DIFFERENCES OF MEAN SCORES ON THE PRELIMINARY SCHOLASTIC APTITUDE

TEST (PSAT) FOR CLASSICAL CHRISTIAN SCHOOLS COMPARED TO

NON-CLASSICAL CHRISTIAN SCHOOLS

by

Christy Anne Vaughan

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

Christian education continues to play an important role in our society. The purpose of the present quantitative study is to compare mean scores on the Preliminary Scholastic Aptitude Test (PSAT) compared between Classical Christian schools and non-Classical Christian schools to see if there are any significant differences in selected areas of academic performance. Classical Christian schools are defined as private schools employing a distinct Christ-centered pedagogy with an emphasis on the Greco-Roman Trivium. Non-Classical Christian schools are defined as private schools with a Christ-centered pedagogy with no emphasis on the Greco-Roman Trivium. A causal-comparative study was conducted to measure archival data that was randomly selected from all schools answering a headmaster survey. The sample consisted of 4,486 mean scores from the 2003-2004 through 2012-2013 school years: 3,768 mean scores from non-Classical Christian Schools and 718 from Classical Christian schools each in reading and math and 3,768 mean scores from non-Classical Christian Schools and 701 from Classical Christian schools in writing. Data was collected using a headmaster survey. Welch's *t*-tests for unequal variances compared school score means with an alpha set at .05 and then at .017 for Bonferroni correction and returned statistically significant results for all three academic areas at both alpha levels. Effect size measured by Cohen's *d* and eta squared indicated Classical Christian methodology should have a large, positive effect on PSAT scores. Future research, including field work for demographics as well as associated correlational studies, is recommended.

Keywords: Christian education, Christian worldview, Classical Christian education, private education, Essentialism, Greco-Roman Trivium.

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List of Abbreviations

Analysis of covariance (ANCOVA)

Association of Classical and Christian Schools (ACCS)

Association of Christian Schools International (ACSI)

Center for Research on Evaluation Standards and Student Testing (CRESST)

Common Core State Standards (CCSS)

Depth of knowledge (DOK)

Magnetic Resonance Imaging (MRI)

Mind, Brain, and Education (MBE)

National Educational and Longitudinal Survey (NELS)

National Hispanic Recognition Program (NHRP)

Preliminary Scholastic Aptitude Test (PSAT)

Preliminary SAT/National Merit Scholarship Qualifying Test (PSAT/NMSQT)

Preliminary Scholastic Aptitude Test (PSAT)

Realistic Mathematics Education Approach (RME)

Theory of mind (ToM)

CHAPTER ONE: INTRODUCTION

Overview

While the Classical Christian education movement has appeared recently in both Christian and secular media as an instructional method new to the scene, it really is a look back at what the Essentialists of the 1920s saw as a tried and true method in Western culture for inculcating youth while preparing them for participatory citizenship. Chapter One includes background information regarding Classical Christian education, the problem and purpose statements, the significance of the study, the research questions guiding the study, and finally, definitions pertinent to the study.

Background

Recently, the Gospel Coalition published an article touting amazing academic progress made in an inner city school (where most had not graduated high school and the ones who did read at an eighth-grade level) utilizing the Classical Christian education method which had been "sprouting up" all across America in the past 25 years (Zylstra, 2017). Similarly, in a secular magazine, author Owen Strachan (2013) wrote an article entitled "Why Classical Schools Just Might Save America." Strachan (2013) wrote that those who "value truth, morality, the unfettered pursuit of life, liberty, and happiness, and the Western canon" should look to the Classical Christian education movement with its "study of Latin and Greek, the development of analytical and critical faculties (over against a narrowly defined body of facts)," as "exactly what is missing from the modern American public school" (para. 4).

The first Evangelical Protestant Classical and Christian school which became the model for others in the Association of Classical and Christian Schools (ACCS) was started in Moscow, Idaho in 1981 (Logos School, 2014) by Pastor Douglas Wilson, Shirley Quist, and Larry Lucas.

The ACCS has grown to an organization of more than 236 member schools with a more than 40,000 student enrollment, including international schools from The Bahamas to Indonesia, South Korea, and Africa (Association of Classical and Christian Schools, 2014). There also are Christian schools following the Classical method within the Association of Christian Schools International, or ACSI. Wilson wrote, "Within the last generation, hundreds of thousands of parents have walked away from the free public school system. A significant number of them are pursuing Classical Christian education" (D. Wilson, personal communication, January 10, 2014).

