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Pepperdine University

Graduate School of Education and Psychology

COMPETENCY-BASED EDUCATION SYSTEMS: ARE THEY EFFECTIVE?

A dissertation submitted in satisfaction

of the requirements for the degree of

Doctor of Education in Organizational Leadership

by

Daniel P. Everett

December, 2019

June Schmieder-Ramirez, Ph.D. – Dissertation Chairperson

This dissertation, written by

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under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

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DEDICATION

This work is dedicated to my loving family and friends who walked this journey with me, who supported me when I needed encouragement, and who gave me inspiration when I needed a reason to continue. I would particularly like to dedicate this project, though, to my wife Karrie and amazing five children who have truly born the burden of this undertaking and whose love means more to me than they know.

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ABSTRACT

The purpose of this preliminary study was to assess the effectiveness of the competency-based education systems in order to aid teachers, administrators, and policy/law makers in their evaluation of competency-based education systems. It was a quasi-experimental nonequivalent group design study that used quantitative data to compare competency-based schools to seat time based schools. This study focused on ten New Hampshire public schools that have implemented competency-based systems and compared them to ten similar California schools that utilize the standard seat time based education systems. The 20 schools were grouped into ten groups containing one New Hampshire school and one California school. The schools were paired based upon similar demographics and total student numbers. The ACT test was chosen as the measurement tool to compare the two education systems. The average ACT scores for each school were acquired and analyzed. The results showed that, on average, the students in the competency-based schools performed equally as well as the students in the seat time based schools. The implication of these results was that competency-based systems can be considered as rigorous as traditional seat time based systems. Recommendations for future research included an expanded sample of schools, a longer duration of data collection, and additional data collection, especially by using a mixed-method approach in order to (a) verify the conclusions of this study and (b) generate additional insights that will help decision makers make better informed choices about whether or not to move to competency-based education systems.

Chapter 1: Introduction

Competency-based education is a rising star on the horizon of today's world of education. This new system reimagines the current system of education. Competency-based education has been established in some areas as an alternative to the current system, seat time based education, which is used in all most all districts across the Unites States. This dissertation will seek to examine the effectiveness of this new system in high schools by comparing its ACT scores to those of the current seat time based educational systems. This study will be a correlational quantitative study within a postpositivist approach. It will look at the effectiveness of competency-based schools by comparing their ACT scores to the ACT scores of traditional seat time schools.

The current seat time system is grounded in the complex history of America. With each twist and turn of the struggles of American history, the American educational system has ebbed and flowed with it. Though our current system is the product of many unique situations and influential people, there are a few main events that have impacted the movement of our educational system over the past three centuries. These events can be separated into two parts: (a) socio-economic events and (b) intellectual influences.

Some examples of these major socio-economic events would be the influence of the Puritan religion on the founding of early schools, the effects of the Revolutionary War on schools and curriculum development, the establishment of legislation such as The Northwest Ordinance of 1785, egalitarianism of America's expansion west, and the civil rights movement (Ornstein & Levine, 1993).

Many great thinkers have offered significant intellectual influence with their theories and ideas. Many of their ideas have greatly impacted our society's view of fundamental ideas relating to democracy, individualism, freedom, human dignity, parenting, and education. Such ideas have shaped the essential elements of our educational system.

Over the past three centuries, having made our way through the drama of American history and thought, we find ourselves in a very entrenched educational system. This system is not just something that can be changed in the moment. It is a system that is firmly rooted in state-legislated funding laws, union contracts, and generations of traditions and expectations. The roots of this system ensure the stability of what we have come to know as seat time education.

Background

This study is investigating the effectiveness of competency-based education systems as compared to traditional seat time education systems. In order to best address this question, it is necessary to first offer a brief overview of both seat time and competency-based education systems.

Seat time systems. The term *seat time* education is being used here to refer to our current educational system. There are two main reasons for this choice of words. The first reason is that our current school system operates on the assumption that the longer that a student is exposed to a concept the more they will understand it. The second reason is that, with the rise of competency-based education models, it is specifically the foundational element of seat time within the American educational system that is being challenged.

Seat time education operates on the assumption that the more time one spends in a classroom, the better they will understand what they are learning. For example, if a high school

student is absent from class for a just over a month for being hospitalized, they should automatically fail the semester because they were not in the class for the allotted amount of time that they are required to be in class. Though this may sound understandable, it should be noted that they will fail the course even if they were able to keep up with their work in the hospital and were able to maintain a B average for the semester. In other words, even though this student received a B for the semester, they would be expected to still fail the semester because they did not fulfill their seat time. Additionally, public high school funding models are based on the seat time of a student. Therefore, because this student was not in school for a month, his or her school will receive less funding for their operations.

Competency-based systems. A competency-based education system is a system that rethinks the traditional system used to educate a child. It is a new system that switches from a seat time mandate to a competency mandate. Therefore, instead of requiring that a student meet a certain amount of time in a classroom seat in order to receive credit for the course, the student is simply required to demonstrate mastery of the subject in order to receive credit for the course. In other words, within this system, learning is seen as most effective when the student is not bound by a seat time mandate.

Competency-based education, on the other hand, seeks to get rid of this requirement of seat time. It seeks to get rid of the cookie cutter model of 180 days a year from 7:30 AM – 3:30 PM. This movement has blossomed in the past ten years as an attempt to create a system that would offer a more individualized educational experience for its students. Though several states and individual schools are making headway in the transition to competency-based education, there are two states and a handful of forward thinkers that provided the inertia required to begin the movement of competency-based education. Michigan and New Hampshire have led the

charge for the competency movement. Michigan made some incremental steps by creating the Seat Time Waiver for their schools, opening the door for flexibility in educating students. However, it is New Hampshire that has given the idea credibility. New Hampshire has effectively changed its K-12 education system from a credit-based system to a competency-based system.

Problem Statement

Some feel that there is a need to assess the effectiveness of competency-based education systems. As many individuals, organizations, and states are beginning to express concerns about the current state of education in the United States, a reconceptualization of our education system has arisen as a possible solution. The current state of education in the United States, in many ways, demands that alternative methods be thoroughly examined as possible solutions for the improvement of student growth and development. For this reason, this quantitative study will attempt to evaluate the effectiveness of competency-based educational systems by comparing them to traditional seat time based educational systems.

The current seat time based educational system has evolved out of, among other factors, the Carnegie Unit where students are categorized into grades by age and shuffled around with bells from subject to subject where they must remain for a certain amount of time in order to receive credit for their work. This model is beginning to clash with current technological advances and cultural movements in today's society.

This situation has caused several state departments' of education and colleges to begin conducting their own studies to determine whether or not they want to consider instituting competency-based education systems in their schools. This study will compare the ACT scores of competency-based high schools to the ACT scores of seat time high schools. This study will

help departments of education, colleges, policy makers, and K-12 administrators further their understanding of the benefits or challenges of competency-based education systems.

Statement of Purpose

The purpose of this quantitative research study is to assess the effectiveness of competency-based education systems by compare the average ACT scores of competency-based schools to the average ACT scores of traditional seat time based schools. Comparing these scores will provide useful data for anyone involved in a process of assessing the effectiveness of competency-based systems.

Recent Statistics on Issue

In August 2013, the Carnegie Foundation for the Advancement of Teaching published a report on some research that they had conducted on the national trends for state course credit policies (White, 2013). This study determined that state education credit policies fell into five different categories. They were:

- Category 1: Carnegie Unit abolished as primary measure of student learning. Credits must be awarded based on students' mastery of content and skills rather than on seat time.
- Category 2: Districts define credits and may use seat time OR another measure (e.g. proficiency or competency) to award credit in core courses.
- Category 3: Districts may apply for special-status or waivers to use measures other than seat time to award credit for core courses.
- Category 4: Districts do not have any flexibility and must use time-based credits.

- Category 5: Districts have some flexibility, but it is limited to special circumstances, such as credit-recovery programs or out-of-school learning, and may require approval from the state.

These categories show the range of positions that states hold in reference to competency-based education. The breakdown was as follows:

Table 1

National Trends for State Course Credit Policies

Category	Policy Description	Number of States
1	Abolished seat time	1 (New Hampshire)
2	Determined by district: may use seat time or CBE	29
3	Districts may apply for a waiver to use CBE	4
4	Seat time only	11
5	Districts may use CBE in special situations	6

These numbers show that there is a slowly rising trend towards states incorporating competency-based systems into their education policies.

Research Questions

The research questions in this study are designed to help assess if there is a relationship between the ACT scores of competency-based education systems and the ACT scores of seat time based education systems in order to determine the effectiveness of competency-based systems. The research questions for the study are:

1. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the average ACT scores of California seat time based schools?
2. Is there a significant difference between the groups of schools?
3. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the national average ACT score?
4. Is there a significant difference between the average ACT scores of California seat time based schools and the national average ACT score?

Importance of Study

As more departments of education, colleges, local school districts, and school principals begin to investigate the benefits of competency-based education systems, this study will offers them an answer to one of their concerns: how does a competency-based education system affect the ACT scores of its students in comparison to traditional seat time based systems.

Most all states, districts, colleges, and school administrators judge the effectiveness of their schools by using standardized assessments. The goal of using these standardized assessments is to have a big picture perspective with which to compare the performance of a particular district, school, or even student against the performance of other districts, schools, and students. These assessments, therefore, play an important role in analysis and decision making for administrators.

The ACT assessment is a standardized assessment that is mainly used to determine a student's knowledge of core curriculum relative to other students across the nation in order to apply for college entrance. Universities and colleges, in turn, use the ACT scores of students as

one determinate of their eligibility for acceptance into their schools. High schools and parents often use ACT scores to evaluate the effectiveness of particular high schools.

This study would be beneficial for policy makers, administrators, or stakeholders interested in evaluating the effectiveness of competency-based education systems and those looking to compare competency-based systems to seat time based systems. Seeing the similarities and differences between these test scores for competency-based education systems and seat time based education systems will specifically enable policy makers and schools to be able to use a national time-tested standard to evaluate the academic outcomes of competency-based education systems.

Additionally, this study will profit administrators of school currently employing a competency-based system. This study will allow these schools to evaluate the results of their testing results in comparison to traditional seat time based schools.

Definitions of Terms

Some key terms which will need to be defined are:

- *ACT Test*: The ACT[®] is a curriculum- and standards-based educational and career planning tool that assesses students' academic readiness for college (ACT, 2016).
- *Alternative Education*: Educational programs that aim to assist students that are in danger of not graduating high school for reasons such as dropping out, repeated failure, or having reached the maximum age for high school (Kentucky Department of Education, 2013).
- *Carnegie Unit*: The standard measurement of credit for educational institutions. This is also known as a credit hour.

- *Competency*: A specific educational goal of which a student is expected to demonstrate mastery. Competencies are usually the standards established by the state department of education; however, competencies take on a different name due to the manner in which students interact with them. Competencies differ from standards in that a student is not allowed to progress on to the next competency until they have demonstrated mastery of the current competency.
- *Competency-based Education*: Susan Patrick and Chris Sturgis, in *Cracking the Code*, define competency-based education as a system that allows for the following components:
 - Students advance upon mastery.
 - Competencies include explicit, measurable, transferable learning objectives that empower students.
 - Assessment is meaningful and positive learning experience for students.
 - Students receive timely, differentiated support based on their individual learning needs.
 - Learning outcomes emphasize competencies that include application and creation of knowledge, along with the development of important skills and dispositions (Patrick & Sturgis, 2011).
- *Seat time Based Education*: A term used to describe the traditional form of education in the United States. It operates on the assumption that a student learns by being present in the classroom. For this reason, most state departments of education require that a student be present for a given amount of minutes in a classroom in order to receive credit for the class.

- *Seat time Waivers*: The Michigan Department of Education Pupil Accounting Manual best defines seat time waivers as a department-approved alternative or innovative education program that removes the days, hours, and physical attendance requirements (unless required as a condition of the waiver) and lifts the cap on the number of online courses in which a pupil can enroll during the count period (Michigan Department of Education, 2015).
- *Standard*: A specific learning objective defined by a state department of education. Each state lays out a set of standards for each individual subject and grade level. Teachers are expected to use these standards as an outline of the content that they are expected to teach their students.

Assumptions

An important assumption being made in this study is that testing core knowledge is an accurate means for comparing the effectiveness of different educational institutions. Based upon the longevity of the ACT test, this study assumes that the ACT test will act as a reliable tool to judge students' core knowledge and that ACT scores are important tools often used to determine not only whether an individual student has achieved proficiency in the areas of core curriculum but also whether a school system has achieved its goals of providing an adequate education. Accordingly, this study will not be using SAT scores to examine the effectiveness of competency-based systems because it is assumed here that the SAT test is not necessarily testing core knowledge but rather is testing one's ability to take a test.

Limitations of the Study

This study has the following limitations:

- The results of this study will not be generalizable because it will be using a limited data set.
- It is limited by only using ACT scores from one school year.
- The design of this study is limited by the fact that it uses one instrument.

Delimitations of the Study

This study has the following delimitations:

- The ACT scores being assessed are being taken from the websites of schools in the 2017-2018 school year, and, thus, are limited to the ACT scores from the 2016-2017 school year only.
- This study seeks to assess the effectiveness of competency-based education by only looking at the results of one standardized test in isolation of other factors involved in both systems.
- This study is assessing ACT scores only and, therefore, not using any other metrics or data points.

Theoretical Framework

This study is written within the historical perspective of the American education system. However, the specific questions being examined here grow out of the continuous movement of education towards a child-centered approach, that is, towards competency-based education.

The educational philosophy of the progressive movement of the early 20th century combined with the psychological theories of thinkers such as Jean Piaget has brought American education to a point where it is beginning to reevaluate its fundamental structure. Competency-based education by its nature questions the efficacy of the traditional seat time based system that America uses as its template for K-12 schools. Competency-based education claims that mastery

of educational standards is more primary in student learning than that the time that the student spends in the classroom. In other words, seat time based systems assume that mandating a fixed amount of time spent in a classroom is the most effective way to acquire learning whereas competency-based systems assume that a focus on a student's mastery of standards is the most effective way to acquire learning.

Kenneth Henson (2003), in his article, "Foundations for Learner-centered Education," shows that progressive theorists at the turn of the 20th century popularized the belief that education should be child centered and based on experience. This movement grew throughout the following decades and was eventually strengthened by thinkers like Jean Piaget (1936). These beliefs eventually became known as constructivism. Piaget (1936) thoroughly developed a system for understanding how humans learn. He explained the development process as having stages. These stages came to greatly influence and shape American education in the 1970s and the 1980s. With the theoretical foundation laid by the progressive movement, Piaget's (1936) ideas specifically helped create a growing worldview of child-centered learning (pp. 9-15).

Out of this child-centered emphasis emerged the competency-based education movement. This study largely operates within this child-centered worldview. It assumes that this movement is an ever-evolving set of beliefs that will continue to grow and change the current structures of education in America.

Organization of the Study

This study consists of five chapters. This first chapter is the introduction chapter which offers a general overview of the study and the elements necessary to understand its general scope and sequence. The second chapter is the study's literature review. The literature review follows the historical and philosophical journey from the origins of American education up through the

20th century. This background is intended to shed light on the cause of the current movement towards competency-based education. The literature review is followed by chapter three.

Chapter three lays out the study's methodology. It contains the details of the data samples to be collected, the method that will be used to collect the data, and the process by which the data will be analyzed. Chapter four contains the findings from the research conducted and the answers to the study's research questions. Finally, chapter five offers the conclusions drawn from the findings discussed in chapter four, suggestions for further research, and a summary of the study.

Chapter Summary

In summary, competency-based education is a movement that current cultural and policy trends indicate is gaining more and more momentum in the United States. In light of the current rise of this movement, this study aims to provide an analysis of the academic performance of competency-based schools by comparing the ACT scores of competency-based education systems to the ACT scores of traditional seat time systems. It is the intention of this study to provide meaningful data to those interested in assessing the efficacy of competency-based systems in comparison to seat time based systems.

