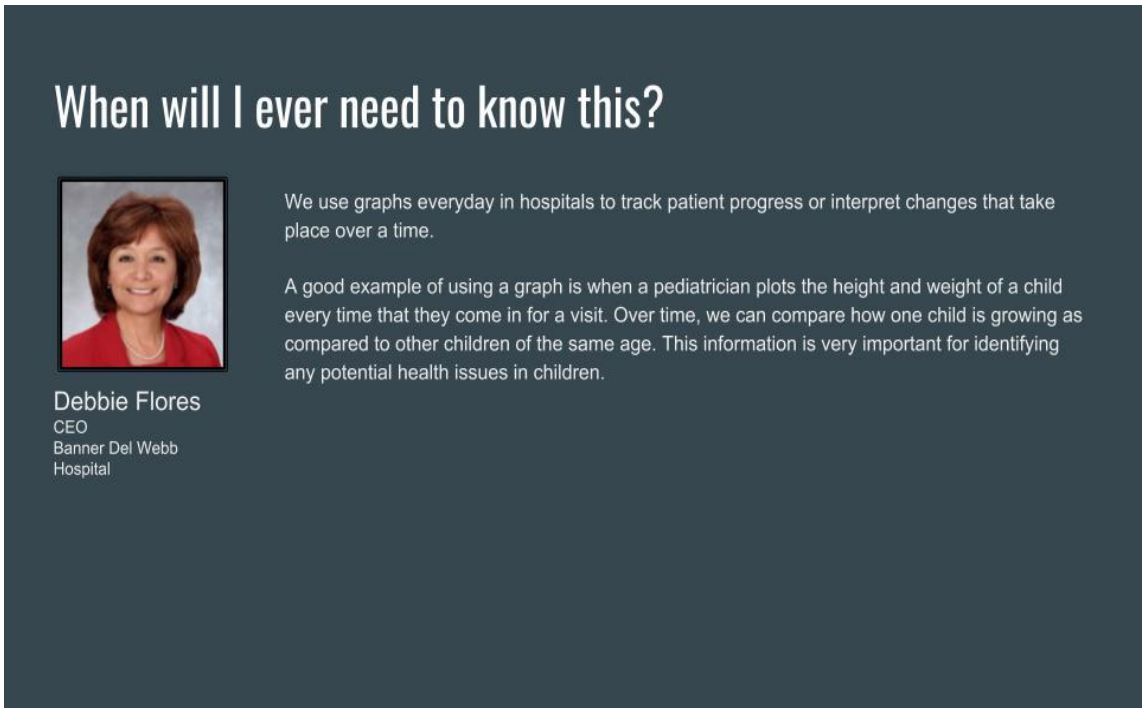
The second industry expert presenter was Tony Sherman, Real Estate Broker and Agent in Goodyear, Arizona. Tony was asked to serve as an industry expert because he worked in a field that offered a livable wage without the necessity of a college degree,

and because he provided a unique perspective as a small business owner. His experience is unique in that he is a key decision maker for his own business and he can provide perspective on employment opportunities while he also maintains a working role and has a comprehensive understanding of the day-today- operations within real estate. Similar to Debbie's experience, Tony was asked to provide a 20-minute presentation about how the students' learning can transfer to business, and then answer student questions for 40 minutes. On the date that Tony was going to present to the class, the Arizona Teachers' Strike began and forced many parents to stay home with their children (including Tony and most of the students in the HSE class). Tony was not able to find another date to come speak with the class.

The third expert presenter was Joshua Peters, Senior Operations Manager for McLane Industries, a shipping and logistics company that specializes in partnering with logistics and technology companies throughout the world. Due to the specialized nature of each manufacturing entity and the varied skillsets that would be needed for each company, Josh provided a neutral perspective of all of the varied skills that are needed within logistics and technology, and also provided perspective on transportation and logistics within those fields. Similar to the first two industry expert presentations, Josh was asked to provide a 20-minute overview of how the students' classroom learning could transfer to logistics jobs and then fielded questions for 40 minutes regarding the logistics and technology industries.

PowerPoint slides. To demonstrate how the students' learning could transfer to future career opportunities, 15 PowerPoint slides were created and shown to the students prior to each lesson. The 15 slides corresponded with each of the 15 different topics that

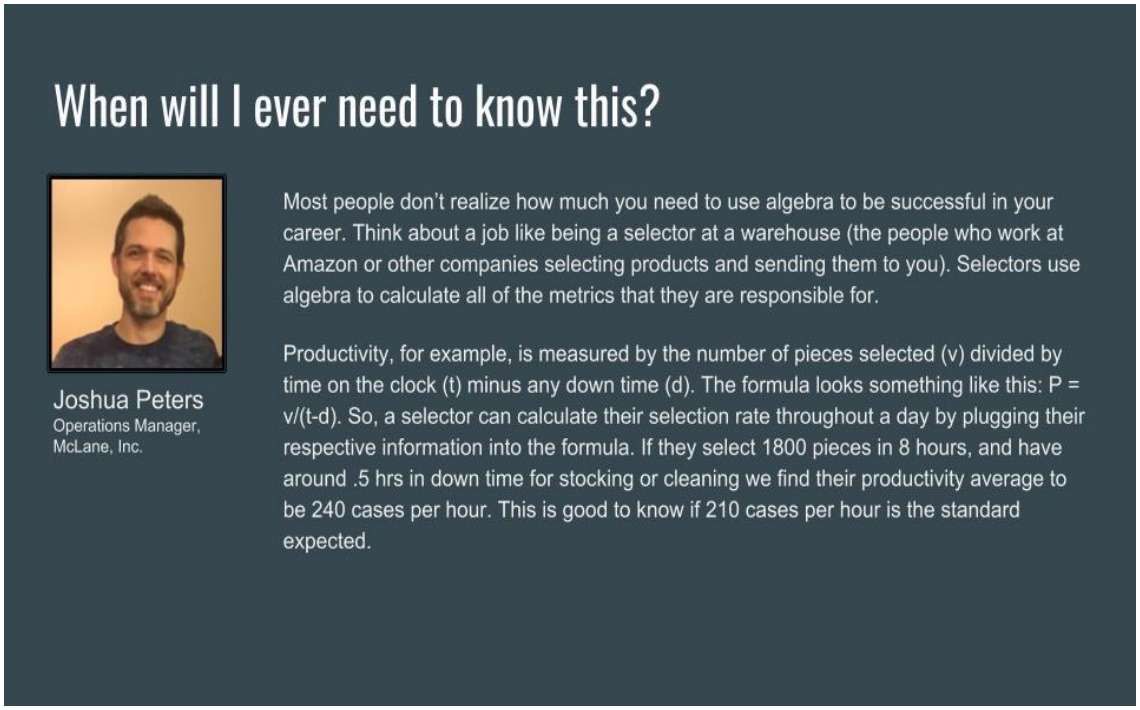
the HSE math curriculum would be covering. For example, when the instructor taught the class about using graphs and graphing algebraic equations, she began the class session by showing this slide:



The purpose of each slide was to correspond to the lesson for that day and inform students about how their learning was needed for the careers that they wanted to have, and how their learning could transfer to real-life situations in various industries. This action established the framework for the research, demonstrating to students that the skills that they were learning could transfer to their future careers. Once this foundation was set, the research could then determine whether or not the prospect of transfer affected student engagement.

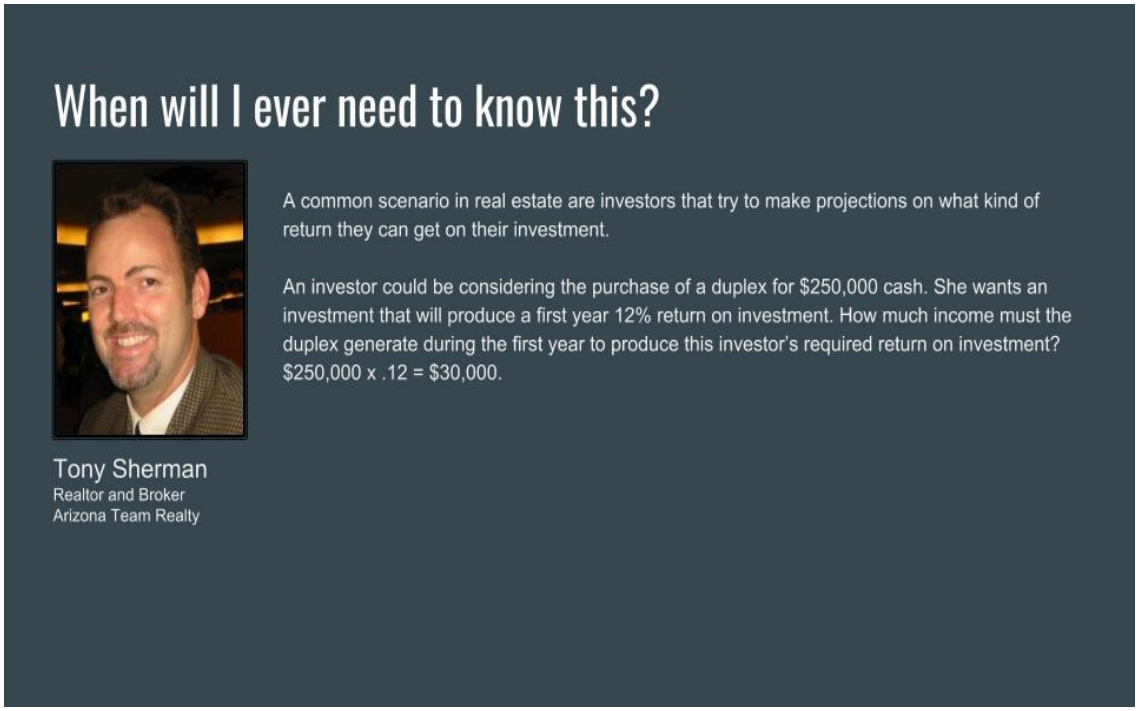
The slides were constructed in a manner to foster authenticity. The industry expert's titles and photos were used to establish that they were real and that students were hearing directly from industry experts in high-ranking positions within their industries.

Students could be told that their skills may transfer to their career by their instructor, but hearing it directly from an industry expert created a more compelling and persuasive experience. Showing photos of the industry experts was important for validating that the examples of transfer that were being provided in the slides were coming from a real person, and not from a textbook or a layperson who was not familiar with those industries. The slides also presented actual applications for the math that students were learning such as the example below:

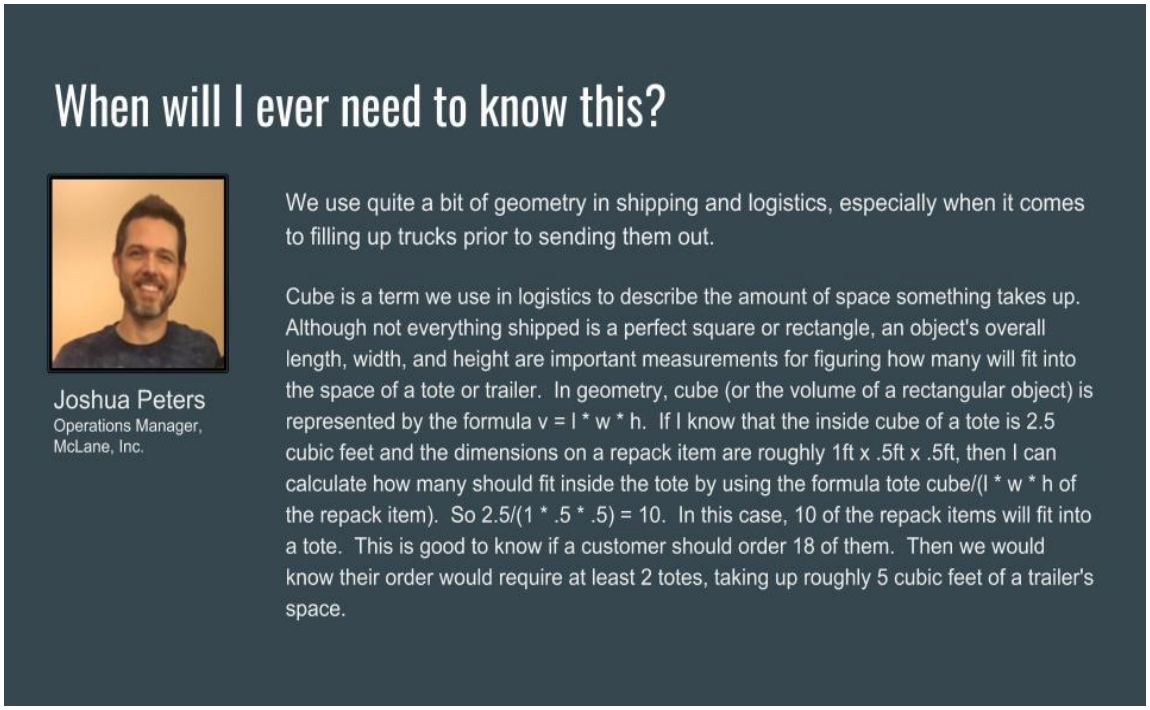


The slide above not only demonstrates how the information was conveyed to the students, but also the close attention that was paid to make the slide applicable to students. For example, one student specifically mentioned wanting to work at Amazon, and in the slide above, Amazon is referenced to show that a student would likely need to poses the math skills in the lesson from that day if they wanted to work at Amazon or a similar organization.