While the Classical Christian education movement looks back to the Trivium method of Greco-Roman education, it also incorporates more modern understandings of child development as espoused by Piaget (1976). The ACCS' Classical Christian philosophy is based in part on a definition of "Classical" drawn from Sayers' (1947) essay and Wilson's (1991) book, *Recovering the Lost Tools of Learning*. The Classical Christian methodology assumes students move through developmental stages in three broadly defined categories correlated to the Trivium, which were renamed by way of illustration in Sayers' essay (1947). What Sayers called the Poll-parrot stage, in which young children like to memorize and chant various bits of information, coincides with the Grammar stage of the Trivium (Association of Classical and Christian Schools, 2001). As children grow into their pre-teen and early teens, they become more argumentative and questioning; this is what Sayers called the Pert stage and coincides with the middle school years and the Dialectic or Logic stage of the Trivium, according to the ACCS (2001). In their mid to late teens, children are more vocal and expressive; this is termed the Poetic stage by Sayers, labeled the Rhetoric stage of the Trivium and coincides with the high school years (Association of Classical and Christian Schools, 2001).

The purpose of education from the Classical Christian theoretical framework encompasses how to learn, when and what content is to be learned, as well as the worldview from which to interpret and apply all knowledge (Association of Classical and Christian Schools, 2012c). According to 1 Thessalonians 5:23, human beings are body-soul-spirit, and as such, require a theoretical framework to understand the three-fold nature of mankind (Fausset, 1871). "The 'spirit' links man with the higher intelligences of heaven, and is that highest part of man which is receptive of the quickening Holy Spirit" (Fausset, 1871, para 4). The Bible also teaches that there are maturational stages in the process of learning, as Henry (1706b) pointed out in his commentary on 1 Corinthians 3:1-2 and 13:11: the Apostle Paul tells the conceited, immature Corinthian believers that he has not deemed them adult and ready for the weightier or meatier matters of doctrine because they have only limited knowledge of the things of God and are not mature enough in their understanding. Henry (1706b) further explained the Apostle's message in terms of instructional method, "It is the duty of a faithful minister of Christ to consult the capacities of his hearers and teach them as they can bear" (lines 15-16). Henry (1706b) noted that the Apostle compared the Corinthians to children in speech and actions, since a child's capacity to learn more difficult concepts grows as he grows and develops into a man, so spiritual understanding in younger Christians should grow, in knowledge and understanding, as they develop more spiritual maturity. In his commentary on Hebrews 5:12-14, Henry (1706c) confirmed the central metaphor Paul used to compare the learning of children -- first the simple, plain truths to be learned, understood and exercised before the more sublime and mysterious concepts were to be tackled and grasped – to the state of Christian doctrinal teaching and learning within the church.

Such maturational stages of learning and development in children needs more investigation and analysis. While areas such as cognitive and moral development as well as public/private test score comparisons have been studied and theorized, there is a lack of research and analysis in this area of acquiring a knowledge base prior to introducing more abstract concepts, as promoted by Essentialists, compared to Progressive pedagogical methods which are more child-centered and student directed in curriculum choices (Kessinger, 2011). According to Nehemiah Institute's Smithwick (2014), "Many, if not most teachers in Christian schools receive their education degree from state universities," and are "often humanist in mind" due to the worldview inherent at institutions granting state teaching certificates (p. 9). This causes a heart/mind worldview disconnect, Smithwick (2014) stated, between humanistic or man-centered educational philosophies, coupled with child-centered pedagogical practices being placed into what educators had intended to be a God-centered education.

Keane (2008), who defined worldview as "deep, ontological/philosophical, representational knowledge" (p. 4) in a study of the Zulu in South Africa, supported the notion that worldview not only affects learning but is important to the learning process. Decades-long studies performed by the Nehemiah Institute (Smithwick, 2013) show that fewer than 10% of students from Christian homes graduate with a biblical worldview, regardless of whether or not they attend Christian private school or public school. The exception to this trend, stated Smithwick (2013), or students retaining a Christian worldview, are those who attended Classical Christian schools such as those accredited by the ACCS, or those who used The Principle Approach home school curriculum. Recent research by Brickhill (2010) supports Smithwick's findings among middle school aged students.

Classical Christian schools develop skills to equip students to be lifetime learners by teaching students that every subject is comprised of certain defining facts with an orderly organization of information and by providing a concise and persuasive way in which to present the acquired material (Association of Classical and Christian Schools, 2012c). This method of instruction has been in use for hundreds of years; it is the new "old-way" of educating students (Association of Classical and Christian Schools, 2012c, para. 2).

Another component of Classical Christian education, reminiscent of Comenius' thorough list of subjects (Sovocol, 1932), is the idea of a topically integrated curriculum, including emphasis on reasoning, poetry, literature, and presentation skills. The idea of integrating of information, learning methodologies, and Christian worldview in the Classical Christian method is similar to what Van Brummelen (2002) described as the soup approach. The soup analogy assumes that the end product has an over-arching purpose, method, and recipe in mind that guides the creation of a whole, far exceeding the individual parts in excellence. Littlejohn and Evans (2006) claimed such an emphasis on both thinking and learning content corresponds well to Plato's pedagogical hierarchy of sensory, intellectual and intuitive learning. The difference from the much maligned "rote learning" is contextual and developmental applications (Littlejohn & Evans, 2006, p. 164). On this point, Bagley and the Essentialists agreed with the Progressives that simply repeating back information is not enough – rote learning without connecting "prior knowledge to current lessons" was just "stupid, parrot like learning" (Null, 2001, p. 46).