Chapter 2: Literature Review

Theoretical Structure

This study seeks to understand how competency-based education systems compare to seat time based systems. Throughout this process, many conceptual theories will be addressed, but the two main theoretical structures being compared are, one, that the education of a student is most effective when the educational system is designed around the time in the classroom as the constant and, two, that the education of a student is most effective when the educational system is designed around the development of competencies as the constant.

Seat time based educational systems are grounded in the belief that a student must be in the classroom for a given set of minutes in order to optimize student learning. This principle guides the countless state laws around K-12 education and is the reason that states have a prescribed number of minutes that a student must attend school in order to receive credit for the class. Additionally, this concept shapes the financial structure of the many states' education system. For example, in order for schools to be funded in California, their law states that high schools must offer a minimum of 64,800 minutes of instruction time; otherwise, the school may impose fiscal penalties (California Code, Education Code, EDC 47612.5).

Competency-based educational systems, however, are founded in the belief that a student has the maximum potential to learn if they are in a system that uses the development of competencies as the constant. Competency-based systems remove the requirement for a prescribed time to be spent in the classroom and assumes that learning can take place in any place and at varying rates. This system believes that demonstration of mastery is all that is required for a student to advance to the next concept or level. Therefore, in a competency-based

system, there would be no mandate of time for credit and funding would not be tied to instructional time.

Historical Background of the Seat Time System

The current education system has its roots in the American story. Its rich history closely follows the ups and downs of America's political birth and growth. Seat time systems are a direct result of the evolution of American thought and the American experience. Each era of American history has left its mark on our education system. To best understand the current seat time educational system it is important to understand its history.

The history of our current education system begins with the first settlers of America and runs all the way up to modern times. In this section, a brief overview of the major political and philosophical influences on education will be discussed. This section will look at the following periods: the Colonial Age, the Revolutionary War, the 19th century, and the 20th century.

The colonial age. America was colonized during the 17th and 18th century by many different groups of people. These new settlers came from several different countries, including mainly the Spanish who settled in Mexico, Florida, and the Southwest area; the French who settled in Canada and the Mississippi area; the Dutch who settled in the New York area; and the English who settled originally in New England. The English went on to eventually defeat the Dutch and the French and therefore came to have the most influence on the cultural and political make-up of the colonies in North America (Ornstein & Levine, 1993).

Colonial America brought with it the remnants of a very established European educational system, and many of the settled areas maintained the class-based schooling systems which had separate school offerings for children depending on their socioeconomic status. It was common for lower class children to either attend a primary school where they learned the basics

of reading, writing, and arithmetic or not attend a school at all. Upper class boys, on the other hand, instead of attending primary schools, would often attend a Latin grammar school which would ultimately prepare them for colonial colleges (Ornstein & Levine, 1993).

The European schools that most influenced the American educational system in the long run, however, were England's schools. The English way of educating was brought to America through the New England Puritans. The Puritans established a school system which culminated in the creation of Harvard University, the first college in America (Jeynes, 2007).

The Puritans, however, had a tremendous influence on the foundation of the American education system. William Jeynes (2003) explains in his book *Religion, Education, and Academic Success* that the Puritans were very committed to the importance of education for both the individual and society. They founded the first American elementary school, secondary school, and university. At New England schools, like other primary schools at the time, the students focused mainly on learning to read, write, and do arithmetic. Their schooling began at around age six or seven. The school day was a little longer than the current school day, the school week was six days a week, and, the school year consisted of meeting throughout the year with summers off.

The Puritan educational system was greatly influenced by their religious beliefs. The Puritan religion was grounded in the theology of John Calvin. Because of this grounding in Calvinist theology, Puritan schools had at its foundation a few central doctrines. Puritanism, as a religion, was grounded in a strict work ethic that defined good Puritans as thrifty and industrious. This work ethic was reinforced with a particular emphasis on the personal values of hard work, punctuality, obedience to authority, and honesty. Such values, over time, were

instantiated into the American school system, and it can be argued that these values are still very present in today's school culture as well (Ornstein & Levine, 1993).

During the early to mid-1700s, English colonies experienced significant economic and population growth. English citizens were increasing in number throughout all of the thirteen colonies. As their numbers grew, the American colonies began to develop a flourishing economy which, in turn, eventually led to the political unrest that caused the Revolutionary War. The growth of the economy and the impending Revolutionary War came to serve as the catalyst for a transition in the educational philosophy and purpose of American schools (Ornstein & Levine, 1993).

Revolutionary war. Prior to the Revolutionary War schools in America were primarily English in style and content. However, with the victory of the Revolutionary War and America's separation from England, it became obvious that America had to separate itself not only politically but also educationally (Jeynes, 2007).

The shaping of the educational system in America after the war was done by prominent figures such as George Washington, Benjamin Rush, Thomas Jefferson, and Noah Webster. These men felt that an English education was no longer an option. Their main motivation for changing the schooling was to create a foundation for their new country. They wanted to educate the citizens of their new country in such a way that they would possess the moral and patriotic values that would allow America to maintain and flourish in their newfound liberties (Jeynes, 2007).

This desire among many in the country of the time spurred on the beginnings of public education throughout the country in what was known as *Charity Schools*. Charity schools were nothing new; they were used all over Europe. They were, however, founded with the goal of

providing for the needs of a new country that now needed its own resources and a population that was morally sound (Jeynes, 2007).

This march towards public education can be seen in the Northwest Ordinance of 1785. This ordinance mandated that a section of each township be reserved for education (Ornstein & Levine, 1993). This ordinance, Ornstein and Levine explain, would later act as the precedence for using land grants to fund education.

The Revolutionary War's lasting effects on education are best summarized by Ornstein and Levine when they show that plans of the thinkers of the times argued that

education should: (1) prepare people for republican citizenship; (2) include utilitarian and scientific skills and subjects to aid in developing the nation's vast expanses of frontier land and abundant natural resources; and (3) be divested of European cultural attitudes and create a uniquely American culture. (Ornstein & Levine, 1993, p. 129)

In addition to these, the foundational structure of traditional schooling systems was beginning to shift. As a result of the founding fathers' enlightenment rationalist political and philosophical beliefs, traditional ideas of the role and audience of education began to change. This shift can best be seen in the views of Thomas Jefferson. Thomas Jefferson was a highly educated man who was skilled in many different disciplines. Educated at the college of William and Mary in Virginia, Jefferson studied core subject areas such as philosophy, mathematics, literature, and rhetoric. Here his enlightenment convictions began to take shape. These beliefs were most famously put to words in the Declaration of Independence, of which he was the primary author. The enlightenment liberty philosophy described in the Declaration of Independence would grow over time to eventually form Jefferson's beliefs about education (Gutek, 2005).

Gerald Gutek, in his book, *Historical and Philosophical Foundations of Education*, explains that Jefferson (1776) established three main goals for education in the new republic of America. They were:

1. State-supported and locally controlled schooling should provide the people with a basic literary, mathematical, and historical education.
2. Schools should be agencies of identifying, selecting, and preparing the most talented persons for leadership positions by providing access to higher education.
3. Popular education should advance human liberty and freedom by safeguarding the individual's natural rights (Gutek, 2005, p. 187).

These views laid the ground work for building a new nation's educational system.

In European societies, secondary and higher educations were generally reserved for upper class males and, thereby, creating a social system that assumed educational aptitude and leadership ability were limited to the upper class. The enlightenment philosophies of Jefferson and other like-minded individuals began to move America's educational beliefs slowly towards an egalitarian approach to education and leadership. This egalitarian view laid the foundation for what eventually became America's public school system (Gutek, 2005).

Having paved the way for the next big movement in American education, the Revolutionary War and enlightenment philosophies greatly influence the foundation and direction of the role of education in American society for centuries to come.

19th century. The early to mid-19th century in America saw the dawn of the industrial revolution started years earlier in England. The arrival of the industrial revolution brought with it a rise of immigrants to American shores and the migration of many rural farmers to cities in search of jobs in burgeoning factories (Feldman, 2001). With the mix of rapid social change

and the increased immigration, the newly formed America was ripe for either heading down the path of unprecedented growth and progress or dangerous instability and internal fracturing. A few key social and educational reformers saw the country at these cross roads, and they felt that standardizing the educational system was the solution to keeping America on track to a bright future.

These reformers had identified a few key problems about which they were concerned. They saw these problems as revolving around three main areas: the localized nature of the current schools, the lack of standardization in curriculum and teacher preparation, and the increasing diversification of the population. The localization of schools and the lack of standardization were suitable for creating pockets of wealth and poverty and potential strife between different nationalities. Because of this, a public school system was seen as the ideal solution. They had hoped that it would act as a great equalizer, giving America a set of common values and a solid educational foundation for its citizens as they took on the challenges of their exciting future as a young country. Due to efforts of these reformers, the progression towards public education was brought to fruition during the 19th century. Massachusetts was the first to lead the way (Rury, 2005).

Massachusetts was the first state in the country to have a functioning public school system. The push for public schools in Massachusetts and throughout the country was largely the result of the life of Horace Mann who helped bring about the vision of his *Common Schools* movement (Feldman, 2001).

Though Horace Mann was not the only person in America who helped bring about the common schools movement, he was the primary catalyst and inspiration for the others to follow in his footsteps. Horace Mann's wife said that he was a man who "had allowed himself to hope

for a more peaceful solution of our national evil through...reflection rather than violence” (Mann, 1904, p. 4). Although there had been various independent versions of public education, Horace Mann was the first to successfully pull together the nation’s first public school system. Horace Mann, a lawyer, was put in charge of the first board of education. With his twelve-year tenure, Mann championed a public school system which would inspire the public school systems not only in America but also in other countries in Europe (Compayre, 1907).

Working with barely a salary and little to no resources, Mann traveled across the state touting the benefits of a public education system to anyone that would listen. With his many speeches, journal articles, and legislative influences he was able to lobby to have new laws passed that worked to create the basic structure upon which the nation’s first public school system would be built (Rury, 2005). He was able to motivate many to create a system that would address such critical issues as funding, excessive absences, school conditions, curriculum, and teacher salaries (Compayre, 1907).

Understanding his audience and the depths of the various needs of the educational system, Mann gave extra attention to two main concerns of his contemporaries: the role of morality in schools and the role of schools in building a workforce. John Rury (2005), in his book, *Education and Social Change*, explains that moral education was seen, at this time, to be a very important part of schooling. Identifying this as a key value, Mann emphasized that he agreed that moral formation of students would have to become a central part of the public school system. Because of this, Mann focused many of his efforts in creating a nondenominational Christian moral foundation in his public schools. Mann felt that public schools, in this way, would function as one of the main elements that would help create a common ground for the many different denominations and nationalities rapidly growing in American cities. In addition

to this, Rury tells us that Mann also worked tirelessly to sway public opinion that a standardized public school system would also help create and train a workforce that would be grounded in the industrial ideals of hard work, punctuality, and responsibility. Using these two points as leverage, Mann was successful in convincing many important and influential people to support his cause (Rury, 2005).

The 19th Century saw many different areas of strife, points of growth, and times of change, the chief among them being the Civil War. The Civil War created a deep divide and social upheaval in America. There were countless cultural, social, emotional, and political consequences to the war. One of the results of the Civil War, however, was the increase of acceptance of publicly funded schooling. Though public education lost a significant amount of funding and momentum during the Civil War, the era that followed it, also known as the Reconstruction era, saw tremendous growth in both the popular acceptance and funding of public education. Gordon Harvey (2010), in his article, “Public Education During the Civil War and Reconstruction Era,” explains that states began to collect more taxes after the Civil War which led to a largely increased operating budget for many states. One of the main uses of these funds was public schools. For example, Harvey tells us that the state of Alabama amended its constitution to give 20% of the state’s revenues to funding the state’s public school system.

Among other things, the rise of state involvement in public education at this time resulted in the creation of state boards of education and efforts to standardize education. Nancy Beadie (2000), in her article, “The Limits of Standardization and the Importance of Constituencies”, says that some of these standardization efforts included strategies for standardizing “textbooks and curricula, teacher certification, student achievement, high school accreditation and graduation, and teacher salaries” (p. 62). Beadie goes on to say, however, that the states

struggled to actually exercise the authority of their newly established boards of education. They encouraged schools to abide by their regulations by allowing them to have the money raised by their taxes if and only if they assented to their rules. Though this gave many state superintendents power over the schools, due to the actual influence of local governments in these schools, state superintendents often fought in vain. The fight for state influence and standardization efforts, Beadie explains, continued on for the remaining decades of the 19th Century as state superintendents and law makers would work tirelessly to increase their influence over the public school system. (Beadie, 2000).

The role and structure of schools in society changed a great deal from the beginning of the 19th century to its end. Though education has often been intentionally used to steer cultural movements throughout history, 19th century America laid the foundation for education to play an unprecedented role in the social and cultural norms of its society. The movements of this century would prepare the way for the next phase of education in America and the power that the states and federal government would wield with the public school system.

20th century. The 19th century gave us the foundation of a fully integrated public school system upon which the 20th century would build its contribution to the current educational system. More than all of the previous centuries, the 20th century shows that politics, social life, and education are essentially inseparable. It has been shown here that politics and social issues have shaped and formed American education, but, in the 20th century, education begins to wield its own force on politics and social issues.

The 19th century, however, did not just abruptly end only to have the 20th century suddenly begin. Rather, the two flowed together as the end of the 19th century and the beginning of the 20th century saw the emergence of two very powerful and influential ideologies:

progressivism and Darwinism. Rury (2005) makes the claim that the people living at the turn of this century experienced change on a greater scale than possibly any other point in human history. This scale of change was driven mainly by the rapidly growing industrialization of the United States, and the worldview of the leaders during this time of massive shifts in the social and political order were largely shaped by these two ideologies in some way. Because of this, Darwinism and progressivism would come to act as ideological constructs that would end up shaping many of the systems and organizations that would eventually characterize the 20th century.

The Progressive Era was a major movement affecting all areas of American life between the 1890s and the 1920s. Steven Diner (1998), in his book, *A Very Different Age: Americans of the Progressive Era*, explains that the progressive movement arose as a response to the policies of the late 19th century political climate and the large corporate monopolies of the burgeoning industrial age. Progressivists set out to counter act the massive monopolies of companies like Rockefeller's Standard Oil. Political movements such as the Grangers and the Populist Party started to arise in the 1890s that sought ways to disrupt the current governmental systems and balance the systems of power and profit. This movement was propelled forward at the turn of the century by a severe economic depression. Thousands of businesses closed and hundreds of thousands of workers were left unemployed. As a result of this economic downturn, many began to question the laissez-faire approach of government and began pushing for more government involvement, regulation, and public support of concerns for general human welfare. The swelling concern eventually found its way to the national stage in presidential candidates such as Jennings Bryan and the eventual split-off of the republican party forming the progressive party.

Though the progressive movement was growing in popularity and appeared to have an impact on society, it came to a screeching end with the beginning of World War I.

The Progressive Era was a time of great change politically, socially, and culturally. It could best be understood as a society trying to find solutions to the greatest ills caused by the unprecedented growth of immigrants, urban population, and corporations. Battles against these problems were waged throughout society, but one of the main and long-lasting fronts was the educational system. Rury (2005) explains that progressivism brought into education an explosion of new ideas and programmatic innovations aimed at making education better attuned to the needs of society. He goes on to say that historians have separated progressive educational reforms into two main groups, pedagogical and administrative progressives. Pedagogical progressives were interested in making the educational system more student-centered/nurturing, and administrative progressives were interested in making the system more organized by focusing on issues of administration of schools, curricula, and system-wide measurements of learning (Rury, 2005).