The slides were developed in partnership between the industry and experts and myself. Each industry expert was provided with a list of lesson topics that the students would be covering for that semester and then asked to send an email back to me detailing how someone in their industry might use the skills that are listed in the lesson topics. This often lead to multiple emails discussing different math concepts and whether or not the examples that the industry experts were considering were applicable the lessons that would be taught. In one instance, Tony Sherman, the industry expert for business, stated in email that he had a good example of how realtors use percentages, but it was not an algebraic example and the lesson plans stated using ratios in algebraic equations. I worked with Tony to slightly modify his example to become an algebraic equation. Instead of applying a ratio to a known dollar amount (as he first suggested), I encouraged Tony to change the example to apply a ratio to an unknown dollar amount, thus creating a basic algebraic equation. Our combined efforts developed the slide below:



Once all of the emails were received from each of the industry experts, I began transcribing their emails into PowerPoint slides, adding a design template, their photos and titles, and adding context if it was needed to support the examples that the industry experts provided. For example, the industry experts may have sent an example from their industry, but did not specifically state which math skills they were referring to or the context for which an employee would use those skills. The slide below demonstrates this concepts:



The original email from Joshua provided almost all of the text in the second paragraph, stating the use of the term “cube” and how they use geometry in his industry. However, the example provided did not actually use the word geometry. In the lesson plan that the students would be reviewing, the lesson was specifically about geometry and measurements. To connect the industry example to the lesson plan, I inserted the word

geometry and added a short introduction (based on Joshua's feedback) to provide additional context to students and to bridge terminology between academics and industry.

As was stated above, the slides were shown prior to each lesson to establish that the materials that the students would be learning that day are needed in various industries and are critical skills that student must possess if they want to be employed in that industry. Beginning each lesson with a slide also presented the instructor with an opportunity to expand on the examples that were provided and create a dialogue with the class about how these skills are utilized in multiple industries on a daily basis. These slides and the corresponding dialogue that they prompted established that the students' learning was relevant, important, and transferable to their future careers.

Guest speaker presentations. Debbie Flores visited the class on March 1st, 2018. Debbie is the Chief Operating Officer (CEO) at Banner Bel Webb Hospital in Surprise, Arizona. Debbie's position as CEO provided the students with a unique, high-level perspective regarding various careers in healthcare and the math skills that are necessary is succeed in the healthcare field. As was stated earlier, nearly half of the students in the class expressed interest in careers in healthcare which posed a unique problem; finding a guest speaker that could appeal to students despite their diverse interests within the healthcare field. A student who is interested in becoming an X-ray technician might not relate to the examples of how math is used by a CNA since there are significant differences between an x-ray technician and a CNA. As CEO, Debbie was able to provide multiple examples of how math is used by employees in different roles.

Debbie began her presentation by telling the students about herself. Debbie shared that she grew up in Maryvale, a small community to the West of Phoenix. She shared that

as a Hispanic female, she had not intended on ever becoming the CEO of a hospital, she did not think that it would have been possible for her to rise to that position because she had never heard of a Hispanic or a female executive. She then shared the different jobs that she had held after she graduated from high school, and how a combination of work history, higher education, and determination created opportunity to advance in her career.

After sharing about her background, Debbie stated "let me tell you something, there are tons of jobs in healthcare. There are office jobs, mechanical, medical, IT, marketing, and everything else. Each job will require you to know about algebra and geometry in some way." She then began to discuss various jobs at a hospital and how the math that the students were learning was critical to nearly all roles in a hospital. The first example that she gave was that a CNA has to understand inputs and outputs as well as percentages and ratios. She stated "CNAs are constantly interpreting data and using basic algebra to determine fluid levels and inform the care that patients receive." She then provided examples of how pharmacists calculate dosages and how X-ray and EKG techs graph results to algebraic equations.

After describing the math skills that are needed in multiple medical positions, Debbie then began to discuss the math skills that are necessary in non-medical hospital jobs. She stated that supply clerks compare inventory to need and calculate orders based on multiple variables, registration specialists calculate copays based on percentages, and food service specialists calculate sodium levels, portions, and caloric content. She then reiterated her earlier point by stating "math is an absolute necessity in all areas of the hospital, even in entry-level jobs, so you have to come prepared with math skills if you want to work in one of these positions." Debbie then thanked the students for their

attention and stated that she would be happy to answer any questions that the student might have.

The first question that a student asked Debbie was “did you ever need to take more classes as you moved up in your career”? Debbie shared that she needed to take “many” additional classes and stated that she went back to college twice because she identified that she needed additional education. She then shared that a desire for knowledge is critical to success and that the students in the class should complete their HSE and then continue on in their educational journey and obtain a college degree. She continued by saying “and don’t stop at a college degree, get multiple degrees, find trainings, attend webinars, do everything that you can to learn.”

After Debbie’s encouragement for student to continue in their education, one student stated that they are “a bit scared” to go to college because the math keeps getting harder and harder. Debbie responded that the math does get harder, but that those skills will help them in every area of their life, “making a schedule, understanding ratios, budgeting your personal income are all skills that you need to have,” Debbie stated. Debbie then answer two additional follow-up questions related to her personal college experience and how long it took her to complete her Master’s Degree. She concluded this topic by once again reiterating that all of the students in the class should continue their education after completing their HSE.

The last question that Debbie received was from a student who shared that they currently work in Registration at a hospital in Phoenix, but that they are thinking about going into X-ray/radiology and wanted to know if that was a good career to pursue. Debbie stated that radiology is an excellent choice because it can lead to multiple

"specialties" such as ultrasound, MRIs, and CT scans. She then explained that have specialization in radiology often generates higher salary and creates more opportunities for advancement. She encouraged the student to pursue that path and to let her know if she can help. Debbie then pulled out a business card and handed it to the student. She stated "I am here to help you, please just let me know what you need." The student appeared to be a bit shocked by receiving her business card and thanked her profusely.

Joshua Peters visited the class on April 5th, 2018. Joshua is Senior Operations Manager for McLane Industries, a shipping and logistics company that specializes in partnering with manufacturers and technology companies throughout the world. Due to the specialized nature of each logistics entity and the varied skillsets that would be needed for each company, Joshua provided a neutral perspective of all of the varied skills that are needed within logistics and technology, and also provided perspective on transportation and logistics within those fields. Similar to the first two industry expert presentations, Joshua was asked to provide a 20-minute overview of how the students' classroom learning could transfer to logistics job and then fielded questions for 40 minutes regarding the logistics industry.

Joshua began his presentation by asking if students were aware of his company or the services that they provide. After only one student raised their hand to signify that they were familiar with the company, Joshua then asked if any of the students shop at stores such as CVS or Walgreen's? Every student in the class raised their hand. Joshua then explained that McLane is the company that is responsible for shipping and delivering the products that customers see at both of those stores. He then provided a basic overview of the company and shared that it was founded in 1894, has over 20,000 employees, and is

worth over 50 billion dollars. In the Phoenix area alone, McLane has over 17 million dollars in sales each week.

After proving basic information about McLane, Joshua discussed then many different facets that go into shipping and logistics and the different careers that are available in his industry. He included an overview of information technology, accounts payable, shipping and receiving, transportations, inventory, connection to manufacturing, selecting, and loading. “What all of these different career opportunities have in common is the critical need to know college-level algebra and geometry,” Joshua stated. He began to provide various examples of how math is used on a daily basis with different job in his company and how math skills are required for employment.

Midway through his presentation, Joshua showed the students a model of a McLane semi-truck that was roughly 32 inches long. He then placed the model on a desk in front of him and informed the students that they would be engaging in a “real-life” activity to demonstrate how math is used on a daily basis at his company. He provided students with the dimensions of a standard semi-truck trailer, as well as the dimensions of a case of Butterfingers candy and posed this challenge, “can anyone tell me how many cases of Butterfingers we can fit in a trailer”? The students seemed at bit surprised at first that the presentation had become interactive, but they quickly got to work trying to solve the presented equation.

Stephanie Stewart-Reese, the instructor of the class, was very excited that the students were being challenged with a real-world math problem and asked Joshua if she could help the students to solve the problem? Joshua graciously agreed and a typical math class became a unique and organic learning experience for the students. Many students

began comparing their notes to try and determine a starting point, while others began asking their instructor and Joshua questions about specific details such as “can you stack the cases all the way to the ceiling,” and “what if there is trailer space left over”? Each question was answered, and the room began to get louder and louder as students engaged in trying to find an answer.

After roughly 10 minutes, two students provided the correct answer to the question. Joshua then asked the students if they could explain to the entire class how they arrived at that answer and the students approached the dry erase board at the front of the class to show their work. After demonstrating how they solved the problem, both students returned to their seats and Joshua resumed his presentation. “That was a real example of why you need to know algebra and geometry. I never thought that I would use algebra after high school, but I need to use it every single day” Joshua shared. He then expanded on the Butterfingers equation by informing the students that he often needs to leave additional room in the trailer for pallets and natural movement, then he proceeded to show the class how he incorporates percentages to ensure that there is enough open space for packaging and movement. He used 20% as his example and showed the students how he could reduce their answer by 20% to ensure that there was adequate space remaining in the trailer.

After answering any questions about the Butterfingers equation, Joshua then pivoted from his work experience and addressed the students in the room who were not necessarily interested in a career in shipping and logistics. He stated “I know that some of you are interested in working in a career like mine, and some of you are not, so let me provide you with a personal example from last weekend.” Joshua then proceeded to tell

the students that he had started a home project a few weeks ago to create raised flowerbeds in his backyard. After concluding the initial structure of the flowerbeds, he then needed to now determine who much dirt it would take him to fill them.

At this point, a student stated that they would "probably just buy a bunch of dirt at Lowes and then keep making more and more trips until they had filled the flowerbeds." Joshua then pointed out how expensive it would be to make multiple trips and how much time it would take away from family. His response resonated with the students and many nodded in agreement that it would be expensive and require additional time to make multiple trips instead of using math. Joshua then proceeded to demonstrated how he used geometry and algebra to determine the exact amount of dirt that he needed to buy, and shared photos with the students of the finished project.

Joshua concluded his presentation by stating that the skills that the students were learning are essential and will be needed in their careers and in life. He then asked if there were any additional questions. One student asked if McLane was currently hiring and Joshua responded "yes, we are always hiring people that have good math skills." Joshua then handed out information about employment at McLane and their tuition assistance program, encouraging the students to continue in their education and obtain a college degree. Another student asked how technology was used in his industry to assist with complex math equations. Joshua then provided an overview of how different computer programs are used to influence ideal routes, selecting products, and loading trucks. He then reiterated that technology assists in this process, but employees are still ultimately responsible for knowing this information and being able to complete complex math problems.

After the last question, the instructor asked for a “round of applause” for Joshua and thanked him profusely for the examples that he provided and for demonstrating how these skills are critical to success in business and in life. Joshua then thanked the class for their time and questions and provided each student with his business card and encouraged future dialogue if they had any questions or would like additional information about his company and how they utilize math.

Self-efficacy. The final phase of the innovation was self-efficacy. Bandura (1994) describes self-efficacy as “people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (p. 71). In the context of this research study, this relates to students’ belief in their ability to use the skills that they have acquired in their future employment. Throughout the first three phases of the innovation the students were told how their learning could transfer to future careers, the final phase of the innovation asked students to document their own interpretation of how their learning could transfer to their future careers. Pugh & Bergin (2006) state that “overall, research suggests that self-efficacy does indeed have a positive relation with transfer” (p. 154). Asking students to reflect on transfer not only reinforces the positive relationship between self-efficacy and transfer, it also provides students with an opportunity to identify additional examples of transfer that may be more specific to their identified career of interest.

In order to promote self-efficacy and to have student demonstrate the transfer opportunities between HSE curriculum and future careers, students were provided with an updated version of the *My Future Career* form (appendix D), asked for more specific information related to their desired careers/career fields (if needed), and then asked to list

a minimum of 10 different skills that they have learned during the semester and how those skills could transfer to their specific career or career field. This activity was conducted during the last month of the semester to ensure that students had encountered the vast majority of the curriculum and taken part in the industry expert presentations.

The four components of the innovation were designed to work in unison to help students to identify their career goals, learn about how each lesson plan can transfer to the students' desired career field, hear directly from industry experts about how those skills are critical to employment success, and finally, identify how their own capabilities and acquired skills can transfer to their employment goals as a means to increase their classroom engagement.

Instruments and Data Sources

My research design was an action research, mixed methods study, which included quantitative and qualitative instruments to develop a richer understanding of the problem of practice and the relationship between my innovation and problem of practice. Teddlie & Yu (2007) state that "multilevel mixed methods sampling strategies are very common in research examining organizations in which different units of analysis are ''nested within one another.'' In studies of these nested organizations, researchers are often interested in answering questions related to two or more levels or units of analysis" (p. 93). Figure 2 shows the sequential mixed methods that was conducted as well as the instruments that were used.

Figure 2**:** Connecting integration strategy of sequential mixed methods action research

Quantitative post-intervention survey. Following the completion of the innovation, all students remaining in the cohort took part in a survey to see if their feelings or perceptions had changed after the innovation. The survey consisted of 10 questions that were separated into two sub constructs, connection to career and engagement, and that directly relate to my research questions and the effect that perceived transfer has on student employability and engagement. All of the non-

demographic questions were based on a 4-point Likert scale that provided participants with the following options: strongly agree, agree, disagree, and strongly disagree.

The purpose of the survey was to measure students' perspectives on the effectiveness of the curriculum and how it may have directly affected their engagement in the class. The survey was printed out and brought to students twice during the last week of their class. All surveys responses were collected and entered into a Microsoft Excel spreadsheet that displayed an identifier code for each participant, and their responses to all survey questions were kept confidential in a locked office.

Quantitative attendance analysis. Attendance hours were recorded from the Arizona Department of Education repository that receives and validates student attendance hours through continuous monitoring and annual audits. Currently, students at Rio Salado Avondale are required to sign an official log of their classroom attendance each day which indicates what time they arrived, what time they left, how many total hours they were in class, and their signature (appendix C). Each instructor is required to review the attendance log daily to ensure that it is accurate, then provide their signature to certify its accuracy. Later that day, data entry staff input all of the attendance data into the Arizona Department of Education repository, as well as scanned copies of the attendance logs. This procedure was explicitly followed during the innovation.

To retrieve the data, I requested a formal report from the Instructional Coordinator of High School Equivalency programs at Rio Salado College, Philip Suriano. Philip holds credentials to access the Arizona Department of Education repository and run a report of attendance hour by individual class at Rio Salado College. This information provided the total attendance hours, average attendance hours by class, and

average attendance hours by individual student within each class. That data allowed me to compare the attendance data of the treatment group (the cohort receiving the innovation) to comparable groups of students at Rio Salado College who were taking the same course at other locations and without the implementation of the innovation. In addition, it also allowed me to compare the data to historical numbers related to other classes that had been previously offered by the same instructor but without the innovation.

Quantitative test score analysis. Test scores were reported by Pearson VUE testing centers that directly administered the HSE test to participants. Students can only take the HSE test at a certified Pearson VUE testing center, and their information is later made available to the locations that administered their test. Currently, all Rio Salado Avondale students take their HSE exam at the Pearson VUE testing center that is located within Rio Salado Avondale, and students who take the test at another location are required to have their results sent to the testing center at Rio Salado Avondale. The students' tests scores are typically provided to the location where the test is taken within one week from test completion. This research study specifically examined the math test scores since the innovation was specific to math.

30 days after the conclusion of the innovation, all HSE math test scores from Rio Salado Avondale were compiled into an Excel document and sorted to determine the passing rate of students who took part in the innovation. The results of the treatment group were then compared to comparable classes that did not take part in the innovation, and historical classes that were taught by the same instructor but did not participate in the innovation to identify inferences related to the research questions. Students are allowed to

take the HSE math test at any time, and many choose to wait longer than 30 days to attempt the test. For the purpose of this research study and the corresponding timelines, the test completion data was examined after 30 days. However, additional research could be conducted by examining later time intervals to see if the percentage of students who completed the test changed and how that may have impacted the statistical significance of the study.

Qualitative post-intervention focus group. A post-innovation focus group was conducted at the conclusion of the research on May, 12th, 2018. The focus group was comprised of four students who took part in the innovation and consisted of two men and two women. Two participants had been in the class since the beginning of the semester, and two of the participants had joined the class later in the semester. The purpose of these group interviews was to discuss the innovation, student engagement, transfer of learning, and how the innovation may have affected their engagement or outcomes. The responses from the focus group were compared to the quantitative data to make meta inferences, triangulate data, and to determine if and to what extent the treatment may have affected students.

Participants for the focus group were selected based on voluntary participation in the research. I conducted a presentation to the class to explain what the focus group interview was, why it was being conducted, what the potential benefits and risks were, and the parameters of the study. Students were then asked if they would like to consent to take part in the study. Four students volunteered to take part in the focus group, two of which had been in the class since the very first class session. In addition to those students,

two participants who joined the class later in the semester volunteered to provide their feedback in the focus group.

To conduct the focus group, I scheduled the use of a private office at the Rio Salado Avondale location to hold the focus group with the four students who had volunteered to take part. The group interviews were scheduled to last for 90 minutes after the last class session of the semester so that students did not have to make an additional trip to the location during summer break. Despite being scheduled for 90 minutes, the focus group lasted approximately 35 minutes due to short answers by the participants. The focus group interviews consisted of 10 open-ended questions to stimulate conversation and they concluded in approximately 90 minutes. Students were read the protocol which provided a comprehensive overview of the study (appendix E), their voluntary participation, confidentiality protocols, and information regarding audio recording. Participants were then informed that the audio from their interview would be recorded and later transcribed by the researcher to ensure that their answers were accurately captured.

Role of the Researcher

The role of the researcher was to create the intervention, invite the guest speakers, develop the slides, and observing the class and guest speakers. When conducting the student focus group, I served as an insider participant and an observer through conducting a focus group after the intervention as well as analyzing the quantitative data. Once the innovation was complete, I identified volunteers for group interviews, conducted the group interviews, then categorized the focus group data based on like-answers, and

analyzed the results. I was also responsible for documenting the results and determining the effectiveness of the innovation as well as answering the research questions.

Data Analysis

To effectively answer the research questions, I utilized quantitative and qualitative data in a sequential order to inform the design of the innovation, study the relationship of the treatment to the identified variables of the research questions, and draw broader, more in-depth conclusions by triangulating the data. An overview of the data analysis process is provided in this chapter to highlight the implementation and use of mixed methods.

Quantitative data. Quantitative data was collected from post intervention surveys, classroom attendance data, and HSE math test scores. The data was then analyzed through descriptive statistical procedures in SPSS to examine the relationship between demonstrated transfer of learning and multiple aspects of student success through determining the correlation coefficient of each variable. Statistical significance was also measured using a *t-test* and the reliability of the survey instrument was tested by conducting Cronbach's Alpha. These methods include all participants, $n=17$, with the exception of any students who did not complete the semester due to various reasons.

Qualitative data. Qualitative data was collected through a post-intervention semi-structured focus group consisting of volunteers from the treatment group. The goal of the focus group was to provide first-hand accounts about the innovation and to develop a greater understanding of survey results and student outcomes. Three levels of coding were utilized: in vivo line by line coding, code mapping, and "the trinity" through the use of the constant comparison method to compare codes and data in order to develop a

conceptual model including all of the theoretical codes. The first stage of coding utilized in vivo coding. Charmaz (2014) states that within a grounded theory framework, researchers use the participant's language when creating codes to attempt to capture the true meaning of the participants. These codes are referred to as in vivo codes (P. 134). I selected in vivo coding to try and capture the true intent of the participants.

The second cycle of coding that I utilized was code mapping. I examined all of the unique codes (66 total codes were identified) to find central themes that aligned under a shared description. I was able to identify like items and create a map that directed how similar items related to one another and could best be described within a centralized theme.

Finally, I selected three major themes are considered their relationship to one another by examining the study's "trinity." Saldana (2015) describes the use of "the trinity" as a way to identify the study's apex or dominate theme and how if may interrelate or impact the other two prominent themes. A researcher captures the three main themes that emerged from the first two rounds of coding, and then writes the themes down on individual sheets of paper and arranges the sheets of paper into a triangle to consider which theme may be dominant or how the themes may relate (p.187). I accomplished this by identifying the three major themes that emerged from the focus group, writing each theme on a separate sheet of paper, then arranging and rearranging them into different triangle combinations until I reached a conclusion as to how the themes were interrelated and impacted one another.

Limitation, Validity, Reliability, and Strengths

Limitations. There are three prevalent limitations within this research study, a small sample size, insider positionality, and students entering and exiting the program at multiple times. The sample size was relatively small due to the design of the research and the low enrollments that the Rio Avondale location experienced during the innovation. The low enrollments posed a challenge to the design of the study because the research questions asked whether or not the intervention that a treatment group received influenced student attendance and completion rates as compared to a standard HSE cohort (control group). To address this issue, the design was slightly modified to compare the treatment group to all other HSE math classes that were being taught at Rio Salado College the same semester that the research was conducted, as well as the instructor's previous classes at the Rio Salado Avondale Location.

The second limitation was positionality as an insider and the risk that student responses may be skewed as a result. Some students may have wanted to provide an answer that they believe I wanted to hear as opposed to providing authentic responses. They may also have provided skewed information based on my ability to address additional concerns that they may have had unrelated to the innovation.

The third limitation was that HSE classes at Rio Avondale enroll new students each month depending on need and classroom availability. This meant that there were students who experienced less of the innovation than their classmates who began the semester in the treatment group. This limitation means that students may have experienced less or more of the innovation than other students in the class. This limitation was addressed when two of the students who volunteered for the focus group had been in

the class for the entire duration, and the other two joined later in the semester. All students selected had varied numbers of attendance hours in the class.

Validity. Kavale (1995) states that the validity of insider research is threatened by the researcher's direct involvement with the subject of study. However, Tierney (1994) states that from an anti-positivist perspective, insider research has the potential to increase validity due to the added honesty and richness of responses that can be garnered by an insider who has established trust with the participants. Cohen, Manion, & Morrison (2000) state that a critical strategy when conducting insider research is to ensure process transparency and present findings in a way that allows readers to construct their own perspectives.

My strategy for addressing the perceived limitations of an insider positionality was to conduct a post–intervention focused group interview based on voluntary participation, ask open-ended questions in semi-structured interviews, and then utilize line by line coding to ensure that student responses dictated the formation of focused coding categories and conclusions. The student responses were then examined with the quantitative methods to triangulate the data. In addition, students were encouraged to share their feelings without fear of reprisal or consequence for doing so. While it may not be possible to prove absolute validity, the steps that were taken in this research process attempted to ensure that students' responses were accurately recorded and presented to the reader without alteration.

Quantitative data such as test scores and attendance were collected from external sources that do not have a vested interest in the outcomes. Test scores were reported by Pearson VUE testing centers that directly administered the HSE test to participants.

Attendance hours were downloaded directly from the Arizona Adult Education Management System that receives and validates students' attendance hours through continuous monitoring and annual audits. "Validity is the most important idea to consider when preparing or selecting an instrument for use. More than anything else, researchers want the information they obtain through the use of an instrument to serve their purposes" (Frankel & Wallen, 2005, p. 153).

To address the limitation that some students may join the treatment group later in the semester, those individuals were provided with the same materials as their classmates and the only significant difference was that they had less reinforcement from the innovation due to limited lesson plan explanations, and some participants who joined the class later in the semester did not see all of the guest speakers.

The final threat to validity was a *novelty factor*. Students in the treatment group had two different guest speakers who are industry leaders visit their classroom, they took take part in identifying their future careers and accessed career services, and they had additional information related to potential transfer of learning presented to them before the start of each lesson. As a result, students in the treatment group may have behaved or performed differently because their experience in the treatment group was different than other HSE cohorts. While there is not a specific way to address the novelty of the innovation design for the treatment group, considerations were given to account for this such as the use of quantitative and qualitative to ensure that the data was not exclusively dependent on student feedback.

Reliability. "Reliability is a measure of how consistent the results of using a measurement instrument (e.g., a test, questionnaire) will be. Reducing 'random' error in

questionnaires by removing ‘quirky’ questions or changing their arrangement improves reliability” (Diem, 2004, p. 5). Nunnally & Bernstein (1994) State that an instrument cannot be valid unless it is reliable. Therefore, close attention was given to reliability. Cohen & Swerdlik (2010) state that calculating alpha has become common practice when multiple-item measures of a concept or construct are employed. Utilizing SPSS 24, I imported my student survey from an Excel document and measured Cronbach’s alpha (*a*) for each construct, as well as for the entire survey (with the exception of demographic questions) to test the reliability of the instrument.

While reliability was measured using the methods previously described, the small sample size may only provide an initial overview from a very limited population. However, that information could still be used to develop and guide future research that examines similar constructs within larger student populations.

CHAPTER 4

DATA ANALYSIS AND RESULTS

Chapter Overview

Chapter 4 consists of analysis and results from the mixed methods action research that was conducted at Rio Avondale during the innovation. This chapter will discuss how the student innovation was conducted in regard to obtaining career interest, the content that was shown to students, guest speaker visits, and how these actions and the research inquiry around them addressed the research questions of this study:

1. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence HSE math section completion rates and how does it compare to a standard HSE cohort?
2. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence student attendance as compared to a standard HSE cohort?
3. How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence students' perception of their level of engagement?

Research Overview

To answer the research questions in this study, I developed an innovation that would demonstrate to HSE math students how their learning will transfer from their class to their future careers. The innovation began with developing an understanding of what careers participants had interest in, and then working with industry leaders in those career fields to inform students how their learning would transfer to the careers they were

interested in. This was accomplished by developing PowerPoint slides that featured industry experts explaining how each HSE math lesson provided critical content that the students would need to know in their industry, and by industry experts coming to speak directly to the class about the same topic.

17 students signed up for an HSE math class that would be offered on Tuesday and Thursday mornings at the Rio Salado Avondale location between January and May of 2018, which accounted for 18 weeks of instruction and 126 in-person instructional hours. Additionally, all students were provided access to online math resources that would also be calculated into their attendance hours. There were no limits placed on the number of online math hours that students could complete, meaning that students could have a very high number of instructional hours (in-person and online combined) if they completed a high number of online hours.