Pedagogical reformers were focused on trying to find a better way to teach children. A survey of the pedagogical practices of the time would have found that most schools in America were using the traditional method of memorization and recitation. The pedagogical progressives sought to create alternatives to this method. They believed that children learned better by being allowed to explore and investigate new things that interested them as well as by being encouraged to express themselves and their opinions. This was a drastic shift in American pedagogy. This shift in worldview was a turning point that would come to affect American education for decades to come and, in fact, had set the educational system on a path that has brought it to today's school system. Simply put, they felt that education should be fun. One of

the most famous pedagogical reformers of the time was John Dewey. With reform efforts of individuals like Dewey, the educational system slowly introduced new methods that included more experiential learning which resulted in lessons that enabled the students to actually interact with the material and resulted in new approaches such as field trips to museums and historic sites (Rury, 2005).

Administrative progressive reformers, on the other hand, sought to make school function more effectively. Rury (2005) explains that the number of administrative progressives greatly outnumbered the pedagogical progressives and thereby accounted for the majority of the substantial reforms that took place during the first half of the 20th Century. Due to the influx of immigrants and the growing urban populations at the beginning of the century, these reformers were increasingly being forced to find ways to make the educational systems more streamlined and cost effective as well as finding ways to guard against corruption. When searching for ways and principles upon which to organize the educational system, many administrators were influenced by a belief that was grounded in Darwinism, the IQ movement.

Darwinism began as a movement within science that was inspired by the work of Charles Darwin. Darwin (1909) in his book, *The Origin of Species*, argued against the mainstream beliefs of his time that diversity in species is primarily the result of environmental factors. Instead, Darwin claimed that heredity operates as the primary source of diversity in species (Darwin, 1909) within a larger framework of natural selection, or survival of the fittest (Darwin, 1909). Though this was not entirely his original idea, he was the first to make a compelling case for the theory. The weight of his argument cannot be underestimated for it spurred an international tidal wave that would eventually come to move through all areas of thought and, consequently, all areas of society. Darwin had caused a fundamental shift of worldview. The

dual ideas of the primacy of heredity and natural selection were not only applied to a variety of intellectual disciplines but also seeped its way into the fabric of society creating a new orientation or way of viewing the world in light of heredity and the idea of the survival of the fittest. This shift shows up in the social sciences as social Darwinism and then in turn in education as the IQ movement or, as it was also known as, the American mental testing movement.

The IQ movement was a movement that used Darwin's ideas about heredity to forward the concept that one could organize children according to their natural mental ability and aptitude. IQ stands for intelligence quotient. It gets its name from the number that results from a set of assessments known as an intelligence test.

The first intelligence test was created by Alfred Binet, in 1905, in France. Binet was commissioned by the French government to develop a way to determine which students were going to need special assistance in their education. Binet worked with Theodore Simon to develop a set of questions that would accurately predict which students would need to be involved in a special program. They attempted this by testing abilities as opposed to specific knowledge. For example, they asked questions that would assess the child's memory and problem solving-skills. This eventually led Binet and Simon to identify a new marker which they called a mental age; mental age was essentially an estimate of the average ability of children within a given age group. The Binet-Simon Scale, the formal name of their test, became the foundation for all further developments in the IQ movement (Cherry, 2016).

Binet, though the father of the IQ movement, held an important ideological difference which would separate him from his predecessors. Leon Kamin (1974), in his book, *The Science and Politics of I.Q.*, says that Binet was opposed to the belief that individuals had a single, innate

level of intelligence. Rather, it can be said that Binet believed that intelligence changes over the course of a person's life and is influenced by many factors along the way.

Kamin (1974) goes on to show that Binet's perspective was diametrically opposed to the American psychologists that used Binet's work in the United States. The main psychologists that used Binet's work were "Lewis Terman at Stanford, Henry Goddard at the Vineland Training School in New Jersey, and Robert Yerkes at Harvard" (Kamin, 1974, pp. 5-6). All of these men, in fact, believed that a mental test could be used to determine a static level of innate intelligence. This belief was largely motivated by their acceptance of another ideology grounded in Darwinism called *eugenics*.

Eugenics is a term that was coined by Francis Galton (1869), cousin of Charles Darwin, in his book *Hereditary Genius*. This book chronicles the results/analysis of his findings from his extensive research into the question of hereditary intelligence. He concluded first that intelligence is in fact hereditary and second that it would be in the human race's best interest to enact social and political norms that would increase the reproduction of families and races that proved to be more intelligent and decrease the reproduction of families and races that proved to be less intelligent (Galton, 1869). Beginning with Galton, the eugenics movement quickly became an international phenomenon. The popularity of his ideas can be seen by the fact that, by 1907, the state of Indiana was able to pass the nation's first sterilization law.

Lewis Terman took Binet's intelligence test and, with the aid of several other researchers and graduate students conducted a set of multi-year trials. During these trials they tried to adjust the scoring scale of Binet's test to more accurately reflect the mental ability of those being tested (Terman, et al., 1971). A close reading of Terman's account of his research will show that he makes attempts to calibrate Binet's scale by making assumptions about the intelligence levels of

middle class students, unemployed migrant workers, and delinquent boys to name a few.

Whether or not these assumptions were caused by Terman's eugenic/social Darwinist bias could be argued, but it is clear that the result of Terman's research, namely the Stanford-Binet test, was used to enact a eugenics/social Darwinist worldview in American schools during the first half of the 20th century.

Gary McKenzie (1998), in his article, "Understanding Curriculum Better: Rise and Fall of Progressive Curriculum and a Humanist Alternative", explains that the enlightenment humanist beliefs that all humans reason and have the ability/duty to govern themselves was used by Horace Mann in the 19th century to develop a strong public school system. Because of this, American schools were developed with the goals of forming children into productive citizens using a more traditional humanistic pedagogy. However, at the turn of the 20th century, the major influences of progressivism and Darwinism quickly supplanted this focus. Instead of the traditional humanistic understanding of education, reformers attempted to use scientific means such as the Stanford-Binet test as well as other psychological studies to shape the educational system in such a way that the ideological worldviews of progressivism and eugenicism would be realized (McKenzie, 1998).

McKenzie (1998) points out that, influenced by thinkers such as G.S. Hall, an influential American psychologist and eugenicist, administrative progressivists designed schools with eugenic and social Darwinistic assumptions. For example, believing that each student had an innate mental capability and that different races were more evolved than other races, progressivists used testing to separate students into different groups and create entire tracking curricula for each group's innate ability and/or race. Additionally, schools were separated into

age-based grade levels and required that teachers learn these underlying developmental theories in order to be certified (McKenzie, 1998).

Diane Ravitch (2000), in her book, *Left Back: A Century of Failed School Reforms*, shows that, in line with the progressivist social reforms of the era, these educational reformers sought to use schools to create distinct paths for career tracks. As opposed to the classical-liberal/humanistic understanding of academic education, *i.e.* all students should take a set academic curriculum of math, science, and literature, etc., they felt that schools should separate out those who were capable of completing academic course work and would eventually attend college and or perform intellectual work from those who were destined to work in factories or in other menial jobs (Ravitch, 2000). Motivated by a eugenics-based worldview, the progressivists used IQ testing to decide which students were determined for which paths.

Lewis Terman and his colleagues (1922) wrote about the use of intelligence tests in the reorganization of school structure and in the formation of curriculum in a National Education Association subcommittee report. The report was created for the Commission on the Revision of Elementary Education. In this report, Terman explains that America had led in the international movement to use intelligence testing throughout society. He says that in the years between 1909 to 1920, the practical use of intelligence tests had become almost universal within reform schools, prisons, juvenile courts, and “institutions for defectives” (Terman, et al., 1922, p. 1).

In Terman’s mind, however, despite these perceived advancements, he felt that the greatest use of IQ tests would be realized in their use in the educational system. Between the years of 1909 and 1918, Terman says that thousands of teachers had already been trained in the use of the Stanfrod-Binet test among others. He claimed that it was expected that, by 1918, a quarter of a million students were being tested each year. Due to the rise in popularity of this

test, Terman explains, new methods of group testing were in need of being developed. He shows that, shortly after World War I, the Board of General Education of the Rockefeller Foundation granted \$25,000 to a committee of psychologist to adapt the army's intelligence tests into a test usable for schools. The committee was overseen by the National Research Council, and it resulted in the National Intelligence Test. In addition to this test, several others were made, and all focused on simplifying the testing and scoring process. In other words, they were designed to be used by any principal or teacher. With the advancement of the test designs, Terman estimated that roughly one million children were tested during the 1919-1920 school year and about two million during the 1920-1921 school year (Terman, et al., 1922).

Terman's report demonstrates, above all, that psychologists, politicians, principals, and teachers alike were coming to an overwhelming awareness that children have varying kinds of differences in them, and that, if they were going to educate them well, they would have to figure out how to determine what the differences were and how to best address the differences in the educational system. Intelligence testing increasingly became the ready solution to these challenges. This situation was being approached from a eugenic/Darwinistic worldview which, consequently, created the belief that the differences in children were hierarchical. The hierarchical assumption led to the generation of categories to classify children's intelligence and thus corresponding curriculum for them. In essence, this worldview combined with intelligence test led to the development of the tracking system still seen in modern education.

The early decades of the 20th century had an established common school system which was built upon the work of the 19th century, but it did not yet have an established system of public high schools. Secondary education existed at the time, but they were mostly private college preparatory institutions. With the administrative progressivists' shift of theory, in order

to be able to funnel children into their destined career paths and therefore places within society, they had to fill in the gap between the common schools and the adult world. For this reason, investments in public junior high schools and high schools were made all across the countries. Students were tested and tracked towards academic classes or towards vocational classes (Ravitch, 2000).

The efforts of both the pedagogical and administrative progressivist slowly pieced together the physical, theoretical, and social foundations of America's current educational system. Their legacy and their implementing of the social Darwinistic and eugenic ideologies through public and educational policies eventually led to a consistently growing anti-intellectual theme in the public-school system as teachers and administrators came to see a large percentage of their students as physically and/or mentally incapable of significant intellectual development. A few fundamental beliefs of this progressivist era and growing anti-intellectual theme would prove to endure into the decades that followed. The three most prominent assumptions from the progressivist era that would come to shape the future of education in America were, one, that curriculum should be less academically driven and more child-centered, two, that people were born with a static innate ability and, three, that one of the main goals of public schools was to engineer the ideal social and economic structure by tracking students according to their innate abilities.

These three assumptions would come to be permanent fixtures in 20th Century education with the work of thinkers like Harl R. Douglass. Douglass had a very accomplished career in education and became a well-known authority of the time on matters of junior high and high school development as well as curriculum design and educational theory in general. He authored or coauthored over 430 publications during his career (Whinery, 2016). Douglass was

successfully able to meld together the three fundamental assumptions of the progressivist era into a holistic view of what high school education should look like in the United States. Douglass succinctly lays out these ideas in his 1937 book called *Secondary Education for Youth in Modern America*.

In this book, Douglass (1937) gives his ideas for the ideal state of high school education by beginning with a description of his worldview and how education fits within it. He says that humans exist within a world of constant change and that they are easily influenced by their environment. From this he reasoned that education, therefore, should be about creating an environment that will direct students to develop in a particular direction. In other words, Douglass, a strict behaviorist, grounded his educational framework in the belief that the primary role of high schools within society should be to help engineer the ideal social structure. He felt that, like churches, advertisements, salesmen, and other various social constructs, schools played a large role in the shaping of the individual. For this reason, Douglass said that the meaningfulness of education is solely grounded in the fact that humans are largely the result of deterministic outside forces, and, therefore, was developed for the purpose of manufacturing human behavior. He felt that a school's main function was to design experiences for students that would strategically develop within them the desired ideals and outcomes (Douglass, 1937).

Douglass (1937) went on to explain that he supported the historical view of education that said that the school's primary function should be to benefit society as a whole. He saw this as directly opposed to those who felt that education should exist to primarily benefit the individual. More specifically, though, Douglass emphasized a three-fold purpose for high schools. He said that they should contribute to the sustainability of society and its institutions; preserve its own structure and function in society, thereby protecting it from private interests;

and contribute to the intellectual evolution of society. In addition to this, however, Douglass firmly believed that, at its core, the school is what he called *supplementary*. He possessed a holistic and dynamic view of society, and, it is because of this, that he felt that it was inherent in the nature of the school as the developer of the future citizens of the country to supplement where the societies other institutions are failing. In other words, he felt that if any other given institution in society, for example, churches or family life, are declining, then it would be the school's job to supplement its students' education with what is lacking (Douglass, 1937).

With this in mind, it can be seen that Douglass then built his philosophy of education and curriculum development upon a dynamic deterministic behaviorist worldview. It is within this context that it makes sense that Douglass laid out his seven objectives of a high school. He said that schools and their curriculum should be developed around the following objectives:

- **Effective citizenship:** The school should play a large part in preparing all individuals to be effective citizens in all aspects of social life.
- **Happy and Effective home life:** Despite the fact that the schools have not played a significant part in developing students for home life, for Douglass, doesn't mean that they should not do so. He saw this as of the utmost importance.
- **Development of leisure interests:** Douglass believed that the schools should spend time helping its students develop outside interests and habits that will help them enjoy life through recreation.
- **Physically healthy:** He thought that the school should put into its curriculum classes that would encourage and train students to have a physically healthy lifestyle.
- **Effective individuality:** The school should help develop a student's personality in such a way that they will be confident in their individuality.

- Desire for continued study: Finally, Douglass wanted schools to grow their students in the habits and skills necessary for a desire to search out continued studies after they graduate high school.

Douglass's (1937) influence on modern school structure is apparent as he recommended that, in order to best achieve these objectives, schools should add guidance activities, extra-curricular clubs and organizations, the management and governance of the school, home activities, and pupil-teachers contact outside of the classroom.

Douglass (1937) goes onto say that the school's design and curriculum should be adjusted to address the needs of the growing population of *lesser academic ability*. Using I.Q. tests and research as the standard, he claimed that the high school curriculum was developed for students with an I.Q. of 105 or higher but that the average high school student, especially boys, had an average I.Q. between 85 and 105. For this reason, Douglass believed that the average student would not be able to learn algebra or Latin well enough to pass the class. With this in mind, he promoted the idea of tracking and contributed to the trend of anti-intellectualism in high schools across the country (Douglass, 1937).

Throughout the remainder of his book, Douglass goes on to make the case for adjusting the organization and curriculum of high schools in order to best meet the needs of all students in such a way that they would ultimately be able to fully participate as an American citizen and live a fulfilling and happy life. Beliefs such as these and by other thinkers like Douglass were eventually moved the progressive ideals of education into the next major educational movement that arose in the 1940s and 1950s known as *life adjustment education*.

Mary Janet (1954), a well-known advocate for the life adjustment theory of education, lays out the major tenets of the movement in her article, *Life Adjustment*. She promotes the idea

that life adjustment beliefs encouraged schools to develop their curriculum based on the current needs of the students in society. She said that lessons should be developed according to the capacities or capabilities of each individual student. The idea promotes an acknowledgment of innate differences of students and the desire to educate them accordingly. Janet demonstrates what she considers the proper use of life adjustment education when she says that student should be allowed to be taught according to their realistic abilities. To demonstrate this point, she explains that it is better to allow gifted students to flourish in challenging classes and to allow students of lesser capabilities to learn at their level as opposed to simply being left “floundering in a Latin class” (Janet, 1954).