All students who signed up were informed that the class that they would be attending would be part of a research project. Each student was read the research protocol and signed the form indicating that they were willing to be part of the research study. On the first day of class, each student was asked to complete a *My Future Career* form that would capture their career interest. This information was then used to identify which career fields needed to be represented in the innovation to ensure that the slides and guest speakers provided examples of transfer that were meaningful to each student.

Research Question 1

> How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence HSE math section completion rates and how does it compare to a standard HSE cohort?

To answer research question 1, three different groups were assessed and compared to one another to determine how and to what extent participating in the innovation influenced HSE completion rates. The three groups consisted of the "treatment group" that received the innovation, and comparisons included all of the instructor's previous math classes at the Rio Salado Avondale Location from the previous two years, as well as all of the HSE math classes that took place at Rio Salado College at the same time that the innovation took place (excluding the treatment group). The research was structured this way to account for multiple variables that could influence the research. For example, the instructor from the innovation could potentially be more engaging than other instructors, or other personal instructional variables could positively skew the data results. Therefore, in addition to the program overall, the treatment group needed to be compared to similar math classes that the instructor had taught before to ensure that this variable was addressed.

Another potential variable that had to be considered was unexpected or uncommon instances that occurred during the semester that the innovation was taking place. An example of this would be if the passing score of the HSE exam had changed during the semester. This would have positively or negatively affected HSE completion rates and made it difficult to compare the treatment group exclusively to the instructor's previous classes. Comparing all Rio Salado HSE classes during the same semester that the innovation occurred addresses this issue and shows an accurate comparison between the treatment group and similar classes that were being conducted during the same time period.

At the completion of the innovation, I accessed the Arizona Adult Education Data Management System (AAEDMS) to review HSE completion totals and percentages for each of the groups that have been discussed: the treatment group, the instructor's previous math classes at the Avondale location, and all HSE math classes at Rio Salado College that occurred during the semester that the innovation occurred (excluding the treatment group). The AAEDMS is a database that all Department of Education-funded adult education providers in Arizona are required to use. The system captures attendance data, educational gain, HSE completion rates, total student enrollments, demographic information, and many other data points related to adult education. Each program is responsible for entering data daily, and all data is audited annually to ensure its accuracy.

Table 1 shows the total number of HSE math section completions and the percentage of students in each group that passed the math section of the HSE test. The treatment group class size was comparable to other HSE classes which typically have 15-20 students.

Table 1.

HSE Completions Comparison

Math Classes	Students	Completions	Avg. Completions Per Group
Treatment Group	17	3	17.6%
Instructor's Previous Classes	321	59	18.3%
All HSE Math Classes at RSC	4259	432	10.1%

Data provided by the Arizona Adult Education Data Management System

Table 1 shows that 17.6% of students in the treatment group passed the math section of the HSE test within one month of the conclusion of the innovation. This

percentage is noteworthy in that it is higher than the percentage of students who passed the math section of the HSE test in all other HSE math classes at Rio Salado College. While the sample size is quite small, this may indicate that the students who participated in the innovation were more likely to complete the math section of the HSE than similar students who did not take part in the innovation.

Table 1 also shows that 18.3% of the instructor's previous students obtained their HSE, yet it is difficult to compare that percentage to the treatment group due to limitations within AAEDMS. The AAEDMS shows the students who have passed the math section of the HSE test regardless of when they passed it. As a result, the instructor's previous classes have had significantly more time to pass the HSE math test than the treatment group and all other HSE classes at Rio Salado College during the same semester that the innovation took place. Despite the fact that all of the students in the instructor's previous classes have had more time to complete the math section of the HSE test, the percentage of students in the treatment group and the instructor's previous classes who completed the math section of the HSE test was nearly identical. The nearly identical completion rate, despite being at a disadvantage to the comparison groups in having less time—may be of practical significance in the context of the program as well as promising for further work seeking to enhance engagement toward greater completion.

To compare HSE math section completion rates, test for statistical significance, and test the null hypothesis that there is no statistical difference between the groups, I ran a two-sample *t*-test between percentages. I compared the 17.6% completion rate of the 17 students (n=17) in the treatment group against the 18.3% completion rate of 321 students (n=321) in the instructor's previous classes as well as the 10.1% of 4259 students

(*n*=4259) in other HSE math classes at Rio Salado College. The *t*-test revealed a significance value of 0.9421 (*p*=0.9421) when comparing the treatment group to the instructor's previous classes, and a significance value of 0.3064 (*p*=0.3064) when comparing the treatment group to all other HSE math classes at Rio Salado College.

A correlation level of $p \leq 0.05$ would have indicated a 95% confidence interval to suggest that these increased results were not due to random chance, which means that my results (*p*=0.9421 and *p*=0.3064) indicate that the results from the treatment group were not significantly different from either control group and that a random error in the data could be responsible for the variance in completion rates. This indicates that while the initial results from this data were potentially meaningful for the purpose of this research study, they were not statistically significant. It is important to emphasize that the results still do have potential practical significance, even if statistical significance could not be found. Given that there was an increased number over the program's averages. Also, given a small sample size of $n = 17$ in the treatment group, attaining statistical significance would be challenging at best. Thus, the null hypothesis that there is no statistically significant difference between the treatment and control groups is valid—yet the results remain interesting in the context of this and future research in this area.

Research Question 2

> How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence student attendance as compared to a standard HSE cohort?

To answer research question 2, three different groups were assessed and compared to one another to determine how and to what extent participating in the

innovation influenced student attendance. The three groups consisted of the "treatment group" that received the innovation, all of the instructor's previous math classes at the Rio Salado Avondale Location from the previous two years, and all of the HSE math classes that took place at Rio Salado College at the same time that the innovation took place (excluding the treatment group). The research was structured this way to account for multiple variables that could influence the research. For example, the instructor from the innovation could be more engaging than other instructors and as a result, students may attend more regularly than in other classes. Therefore, the treatment group needed to be compared to similar math classes that the instructor had taught before to ensure that this variable was addressed.

Another potential variable that had to be considered were any specific instances that occurred during the semester that the innovation was taking place that could have affected attendance. An actual example of this occurred with the Arizona Teacher Walkout that left many parents without childcare for their children (Snow & Tang, 2018). As a result of not having childcare, many parents were unable to attend HSE classes for one week which impacted student attendance data. Comparing all Rio Salado HSE classes during the same semester that the innovation occurred addresses this issue and shows an accurate comparison between the treatment group and similar classes that were conducted during the same time period.

Table 2 shows the average attendance hours per student from each of the groups that have been described. Attendance hours are calculated in AAEDMS as the hours that students physically spend in the classroom as well as any hours that they spend participating in online practice math resources provided by the Arizona Department of

Education. The table below shows the average attendance hours per student in each group.

Table 2.

Average Attendance (per student) Comparison

Math Classes	Avg. Attendance Hours
Treatment Group	130.25
Instructor's Previous Classes	86
All HSE Math Classes at Rio Salado College	92

Data provided by the Arizona Adult Education Data Management System

Table 2 shows that students who participated in the treatment group averaged 130.25 attendance hours for the semester, compared to an average of 92 attendance hours for students in all other HSE math classes at Rio Salado College during the same time span. This means that students who participated in the innovation had, on average, over 38 more attendance hours than students who did not received the innovation. In addition, students who took part in the innovation averaged over 44 more attendance hours than the instructor's previous classes at the same location. This indicates that students in the treatment group attended class more frequently and/or utilized online practice math resources more frequently than either of the comparison groups. This substantive increase is promising with respect to the potential of this (or similar) innovations designed to heighten student engagement and is meaningful in the context of these findings.

As was stated in chapter 2, engagement is defined in this study as the occurrence of high concentration, participation, enjoyment, and active interest in learning activities

simultaneously occurring (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003). The number of attendance hours demonstrates participation in learning as well as an active interest in learning since there are no penalties for students who do not attend class or access online practice math resources. For these reasons, the results in table 2 clearly show that students who received the innovation may have been more engaged than previous classes that the instructor had taught as well as all other HSE math classes at Rio Salado College that were taught during the same semester as the treatment group. Participation in the innovation may have increased the average number of attendance hours and thus by proxy, may suggest the overall engagement of participants.

While the results stated above are encouraging for inferences and the potential for future research, it does not mean that the results were statistically significant, particularly given the small sample size of the treatment group. To compare HSE attendance hours, to test for statistical significance, and to test the null hypothesis that there is no statistical difference between the groups, I ran a one-sample *t*-test by dis-aggregating data from the treatment group (n=17) and comparing it to the mean of the instructors previous classes (n=321) as well as all other HSE math classes at Rio Salado College (n=4259). The *t*-test revealed a significance value of 0.0537 (p=0.0537) when comparing the treatment group to the instructor's previous classes, and a significance value of 0.0907 (p=0.0907) when comparing the treatment group to all other HSE math classes at Rio Salado College.

A correlation level of $p \leq 0.05$ would indicate with 95% certainty that the results could not have occurred otherwise through random error, which means that my results (p=0.0537 and p=0.0907) indicate that the results from the treatment group were not quite statistically significantly different from either control group and that a random error in

the data could be responsible for the variance in completion rates. This indicates that while the initial results from this data were potentially meaningful for the purpose of this research study, they were not statistically significant. Thus, the null hypothesis that there is no statistical different between the treatment and control groups is valid. However, it must be noted that the small sample size (n = 17) may likely have affected these results and a p value of 0.0537 is a borderline value that approaches statistical significance. This is again, meaningful in this context for the results, and when taken with the clear differences in attendance hours between groups, and the small sample size of the treatment suggests that the results are promising and are of practical, if not statistical in this case, significance.

Research Question 3

> How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence students' perception of their level of engagement?

For the purpose of this study, engagement was measured in two different ways: a student engagement survey that captured student feedback on how engaged they were in the curriculum, and a student focus group. The results of both indicated that students were highly engaged as a result of their participation in the innovation and that demonstrating how their learning could transfer from an HSE math class to their future careers specifically impacted their level of engagement. These results will be presented in the following sections, in addition to the reliability of the survey and the methods used to conduct the student focus group and the student engagement survey.

Reliability of the survey. To develop a deeper understanding of quantitative research and to test the reliability of the survey, I piloted the student survey with 12 participants (*n*=12) in 2017 in preparation for my dissertation research. All participants were former students in the general education diploma (GED) program at Rio Salado College and who are now enrolled in college. Former students were selected because of their intimate knowledge of the program and how other students may interpret the instrument. The survey consisted of 15 total questions, five regarding demographic information, and 10 that were specific to vocational skills training being incorporated into GED curriculum. The 10 questions were separated into two sub constructs, connection to career and engagement, and were directly related to my research questions and the effect that infusing vocational skills training has on potential transfer and engagement. All of the 10 (non-demographic) questions were based on a 4-point Likert scale that provided participants with the following response options: strongly agree, agree, disagree, and strongly disagree.

The purpose of the survey was to measure former students' perspectives on the effectiveness of the curriculum and how it may have directly affected them. The survey was conducted via surveymonkey.com, an online survey website that sent email invitations to Rio Salado college students who completed their GEDs in the last 24 months and who were willing to take part in the survey. All surveys responses were collected and entered into a Microsoft Excel spreadsheet that displayed an identifier code for each participant and their responses to all survey questions. All 12 participants completed the entire survey and provided responses for each question.

Prior to employing my survey to a large group of current students, I first had to study the reliability of my instrument. Nunnally & Bernstein (1994) state that an instrument cannot be valid unless it is reliable. Therefore, close attention must be given to reliability. Cohen & Swerdlik (2010) state that calculating alpha has become common practice when multiple-item measures of a concept or construct are employed. Utilizing SPSS 24, I imported my survey results from an Excel document and measured Cronbach's alpha (*a*) for each construct, as well as for the entire survey (with the exception of demographic questions). Table 1 shows the results from the measured Cronbach's alpha.

Table 3

Career and Engagement Student Survey Estimates of Internal-Consistency Reliability (n=12)

Construct	Within Construct Items	Coefficient Alpha Estimate of Reliability
Connection to career	Items 1-5	.817
Engagement	Items 6-10	.719

Overall Alpha	Items 1-10	.854

Plano Clark and Creswell (2010) state that "the scores for all questions should relate to each other at a positive, high level", where Cronbach's alpha (α) is equal to 0.7 – 1.0 (p. 190). My first sub construct, connection to career, produced a coefficient alpha estimate of reliability of .817 (*a=.817*), which was higher than the second construct of academic motivation (*a*=.719). However, both scores fell within the recommended range of 0.7 – 1.0 and the combined total alpha was .854 (*a*=.854). These results indicate that

the survey questions were moderately high to highly related. This is critical to the reliability of my instrument and to the assertions of Tavakol & Dennick (2011) that "alpha is an important concept in the evaluation of assessments and questionnaires. It is mandatory that assessors and researchers should estimate this quantity to add validity and accuracy to the interpretation of their data" (p. 53)

Considering the results of the Cronbach alpha (a=.854), I determined that there was not an immediate need to remove or significantly modify the survey questions. However, at the end of the survey, students were asked if they had any questions or recommendations regarding the survey that could help to improve it. Two students mentioned that the term "vocational skills" was confusing and asked if it was different than "job skills." These comments presented a keen insight; the two terms had been used interchangeably throughout the survey without any specific definitions or differentiators being provided. In response, I replaced all references to vocational skills with job skills prior to administering the survey to the treatment group. My rationale in doing this was to address participant concerns, provide more clarity, and utilize a more common term.