One can see in her thought, and in countless others like Janet, that the life adjustment movement was the logical next step to the educational reforms of the progressive era. The life adjustment movement was built upon the eugenicist belief that everyone has innate mental abilities and that only a small percentage of people were actually capable of college studies. Though the student-centered ideas of pedagogical progressives like John Dewey persisted in the framework of the curriculum of the 40s and 50s, the thought of the administrative progressivist drove the major formative themes of the day. Herbert Kliebard (2004), in his book, *The Struggle for the American Curriculum, 1893-1958*, shows that the life adjustment movement was supported by the day’s current scientific and psychological views of the mind. Kliebard (2004) explains that thinkers like Edward Thorndike, a prominent psychologist of the early 20th century, and his ideas had a major impact on the direction of educational theory. Edward Thorndike, Kliebard (2004) shows, believed that learning was a stimulus-response process that did not transfer well to other situations. His psychological experiments seemed to show that the mind was not in fact made up of unifying functions such as reasoning and memory, as had been held

from the time of Plato, but rather was a machine-like entity that was made up of millions of individual circuits that had little to no interaction. Kliebard (2004) makes it clear that this view came to have a significant impact on the development of educational theory. The influence of psychologist such as Thorndike and Hall came to provide apparent scientific evidence to the eugenicists ideas of mental ability and the development of curriculum (Kliebard, 2004).

One of the most influential forces in the development of the life-adjustment movements, Kliebard (2004) says, is Charles Prosser. Prosser, a lawyer and an educator, was heavily involved in education throughout the progressive era. He is most well-known for his development of the vocational school systems throughout the country and for his promotion of the need for a life adjustment curriculum. As a major player in the development of vocational schools in the U.S., many people listened to Prosser when he gave his renowned speech in New York which came to be known as the Prosser Resolution. Kliebard shows that, in this speech, Prosser laid a strong criticism against the high school system which ended up being a rally cry for the life adjustment movement. Prosser claimed that science pointed to the fact that twenty percent of high school students were capable of being prepared for college studies, twenty percent of high school students had the skills to be trained for vocational jobs, and the remaining sixty percent of students were being failed by the education system. For this reason, Prosser declared that the underserved sixty percent needed life adjustment education; that is, they needed to be given an education that prepared them for living the mundane everyday life of a non-vocational/non-college educated adult (Kliebard, 2004).

With the thought and influence of thinkers such as Douglass and Prosser and the social and cultural shift of WWII, life adjustment education quickly grew in popularity on a national level. It was seen as being based in democratic principles and would, ultimately, help develop

flourishing democratic citizens. Thomas Fallace (2011), in his article, “The Effects of Life Adjustment Education on the U.S. History Curriculum, 1948-1957,” demonstrates this growth when he explains that a conference on life adjustment education was held in 1951 which was attended by over 200 representatives coming from about thirty-eight different states. The momentum from this conference, Fallace says, went on to spur a second national conference and numerous state sponsored conferences and workshops that were reported to have had over 200,000 administrators and local teachers participating.

The progressive era education system and the extensive acceptance of the life adjustment movement helped to lay a foundation for the next half of the 20th century education. The second half of the 20th century saw a tumultuous move towards inclusion. In hind sight, the country’s march to inclusion, in many ways came to characterize numerous social and educational changes that took place throughout the 1950s and beyond. The United States began to wrestle with its understanding of what it means to be a human being as well as what the rights of those human beings should look like within society. Particularly, the march towards inclusion, in many ways, focused on the role of minorities in society and, consequently, in education.

Paula Fass (1989), in her book *Outside In: Minorities and the Transformation of American Education*, demonstrated how the major component of both social and educational change during those years was integrally bound up in the role of minorities. Fass listed the most influential minorities groups for educational reform in the 20th Century as African Americans, immigrants, women, and Catholics.

America’s educational system’s movement towards an inclusion of diversity took a difficult and painful road which it walked with the country at large. Since schools had come to play such a large part in the daily life of most every family, they also became one of the main

sites for cultural warfare. In all of the major transitions of inclusion of minorities during the 20th Century, schools seemed to play a significant role.

The court rulings in the cases of *Brown v. Board of Education* left a permanent mark on American education. With this decision, the schools became one of the main areas of life that the Civil Rights movement was inched forward. This could be seen in the role of Arkansas's Central High School in the lives of, what came to be known as, the Little Rock 9 in 1957 and, again, in the role of New Orleans's William Frantz Elementary School in the integration of Ruby Bridges in 1960. With the Civil Rights Act of 1964, the United States was well on its way to attempting to create a more inclusive nation with laws that supported and enforced the idea of respect for all humans at every level of society.

In addition to the plight of the African Americans' struggle for freedom, women struggled to gain access to higher education and career opportunities and immigrants from South America were struggling to gain access to education. Catholics eventually created a vast Catholic school system that, to this day, has been a form of competition for the public schools (Fass, 1989).

The struggle for freedom and inclusion into society of these minorities eventually bore fruit for other groups in society, specifically, those with physical and mental disabilities. Robert L. Osgood (2005), in his book, *The History of Inclusion in the United States*, acknowledges that the *Brown v. Board of Education* decision ushered in a new era of special attention to the civil rights of all American citizens. Throughout the 1960s and 1970s, the needs of the individuals with physical and mental disabilities were also brought into the country's awareness. Laws and policies were established and put into practice that eventually led to today's current special education system.

Paralleling the United States acceptance and integration of minorities was also an ever-evolving philosophy of education that helped form the decisions that shaped the development of the country's school systems during the decades of the 2nd half of the 20th century. Beginning with thinkers like John Dewey, the pedagogical progressivists put the philosophy of education in America on a child-centered path. Despite the administrative progressivists' focus on mental ability, child-centered theories of education pushed forward throughout the 20th century. The work of Jean Piaget in the realm of child development gave scientific backing to the child-centered emphasis begun with the pedagogical progressivists and began to shape the assumptions about education during the 2nd half of the century.

Jean Piaget (1970) , in his book, *The Principles of Genetic Epistemology*, described the foundation of his theories as genetic epistemology. He took great care to show the difference between what he was attempting to do with genetic epistemology and traditional epistemology. Piaget explained that traditional epistemology was a formal area of study in philosophy that seeks to understand what knowledge *is* whereas what he was trying to do was to figure out how knowledge grows. Piaget's (1970) fundamental concept that drove most of his career was the idea that knowledge is not something that humans pick up as empirical data when interacting with a particular set of information but rather is a life-long process that is bound up in the way that humans interact with the world through their entire life. Genetic epistemology, for Piaget, was a process by which humans construct knowledge (Piaget, 1970).

Piaget's idea of genetic epistemology was a revolutionary idea that ended up having a major impact on both education and the greater intellectual world of the 20th century. His ideas were impactful because he strove to truly integrate the fields of philosophy and psychology. Up until his time, epistemologists had based their ideas on static instances of logical concepts or

ideas divorced from the reality of being a developing human in time. Piaget, however, chose to look at the question of how we know things within the context of human development. This idea grew quickly as it was a concept that gave an in-depth explanation of the role that the development or construction of knowledge plays within the larger picture of human society (Piaget, 1971).

More particularly, however, Piaget (1971) saw human knowledge as an active process. He believed that acquiring knowledge was a process of assimilating some part of reality into a system of transformation. In other words, he felt that knowledge was the result of a dialectic interaction between the knower and the aspect of the world with which the knower is currently interacting. This means, therefore, that knowing is not simply a passive process wherein the knower copies the information outside of itself and replicates it in its mind as was the assumption for centuries prior but rather actively creates ideas and understanding through an interactive process. In some sense, Piaget, similar to the philosophy of Martin Heidegger, said that the knower has an equal effect on the object being known and that it is in that interaction that knowledge is created. This difference in belief can be the difference between using a memorization-based curriculum versus using an experiential-based curriculum.

Piaget's work was quickly formed into an entire worldview known as constructivism. Constructivism was a way of understanding life and its many facets from the perspective of Piaget's ideas about knowledge as a constructive process. In contrast to the theory of behaviorism which saw knowledge as a process of stimulus and response, i.e. from psychologists like Thorndyke, constructivism claimed that knowledge was constructed through an active interaction with the world. Essentially, constructivism saw learning as a process made up of one constructing an interpretation of the current experience that is created with and in the existing

belief system of the individual. Therefore, constructivism's key addition to educational theory is the idea that learning is an active process as opposed to the behaviorist belief that learning is, in essence, a passive process.

In their journal article entitled "The Impact of Constructivism on Education: Language, Discourse, and Meaning," M. Gail Jones and Laura Brader-Araje (2002) discuss the contrast between the constructivist idea of active learning and the behaviorist belief of passive learning. They show that behaviorism has played a large role in educational theory, even up to the present. They explain that, as behaviorism saw knowledge as being a stimulus-response process, classrooms were structured around the idea that it was the teachers job to create an environment that would provide the right stimuli for students to learn. It was believed that providing such stimuli would not only optimize student learning but would then also allow the teachers to evaluate the progress of student learning by observing their behaviors. Jones and Brader-Araje show that approaching education with a behaviorist worldview brought schools to create objectives-based management systems and outcome-based curricula. Additionally, they go on to say that, when behaviorist beliefs were applied to the classroom, they created the assumption that if learning was not happening, then it was the teacher's job to restructure the classroom environment, create a new form of reinforcement to produce the desired behavior of a student, or to generate a negative reinforcement to get rid of a student's troublesome behavior. In essence, the behaviorists theories created an education system that placed the blame for students' failure to learn with the teachers' lack of performance.

Though, to this day, educational institutions still have many practices and assumptions routed in behaviorism, Piaget's thought planted a seed that has grown strong throughout the last decades of the 20th century. Supported and enhanced by the thought of other constructivist

thinkers, constructivism was slowly adopted as a worldview that has come to replace most of the ideas of behaviorism. The core idea of learning as a constructive process as opposed to a stimulus response process created a need for a reassessment of how schools should approach pedagogy.

As the theory of constructivism progressed, other thinkers added to the constructivist ideas. Jones and Brader-Araje (2002) show that constructivism has been separated into different branches or approaches. Following Piaget's influence, there were two other branches that had a significant impact on the education system; they were social constructivism and radical constructivism. Social constructivism, created by a Russian psychologist named Lev Vygotsky, was made popular in the United States during the 1980s. It emphasized the primacy of the role of interpersonal and social interaction in the learning process. Radical constructivism, advocated for by Ernst von Glasersfeld in the early 1990s, focused on the uncertainty in the constructivist learning process and therefore emphasized the learner's interpretation in knowing. Throughout the various thoughts and theories that have contributed to the constructivist worldview, however, there is one main concept that has persisted, meaning-making. Meaning-making is the idea that learning takes place when the learner is actively engaged in the learning process by making meaning out of their interactions with others and their environment. It has become the hallmark of the constructivist worldview, and it brings the many beliefs about how humans learn together into one conceptually dense phrase.

The 2nd half of the 20th century, with the greater social march towards inclusion and the penetrating ideas of constructivism slowly overtaking the beliefs of behaviorism, saw the beginning of a seismic shift in the world of education. In other words, the worldview used to understand the role of the individual in learning and how they interact with the many elements of

the learning environment has been altered which will come to likewise shift the structure of the learning institutions and the learning process itself.

This shift was laid out by the Claire Booth Luce Policy Institute. The Clarie Booth Luce Policy Institute created a document that outlines a brief history of American Education. In their outline, they define the time period from 1980 to present day as the *School Choice Era*. They define the school choice era as the time when educational options were diversified and expanded beyond the traditional structures. For example, policies were created that made allowances for homeschooling, vouchers, charter schools, and various tax credits for tuition and scholarships. They say that, along with the increase in option and child-centered educational theories, this period was also marked by an increase in the role of the parents' authority and say in the educational process (Claire Booth Luce Policy Insititute, 1980).

The historical foundation for the school choice era was laid upon the practical world of the vocational school system established earlier in the century by Charles Prosser and the growing adoption of the constructivist worldview. The emergence of the school choice era was not a new movement of thought but rather a cultural shift. In the 1980s, this shift eventually ushered in the acceptance of the slowly growing world of homeschooling. By the end of the 1980s, the compulsory education laws in all fifty states had been brought into question, and, as a result, by the early 1990s, all fifty states changed their compulsory education laws to allow parents to homeschool their children in place of sending them to school. In addition to homeschooling, the school choice era would come to be defined by the establishment of charter schools and the introduction of various voucher programs (Coulson, 1999). Along with the growing acceptance of homeschooling, charter schools and vouchers carried the education

system into the 21st century, laying the groundwork for the future of education for the next 100 years.

Competency-based Education

The gradual shift from inclusion to the school choice era has set the stage for the next great shift in the educational landscape, competency-based education. Competency-based education is a reconceptualization of the system of education within America. It is a movement that has grown out of the struggles of the school choice decades. Competency-based education, in a nutshell, is a redesign of the current system that has evolved over the past two centuries. It brings a natural conclusion to the many complaints of the current system. Competency-based education, in some sense, realizes the pedagogical progressivist's ideals by reorienting the focus of the educational system to focus on the individual student; in other words, it makes the student the primary agent in the educational system.

In many ways, competency-based education is a logical result of the 20th century's progress towards inclusion. The movement of American education to include and accept diversity and minorities was really a movement that gave recognition to the value and dignity of all humans. Having fought through this difficult process for the past hundred years, the United States has come to see children as unique individuals that all have different learning styles. Competency-based education is the attempt to institutionalize this new-found view of the dignity and individuality of children and the ideals of the constructivist theory of learning.

To understand how competency-based education fulfills the movement of inclusion it is best to first understand what competency-based education is in practice. In 2011 many proponents of competency-based learning gathered together to establish a definition of competency-based education. They came up with the following list:

- Students advanced upon mastery.
- Competencies include explicit, measurable, transferable learning objectives that empower students.
- Assessment is meaningful and a positive learning experience for students.
- Students receive timely, differentiated support based on their individual learning needs.
- Learning outcomes emphasize competencies that include application and creation of knowledge along with the development of important skills and dispositions. (Shubilla & Sturgis, 2012)

Competency-based education is based on the idea that learning is a process of mastering a concept or skill. In the current system, a student can move from class to class and from year to year with satisfactory grades until they reach their senior year at which time they graduate (Priest, Antonia, & Ephraim, 2012). However, just because this student graduated does not mean that they learned what they were supposed to learn. With the rise of homework assignments and the pressure of sports, students focus most of their time on how to get the A as opposed to learning what they are supposed to learn.

With this new model, schools lose the seat time requirements for credit and for graduation as well as grade levels. Instead, all subjects are broken up into levels with certain competencies for each level. The goal is no longer to get a student to sit in class for a certain amount of time and receive a certain grade on a test, but rather the goal becomes the desire to have students demonstrate mastery of each and every competency in each and every subject. In other words, a student can move as fast or as slow through each individual subject as necessary (Priest, Antonia, & Ephraim, 2012). Instead of moving a group of like-aged students through a set of lessons together, competency-based education allows each student to move at their own

pace and in the direction that they want to move. When students are moved around as a group, the top of the class is inevitably held back and the lower part of the class is dragged ahead. With this new model, every student progresses according to their own ability and interests, thereby creating motivation and momentum. Fred Bramante and Rose Colby (2012) express the concept best in their landmark book, *Off the Clock: Moving Education From Time to Competency* when they show that instead of time, that is the number of minutes a student sits in a classroom, being the constant and student achievement varying, that is grades, achievement will be the constant and time will be the variable. In other words, competency-based education attempts to allow for completely inclusive child-centered education by offering a Copernican flip of the fundamental structure of the current educational system by replacing the seat time requirement with a competency requirement.

Attempting to create a system that helps students learn best is nothing new in the field of education as that is generally what motivates most teachers and administrators on a daily basis, but redesigning the current system so that all students learn at their own pace and in the direction and methods that most inspire them to learn individually is newly realized in this system (Shubilla & Sturgis, 2012).

The ACT

David Holgren (2008), in the Biographical Dictionary of Iowa, tells the story of the man that created the ACT, Everett Franklin Lindquist. The ACT test grew out of Lindquist's many years of experience working at the University of Iowa. At the University of Iowa, he helped to develop a program that came to be known as the Iowa Testing program. This program began in 1929 when Lindquist developed a high school academic competition called the Iowa Academic Meet; however, it eventually became known as the Brain Derby. Because of the success of this

competition, Lindquist and his associates went on to develop a series of academic tests. These tests included the Iowa Every-pupil Achievement test, the Iowa Test of Basic Skills (ITBS), the Iowa Tests of Educational Development (ITED), and the General Educational Development test (GED). After many years of success creating and validating tests and establishing innovative means for scoring, Lindquist worked with a man named Ted McCarrell to start the American College Testing Program in 1959.