Survey results. After verifying the reliability of my survey through the use of Cronbach's alpha and changing the term vocational skills to job skills, I scheduled a time that the survey could be administered to the class. The instructor informed me that the week before the last day of class would be the best time since some students had already indicated that they would not be there during the last week of the class. Following the instructor's recommendation, I traveled to the class and distributed paper copies of the survey one week prior to the last day of class. Due to low attendance on that day, I came back a second time that week when more students were present and repeated the process

with any students who were not in class earlier that week. All students were informed that participation in the survey was completely optional, and that their results would be confidential.

Between the two class sessions, 12 surveys were completed and returned to me. Once the survey were completed, I returned to my office and utilized an Excel spreadsheet to track the total number of "strongly agree," "agree," "disagree," and "strongly disagree" responses that I received for each question. These totals were then divided by 12 (*n*=12), for each question to determine what percentage of students selected each response. This allowed student responses to be aggregated into usable data that could inform the general perceptions of the class. As was stated above, the survey was divided into two different constructs, connection to career and engagement, which allowed the results to be separated and inform different research questions or themes within the research. Connection to career construct results will be discussed in Chapter five, engagement construct responses frequencies are presented below:

Table 4

Student Engagement Construct Response Frequencies

n=12	Response Frequency Percentages			
Item	Strongly Agree	Agree	Disagree	Strongly Disagree
Q7. I feel confident as a student as a result of my participation in this class.	50%	50%		
Q8. I enjoyed	25%	67%	8%	

coming to class.				
Q9. I was excited about the topics that I was learning.	17%	42%	33%	8%
Q10. What I learned from this class was important to me.	67%	25%	8%	
Q11. I enjoyed the topic that I was learning about.	9%	8%	75%	8%

Question seven stated "I feel confident as a student as a result of my participation in this class." 100% of students stated that they "strongly agreed" or "agreed" with this statement. This result indicates that all respondents believed that their participation in the class made them more confident as students. This result is interesting because it suggests that participation in the innovation may have prompted engagement which lead to confidence. This result is also significant when compared to the findings of Johnson & Frank (2013) which stated that HSE learners often experienced educational failures prior to joining adult basic education programs and lack confidence in their ability to learn.

Question eight stated "I enjoyed coming to class." 92% of respondents indicated that they either "strongly agreed" or "agreed" with this statement. This result shows that the vast majority of students enjoyed coming to class. Engagement is defined in this study as the occurrence of high concentration, participation, enjoyment, and active interest in learning activities simultaneously occurring (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003). Student excitement falls within the definition provided

above and indicates that we can extrapolate that 92% of students were engaged in the class based on their reporting here.

Question nine stated “I was excited about the topics that I was learning.” This question produced a split between students agreeing or disagreeing with the statement. 59% of students “strongly agreed” or “agreed” with the statement while 41% “disagreed” or “strongly disagreed” with the statement. This result may be due to each student’s individual interpretation of the questions. The innovation combined traditional math curriculum with information regarding how their learning could transfer to their future careers. Student responses to question nine could be in response to the examples that students were provided from industry experts on how their learning could transfer, or it could be related to the traditional math curriculum. Since this question had a mix of both positive and negative responses, it provides an interesting construct for future analysis and additional consideration. It is difficult to tell from the Likert-type scale data what prompted these responses regarding excitement (or lack of, in some cases), yet this may reflect a need to better understand how excitement connects from engagement in this context or to direct further inquiry in the future.

Question 10 stated “what I learned from this class was important to me.” 92% of students responded that they “strongly agreed” or “agreed” with this statement. This result shows that students in this context believed that the course content was of value, but it does not demonstrate what they specifically found to be important. As was stated above, the innovation combined traditional math curriculum with information regarding how their learning could transfer to their future careers. Student reactions to question 10 could be in response to the examples that students were provided from industry experts

on how their learning could transfer, or it could be related to the traditional math curriculum. However, survey responses are subjective to each respondent and their personal interpretation of the question. Regardless of the individual reasons that students believed that the course was important to them, question 10 demonstrates that 92% of students found value in what they learned.

Question 11 stated "I enjoyed the topic that I was learning about." 9% of students strongly agreed with this statement, 8% agreed, 75% disagreed, and 8% strongly disagreed. This question received the single highest percentage of selections to any one response, with 75% of participants disagreeing with the statement, and also produced the most negative response of any of the questions, with 83% of students selecting "disagree" or "strongly disagree." This indicates that the vast majority of respondents did not enjoy learning about math. This finding is consistent with national data that shows that students tend to dislike math more than other subjects, and in some cases take pleasure in their hatred of math (Whyte, Julie, Anthony & Glenda, 2012). Research also shows that students are less likely to be embarrassed by poor math skills than poor English skills (Latterell, 2005), which may also to contribute the negative response to this question and student's openness to overwhelming state that they do not enjoy learning about math.

While perception regarding math and a student's willingness to state that they do not enjoy math may have impacted the responses, this result is still interesting when compared to the results from question eight, "I enjoyed coming to class." 92% of the responses to question eight were either "strongly agree" or "agree." The responses from question eight and question 11 indicate that the majority of participants were excited to come to class despite the fact that they do not enjoy learning about math. This may imply

that participation in the innovation increased engagement for students who do not enjoy learning about math.

Observations. The survey data indicates that the majority of students in the treatment group provided positive responses when asked about their excitement of coming to class, their level of confidence, and the importance of what they learned. These results sharply contrast the assertion from nearly all participants that they do not enjoy studying math. This feedback may indicate that the innovation was responsible for increasing levels of engagement, confidence, and the value that students placed on what they learned. I interpreted the data to mean that students found value in the class and in many instances actually enjoyed coming to class despite learning about a subject that they (based on their own reports) do not enjoy.

Focus Group

The participants in the group interviews were five students who took part in the innovation. The group was comprised of individuals over the age of 18 from diverse ethnic and cultural backgrounds. These students had not obtained their high school diploma and had enrolled in HSE math classes at the Rio Salado Avondale location to take HSE preparatory. Participants were comprised of four students, two identified as female and two identified as male. All participants were between the ages of 19 and 44. Three of the four participants identified as an ethnic minority, and two stated that English was their second language. All four of the participants had completed a minimum of 40 instructional hours and three of the participants had over 80 hours of instruction in the treatment class.

Participants were selected based on voluntary participation in the research. I conducted a presentation in the treatment class one week prior to the end of the semester and explained what the focus group was, why it was being conducted, what the potential benefits and risks were, and the parameters of the study. Students were then asked if they would like to consent to take part in the study. The first four students who volunteered from the class were selected. These students were then provided with the location and time of the focus group, as well as my email address that they could use to ask any follow up questions or to inform me if they need to reschedule. Not all of the discussion prompts in the focus group were specific to engagement, however, this section will only address the prompts and responses that were specific to perceived student engagement in order to answer the research question.

Procedure

To conduct my research, I scheduled the use of a private office at the Lifelong Learning Center and conducted a focus group interview on a Thursday afternoon. The focus group began at 12:00 p.m. which was the same time that the students' class ended. This allowed students to transition directly from class into the focus group while the concepts and curriculum were fresh in their minds. This also allowed students to attend the focus group without needing to make an additional trip to the location. The focus group consisted of 10 open-ended questions (Appendix G) that were expected to take approximately 60-90 minutes but was completed in approximately 35 minutes due to short answers by participants, some participants choosing not to respond to each of the discussion prompts, and one participant receiving a phone call and leaving midway through the focus group.

As part of the procedure, students were read the protocol which provided a comprehensive overview of the study, their voluntary participation, confidentiality protocols, and information regarding audio recording. Participants were informed that the audio from their interview was going to be recorded in order to ensure that no details were missed and that their comments were accurately captured; the audio recording would then be transcribed by the researcher to ensure that their answers are accurately recorded.

To record the responses from the focus group I utilized a digital audio recorder and took notes as a backup to the recording. After the focus group concluded, I went back to my office and transcribed the responses word-for-word and then began the process of coding each line to identify the common themes that emerged from the data through the use of grounded theory. Three levels of coding were utilized: in vivo line by line coding, code mapping, and "the trinity" through the use of the constant comparison method to compare codes and data in order to develop a conceptual model including all of the theoretical codes.

The first stage of coding utilized in vivo coding. The second cycle of coding that I utilized was code mapping. I examined all of the unique codes (66 total codes were identified), to find central themes that aligned under a shared description. I was able to identify like items and create a map that directed how similar items related to one another and could best be described within a centralized theme.

Finally, I examined the study's trinity by identifying the three major themes that emerged from the focus group, writing each theme on a separate sheet of paper and arranging them into a triangle. From this exercise, I determined that demonstrating how

student learning will transfer increased the participants' perceived engagement. This occurred through demonstrated transfer of learning to careers that were of interest to participants, and through transfer of learning to various non-career situations that students found to be meaningful. Non-career situations as well as career-specific examples of transfer both contributed to a greater level of engagement.

Preliminary Findings and Implications

The two most significant findings from the student focus group were that ***students believed that the skills that they had learned in the class would transfer,*** and that the ***perceived transfer increased student engagement***. These finding came from a range of student responses including 16 specific responses that were coded as "career transfer" or "life transfer," and 12 additional responses that were coded as "engagement." Focus group participants provided multiple statements to various discussion prompts that supported these findings, including statements from all four participants that indicated that they learned skills in the class that they would use in other aspects of their lives.

Students believed that the skills that they had learned in the class would transfer. Discussion prompt three asked students "Do you think that you will use the skills that you learned in your future career? Why or why not"? This question was critical to the research because if students did not perceive that their learning would transfer, then the premise of the research question would be flawed. If students did not believe that their learning would transfer then the research question could not have been answered because students did not perceive that their skills could transfer and therefore and engagement could not be measured. However, all four participants in the focus group

responded that they will use the skills that they learned in the class in their future careers, thereby validating the innovation and the research questions.

Participant four stated that "math is everywhere," and that they would "absolutely need it as an RN." Participant three stated that they already use math in their current job, but that they will "need to know even more math in my next job." Participant three's response demonstrates that the innovation was successful in conveying the need for math skills in the career fields that were presented throughout the semester. The participant acknowledged that math skills are needed in their current job, but emphasized that they will "need to know even more math" in their future career. This indicates that the innovation successfully conveyed the necessity for math skills in the different career fields that were presented to students through the slides and guest speakers.

Participant two also stated that the math skills that they had learned in the class would be critical in their future employment. Participant two also provided specific examples of the math skills that they anticipate using in their future career and stated "I know that I will need to use percentages and ratios [in their future career]." This response shows a deep level of understanding and reflection regarding how their learning in the class will transfer into their future career. The granular level of detail provided by participant two also shows that the content provided in the slides and by the guest speakers impacted the student's belief that their learning will transfer since the specific skills stated by the participant were the same skills that were stated in the slides.

Participant four also shared specific examples of how they anticipate that their learning will transfer to their future career after participant two stated specific math skills that they anticipated using. In addition to their initial statement that "math is everywhere,

I will absolutely need it as an RN," participant four concurred with participants two's statements and stated "as an RN you have to measure dosages and know what you are doing." This statement demonstrates that the example provided by the industry expert, Debbie Flores, resonated with the student and they retained Debbie's example of how measurements are used in a hospital setting. Participant four's previous statement that "math is everywhere," also demonstrates that they retained the information that was shared by Debbie Flores. As was stated earlier in this chapter, Debbie emphasized to the class that "math is everywhere," and participant four restated that assertion without being prompted to do so, again showing that the message resonated with the student.

Observations. I was very surprised by the level of detail that students provided in regards to the content that they retained from the guest speakers. While it had always been my belief that students would be interested in the examples of transfer the industry experts provided, I had not anticipated that students would be able to recall specific examples of transfer, the mathematical concept that the example was connected to, and then share why the example was personally meaningful to them. This level of detail and self-efficacy demonstrated to me that the guest speaker visits were very important to the students and that the activity likely increased their level of engagement in the course.

Perceived transfer increased student engagement. Discussion prompt four asked participants "did you feel engaged in class? Why or why not"? All four participants stated that they felt engaged in the class, although the reasons that they felt engaged varied. Participants two, three, and four all specifically mentioned their instructor as the primary reason that they were engaged in the class. Participant two stated that "Stephanie

(the instructor of the class), was so upbeat and positive." Participant four shared that "she (Stephanie) was always over-the-moon about everything that she taught."

While the instructor's interaction and enthusiasm were critical components to the success of the innovation, it was clear that students often cited their instructor as a broad term to also describe curriculum, guest speakers, industry examples, etc. This is likely a result of the student's perspective that anything being presented to them in the class was developed and presented by their instructor. An example of this would be a broader statement that participant four shared, after stating that their instructor was "over-the-moon about everything that she taught," participant four went on to say that "she (Stephanie) was always willing to bring examples of why things mattered or how you will use them in real life." This statement was key in that it demonstrated that students viewed the instructor and the innovation as being one in the same, and that their statements regarding their levels of engagement were not exclusively impacted by the instructor, but rather by the totality of the innovation.