E. F. Lindquist (1970) himself, in his journal article, “The Iowa Testing Programs – A Retrospective View,” explains his purpose for founding the American College Testing Program. He says that the test was created to serve the requirements of both the small junior and private colleges and the large state colleges throughout the country whose needs were not being met by the College Entrance Examination Board’s test, the SAT. Lindquist says that the SAT was being used by elite, competitive colleges to determine the top performers in their application pool in order to weed out those that they did not want to accept. The smaller junior and private schools and larger state colleges, on the other hand, were not interested in separating out the elite for acceptance; rather, they were more interested in having a test that would help them place their students appropriately. In other words, these colleges were not so much interested in turning student away but rather were interested in helping them succeed in college. For this reason, the ACT was designed to be a basic skills test as opposed to an aptitude test.

New Hampshire Education

Nathaniel Bouton, in a lecture given at the New Hampshire historical society in 1833, gave a thorough account of the history of education in New Hampshire up until that point. He explains that the New Hampshire education system has deep roots in the Massachusetts puritans. The puritan schools and philosophies quickly spread into New Hampshire by the middle of the

17th century as puritan schoolmasters moved to New Hampshire to start schools for the settlers there. Driven mostly by the desire for a religious education, the Massachusetts/New Hampshire court enacted a few laws between the years 1647 and 1721 that any town with more than one hundred households would need to fund a free grammar school for their children. This ruling and accompanying philosophies about education would become engrained into the New Hampshire understanding of education (Bouton, 1833).

Bouton points out that despite the following years of the French and Indian war and border issues with Massachusetts, the laws about education were followed and enforced as much as possible. However, he also explained that since the majority of towns had less than fifty households in it, education at large was neglected in the state of New Hampshire. Nonetheless, the state kept pursuing the desire to grow an educated population. In 1769, Governor John Wentworth authorized the establishment of a college in the province, Dartmouth College. In 1783, New Hampshire became a sovereign state. Then, upon the recommendation of the Colonial Congress, that same year, New Hampshire passed an act for the encouragement of literature and genius, and for securing to authors the exclusive right and benefit of publishing their literary productions for twenty years. This act would come to inspire many laws that would in turn shape the role of education in New Hampshire (Bouton, 1833).

In 1789, New Hampshire passed the first law. It repealed all former laws on education and established the mandate that all selectmen should collect taxes to support the schools in local towns. The law stated that the money should be used to help keep grammar schools open, and it mandated that they teach reading, writing, and arithmetic. Additionally, it required that each school master produce some sort of certificate that proves that they were qualified to run a school. The next law was passed in 1791. This law raised the tax from five shillings to seven

shillings. In 1805, the third law was passed. It gave towns the ability to divide their town into districts and empowered citizens to be able to vote in district matters. The fourth law, passed in 1807, raised the tax again to seventy dollars for every dollar of the proportion of estates. The fifth law, passed a year later in 1808, was more explicit. It required the schools to add phonics and geography to the curriculum. It also allowed schools to replace math and geography with “female education” as desired. In addition to this and the usual certificates, this law required that teachers also present a certificate that demonstrated good moral character, from a selectman or a minister. The sixth law, passed in 1818, raised the tax again to 90 dollars per every dollar proportioned, but the seventh law, passed in 1827, was far more extensive. The seventh law created the requirement for a superintending committee that would annually evaluate the state of the local school as well as the ability of the teacher. They were also tasked with helping to pick class books and present a written report to the town (Bouton, 1833).

These laws created a solid foundation for the influence of Horas Mann to eventually build a fully operating public school system. The public school system would continue to grow throughout the early 1900s and eventually throughout the 20th century. After more than a century, in 2005, New Hampshire undertook the task of revamping its educational laws once again. It began the slow process of changing its education laws from a seat time based system, which developed during the 19th and 20th centuries, to a competency-based system. New Hampshire eliminated the Carnegie Unit (the standard used to award credits based on hours in class), and replaced it with the need to show mastery of a subject. In other words, in 2005, New Hampshire established a regulation that asked high schools to award credit based on mastery, as opposed to seat time, and, in 2009, New Hampshire additionally made it possible for schools to

award their credit for learning that was learned anytime, anyplace, anyhow, and at any pace (Bramante & Colby, 2012).

New Hampshire's roots of developing an effective educational system for its citizens has grown into a state-wide system that, today, has become known as competency-based education.

California Education

As a younger state, California's education system does not reach as far back into history as New Hampshire. California's educational roots originally grew out of the state's first constitution. The framers of the state constitution met in Monterey in 1849 and fiercely debated the idea of public education which, at that point, was on the rise in the eastern part of the country. After much debate, the framers settled to support the idea of public education (History of Public Education in California, 1961).

The result of this decision was that the constitutional position of Superintendent of Public Instruction was created which would be filled by a statewide vote. Despite this seemingly large victory for public education, it remained a political struggle to gain support for public education in California. Because of education's early connection to the constitution, however, similar to New Hampshire, state funding for local schools was a natural conclusion for many and ended up receiving political influence. In 1851, San Francisco opened the state's first free public school which was then quickly followed by seven more schools no more than a year later (History of Public Education in California, 1961).

Each year the superintendents were able to garner more taxes for public schools and longer school years (originally only starting out as with three months). In 1862, California opened its first normal school to educate teachers. This school would be the foundation upon which the state college system would be built. A law mandating compulsory school attendance

for children between the ages of eight and fourteen was instituted in 1874, and this law also tied state funding for school to the number of children in their district. Then, the next big step in education was taken when, in 1902, the citizens of California voted to fund the creation of high schools. The funding for schools was altered in 1911 when the legislature decided to base the amount of money given to the schools on the number of children actually attending the schools as opposed to just the number of children that live in the district, thus connecting the schools funding to their enrollment. A year later in, in 1912, textbooks became free to all students (History of Public Education in California, 1961).

As the years passed by, the few people involved with helping the superintendent of public instruction gradually became known as the department of education. However, it was not until 1921 that the State Department of Education officially established. Throughout the remainder of the 20th century, the California State Department of Education grew and changed and eventually morphed into today's current seat time based educational system (History of Public Education in California, 1961).

This Study

Acknowledging the differences between the strengths of the ACT test and of the SAT test, this study will use the skills-based ACT test scores of students as opposed to the aptitude-based SAT test scores. With this in mind, this study will attempt to be a small but useful tool in the transition from the current seat time based education system to a competency-based education system. In order to provide current seat time based administrators with helpful information, this study will compare ACT scores of competency-based high schools to traditional seat time based high schools. It is the hope of the author of this study that such an analysis will assist seat time based administrators in evaluating the evidence of the effectiveness

of competency-based education systems and whether or not to switch their schools, districts, or dioceses to a competency-based model.

Conclusion

In conclusion, it has been shown that the new movement of competency-based education is the current fulfillment of three centuries of American education. This can be seen in that American education received its fundamental concepts of punctuality, respect for authority, and productivity from the Puritans during the colonial period. The system was then given the American spirit of liberty, scientific rigor, and mission of creating republican citizens from the post-revolutionary war timeframe. Upon the arrival of the 19th Century, it was then seen that the American educational system began to take on a larger role in society by becoming organized into a public school system. This system began to flourish as it moved into the 20th Century, acting as the frontline for many of the century's struggle to acknowledge the dignity and value of each individual person. This caused the purpose of education to begin to shift from education as primarily designed to benefit society to education as designed to primarily benefit the individual. The emerging educational worldview was the result of the 20th century progressivist ideas minus the eugenic/Darwinistic determinism assumptions. Finally, towards the end of the 20th century, it was shown that the seedlings of the next major growth spurt of the educational system could be found in the development of the school choice era. This undertaking strove towards finding a solution to the many problems within the educational system and eventually sprouted into the current competency-based education system movement.

This study will, therefore, help aid the process of transition from seat time based education to a competency-based education system by offering a small contribution of comparing ACT scores of both systems.

Chapter 3: Research Method

This study seeks to understand the effectiveness of competency-based education as compared to seat time based education. It will use average ACT scores of selected competency-based high schools from New Hampshire and average ACT scores of seat time based high schools from California to analyze the effectiveness of competency-based systems.

This chapter will lay out the research method, and the procedures that will be used to achieve the study's goal. It will provide the study's framework and approach to research. This chapter begins by giving an overview of the study with the restatement of the problem statement and of the research questions. Then, it provides the structure of the research by stating the research design methodology and explaining the details of the population and sample to be studied. Finally, the data and its collection process will be discussed in the remaining sections.

Restatement of Problem Statement

The trends in culture and education over the past thirty plus years have moved students, parents, school administrators, and policy makers to revisit the method of learning used in the education system. Ken Robinson (2015), internationally renowned author and education advocate, explains in his book, *Creative Schools: The Grassroots Revolution That's Transforming Education*, that he has witnessed countless people becoming increasingly frustrated by the negative effects of the current system that have arisen. He shows that political pressures over the past several decades have intentionally engrained a standards based system into America's schools and have fortified it by connecting money to test results. The effects of this system on the children combined with larger cultural shifts are causing grassroots movements that are questioning the essence of this system.

One of the alternative methods being explored is known as competency-based education. Competency-based education seeks to address some of the fundamental issues in the current educational system by shifting from using the amount of time that a student spends in class as the primary element of the learning system to using the students' competencies as the primary element of the system.

Despite the growing attention being given to competency-based learning, however, there are not many study's being done to help school administrators and policy makers assess the effectiveness of competency-based educational methods. A study that will provide a clarity about the effectiveness of competency-based education systems is needed by school administrators and policy makers to help make informed decisions about reforming their schools. Additionally, administrators and policy makers often approach changes at this level with great skepticism. For this reason, measurement of the effectiveness of the competency-based systems need to be evaluated with a set of metrics that are reliable, well-known, and trusted.

Restatement of Research Questions

The research questions for this study are used to guide the research and to ensure the goal of the study is met. The following questions will be used to help assess the effectiveness of competency-based education by comparing the ACT scores of competency-based schools to seat time based schools. The research questions are:

1. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the average ACT scores of California seat time based schools?

- a. H_{10} : There is no significant difference between the average ACT scores of competency-based education systems and the average ACT scores of seat time based education systems
 - b. H_{1A} : There is a significant difference between the average ACT scores of competency-based education systems and the average ACT scores of seat time based education systems
2. Is there a significant difference between the groups of schools?
- a. H_{20} : There is no significant difference between the groups of schools
 - b. H_{2A} : There is a significant difference between the groups of schools
3. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the national average ACT score?
- a. H_{30} : There is no significant difference between New Hampshire average ACT scores and the national average ACT score
 - b. H_{3A} : There is a significant difference between New Hampshire average ACT scores and the national average ACT score
4. Is there a significant difference between the average ACT scores of California seat time based schools and the national average ACT score?
- a. H_{40} : There is no significant difference between California average ACT scores and the national average ACT score
 - b. H_{4A} : There is a significant difference between California average ACT scores and the national average ACT score

Research Design

This research project will be a quasi-experimental, quantitative, nonequivalent group design study. It will use secondary or archival data to analyze the differences between the average ACT scores of the selected high schools. This study will be organized around four research questions, and the methodology will include the population, the sample high schools' average ACT scores, the treatment of the data, and an explanation of the significance of the analysis of the data.

This project's design method will be classified as a quasi-experimental method because the subjects of the study will not be chosen randomly but rather will be chosen by identifying pre-defined characteristics as opposed to a true experimental design which would use randomly chosen subjects (Gravetter & Forzano, 2009). It will additionally be categorized as quantitative because it will not involve qualitative data but rather will compare the average test scores of selected schools.

This study will also be considered a nonequivalent group design. Charles S. Reichardt (2007), in his article, "Estimating the Effects of Educational Interventions," describes nonequivalent group design by contrasting it with correlational design. Reichardt explains that, though these two designs are similar, the main difference between them is that one has a continuous variable (correlational design) and the other has a discrete variable (nonequivalent group design). A continuous variable in a correlation design, he shows, would be a variable that naturally occurs within the situation. For example, the amount of time that a student is exposed to a given subject during a typical day would be considered a continuous variable. Reichardt goes on to describe a discrete variable, on the other hand, as something that is either present or not present in a given situation. For example, comparing different groups of students that either

have been instructed with a particular curriculum or not. For this reason, this study will be considered a nonequivalent group design because it is measuring the difference between two sets of students that have been in two discrete educational environments. Furthermore, it will not be considered a correlational design because it will not be searching for correlations among naturally occurring situations within the same educational environment.

This study, therefore, will be designed to maximize the results found by utilizing a quasi-experimental, quantitative, nonequivalent group methodology in order to better understand the given data from the selected schools.

Population and Sample

The population being studied for this project are the public high school students from the states of New Hampshire and California. These two states were chosen because, as described in their education codes, each is fully grounded in the respective approaches in question. That is New Hampshire uses a competency-based system for its schools and California uses a seat time based system for its schools. The students will be evaluated at the school level and will not be identified individually. The high schools being evaluated will be separated into two different groups, competency-based high schools (New Hampshire high schools) and seat time based high schools (California High Schools).

The population of this study will be represented by a sample of high schools taken from each state. When choosing the high schools for the study, ten schools will be chosen from each state. The number of ten schools will be used because New Hampshire has ten school districts, and one high school will be taken from each district. The sample will, therefore, consist of ten groups. To create these groups, one school from each state will be matched together forming the ten sample groups. Each group will be comprised of two high schools that possess similar

numbers of students and similar socio-economic designations. Schools with a similar number of students will be defined as schools with student populations within 500 students. The data will be taken from each schools' publicly available school profile. In order to pair schools with similar socioeconomic statuses, this study will use mean income data taken from all of the households in the individual schools' school districts. This data will be drawn from the Census Bureau's 2016 American Community Survey (ACS) 5-year estimates data set. It will be delimited by the state's geo display label for each school district and using the HC02_EST_VC02 field which presents the calculation of the estimated mean income in dollars of all household for the given delimited areas. For purposes of this study mean household incomes within \$20,000.00 will be considered similar. In other words, the groups of high schools being used in this study will be formed by matching schools that possess both a similar number of students (within 500) and a similar school district level mean household income (within \$20,000.00).

Data Gathering Procedure

The data used in this quantitative study will be taken from publicly available data sources. The data will be secondary data and no permissions will be required for it to be obtained. Likewise, no survey will be used in this project to gather data.

Before beginning research for this study, approval from Pepperdine University's Institutional Review Board (IRB) will be sought. As this project will use publicly available data and will not involve interaction with any human subjects or require any informed consent or parental consent, an exempt IRB approval will be requested.

After receiving IRB approval, two points of data will be used to organize the sample groups, the total number of students in the schools and the demographic breakdown of the

schools. Once the New Hampshire schools are identified, the New Hampshire Department of Education website will be accessed in order to gather both the total number of students at each high school as well as the demographic breakdown of each school involved. After this data has been recorded, the data quest section of the California Department of Education website will be accessed in order to collect the total student number and demographic information for all California schools. This information will be analyzed in order to find California schools that possess similar numbers to the ten New Hampshire schools chosen. Total student numbers for the paired schools will have no greater difference than 500 students.

After forming the ten sample groups, the individual New Hampshire high school websites will be accessed to find each school's School Profile. The School Profiles will then be used to retrieve the average ACT score for each high school. The California Department of Education website will be used to acquire the average ACT scores for the California schools in each group. The ACT score for all twenty schools will be recorded on a Microsoft Excel sheet and formatted for statistical analysis.

Data Analysis

Once the data from the selected groups has been collected and prepared for analysis, it will be used to assess whether the hypotheses of research questions should be accepted or rejected. Questions one, three, and four will be evaluated using a two-sample t-test and, question number two, will be assessed using an ANOVA test.

The null hypotheses and the alternative hypotheses for questions one, three, and four will be tested using a two-sample t-test assuming unequal variance. The test will be completed for each group of two high schools. The analysis will test the difference between the ACT score means of the two schools and will be performed with a significance level of one percent. The

two-sample t-test will be used in the analysis process because it will be looking at the difference between the two high school means rather than the means themselves. In testing the data, each school will be considered an independent variable. They will be considered independent because there is no existing relationship or dependency or inherent relationship between the two schools.

Standard statistical notation will be used in analyzing the data. In each group, School 1 will be the New Hampshire school, and School 2 will be the California school. For this reason, the notations used in the analysis of each group will be represented as in the following chart.

Table 2:

Statistical Notation Chart

School 1 (New Hampshire School)		School 2 (California School)	
Notation	Variable Represented	Notation	Variable Represented
μ_1	Population mean of New Hampshire school	μ_2	Population mean of California school
σ_1	Population standard deviation of New Hampshire school	σ_1	Population standard deviation of California school
n_1	Size of New Hampshire school sample	n_2	Size of California school sample
χ_1	Sample mean of New Hampshire school	χ_2	Sample mean of California school
S_1	Sample standard deviation of New Hampshire school	S_2	Sample standard deviation of California school

Using the above notation, the following formula will be used to perform a t-Test on the gathered data.

Equation 1 - t-Test Equation for Two Means

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Because this study will have two independent samples and the standard deviations of the population means are not known a t-distribution will be used.

Research question number two will be evaluated using an ANOVA test. The ANOVA test will be a two-factor ANOVA without replication. Whereas the above t-test will compare the means of the New Hampshire schools and the California schools, this test will be used to examine the difference between the groups while accounting for the factors of each group, namely, the New Hampshire schools and the California schools. It will show whether or not there is a significant variance between the scores of the two states as well as between the scores of the ten groups.

Validity of the Instrument

Though the data that will be used for this study will be publicly available secondary data, the ACT test will be the primary instrument used in the study to assess the effectiveness of competency-based systems. The ACT determines the validity of its test by focusing on two types of validity, content validity and predictive validity (ACT, Inc., 2017).

For the ACT, content validity focuses on the question of whether the test is accurately measuring the content which it is aiming to assess. As part of their validation process, the ACT uses the ACT National Curriculum Survey. This survey is conducted every three to five years

and is designed to collect data about what college freshmen would need to know to be able to operate at the college level in the core subject areas of English, math, reading, and science. The results from National Curriculum Survey is used in a continual validation process in which the ACT reevaluates its test blueprint and the questions developed for its test. In this way, the ACT ensures that its content is able to accurately assess college readiness.

The element of predictive validity, on the other hand, focuses on whether the test is able to predict performance in a reliable manner. Predictive validity is acquired by gathering information about actual college course performance and testing to see if its assessment is an accurate prediction of the college readiness (ACT, Inc., 2017).

Reliability of the Instrument

The ACT lays out its process for reliability testing in its ACT Technical Manual. It explains that it uses the Coefficient alpha test to estimate the reliability of its tests. Furthermore, the manual shows that ACT test's standard error of measurement (SEM) is calculated using a four-parameter beta compound binomial model (ACT, Inc., 2017).

The manual gives an overview of its most recent reliability and SEM estimates. The reliability of the English, math, composite, STEM, and ELA scores were found to have values over 0.9, and the reading and science scores were found to have values over 0.8. Likewise, the SEM values were found to be consistent across the multiple tests used for estimating.

This project, however, is primarily concerned with the reliability of the composite score, as the composite score is what the high schools use to determine the average ACT score for their particular high school. The reliability specifically for the composite scores were found to have a median value of 0.94, and the SEM was found to have a median value of 1.25 which was consistent with the other sections estimated (ACT, Inc., 2017).

Protection of Human Subjects

Before any research will be conducted, permission will be sought from Pepperdine University's IRB. This study will use publicly available secondary data that may be used for research and analyzed. As this project will be collecting archival data only, no human subjects will be addressed in the research process. Individual student ACT scores are not reported in the data but rather are reported as a school average. The individual schools and school districts are named in the data, but the data is posted by them on their own website. Because of this, the school name and district name could be used in the research; however, for the purposes of this study, the names of the districts and schools will be left out of the reported data. Since no individual student names or scores are reported in the archival data, no informed student consent or parent permission for the collection of or disclosure of student scores will be required. For these reasons, an exempt IRB approval will be requested.

Because no human subjects will be directly required for this project, no students will be contacted at any time and, therefore, will not be open to any sort of exposure or risk during this study. The ACT test as a testing instrument does collect personally identifiable data; it is done with the express permission of the student and parent involved. According to the ACT privacy policy, ACT, Inc. takes appropriate steps to inform both parents and students about the collection of student data ahead of time as well as taking steps to protect student information during research processes or public communication of student information. When student test scores are reported to the student's school administration or to research institutions, ACT, Inc. requires explicit forms of student protection (ACT, Inc., 2017).

Summary

The problem that this study seeks to address is that school administrators and policy makers are lacking in statistical research to aid in their decision process when assessing whether or not to engage in or switch to a competency-based learning model. The purpose of this study will be to determine if a relationship exists between the ACT scores of competency-based education systems and the ACT scores of traditional seat time based education systems. As guided by the research questions, it will find the significance of the difference between the scores of the two education systems. In addition to this, the study will examine how the average ACT of both the New Hampshire schools and the California schools involved compare to the national average ACT score.

A quasi-experimental, quantitative, nonequivalent group design format will be used for this research project. Using a quasi-experimental approach will allow the schools being used in this study to be selected according to predetermined criteria. Using quantitative data only for this study means that this study will not use any sort of qualitative elements in the research process. Additionally, following this research model will provide a structure for analyzing the statistical data attained in this study in relation to a national perspective of ACT scores and to the general philosophies of both the competency-based education systems and the seat time based systems.

Publicly available data without student identification information will be acquired and analyzed with statistical software. This data will be assessed using a t-Test for two means of independent samples. Though the data collected in this study will be collected from archival data, the ACT test will be the indirect instrument used in this study. This study will trust the results of the ACT test scores being used because ACT, Inc. consistently ensures the validity and

reliability of this instrument as stated on its website and in its Technical Manual (ACT, Inc., 2017).

Finally, this study will seek approval from Pepperdine University's IRB before conducting any research. Approval for an exempt status will be sought because this study will use only publicly available data. This project will, therefore, ensure the privacy and confidentiality of all student scores indirectly involved in this research study.

Chapter 4: Results

The purpose of this quantitative study is to look at the effectiveness of competency-based schools by comparing them to similar seat time based schools. The sample for this study is made up of ten groups of schools wherein each group is made up of one New Hampshire competency-based school and one California seat time based school. Schools in both New Hampshire and California were chosen based on similar demographic profiles. The schools were matched by similar overall student population and similar ethnic population numbers. This study seeks to look at the effectiveness of competency-based schools by comparing their ACT scores to the ACT scores of seat time based schools. The average ACT scores used in this study as well as the demographic data used to establish the sample groups is publicly available data. Using the research questions from Chapter 1, this chapter presents the results of the statistical analysis on the sample groups and offers an evaluation of the findings.

Population Demographics

The population for this study is made up of twenty high schools, ten schools from California and ten schools from New Hampshire. The schools were matched and grouped into pairs based upon similar ethnic breakdowns and total number of students. Table 3 below shows the breakdown of the schools' demographics as well as the absolute difference between the grouped schools for each category. Schools were coded by the state abbreviation and the number of the school for that state, for example, CA 01 and NH 01.

Table 3

School Demographic Breakdown

Group #	School	# of American Indian or Alaska Native, Not Hispanic	# of Asian or Pacific Islander Count	# of Hispanic or Latino of Any Race	# of African American, Not Hispanic	# of White, not Hispanic	# of Two or More Races, Not Hispanic	# Not Reported
Group 1								
	CA 01	6	14	43	7	251	9	2
	NH 01	0	8	3	4	263	5	0
	Absolute Difference	6	6	40	3	12	4	2
Group 2								
	CA 02	26	3	46	7	356	2	3
	NH 02	2	7	8	4	464	3	0
	Absolute Difference	24	4	38	3	108	1	3
Group 3								
	CA 03	3	73	81	14	389	24	18
	NH 03	7	4	16	7	498	11	0
	Absolute Difference	4	69	65	7	109	13	18
Group 4								
	CA 04	4	6	48	4	583	21	1
	NH 04	0	41	17	15	501	4	0
	Absolute Difference	4	35	31	11	82	17	1
Group 5								
	CA 05	64	20	136	15	426	7	1
	NH 05	4	7	12	10	599	4	0
	Absolute Difference	60	13	124	5	173	3	1
Group 6								
	CA 06	59	27	96	15	547	16	0
	NH 06	0	0	7	2	635	19	0
	Absolute Difference	59	27	89	13	88	3	0
Group 7								
	CA 07	27	11	110	3	501	46	0

(continued)

Group #	School	# of American Indian or Alaska Native, Not Hispanic	# of Asian or Pacific Islander Count	# of Hispanic or Latino of Any Race	# of African American, Not Hispanic	# of White, not Hispanic	# of Two or More Races, Not Hispanic	# Not Reported
	NH 07	7	23	27	5	725	0	0
<hr/>								
Absolute Difference		20	12	83	2	224	46	0
Group 8								
	CA 08	0	15	122	0	579	60	2
	NH 08	3	25	11	4	733	17	0
Absolute Difference		3	10	111	4	154	43	2
Group 9								
	CA 09	9	32	135	5	573	74	19
	NH 09	1	43	15	9	733	5	0
Absolute Difference		8	11	120	4	160	69	19
Group 10								
	CA 10	28	21	154	11	788	13	4
	NH 10	4	28	37	24	1096	11	0
Absolute Difference		24	7	117	13	308	2	4

The absolute difference between the schools in each group for each ethnic category can be seen above in Table 3. Calculating the absolute difference gives, at a glance, an easy way to measure how close the two high schools are in number for any given ethnic category.

Figure 1 below offers a graphical view of the absolute difference between the schools in each group for each demographic category. This figure shows the schools have similar demographic profiles.

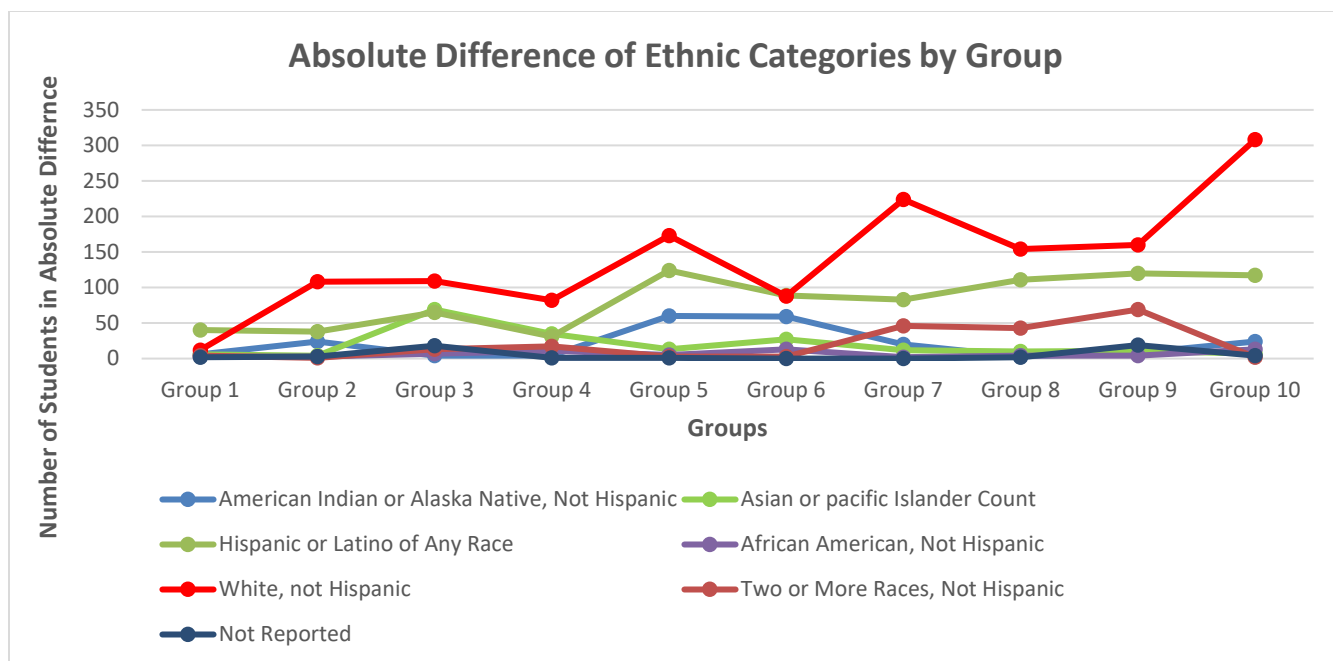


Figure 1: Absolute difference of ethnic categories for each group.

The table below, Table 4, gives the results from an analysis on these absolute differences of student ethnic category breakdowns between the schools in each group. The table shows that the maximum absolute difference between any given ethnic category of the schools in each group is 308 students. It demonstrates that the average absolute difference for all groups for all categories is 42.25 students, and it shows that the mean absolute deviation between all of the differences is 43.75 students.

Table 4

Ethnic Differences/Deviations

Statistical Calculation	Result
Maximum Absolute Difference Between Schools in any Ethnic Category	308
Average Absolute Difference for All Groups for all Categories	42.25
Mean Absolute Deviation Between All Absolute Differences	43.75

Table 5 lists the total number of students in each school as well as the absolute difference between the schools in each group.

Table 5

Student Total Count by Group

Group #	School	Total Students
Group 1		
	CA1	332
	NH1	283
	Absolute Difference	49
Group 2		
	CA2	443
	NH2	488
	Absolute Difference	45
Group 3		
	CA3	602
	(continued)	

	NH3	543
	Absolute Difference	59
<hr/>		
Group #	School	Total Students
<hr/>		
Group 4		
	CA4	667
	NH4	578
	Absolute Difference	89
Group 5		
	CA5	669
	NH5	636
	Absolute Difference	33
Group 6		
	CA6	760
	NH6	663
	Absolute Difference	97
Group 7		
	CA7	698
	NH7	787
	Absolute Difference	89
Group 8		
	CA8	778
	NH8	793
	Absolute Difference	15
Group 9		
	CA9	847
	NH9	806
	Absolute Difference	41
Group 10		
	CA10	1019
	NH10	1200
	Absolute Difference	181
<hr/>		

Figure 2 gives a graphical representation of the absolute differences of the student totals between the schools in each group.