Discussion prompt seven asked students "did the guest speakers impact your experience in this class? If so, how"? Participant four quickly chimed in and shared his feelings regarding the visit by Joshua Peters. Participant four stated "he (Joshua) showed us that math is in everything. Knowing that he legitimately uses it [algebra and geometry] every day was nice to see, you learn from it in a way." This statement demonstrates that the participant not only remembered the guest speaker, but that they also reflected on the examples that were provided and felt that they had learned from them by stating "you learn from it in a way." Participant one stated "yes, the speakers were great, some of it really had a lot to do with what I want to do in life." The participant went on to say "but

even if they weren't talking about things connected to me, it was still good information to hear and really interesting."

Participant one's statements indicated that they found the information to be personally applicable to their future career interest, but that they also found value in hearing career examples from industries that they had not expressed personal interest in. Participant two shared a similar statement, "it's really nice to know that this [HSE math class] isn't all a waste of time. They [the industry experts] showed how this [HSE math skills] are actually being used every day. We're not wasting our time." Participant one's statements were in reference to the guest speakers in general as opposed to only the guest speaker that represented their desired career field. This may indicate that some students became engaged in the course content by seeing examples of transfer regardless of whether or not it is an industry that they are specifically interested in.

Discussion prompt eight asked the participants "Did the PowerPoint slides that described how your learning could transfer to a future career impact your experience in class? If so, how"? The participants provided diverse answers to this discussion prompt, which will be discussed in greater detail in chapter 5, including providing examples of slides that were not shown to the students. However, all of the participants did state that the slides impacted their experience in the class. Participant two responded to the prompt by saying "oh yeah, absolutely. They showed the reality about different situations. You don't really think about it [how the learning transfer] until you see it." This comment demonstrates that the participant would not have identified how their learning could transfer without the innovation being implemented. By stating "you don't think about it until you see it," the participant is explaining that they would not have made the

connections regarding how their learning could transfer without it being presented to them.

Participant four stated “when she would do that [show the PowerPoint slides] it was great. Really helpful to see how things are actually used.” Participant four’s statements also demonstrate that they found value in the slides and that they were “really helpful.” This also indicates that students appreciated seeing examples of how their learning can transfer to different careers that they may or may not have interest in.

Discussion prompt nine asked the participants “did selecting a career and identifying how your learning can transfer to that career impact your experience in the class? If so, how”? Participant four stated “I don’t know everything that is required [for their desired career], but I know that I’m going to need the stuff that I learned in this class.” Participant two stated “absolutely, we weren’t wasting our time learning this, we need it.” Both responses demonstrated that identifying a desired career and seeing examples of how the math skills that they are learning in their HSE class will be needed in their future careers. Participant two’s statements are also significant in that they demonstrate that the participant was engaged in the course and that they were not “wasting their time.”

The information that was provided in the focus group shows that students believed that the skills that they had learned in the class would transfer, and that the perceived transfer increased student engagement. These results support the initial findings in the student engagement survey and triangulate the data by affirming the same results that were shown in quantitative and qualitative analysis. These results provide a clear answer to research question three. Participating in a class that demonstrates how

learning can transfer to a future career increases student engagement by establishing personal connection between the student's individual career interest and the skills that they are learning in the class. It also demonstrates that any examples of how the learning can transfer to careers are useful to students in that they interpret all examples as being a form of assurance that the information that they are learning is meaningful and not a "waste of time." This feeling of meaning also contributed to the overall level of student engagement.

Observations. The feedback from students regarding the value that they found in prospective transfer was affirming to hear. The initial design was based on the premise that having a personal connection to the materials that are presented would increase a student's level of engagement. The feedback indicated that this assumption was correct and that personalized examples of how math skills can transfer to a career field that a student is personally interested in increased their level of engagement and perceived value of the content.

CHAPTER 5

DISCUSSION

Chapter Overview

This action research study was designed to explore the prospect of transfer within high school equivalency students through a wicked problems framework. This was accomplished by implementing an innovation and measuring the relationship between the prospect of transfer and student engagement through mixed methods. Chapter 5 will present contextual issues, considerations and recommendations for future designs, implications for practice, implications for future research and final conclusions.

Summary of the key results and findings. Chapter 4 discussed several meaningful findings that will be expanded on, contextualized, and extrapolated on to inform future design and implementation within Chapter 5. The meaningful findings included higher attendance hours and HSE math section completion rates for the treatment group, as well as students' perceived value and increased engagement as a result of taking part in the innovation. While it was stated that the results were not statistically significant possibly due to the low sample size (n=17), Chapter 5 will demonstrate why these findings are still practically significant and important to future research.

The key finding from Research Question 1, was that students in the treatment group completed the math section of the HSE test at nearly the same rate as the instructor's previous classes. This result was intriguing within the context of the research because The AAEDMS database displays whether or not students completed the math section of the HSE test regardless of when they passed it. As a result, the instructor's

previous classes have had significantly more time to pass the math section of the HSE test than the treatment group and all other HSE classes at Rio Salado College during the same semester that the innovation took place. Examining the treatment groups' HSE math completion rate over the next two years would provide a more accurate comparison to the instructor's previous classes and could potentially demonstrate that the innovation had a greater impact on HSE math completions than the data initially indicated.

The key finding for Research Question 2 was that students who participated in the innovation had, on average, over 38 more attendance hours than students who did not received the innovation during the same semester. In addition, students who took part in the innovation averaged over 44 more attendance hours than the instructor's previous classes at the same location. This indicated that students in the treatment group attended class more frequently and/or utilized online practice math resources more frequently than either of the control groups. These results were nearly statistically significant (P=0.0537) and presented a borderline value that approaches statistical significance despite the small sample size (N=17). The high disparity of attendance hours between the treatment and control groups make this a key finding that deserves additional discussion and consideration for future research.

The key finding for Research Question 3 was that students believed that they were more engaged in their class as a result of their participation in the innovation. The responses from question eight and question 11 of the student survey indicated that the majority of participants were excited to come to class despite the fact that they do not enjoy learning about math. This may imply that participation in the innovation increased engagement for students who do not enjoy learning about math. These findings were

consistent with the feedback that was provided in the student focus group and the assertions that students found value and enjoyed participating in an innovation that demonstrated the prospect of transfer based on each participant's career interest.

Contextual Issues

In chapter 4, results were shared regarding how the innovation may have impacted research question 2:

> How and to what extent does participating in a class that demonstrates how learning will transfer from class to career influence student attendance as compared to a standard HSE cohort?

The results from my action research showed that the treatment group averaged 130.25 attendance hours for the semester, compared to an average of 86 attendance hours for students who participated in the instructor's previous math classes at the Rio Avondale Location. This data shows that students receiving the treatment averaged 44 more attendance hours than the instructor's previous classes at the same location. While this result is encouraging because it may indicate that the innovation directly increased student attendance, there is additional context regarding that make this data even more compelling: the 2017-2018 flu season and Arizona teacher walkout.

Low Enrollments. The initial design of this mixed methods research study was to compare a treatment and control group that were both being taught by the same instructor, at the same location, and at the same time of day but on different days. The treatment group would have consisted of 10-20 students that would have been taught on Monday and Wednesday mornings by Stephanie Stewart-Reese at the Rio Salado Avondale location. The control group would have consisted of 10-20 students that would

have been taught on Tuesday and Thursday mornings by Stephanie Stewart-Reese at the Rio Salado Avondale location.

The research design that was described in the previous paragraph was predicated on the assumption that at least 20 total students would register for morning math classes at Rio Salado Avondale. If a minimum of 20 students registered, then they could be split into a treatment group and a control group while ensuring that there was a minimum of 10 students in each group, which was the minimum number of students required to run a class at that location. Unexpectedly, less than 20 total students registered for morning math classes at the Rio Salado Avondale location, and there were not enough students to split into a treatment group and a control group.

The low enrollments posed a challenge to the design of the study because the research questions asked whether or not the intervention that a treatment group received influenced student attendance and completion rates as compared to a standard HSE cohort (control group). To address this issue, the design was slightly modified to compare the treatment group to all other HSE math classes that were being taught at Rio Salado College the same semester that the research was conducted, as well as the instructor's previous classes at the Rio Salado Avondale Location.

The "new" control groups were both classified as standard HSE cohorts in that they only taught the existing curriculum and did not include any of the transfer content that was provided to the treatment group. This meant that the research questions could still be answered by the research that was being conducted and provide a direct comparison between a treatment group and two different control groups.

The decision to use two different control groups was based on minimizing as many variables as possible when examining the data. If I were to only compare the treatment group to all other HSE math classes at Rio Salado College, the research may not address the fact that the instructor of the treatment group may be more or less engaging than other instructors at Rio Salado College, which could influence student engagement more than the innovation and skew the results. Conversely, if I were to only compare the treatment group to the instructor's previous classes at the same location, the results may not have accounted for any abnormal occurrences that transpired during the treatment and that may have affected attendance or completions such as the 2017-2018 Flu season and the Arizona Teacher Walkout.

2017-2018 Flu Season. In chapter 4, results were shared regarding how the innovation may have impacted Research question 2:

> How and to what extent does participating in a class that demonstrates how learning will transfer from class to career, influence student attendance as compared to a standard HSE cohort?

The results from my action research showed that the treatment group averaged 130.25 attendance hours for the semester, compared to an average of 86 attendance hours for students who participated in the instructor's previous math classes at the Rio Avondale Location. This data shows that students receiving the treatment averaged 44 more attendance hours than the instructor's previous classes at the same location. While this result is encouraging because it may indicate that the innovation influenced student attendance, there is additional context that make this data even more compelling: the 2017-2018 flu season and Arizona teacher walkout.

Three weeks into the treatment, I received the first concern from the instructor regarding the flu and how many students had been infected or needed to care for a family member that had the flu. In response to a standard "check-in" email that I had sent to the instructor, she responded:

> My only concern is the flu season. Attendance has been down in January, and this week was atrocious, with 3 students leaving mid-class for sick children and doctor's appointments.

The instructor sent an additional email seven days later, on February 5th, 2018 that provided an overview of how the cohort was going, and once again raised an alarm regarding the impact that the flu was having on the cohort. She stated: "I am concerned about the flu this year wreaking havoc on the data. I have never had so many students out sick. I am sorry about that."

The instructor would share her concerns about the flu on two other occasions reiterating that many students had been out sick. Despite the instructor's concerns, the attendance data from the semester shows that students in the treatment group actually had more attendance hours than the instructor's previous classes and the rest of the Rio Salado College HSE math classes. This could indicate that her concerns were potentially heightened due to the fact that she was taking part in the research study.

The higher attendance hours for the treatment group could also indicate that students in the treatment group attended class or participated in online learning more than the control groups despite the fact that many participants missed classes due to the flu. This could demonstrate that students in the treatment group were more engaged than the control groups and they attended more frequently despite what the instructor statement

indicated in that she has “never had so many students out sick.” Due to the fact that the *Arizona Adult Education Data Management System* displays student attendance in total hours as opposed to number of days attended, additional research would be needed to conclusively determine whether or not the 2017-2018 flu season affected student attendance hours or if the number of absences was consistent with previous semesters.

Arizona Teacher Walkout. From April 26-May 3rd, elementary, middle, and high school teachers across the state of Arizona walked out of their classrooms to protest low wages and classroom conditions. As a result, public schools across the state were closed during the walkout. While this walkout did not directly affect colleges in Arizona like Rio Salado College, many students in HSE classes had to stay home with their children due to the school closures. The instructor of the course provided an update email on April 30th that stated:

> I thought I should let you know that on Thursday there were only three students out of my class that on Tuesday had over a dozen. The absent are parents whose children are out of school. I honestly don't expect more than 2 or 3 tomorrow.

The instructor’s email was in response to coordinating one of the guest speakers to come visit the treatment group. Tony Sherman, the industry expert for business was scheduled to visit the class on May 1st, and the instructor was concerned that very few students would be there due to the walkout. Due to the instructor’s concerns, as well as his own children not being able to attend school on that day, Mr. Sherman agreed to come visit the class on May 3rd instead. Unfortunately, Arizona schools had not resumed offering classes on May 3rd, and Mr. Sherman once again cancelled. He was unable to find another time to visit the class prior to the end of the semester.

In addition to the impact that the Arizona teacher walkout had on coordinating one of the guest speakers, it also may have impacted student attendance hours. Similar to the commentary that was provided regarding the 2017-2018 flu season, students in the treatment group may have had more attendance hours if this event did not occur. *Arizona Adult Education Data Management System* displays student attendance in total hours as opposed to number of days attended, and additional research would again be needed to conclusively determine whether or not the Arizona Teacher Walkout affected student attendance hours and students or if the number of absences was consistent with previous semesters.

Considerations and Recommendations for Future Design

There are three primary considerations that should be examined for future research design: improved scalability, increased participation between the instructor and industry experts, and modified slides. The design of the innovation was largely based on the ability to identify and partner with industry experts to provide specific, applicable examples of transfer to the treatment group. This included developing examples of how HSE math skills were used in specific career fields and being able to extemporaneously answer student questions related to how specific math content may be needed in multiple careers within the expert's industry.