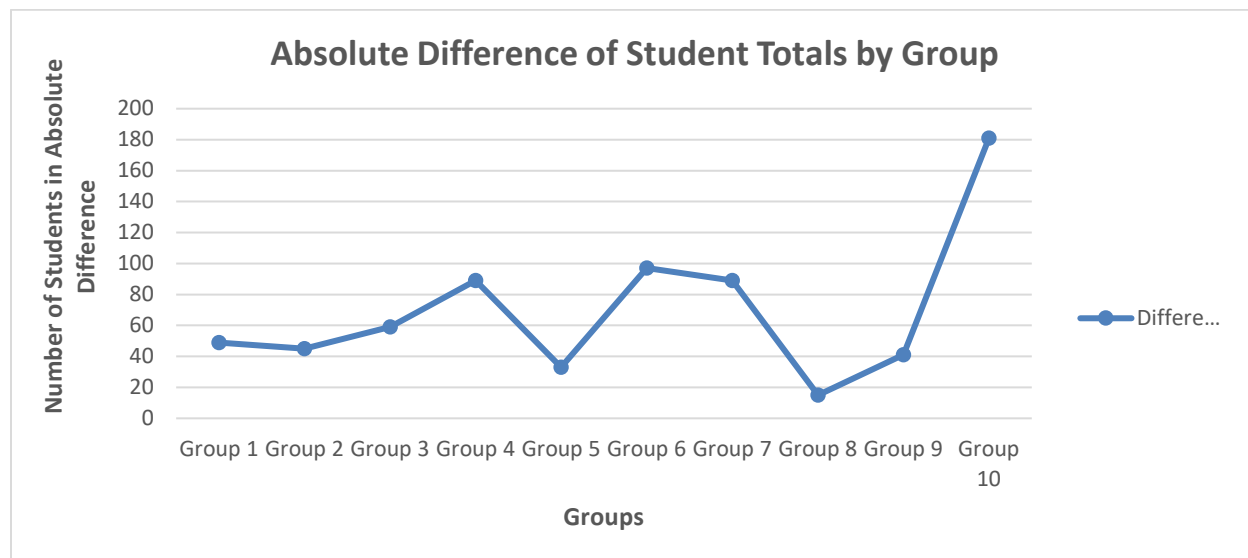


Figure 2: Absolute difference of student totals by group.

The following table, Table 6, analyzes the differences in total student numbers between the schools in each group. It shows that there is a maximum difference of 181 students between each pair. The average difference for all ten groups is 69.8 students, and the mean absolute deviation between the differences of the ten groups is 35.36. This demonstrates that the schools chosen are similar in size.

Table 6

Student Number Difference/Deviation

Statistical Calculation	Result
Maximum Difference Between Schools in any Group	181

(continued)

Average Difference for All Groups	69.80
Mean Absolute Deviation Between All Absolute Differences	35.36

Restatement of Research Questions

The purpose of this study is to assess the effectiveness of competency-based education systems. This will be accomplished by assessing the relationship between the ACT scores of competency-based schools and the ACT scores of seat time based schools. To this end, the following research questions were established for this study:

1. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the average ACT scores of California seat time based schools?
 - a. H_{10} : There is no significant difference between the average ACT scores of competency-based education systems and the average ACT scores of seat time based education systems
 - b. H_{1A} : There is a significant difference between the average ACT scores of competency-based education systems and the average ACT scores of seat time based education systems
2. Is there a significant difference between the groups of schools?
 - a. H_{20} : There is no significant difference between the groups of schools
 - b. H_{2A} : There is a significant difference between the groups of schools
3. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the national average ACT score?

- a. H3₀: There is no significant difference between New Hampshire average ACT scores and the national average ACT score
 - b. H3_A: There is a significant difference between New Hampshire average ACT scores and the national average ACT score
4. Is there a significant difference between the average ACT scores of California seat time based schools and the national average ACT score?
- a. H4₀: There is no significant difference between California average ACT scores and the national average ACT score
 - b. H4_A: There is a significant difference between California average ACT scores and the national average ACT score

Validity and Reliability of Data

Statistical measurements in a quantitative study need to maintain a demonstratable standard of validity and reliability. Data is considered valid when it measures what it says that it is going to measure, and it is considered reliable when it produces consistent results (Beaudry & Miller, 2016).

The instrument being used in this study, the ACT test, is a national test that meets the standard requirements for validity and reliability. The ACT company creates a document called the ACT Technical Manual (2017) which documents the processes used in the creation of the test content, its psychometric aspects, and the interpretation of its results. The document shows how the ACT is built with the standard components of statistical validity, including components like construct validity, fairness, and accessibility. The ACT Technical Manual states that the ACT is in compliance with The Standards for Educational and Psychological Testing, The Code of Fair

Testing Practices in Education, and The Code of Professional Responsibility in Educational Measurement.

Results

This study's results are based upon the average ACT scores of ten New Hampshire competency-based schools and the average ACT scores of ten similar California seat time based schools. The statistical tests employed in this study to analyze these scores were chosen based on their ability to provide data that would help answer this study's research questions. A two-sample t-test assuming unequal variance was used to provide data for research questions number one, three, and four, and a two-factor ANOVA test was used to provide data for research question number two.

Research question #1. The following is a restatement of research question number one:

1. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the average ACT scores of California seat time based schools?
 - a. H_{10} : There is no significant difference between the average ACT scores of competency-based education systems and the average ACT scores of seat time based education systems
 - b. H_{1A} : There is a significant difference between the average ACT scores of competency-based education systems and the average ACT scores of seat time based education systems

In order to determine if there was a significant difference between the average ACT scores of the New Hampshire schools and the average ACT scores of the California schools, a two-sample t-test assuming unequal variance was used. The results for this analysis are shown in Table 7.

Table 7

t-Test Results for Research Question #1

	<i>Avg NH Act</i>	<i>Avg CA Act</i>
	<i>Score</i>	<i>Score</i>
Mean	25.32	24.07
Variance	3.861777778	3.662333333
Observations	10	10
Hypothesized Mean Difference	0	
Df	18	
t Stat	1.441061159	
P(T<=t) one-tail	0.083368958	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.166737916	
t Critical two-tail	2.10092204	

Table 7 shows that the *t-Test* proved that there is no significant difference between the average ACT scores of the New Hampshire competency-based schools and the average ACT scores of the California seat time based schools. The test results demonstrate that there is no significant differences between the scores because the t Stat number (1.441061159) is less than the t Critical two-tail number (2.10092204). Alternately, this conclusion could also be reached because the *p value* (0.166737916) is greater than the test's *alpha* (.05).

For this reason, the null hypothesis is accepted. That is, there is no significant difference between the average ACT scores of competency-based education systems and the average ACT scores of seat time based education systems.

Research question #2. The following is a restatement of research question number two:

2. Is there a significant difference between the groups of schools?
 - a. H_{20} : There is no significant difference between the groups of schools
 - b. H_{2A} : There is a significant difference between the groups of schools

In order to determine if there was a significant difference between the ten groups of schools, a two-factor ANOVA test without replication was used. Table 8 provides the resulting data from this test.

Table 8

ANOVA Results for Research Question #2

<i>SUMMARY</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
CA	10	240.7	24.07	3.662
NH	10	253.2	25.32	3.862
G1	2	50.8	25.4	0.720
G2	2	46.3	23.15	1.445
G3	2	51.4	25.7	0.720
G4	2	50.8	25.4	7.220
G5	2	43	21.5	0.500
G6	2	49.5	24.75	21.125
G7	2	48.7	24.35	0.245
G8	2	51.3	25.65	0.845
G9	2	53	26.5	0.080
G10	2	49.1	24.55	4.805

ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Rows	7.812	1	7.812	2.352	0.159	5.117
Columns	37.825	9	4.203	1.265	0.366	3.179
Error	29.893	9	3.321			
Total	75.530	19				

This ANOVA tested to see if there was a significant difference between the ten groups while accounting for the factors within each group, New Hampshire schools and California schools. The results of the test show that there is no significant variance between the two states' scores and that there is no significant variance between the ten groups. These results are determined as such because the *F value* for the states (2.352) is less than the *F critical value* (5.117) and because the *F value* for the groups (1.265) is less than the *F critical value* (3.179). Alternately, this can also be concluded because the *p value* for both the states (.0159) and the groups (0.366) are greater than the test's *alpha* (0.05).

For this reason, the null hypothesis for research question number two is accepted.

Research question #3. The following is a restatement of research question number three:

3. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the national average ACT score?
 - a. H_{30} : There is no significant difference between New Hampshire average ACT scores and the national average ACT score

- b. H_{3A}: There is a significant difference between New Hampshire average ACT scores and the national average ACT score

According to The ACT Profile Report – National (ACT, Inc., 2016), the national average ACT score in 2016 was 20.8. In order to determine if there is a significant difference between this national average and the average ACT scores of New Hampshire competency-based schools, a two-sample t-test assuming unequal variance was used. The results for this analysis are shown below in Table 9.

Table 9

t-Test Results for Research Question #3

<i>Avg NH</i>	<i>Act Score</i>	<i>National average</i>
Mean	25.32	20.8
Variance	3.861777778	1.40242E-29
Observations	10	10
Hypothesized Mean Difference	0	
Df	9	
t Stat	7.273522645	
P(T<=t) one-tail	2.34802E-05	
t Critical one-tail	1.833112933	
P(T<=t) two-tail	4.69604E-05	
t Critical two-tail	2.262157163	

The data from Table 9 shows that there is a significant difference between the national ACT average and the average ACT scores of the New Hampshire schools. This is determined because the *t Stat* number (7.273522645) is greater than the *t Critical two-tail* number (2.262157163). Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted. For this reason, it can be stated that there is a statistically significant difference between the national average ACT score and the New Hampshire competency-based schools.

Research question #4. The following is a restatement of research question number four:

4. Is there a significant difference between the average ACT scores of California seat time based schools and the national average ACT score?
- H₄₀: There is no significant difference between California average ACT scores and the national average ACT score
 - H_{4A}: There is a significant difference between California average ACT scores and the national average ACT score

As mentioned above, The ACT Profile Report – National (ACT, Inc., 2016) reports that the national average ACT score in 2016 was 20.8. In order to determine if there is a significant difference between this national average and the average ACT scores of California seat time based schools, a *two-sample t-test* assuming unequal variance was used. The results for this analysis are shown below in Table 10.

Table 10

t-Test Results for Research Question #4

<i>Avg CA</i>	<i>Act Score</i>	<i>National average</i>
Mean	24.07	20.8
Variance	3.662333333	1.40242E-29
Observations	10	10
Hypothesized Mean Difference	0	
Df	9	
t Stat	5.403421143	
P(T<=t) one-tail	0.000215537	
t Critical one-tail	1.833112933	
P(T<=t) two-tail	0.000431074	
t Critical two-tail	2.262157163	

The data from Table 10 gives evidence that there is a statistically significant difference between the national ACT average and the average ACT scores of the California schools. This is so because the *t Stat* number (5.403421143) is greater than the *t Critical two-tail* number (2.262157163). For this reason, the null hypothesis is rejected, and the alternative hypothesis is

accepted. That is, there is a statistically significant difference between the national average ACT score and the California seat time based schools.

Summary of Findings

This study seeks to assess the effectiveness of competency-based education by comparing the ACT scores of New Hampshire competency-based schools to the ACT scores of California seat time based schools. This chapter reported on the results of the statistical analysis of the ACT scores for these given New Hampshire and California schools.

Ten groups of schools were formed for this study. Each group was made up of one New Hampshire school and one California school. These schools were paired based on possessing similar ethnic breakdowns and similar total student population numbers.

The average ACT scores for each of these schools were collected and analyzed within the framework of this study's research questions. The statistical tests that were completed were chosen according to the needs of the hypotheses to be tested for each research question.

The results of these tests gave evidence that there is no significant difference between the ACT scores of the New Hampshire schools and the ACT scores of the California schools. This result was reached because the null hypothesis was accepted for both research question number one and research question number two. However, the statistical tests for research questions three and four showed that there was a significant difference between the average ACT scores of the New Hampshire competency-based schools and the national average ACT score as well as between the California seat time based schools and the national average ACT score. This was seen because the null hypotheses were rejected for both research question number three and research question number four.

Chapter 5: Discussion, Conclusions, and Recommendations

The current education model in the United States has been very effective in educating a nation of citizens for the past hundred years or so. It was established just after the turn of the 20th century and was intentionally developed with the goal of mass educating students in such a way that they would be prepared to survive in a thriving industrial and democratic nation. The problem that the United States is experiencing with its education system now is that this original industrial-based system is no longer serving the needs of a more individualistic service-based society.

This study explores the effectiveness of one of the alternative approaches to the current seat time based education system, that is, competency-based education. This problem shaped the design of this study by narrowing its focus to finding a nationally accepted way to evaluate the effectiveness of competency-based education as compared to the current seat time based system. In an attempt to evaluate the difference between the two systems and use a nationally accepted measurement, the study uses the average ACT scores of the sample schools to analyze the effectiveness of competency-based learning.

Chapter 1 of this study laid out the foundational elements for the project by giving the purpose and background of the research in the problem statement, research questions, and assumptions, and it showed the fundamental structure with its limitations, delimitations, and theoretical framework. The information in these sections gave a general introduction to competency-based education and specifically the areas of this field that the study was going to assess.

Chapter 2 offered the literature review for the study. It focused on understanding the sources of the problem and the rise of the competency-based method. This was done by tracing

the educational progress in the United States throughout history with an emphasis on how the intellectual and social movements shaped the changes and developments of the education system. In addition to this, a specific review of both competency-based education and the ACT were given. Chapter 2 concluded by showing that the rise of competency-based education can be seen as the result of a slow progression towards a child-centered worldview within the education system as well as within the larger set of cultural beliefs.

Chapter 3 laid out the methodology of the study. It explained that a quasi-experimental, quantitative, nonequivalent group design was used to structure the research. Additional details surrounding the population, sample schools, data analysis process, and the instrument being used were also given. The chapter finished by showing that the above approach allowed the schools in the study to be selected by predetermined criteria as well as provide a structure for analyzing the data obtained in relation to the national ACT test.

Chapter 4 described the findings of the data collected and the statistical significance of the data in light of the study's research questions. It did this by offering detailed tables that demonstrated demographic information about the population as well as the results of the various statistical analyses performed on the data collected during this study. It also showed how the data collected was linked to the studies research questions.

This chapter will, in turn, build upon the first four chapters and offer a discussion of the results of the data analysis for each research question as well as offer some conclusions and recommendations for further study. Additionally, it will look at current trends within the field of competency-based education and identify how the results of this study could possibly help inform these current trends.

Discussion of Research Question 1

The research questions were designed to guide the study to its end of determining if anything can be said about the effectiveness of competency-based learning. Research question number one was:

1. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the average ACT scores of California seat time based schools?

The statistical test performed for this question determined that there was no significant difference between the ACT scores of the New Hampshire schools and the ACT scores of the California schools. It was for this reason that the null hypothesis for this question was accepted.

The goal of the study is to determine the effectiveness of competency-based education, and the results of this test seem to show that competency-based education is of an equal level of effectiveness as compared to seat time based education. Though the results do not show that competency-based system is more effective, the fact that it is equally effective is an important point to acknowledge, for it will allow proponents of competency-based education the ability to rightly claim it as an alternative option to traditional seat time based education.

Discussion of Research Question 2

Research question number two sought to assess if there was a difference between the ten different groups of schools. It was stated as:

2. Is there a significant difference between the groups of schools?

Testing to see if there was a difference between the average ACT scores of the groups would determine whether or not there were any additional factors that would inform or call into question the findings for research question number one. The results of the statistical test for

question number two showed that there was no significant variance between the ten groups' scores. In other words, there is no major differences between the ten groups.

No significant differences between the groups demonstrated that the results for question one are further validated for, if there was a significant variance between some or all of the groups, the results from question one would be called into question. Instead, the fact that there is no significant difference between the groups further shows that competency-based learning is of equal ability to prepare students for the rigors of the ACT exam.

Discussion of Research Questions 3 and 4

Research questions three and four examined the relationship between the average ACT scores for the New Hampshire schools and the national average ACT score (Question 3) as well as the relationship between the average ACT scores of the California schools and the national average ACT score (Question 4). They were stated as:

3. Is there a significant difference between the average ACT scores of New Hampshire competency-based schools and the national average ACT score?
4. Is there a significant difference between the average ACT scores of California seat time based schools and the national average ACT score?

The results of the statistical test for research question number three showed that there was a significant difference between the national average score and the average New Hampshire schools in the sample. Additionally, the test for research question number four also showed that there was a significant difference between the national average score and the average California schools in the sample. In both situations, the average scores for the sample schools were higher than the national average to a significant degree. For this reason, the null hypothesis was

rejected for both question number three and number four, and the alternative hypotheses were accepted.

Comparing both sets of schools to the national average enable the study to have another point of reference in assessing the finding for research question number one. It is clear that the California seat time based schools offered a significantly higher performing standard of preparation for the ACT test, and, the fact that the New Hampshire competency-based schools performed equally as well in the preparation for the ACT test, demonstrates that the competency-based system not only is capable of offering an equivalent level of education as seen in question number one but also that it is able to equally offer a high-performing level of education.

Research Questions 3 and 4 and Current Trends

The results of this study in general and, particularly, of research questions three and four can contribute to the current national conversation about competency-based education models moving forward. The findings for questions three and four showed that competency-based schools are able to offer an equally high-performing level of education as seat time based schools. This small but significant point can help other competency-based projects make decisions about moving forward with confidence in the standard of rigor that competency-based systems can offer. This data could specifically contribute to the following current competency-based issues being discussed.

University competency-based systems. In order for K-12 schools to be able to effectively move to competency-based systems, they need to be able to hire teachers who are able to successfully teach within the system. Therefore, the next big question is whether or not universities should offer teaching degrees/programs that focus on training teachers in competency-based learning strategies. For this reason, there are likely many people who are

responsible for designing these teacher programs that are, essentially, trying to predict the future of competency-based learning in K-12 schools.

If universities are going to offer teacher training and credentialing programs that prepare their graduates to be successful teachers in a competency-base K-12 school system, then one might argue that the university program itself should be competency-based as opposed to teaching competency-based techniques within a seat time based system. In other words, it is not enough for the K-12 systems to transition to a competency-based model; but rather, in order to make the K-12 competency-based schools most effective, the university systems would also have to transition to a competency-based model as well.

Adam Rubin and Ali Brown (2019), in their article, “Unlocking the Future of Learning by Redesigning Educator Learning,” describe the need for teacher training reform. They claim that the universities need to fundamentally alter the current *pre-service* and *in-service* parts of teacher training programs. Rubin and Brown feel that the current system focuses more on the educational system itself as opposed to the individual teacher for teacher training emphasizes content and pedagogy. Moving college students through a standardized model of learning, Rubin and Brown say, needs to transition to a model that allows the college students to experience what they want their future K-12 students to experience. If competency-based K-12 education will meet students where they are, allow them to progress at their own learning pace, and learn from real-world experiences, then the university level teacher training programs need to do the same for its students.

Rubin and Brown (2019) claim that there are four main problems with the current teacher training system that need to be addressed. They say that, one, the learning process is a passive process; two, the general use of time in the programs are being used inefficiently; three, the

students and teachers are isolated and do not spend much time collaborating with other educators; and, four, the general field of teacher training has stagnated. In light of their concerns about teacher training programs, Rubin and Brown (2019) offer several suggestions about how to transform the system including a comprehensive framework; however, one of their main recommendations is to create programs that are build around andragogy as opposed to pedagogy. They feel that focusing on the principles of andragogy will help bring about a more student-centered learning environment that will enable the system to move more towards a competency-based model. However, there are many large obstacles that would need to be overcome at the university level in order for programs to transition to a competency-based model.

In the article, “Competency-Based Education in Science Teacher Education: The Next Disruptive Innovation or the Next Disruption?” (Annetta, Keaton, Shaprio, & Burch, 2018), the authors identify the problems that would make it most difficult for a university to transition. Their points are best represented in three areas: Time structure, student grouping models, and compensation methods. The authors show that competency-based models would not fit into the semester time blocks because a competency-based system necessitates that the duration of time that a student spends on the content of a certain standard is determined by their mastery of the content, not a fixed semester timetable. Additionally, the article discusses the fact that a cohort structure would also not work with competency-based systems because the students, again, would move at their own pace which would make it difficult to maintain a successful program. They show that, if the cohort model changed, other core elements of the university would be greatly affected, for example, admissions and course scheduling, to name a few. Finally, the authors say that changing to a competency-based system could affect the current teaching load model since it would be hard to continue to block students into courses when students are

progressing at their own pace. This would then, in turn, affect the full-time equivalent model for budgeting as well as rules for advancement and tenure of professors (Annetta, Keaton, Shaprio, & Burch, 2018).

Before a university is going to invest in such a major overhaul of its system, they would be wise to conduct extensive research into whether or not it would be an effective system of learning for their students and whether or not K-12 schools are likely to actually make the transition themselves to competency-based systems. The role of the findings of this study in university competency-based research could be two-fold. First, it could provide a small bit of confidence that competency-based systems could be at least equally successful in offering a high-level of achievement, and, second, it could offer a model by which to examine the effectiveness of competency-based university programs as compared to seat time based university programs.

Assessing PACE. New Hampshire is leading the nation in advancing competency-based education by thoroughly and methodically changing their state laws and department of education policies. In addition to integrating competency-based education into its state education system, New Hampshire is also leading the nation in creating an alternative state-wide assessment system which is designed to be more inline with the educational goals and philosophy of competency-based learning. The assessment is called Performance Assessment of Competency Education (PACE). PACE is a pilot assessment program which was officially approved by the United States Department of Education in 2015 and thereby granted a waiver to use the assessment (Delisle, 2015). In addition to this, in 2018, the state of New Hampshire also applied for and was granted by the United States Department of Education official permission for the PACE test to participate in the Innovative Assessment Demonstration Authority program. (U.S. Department of

Education Press Office, 2018). The Innovative Assessment Demonstration Authority program was created in the Every Student Succeeds Act (ESSA); it and enables states to apply for approval to use an innovative approach to standardized testing.

As a standardized test, PACE stands out as revolutionary in its format and goals. It was created to build upon and assess the state's college and career ready competencies. This exam has several components, but performance assessment is meant to be a primary part of the exam. It focuses on the English language arts, science, and mathematics. What makes PACE unique is that it is made up of common locally administered tests. These tests are designed to allow students to demonstrate proficiency in the state's competencies through performance-based assessments which are given in various contexts and situations. They are multi-step tests that measure a student's ability to perform complex tasks and demonstrate knowledge gained from different areas in new situations (New Hampshire Department of Education, 2019).

Carla M. Evans (2019), in her article, "Effects of New Hampshire's Innovative Assessment and Accountability System on Student Achievement Outcomes After Three Years," lays out the findings of her research project which looked at the results of three years' worth of PACE testing scores. Her thorough study assessed the effect of PACE results on grade eight and eleven students in the areas of mathematics and English language arts and then compared them to subgroups of other New Hampshire's state tests results, namely, Smarter Balance scores and SAT scores. Evans results showed that, in general, PACE school students tended to evince minor positive effects in both mathematics and English language arts over the non-PACE school students (Evans, 2019).

Evans's (2019) study is based upon the Smarter Balance scores and SAT scores of the New Hampshire students. This study, however, can contribute to the area of PACE analysis by

offering a template that can offer a third point of reference by which to assess the validity of the PACE assessment. The New Hampshire Department of Education does not track the ACT scores of its schools but rather only tracks its state standardized test scores and the SAT scores of its schools. This study can add to the evaluation process in that it takes the view that the ACT test is a better assessment tool to use in evaluating the effectiveness of competency-based learning over the SAT test because it focuses more on content and less on test taking strategies.

Linking Results to the Theoretical Framework

A theoretical framework is a designed structure within which a study can reside. It usually consists of concepts, definitions, and references that are relevant to the field of the study. A theoretical framework provides background and context to the worldview within which the study takes place as well as provide a pathway for the researcher to stay focused and ensure that the study remains on a narrow road of contribution to its field. In addition to this, a clearly stated theoretical framework aids the reader to have bounded assumptions within which to place the study. Having such a framework gives the reader the ability to offer appropriate criticism of the study either within the same assumptions of the study or about the assumptions of the study (Mary and John Gray Library, Lamar University, 2018).

As stated in chapter one, the theoretical framework for this study is such that education has slowly been evolving into a child-centered system. It holds that, beginning with the progressivists in the 1920s, education in the United States has steadily been shifting to a more child-centered approach to learning. Competency-based education systems are seen as a culminating result of this slow growth throughout the past century.

Operating within this theoretical framework, if competency-based education is potentially the next evolution in the United States educational history, then finding a way to assess its

effectiveness is an important and necessary task. This study sought to take a contributing step towards that goal.

The research questions of this study and their findings are consistent with the theoretical framework laid out and have proven to offer some further insight into the movement of the educational system towards a more child-centered approach to education. Therefore, in light of this theoretical framework and the question that it brings up as to whether it will be a reliable system to evolve into, the results of this study show that it can safely be considered a reliable educational system that is capable of performing at least at an equal level of high rigor compared to that of the current seat time based education system.

Conclusions

The results of this study concluded that competency-based education systems can be considered as equally effective as seat time based education systems and that they are able to operate at an equally high level of rigor. However, as of the writing of this paper, where competency-based education fits into the larger national narrative is still yet to be seen.

Although that it is abundantly clear that society at large is moving into a child-centered educational mindset and that competency-based education is most definitely growing out of this movement, transitioning to such a system is proving to be very difficult. The current educational system is not keeping up with the social sentiment because it is being hindered by entrenched bureaucratic and political standards. Though there are many isolated pockets throughout the United States that are forming schools, training teachers, and passing laws that are causing change, the majority of the country is either afraid of change or too set in their ways. Though there are many evangelists for the cause to reform the education system, many of the books and

research projects that are being written today are focusing on the bureaucratic and political situations that need to be addressed in order to make change even a possibility.

Among the many bureaucratic and political obstacles, the two largest are laws requiring seat time based systems and a deep-seated belief that testing is required for the success of education in schools and for government oversight. Both of these hindrances are proving to be very difficult to overcome because they go to the heart of the current philosophy of education. Causing change in these two areas requires a complete philosophical shift. Though society has been moving to a more child-centered worldview, its philosophy of education as a whole has not shifted enough to be open to entirely new philosophical ideas.

This study's role within this larger change process is a very small one, but it plays a role, nonetheless. The results of this project can act as the first plank in a long bridge that needs to be built between the currently entrenched ideas and laws about education and the shifting beliefs about children and how they learn. This study can speak to both sides of the situation in that it acknowledges the reality of the change that is happening in competency-based systems but also speaks to the competency-based movement within the language of the current system, namely in terms of long-standing national testing scores.

As in the majority of negotiation situations, the most important task at hand is the art of learning to speak the same language as the other side, and, so, this study attempted to do just that. The results of this project point towards giving confidence and hope to both those currently involved in a seat time based education system and those currently involved in a competency based system.

The findings of this study suggest that the movement towards a child-centered education system and more specifically a competency-based system is a valid and secure attempt to

improve the educational system in the United States. Therefore, the movement should continue to be pursued and researched further in order to ensure a successful outcome for all involved.

Opportunities for Future Research

The limitations of this study shape the areas for future recommendations on research. As noted in the *Limitations* section of Chapter 1, this study is limited in the following ways: it is not generalizable; it uses data from only one school year; and it uses one quantitative instrument.

This project is not generalizable because of its limited amount of data points and sample size. As the number of competency-based schools grow throughout the United States, future researchers will be able to conduct a study with a larger sample size and, consequently, with a larger pool of data. Because of the current lack of competency-based schools, this study was not able to generate random samples since there was such a small amount from which to pick. Having a large selection of competency-based schools to pick from, future researchers could also conduct a true experimental study as opposed to this quasi-experimental study.

Limiting the study to only one school year, narrows the scope of its results. For this reason, a recommendation for future development would be to extend the scope of this study. Conducting a multi-year study would allow for greater statistical evaluation and more concrete findings.

Using only one quantitative instrument to measure the effectiveness of competency-based schools is a good and reliable way to begin to answer the question; however, future researchers could potentially observe the effectiveness of competency-based education systems on a much deeper level by using additional points of data. For example, combining national testing data with a multi-year qualitative study of the students taking the national tests would add many

additional layers of understanding that would better help teachers, administrators, and policy/law makers comprehend the pros and cons of transitioning to a competency-based education system.

In addition to the limitations and scope of this study, it is recommended that researchers also consider creating studies similar to this study that will investigate the effectiveness of the laws and policies that states like New Hampshire are enacting in order to make competency-based learning possible. Providing concrete practical evidence to the effectiveness of the laws and policies being used will also help decision makers make more informed choices as well as begin to more readily identify realistic and unrealistic concerns.

Future researchers are recommended to focus on the effects of competency-based education systems on specific populations within the student body. For example, creating studies that assess the results of competency-based education on groups such as the socially and economically impoverished, minorities, those struggling with diagnosed psychological disorders, and those within the special education system to name a few.

Finally, it is recommended that future researchers explore the role of school culture in a successful competency-based school. School culture is an integral part of the learning environment; it creates a space of trust in which learning can take place. Focusing future research on which elements of school culture would be necessary to help build a solid foundation of mutual trust within an effective competency-based school will help generate a body of research that enable schools to create lasting change.

In short, this study has provided a limited but solid model for future research to be conducted in the field of competency-based education evaluation.

Chapter Summary

Chapter 5 concludes this study by bringing together the insights from the literature review, the format of the research design, and the results from the statistical evaluations to reflect on the findings of this study. Each research question was addressed and elaborated on in light of the analysis of the data collected.

It was concluded that, when comparing the ACT scores of ten New Hampshire competency-based schools to similar California seat time based schools, competency-based schools are as effective as seat time based schools.

The relationship between the findings of this study and other relevant areas of research within the field of competency-based education was considered. It was shown that the conclusions of this study could potentially contribute to the two major questions of colleges and universities transitioning to competency-based systems as well as to assessing the effectiveness of competency-based standardized test such as the New Hampshire PACE test.

The theoretical framework for this study assumed that the United States education system has slowly been moving towards a more child-centered approach. It saw competency-based education as growing out of this gradual philosophical shift. It was shown that this study has created a first step to help advance this change process by utilizing a nationally accepted measurement, that is the ACT test, to help assess the effectiveness of the potential next step in the evolution of the United States' education system.

Finally, it was concluded that this study can contribute to the building of a bridge that needs to be established between the current philosophical ideas about how the educational system should be structured and the future state that will be designed to embody the child-centered philosophy that has been slowly shifting in the foundation of society. Though this study

was limited in design and purpose, it has intentionally played a small part in a larger societal shift and evolution.

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APPENDIX A

IRB Approval Letter

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

April 19, 2018

Protocol #: **4192018**

Project Title: **Competency Based Education Systems: Are They Effective?**

Dear Daniel:

Thank you for submitting a "GPS IRB Non-Human Subjects Notification Form" related to your project titled, ***Competency Based Education Systems: Are They Effective?***, for review to Pepperdine University's Institutional Review Board (IRB). The IRB has reviewed your submitted form and all ancillary materials. Upon review, the IRB has determined that the above titled project meets the requirements for *non-human subject research* under the federal regulations 45 CFR 46.101 that govern the protection of human subjects.

Your research must be conducted according to the form that was submitted to the IRB. If changes to the approved project occur, you will be required to submit *either* a new "GPS IRB Non-Human Subjects Notification Form" or an IRB application via the eProtocol system (<http://irb.pepperdine.edu>) to the Institutional Review Board.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the IRB and documenting the adverse event can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* at <https://community.pepperdine.edu/irb/policies/>.

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval.

On behalf of the IRB, we wish you success in this scholarly pursuit.

Sincerely,

Institutional Review Board (IRB)
Pepperdine University

cc: Mrs. Katy Carr, Assistant Provost for Research
Dr. Judy Ho, Graduate School of Education and Psychology IRB Chair

APPENDIX B

IRB Consent Form

PEPPERDINE UNIVERSITY

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH ACTIVITIES

COMPETENCY BASED EDUCATION SYSTEMS: ARE THEY EFFECTIVE?

No informed consent form is necessary for this study as it will be using publicly available data taken from the internet.