Identifying and partnering with industry experts who are knowledgeable about math and willing to perform all of the duties that were described in the paragraph above is a "tall order." I was able to leverage personal and professional relationships to identify and partner with industry experts, but leveraging relationships is not necessarily a scalable strategy. Future designs will need to take into consideration that some instructors

might not have a broad network that they can tap into to find industry experts. Future designs will also need to take into account that there may be geographic limitations in rural and remote areas that may make it difficult to find industry experts that can visit the class as guest speaker.

One recommendation to improve the scalability of the design is to utilize technology to find industry experts on social media or in industry-specific online groups regardless of their location. Finding industry partners who are able to provide their expertise and help to develop relevant examples of transfer from another region would provide additional opportunities to find the "right" industry experts who are willing to graciously share their time and support the student's learning. Industry experts from other regions or areas would also provide an opportunity to do additional research regarding the effectiveness of video conferencing as opposed to having in-person guest speakers. Utilizing technology and online resources in future designs would increase the likelihood that the innovation could be scaled by removing the burden of identifying industry experts in close proximity of the group receiving the innovation.

The second consideration for future designs is to include the instructor of the class in the process of identifying and actively partnering with industry experts to develop slides. My objective in the early stages of my research was to provide additional tools to the instructor of the class without placing additional burdens on her. I took it upon myself to find the industry experts and work with them to develop slides so that I was not placing additional, and un-compensated burdens on the instructor. This resulted in the instructor providing me with her lesson plans, and then I had to try and interpret and translate her intentions as well as complex mathematical concepts to industry experts. I

would then work with the industry partners to develop what we believed to be relevant slides, only to find out that changes needed to be made to ensure that the slides were truly applicable to the instructor's lesson.

A recommendation for future designs would be to have the instructor take a more active role in communicating the concepts in each lesson directly to the industry experts and fielding any questions that they might have. The instructor in my research was much more knowledgeable than I was regarding the concepts in each lesson and the instructor should be included in the development of future designs, not just in the delivery of the content. The specific context of my research as part of a dissertation process likely affected the limited role of the instructor, but future designs should note the important of including any instructor(s) throughout the development process.

The final consideration is the possibility of modifying the delivery and or the content of the slides that were shown to students prior to each lesson. In the student focus group, two discussion prompts were presented to the group: Did the guest speakers impact your experience in class and did the PowerPoint slides impact your learning experience? In regard to the question about guest speakers, the answers were overwhelmingly positive and provided detailed examples, but students did not provide the same feedback for the slides that they viewed prior to each lesson.

When asked about the impact of guest speakers, Participant 4 discussed how much he learned from Joshua Peters about how he uses math in transportation and logistics. Participant 4 referenced the example that Joshua provided of how to calculate how many candy bars would fit in a truck and stated "he showed us how he uses length multiplied by width. It is not a waste, you actually need to know this stuff." This

comment shows that the student retained the specific industry examples as well as the mathematical concept that it was connected to, and a personal belief that the content is important.

Participants 1 and 2 also provided specific examples of how guest speakers impacted their experience in the course. Both participants cited a different example that Debbie Flores provided regarding how the math skills that they were learning are needed in the healthcare industry. Participant 1 stated "I was really interested in what she said, but even if I wasn't, it would still be good information to hear. Math is everywhere and you really need to know it." These comments also demonstrate that students retained specific examples and found value and importance in what they were learning in the classroom.

Despite the incredible feedback from the focus group regarding the guest speakers, the same cannot be said for their responses to the slides. While all focus group participants remarked positively about the slides, they could not provide any examples of a specific slide that they found to be impactful, nor did they demonstrate that they developed a clear connection between the industry example that was provided in the slide, the mathematical concept that the example was connected to, or a sense that what they were learning was important to them.

When the focus group was asked if the slides impacted their experience, all of the participants responded "yes." However, when I asked a follow up question of which slides specifically impacted them, it became clear that they had not retained or valued the information in the slides as much as they had retained and valued the information that was provided by the guest speakers. In regards to the follow up question about specific

slide content that impacted them, Participant 4 stated “the one [slide] about how there are the same ingredients for different plates. Like it can go in tacos of enchiladas or whatever. That was really cool.” Participant 3 then stated, “oh yeah, I really liked the taco thing.”

The examples that the participants provided of the slides they found meaningful were not actually included in any of the slides that were developed to demonstrate how the skills that they were learning were connected to future career opportunities. After the focus group had concluded, I reached out to the instructor to ask about the “taco example” that the students were referencing in the focus group. She shared that this was a simple example that she provides in all of her classes. She uses a Mexican food analogy to explain algebraic equations to her students and she was glad to hear that they remembered it.

It was good that the students recalled a specific example that the instructor had provided, but the fact that the students could not recall a specific example from the slide may indicate that additional revisions are needed or that the slides are not critical to the design of the innovation. It may be that the slides provided additional information and context to support the guest speakers and help their in-person presentations to be more effective. Each slide showed the industry expert’s photo, title, and specific examples of transfer from their industry. This early introduction to the industry experts prior to their classroom visit may have positively impacted their visit, or it may have had no effect at all. Additional research would be needed to determine the effectiveness of the slides and how they could be improved or eliminated in future designs.

A recommendation for future design would be to show the class short videos of the industry experts providing the information that was in the slide as opposed to simply showing the slide. This design modification would be based on the retention and personal value that students associated with the guest speakers presenting the information as opposed to reading the examples that they provided on a slide. Another recommendation for future research would be to ask students if there are specific examples of transfer that they would like to see and then develop the slides around the content that they request. This would be similar to a student's ability to ask a question that is relevant to them when a guest speaker is in the classroom.

As was stated in Chapter 1, most HSE classes at Rio Salado College feature a didactic lecture style of instruction, meaning that students are accustomed to seeing PowerPoint slides as a means of instruction. By embracing an instructional practice other than lecture style, students may become more engaged in the content, or recall lessons more readily because they content would be presented in a way that is different than the status quo of most HSE classes. Another recommendation would be to discard the slides and instead embrace learning activities that convey the same message but use interactive activities as opposed to lectures. Group activities, trivia games, individual and collaborative research projects, field trips, embedded professional development, and many other activities may be more effective at conveying potential transfer than the slides. These activities should be integrated into future designs to see if they are more successful.

Implications for Practice

There are many implications for practice that may be drawn from this research study. These implications include utilizing the prospect of transfer to increase engagement, developing direct connections to industry experts, and aligning course materials to the specific interests of students. As was stated in Chapter 2, Lawson & Lawson (2013) found that "student investment may result from students' perceptions that activity engagement will result in future benefits or rewards" (p. 450). The qualitative results from this action research study support the findings of Lawson & Lawson (2013). Participants in the treatment group provided survey and focus group responses that indicated that they found value and relevance in the course content due to demonstrated examples of transfer to their careers of interest.

The assertions that prospect of transfer may increase engagement was further supported by student responses to survey questions 10 and 11. Questions 10 asked students if what they learned in the class was important to them. 92% of students strongly agreed or agreed that what they had learned was important to them despite the fact that 83% of the same students also indicated that that they did not enjoy the topic that they were learning about. This demonstrates that students found value and importance in HSE math despite not enjoying the topic. Additional research would be needed to conclusively determine that the prospect of transfer increases engagement, but multiple student responses indicate that this could be an implication for practice that should be examined further.

Developing connections to industry experts is another implication for practice that should be considered. As was stated earlier in this chapter, multiple focus group participants recalled specific examples that were provided by industry experts, the

mathematical concepts that the examples were connected to, and why that content was important to the them. As was stated in Chapter 2, Bandura (1994) describes self-efficacy as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (p. 71). In the context of this research study, this relates to students' belief in their ability to use the skills that they have acquired in their future employment. Multiple focus group responses indicated that students believe that the skills they have learned were relevant and important. Furthermore, 100% of survey respondents indicated that they feel confident in their abilities as a result of their participation in the class.

Focus group data indicated that the industry expert's in-person visit to the class was the most meaningful element of the innovation for students and that it demonstrated how concepts could transfer from the classroom to their future careers and promoted self-efficacy. The concept of industry experts was originally derived from my personal assumption that hearing directly from an individual in an industry of interest for students would be more engaging than hearing the same message from their instructor.

Students may find more value and authenticity in hearing examples of transfer and how their learning is meaningful when the message comes from an "outsider" who can definitively state why the skills that the students are learning are critical to their future success. Students hearing the same message from their instructor (as opposed to an industry expert), might believe that their instructor is assuming that there is a connection or that they are trying to persuade students to believe that the lesson is relevant without personally knowing if the skills are needed in the industry of interest. This concept may

also explain why the slides were potentially less effective than the guest speaker visits; the slides were presented to the students by the instructor.

Despite the fact that the slides contained the industry experts' photo and title, the information was conveyed from the instructor to the students and did not provide students with an opportunity to ask the industry experts specific questions about the examples that were provided, nor could the students be sure that the industry experts actually created that content as opposed to the instructor creating it and attributing it to an industry expert. Hearing directly from industry experts had a clear impact on the treatment group and led to demonstrated examples of transfer, retention of information, and self-efficacy for students. Developing and fostering relationships with industry experts is a key implication for practice that should be considered.

The final implication for practice is aligning course materials to the specific interests of students. As was stated in Chapter 2, multiple studies have found a direct correlation between focusing adolescent students on career opportunities as a means to increase engagement (Lawson & Lawson, 2013). This concept was expanded on by this study to include personal choice and the interest of students in fostering career skills as a means to increase engagement. My research design customized the treatment to address the individuals' specific interests as opposed to presenting career opportunities or skills that adult students may not have found relevant.

Aligning course materials to the specific interest of students produced excellent feedback by the focus group and student surveys related to the value of what students learned and their engagement. 92% of students stated that they were excited to come to class despite the fact that 83% of the same students did not enjoy learning about math. An

implication for practice is that aligning learning to the specific career interests of students may increase their level of engagement, retention of course materials, and personal beliefs that what they are learning is valuable to them.

Implications for Future Research

The purpose of my research study was to examine the influence that prospect of transfer had on HSE students and their engagement in HSE preparation classes at the Rio Salado College Avondale location. While some of the results were not statistically significant, the qualitative data and the high attendance hours in the treatment group indicate that there potentially was value in this study that should continue to be researched. There are three primary implications for future research that were identified during this research project: a larger sample size, different populations, and modified content.

The sample size for this research study (n=17), was small and may have affected the statistical significance as it relates to student attendance hours and completion rates. In reference to desired sample size, Wuensch, (2015) states:

> The more data you have, the more likely you are to reach a correct decision and the less error there will be in your estimates of parameters of interest. The ideal would be to have data on the entire population of interest. In that case you would be able to make your conclusions with absolute confidence (p. 1).

An implication for future research would be to redeploy this innovation with a much larger sample size to examine whether or not the larger sample affects statistical significance or produces varied outcomes from the original research project. On the surface, it is encouraging to see that students in the treatment group averaged 44 more

attendance hours than the instructor's previous classes, but the research study would need to be replicated with a larger sample size to determine whether the increased hours came as a result of the innovation, or if the increased attendance hours were an anomaly.

The second implication for future research is that the concept for using prospect of transfer to increase engagement may be applicable or even more successful in different educational contexts. While there is much data to support the need for HSE students to feel that their learning is relevant to them, this concept is not exclusive to HSE students. As was stated earlier, Lawson & Lawson (2013) found that "student investment may result from students' perceptions that activity engagement will result in future benefits or rewards" (p. 450). With many so called "cradle to career" educational opportunities already underway across America, incorporating the prospect of transfer and utilization of industry experts to share transfer examples may increase engagement in educational contexts that already have a career-focus.

Future research could take the concepts that were presented in this research study and apply them in non HSE classes to tests whether the innovation is more or less successful in different educational settings. Again, much of the qualitative research demonstrates that there was perceived value from students in hearing directly from industry experts about how their education could transfer to industry. Future research could explore whether these results were unique to an HSE population or if these concepts increase engagement and or knowledge retention in college or high school classes.

The final implication for future research is modified content. As was stated previously, students appeared to find the greatest value when the industry experts visited

their class as guest speakers, and none of the focus group participants could recall the content that was presented on the slides. This indicates that am implication for future research would be to modify the design of the research by changing or eliminating the slides that students viewed prior to beginning each lesson in their class.

Modifying or eliminating the slides would allow future researchers to determine whether the slides provide value or influence students' perceived prospect of transfer or level of engagement. This could be accomplished by eliminating the slides, or attempting the future design recommendation that was shared earlier in the chapter - to show the class short videos of the industry experts providing the information that was in the slide as opposed to simply showing the slide. This design modification would be based on the retention and personal value that students associated with the guest speakers presenting the information as opposed to reading the examples that they were provided on a slide. This change would allow future researcher to better understand the relationship between the slides and increased engagement.

Final Conclusions

Utilizing the prospect of transfer to increase engagement in HSE students was an attempt to acknowledge the needs and desires of students for relevant, applicable content that could benefit them in their careers. This research was situated in a wicked problems framework, with the realization that demonstrating prospective transfer cannot and will not solve educational problems for all HSE students. However, the research shows that students found value in this approach and that they believed that it made them more confident and better prepared for their futures. While more research is needed to gauge the impact of this research study, there is now a solid foundation in the concept of using

the prospect of transfer to potentially increase engagement, and I look forward to others building on my research and drawing their own conclusions.

I began this dissertation by using the word "outliers" to describe HSE students within a wicked problems framework. They rarely fall into a clear category within education and they are often forgotten or ignored in discussions about educational innovations or improvements. However, the status quo does not need to dictate the future of research and HSE populations. This study demonstrated that HSE classes can be optimal environments for educational research. Unlike the strict, mandated curriculum that high schools are required to follow, HSE classes present an open environment to develop and test innovations by offering unfiltered perspective on high school-level curriculum and instruction. HSE students are also free to share their insights without fear that they would experience retaliation in their grades or their ability to graduate, since they are not given grades and their completion is solely dependent on passing a test outside of the classroom.

Perhaps HSE students are not outliers after all. They are the exact population that educational researchers need to work with to shape the educational innovations of the future. The feedback from these students can be invaluable in multiple educational contexts and should be sought after for many different studies. After all, these students have overcome many adversities and demonstrate a desire to not only improve their lives, but also improve the lives of those around them.

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APPENDIX A

MYCAREER PLAN FORM

My Future Career Plan

Date:_____

Name:_____

Desired CareerField:_____

Desired Career:_____

Signature:_____

APPENDIX B

LESSON PLAN OVERVIEW SLIDES

When will I ever need to know this?

Tony Sherman
Realtor and Broker
Arizona Team Realty

A common scenario in real estate are investors that try to make projections on what kind of return they can get on their investment.

An investor could be considering the purchase of a duplex for $250,000 cash. She wants an investment that will produce a first year 12% return on investment. How much income must the duplex generate during the first year to produce this investor's required return on investment? $250,000 x .12 = $30,000.

When will I ever need to know this?

Tony Sherman
Realtor and Broker
Arizona Team Realty

Percentages are critical in real estate through the homebuying and home selling experience.

We use percentages in many different areas of real estate. One example has to do with a homebuyer down payment. When a homebuyer utilizes a conventional loan to purchase a home, it often requires a 20% down payment. So, if the purchase price of the home is $300,000 x .20 = $60,000.00 needed for a down payment.

When will I ever need to know this?

Tony Sherman
Realtor and Broker
Arizona Team Realty

Understanding basic algebra is critical in real estate through the homebuying and home selling experience.

Building on the previous example of percentages- When a homebuyer wants to utilize a conventional loan to purchase a home that requires a 20% down payment they may not know how much they afford to spend. A homebuyer might say that they have $45,000 for a downpayment and then a broker needs to figure out how expensive of a house they can purchase with a downpayment of $45,000. See if you can solve the problem, maybe you could go into real estate!

When will I ever need to know this?

Tony Sherman
Realtor and Broker
Arizona Team Realty

Ratios are critical in real estate through the homebuying and home selling experience.

When shopping for a home loan, a home buyer needs to understand a good credit utilization ratio less than 30% gets them the best home loan rates. That means you're using less than 30% of the total credit available to you. To achieve 30% credit utilization, you should keep your balances below 30% of the credit limit. Anything above 30% ratio can cause your credit score to drop.

When will I ever need to know this?

Tony Sherman
Realtor and Broker
Arizona Team Realty

One of the most important equations in real estate is debt to income ratio. Your debt to income ratio is all your monthly debt payments divided by your gross monthly income. This number is one way lenders measure your ability to manage the payments you make every month to repay the money you have borrowed.

Add up all your monthly debt payments and divide them by your gross monthly income. Your gross monthly income is generally the amount of money you have earned before your taxes. Example, if you pay $2000 a month for your mortgage, $200 a month for an auto loan and $500 a month for the rest of your debts, your monthly debt payments are $2,700. ($2000 + $200 + 5400 = $2,700.) If your gross monthly income is $6,000, then your debt-to-income ratio is .45 percent. ($2700 is 45% of $6000.)

When will I ever need to know this?

Tony Sherman
Realtor and Broker
Arizona Team Realty

We all need to make money, and real estate requires that you do a little math every time a sale goes through to figure out how much you will make.

Let's say that you are a broker selling a vacant residential lot without a house on it. The lot ends up selling for $52,000 and your commission is 6%. You need to determine what 6% of $52,000 to find out how much you made on the transaction.

When will I ever need to know this?

Debbie Flores
CEO
Banner Del Webb
Hospital

We use graphs everyday in hospitals to track patient progress or interpret changes that take place over a time.

A good example of using a graph is when a pediatrician plots the height and weight of a child every time that they come in for a visit. Over time, we can compare how one child is growing as compared to other children of the same age. This information is very important for identifying any potential health issues in children.

When will I ever need to know this?

Debbie Flores
CEO
Banner Del Webb
Hospital

We use tables everyday in hospitals to help inform health decisions for patients.

A good example of using a table is when a nurse practitioner is administering medication. Before giving some medication in a hospital or prescribing medication, we often need to review a dosage table to determine how much medication a patient needs. A dosage table tells us how much medication is appropriate for a patient depending on their gender, weight, or other specific information.

When will I ever need to know this?

Debbie Flores
CEO
Banner Del Webb
Hospital

We use ratios everyday in hospitals to ensure that patients receive the best care possible and to ensure that we do not cause any harm.

A good example of using ratios is establishing a set ratio of nurses, medical assistants, and other care professionals for a set number of patients. For example, a hospital might have a policy that they need to have a minimum of one nurse for every four patients in the intensive care unit.

When will I ever need to know this?

Debbie Flores
CEO
Banner Del Webb
Hospital

Algebra and geometry can be very useful in a hospital when it comes to making decisions on the best way to use space as well as how to keep the space clean. We might look at the specific square footage of an area as well as how much it is used to determine custodial staffing, or to make sound fiscal decisions.

When will I ever need to know this?

Joshua Peters
Operations Manager,
McLane, Inc.

Most people don't realize how much you need to use algebra to be successful in your career. Think about a job like being a selector at a warehouse (the people who work at Amazon or other companies selecting products and sending them to you). Selectors use algebra to calculate all of the metrics that they are responsible for.

Productivity, for example, is measured by the number of pieces selected (v) divided by time on the clock (t) minus any down time (d). The formula looks something like this: P = v/(t-d). So, a selector can calculate their selection rate throughout a day by plugging their respective information into the formula. If they select 1800 pieces in 8 hours, and have around .5 hrs in down time for stocking or cleaning we find their productivity average to be 240 cases per hour. This is good to know if 210 cases per hour is the standard expected.

When will I ever need to know this?

Joshua Peters
Operations Manager,
McLane, Inc.

Quality metrics in a warehouse are important because they help to control inventory gains and losses. They are also figured using algebra.

Here is a good example: If forklift operators are expected to maintain a quality average at or less than than 1 error per 1000 pallets moved (0.1%) we can use the formula Quality = (errors/units handled)*100 to compare performance to the standard. So a forklift operator knows he/she is in trouble if they have 4 errors but only handle 3200 pallets because (4/3200)*100 = 0.125%, and 0.125% > 0.1%.

When will I ever need to know this?

Joshua Peters
Operations Manager,
McLane, Inc.

We use quite a bit of geometry in shipping and logistics, especially when it comes to filling up trucks prior to sending them out.

Cube is a term we use in logistics to describe the amount of space something takes up. Although not everything shipped is a perfect square or rectangle, an object's overall length, width, and height are important measurements for figuring how many will fit into the space of a tote or trailer. In geometry, cube (or the volume of a rectangular object) is represented by the formula v = l * w * h. If I know that the inside cube of a tote is 2.5 cubic feet and the dimensions on a repack item are roughly 1ft x .5ft x .5ft, then I can calculate how many should fit inside the tote by using the formula tote cube/(l * w * h of the repack item). So 2.5/(1 * .5 * .5) = 10. In this case, 10 of the repack items will fit into a tote. This is good to know if a customer should order 18 of them. Then we would know their order would require at least 2 totes, taking up roughly 5 cubic feet of a trailer's space.

When will I ever need to know this?

Joshua Peters
Operations Manager,
McLane, Inc.

Staffing in a distribution center can be really challenging and require a supervisor to use formulas involving projected sales and current productivity standards within the warehouse's departments. In addition to sales, vacation and sick time play a role in determining the number of people needed to adequately staff a distribution center.

Let's say the grocery department expects to see approximately 105,000 cases sold/shipped in a given week, and company policy allows up to 10% of the department to schedule off for vacation on any given day. We can calculate the needed staff to handle by processing these numbers through the formula (cases shipped/working days)/productivity standard)/hrs worked in a day)*1.10. If the productivity standard there is 210 cases/hr, then the formula would look like this: Needed Staff = (105,000/5)/210)/8)*1.1 = 13.75. In this case, the D.C. would need between 13~14 people depending on how much overtime they are willing to pay and if other departments are cross-trained to help.

When will I ever need to know this?

Joshua Peters
Operations Manager,
McLane, Inc.

Production flow is a critical measurement of how efficient an operation is running. There are several metrics used in warehouse settings to explain this concept, but most company dashboards will include a simple rate to describe what is going on. For instance, if a loading team of 10 loaders in 10 doors can move 25000 cases in an eight hour day, then the team would be moving at a rate of 3125 cases per hour because 25,000 cases/ 8 hrs = 3125.

APPENDIX C

ATTENDANCE LOGS

Location:_____ Class Times:_____

Student:_____ Instructor:_____

College Bridge Pathways

Date	Signature	In	Out	Total
		Total Monthly Hours		

Instructor signature:_____

APPENDIX D

UPDATED MY CAREER PLAN FORM

My Future Career Plan
(Updated)

Date:_____

Name:_____

Desired CareerField:_____

Desired Career:_____

Signature:_____

APPENDIX E

INTERVIEW PROTOCOL

Interview Protocol and Recruitment Form

Dear Students,

My name is Greg Pereira, and I am a student at Arizona State University. I am conducting a research study to examine the nature of the relationship between job skills training and General Education Diploma (GED) class attendance and completion. I will be working Dr. Danah Henriksen, professor at the Mary Lou Fulton Teachers College at Arizona State University.

To complete this research I am asking for your help, which will involve your participation in a one-time interview to discuss your experience, knowledge, and general impressions of vocational skills training as a part of the GED curriculum.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty whatsoever.

The benefit to participation in this research is the possibility of expanded knowledge within this field and the knowledge that your participation could lead to an improved GED experience for future students. There are no foreseeable risks or discomforts to you as a participant.

Your responses will be confidential. Results of this study may be used in my dissertation reports, presentations, or publications but your name will not be used. If you have any specific questions regarding the survey or how it will be used, please contact me by phone at (503) 317-7113, or by email at gspereir@asu.edu. You can also contact my advisor, Dr. Danah Henriksen by phone at (517) 256-2344, or by email at Danah.Henriksen@asu.edu.

Consent Statement: I agree to participate in the interview being conducted. I understand that the interview will take approximately 45 minute to complete. I understand that I will not be penalized in any way if I decide to not take part in the interview process and I am at least 18 years of age.

Signature _____ Date _____

If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board through the ASU Office of Research Integrity and Assurance at (480) 965-6788.

APPENDIX F

STUDENT SURVEY

Student Survey

Date: _____

Select Your Class: Mon/Wed _____ Tue/Thu_____

Please complete the following survey regarding your participation in High School Equivalency Classes at Rio Salado Avondale. This survey is confidential and will not affect your standing in the program in any way. Please return this survey to your instructor prior to leaving class today.
Please use the following scale to answer the questions below:

4	3	2	1
Agree	Somewhat Agree	Somewhat Disagree	Disagree

Career

1. I have learned skills this semester that I will need to get a job or to get a better job.
   4 3 2 1
2. I have learned skills that I plan on using in a career.
   4 3 2 1
3. As a result of my participation in this program, I know what specific skills employers are looking for.
   4 3 2 1
4. My instructor explained how each lesson related to job skills.
   4 3 2 1
5. I feel confident in my employability as a result of my participation in this program.
   4 3 2 1

Engagement

6. I feel confident as a student as a result of my participation in HSE classes.
   4 3 2 1
7. I enjoyed coming to class.
   4 3 2 1
8. I was excited about the topics that I am learning about.
   4 3 2 1
9. What I learned in this class was important to me.
   4 3 2 1
10. I enjoy the topic that I learned about.
    4 3 2 1

Demographic Information

What is your gender? Please circle one: Male Female

What is your race or ethnicity? Please circle one: Asian Black Caucasian Hispanic

Native American Multiple Races/Ethnicities Other:_____

What is your age range? Please circle one: 18-25 26-35 36-45 46-55 55+

Do you have children? Please circle one: Yes No

Thank You

Thank you for your participation in this research survey. Your responses are very important to my research and I genuinely appreciate your time and attention. If you have any questions, please feel free to contact me by phone at (503) 317-7113, or by email at gspereir@asu.edu.

APPENDIX G

FOCUS GROUP DISCUSSION PROMPTS

Focus Group Discussion Prompts

1. How would you describe your experience in class this semester?

2. What specific skills did you learn?

3. Do you think that you will use the skills that you learned in your future career? Why or why not?

4. Did you feel engaged in the class? Why or why not?

5. What motivated you to come to class?

6. Was this class different from other HSE classes that you have taken? If so, how?

7. Did the guest speakers impact your experience in class? If so, how?

8. Did the PowerPoint slides that described how your learning could transfer to a future career impact your experience in class? If so, how?

9. Did selecting a career and identifying how your learning can transfer to that career impact your experience in the class? If so, how?

10. Is there anything else that you would like to share?