In the tradition of Western culture, immersion in the great books of civilization with the Bible illuminating all knowledge and wisdom had been in use for hundreds of years until recently, and it "is the means which produced most of history's great thinkers; it is the new 'old-way' of educating students with a long history of success," (The Association of Classical and

Christian Schools, 2012c, para 3). In Jeremiah 6:16, as explained by Henry (1706d), God calls to a wayward generation to return to the old good ways, the tried and true ways outlined in God's word, and to walk in them.

The Essentialist movement, which started in about 1940 and re-emerged in the 1980s, hearkened back to these old good ways and was founded by teacher trainer and educational theorist Bagley (Kessinger, 2011). Bagley "believed that there were essentials for all to learn" in formal instruction governed by "tried and true" methods (Ediger, 2012, p.176). The Essentialists emerged in response to a call for universal student centered education by "Progressives" such as Dewey and Kilpatrick who divorced the liberal arts tradition in favor of child interest-directed or purely vocational curriculum choices "instead of advocating for a …liberal arts curriculum for all" (Null, 2007, p. 1015). Kohlberg and Mayer's (1972) emphasis on cognitive-psychological development of the self as the driving force in education and the Progressive educators' emphasis on "child-centered" social reformism (Gutek, 1995, p. 488; Ediger, 2012, p.176) stand in contrast to Essentialist thinking, according to Null (2008). The Essentialists, led by Bagley, argued for education's end outside the realization of the self; that the moral purpose of molding children's lives is inseparable from academic instruction (Null, 2008). Bagley valued the "fundamental and thoroughgoing" approach with a "penetrating program" of study having "virtues" (Bagley, 1917, p. 624). Rankin (1876), an educator and doctor of divinity, earlier pointed to biblical truth as the foundation of civil education as well as the lamp illuminating all history in his sermon titled, *The Bible the Security of American Institutions*. In arguing against removing the Bible from public classrooms, Rankin (1876) stated the Bible is "the standard by which we determine the character of our civilization" (para. 22). Henry (1706a) argued that

Christians should utilize reason as a tool under the subjection and direction of the scriptures in his commentary on Acts 17:1-9.

Bagley also emphasized that teaching is a profession; educators should have a thorough knowledge of what was to be taught as well as how to teach and reach young people "for the common good" (Null, 2008, p. 210). Bagley formed an "Essentialist" committee to study Progressive ideas and classroom applications (Null, 2001, p. 46). Bagley's work in the 1920s through 1940s was "somewhat opposite of Dewey's thinking" (Ediger, 2012, p. 176) as he emphasized what was tried and true in his quest to professionalize the art of teaching as well as improve classroom instruction (Null, 2001). While Dewey emphasized problem-solving for its own sake, Bagley emphasized "a somewhat changeless curriculum" comprised of disciplined study in literature, arithmetic, science, and social sciences which would enable students to think critically, once mastered (Ediger, 2012, pp. 176-177). Fellow Essentialist Bestor, along with World War II war hero Admiral Hyman Rickover, felt that schools should be developing the ability to think clearly so American K-12 students could better enter rigorous and technical programs of study as adults (Kessinger, 2011).

Comparing instructional methods is a tried and true exercise with current applications. Hobbs and Davis (2013) found that comparing pedagogies is useful in raising the level of analysis while evaluating different methods of K-12 instruction. Hobbs and Davis (2013) compared results from two independent studies looking at narrative as an approach to math, science, and technology instruction. Similarly, Miyazaki (2011) compared two pedagogies within the Japanese School of the Dialogue of Cultures, one more student centered and the other teacher centered, then contrasted both with the American "teacher as a facilitator of student-initiated inquiries" (p. 5). Dai (2013) saw comparing pedagogies as a path to determining best

practices in adult business education. Su, Yang, Hwang, Huang, and Tern (2014) found ways to improve elementary school students' learning after comparing annotative and problem-solving instructional methods related to computer programming language concepts.

The present study sought to isolate and identify any difference in results of such an Essentialist philosophy of education, evident today in the resurgence of the Classical Christian method of instruction, in terms of academic achievement based on the standardized PSAT.

Problem Statement

Within the faith-based education field, others have studied spiritual formation (Dernlan, 2013), the effects of educator worldview on students (Brickhill, 2010; Fyock, 2007; Smithwick, 2014; Wood, 2008), and even headmaster job satisfaction (Dietrich, 2010) as differences between the Classical and non-Classical Christian schools.

Aside from areas already studied, including theological issues such as faith development (Boerema, 2011) and worldview (Fyock, 2008; Smithwick, 2014; Wood, 2008), no study has looked at pedagogical differences between Classical Christian schools and non-Classical Christian schools as far as performance on standardized tests measures.

Whether students attend private or public schools, charter, college prep, or religious schools, the standardized tests for college admission are considered a reflection of academic achievement (The College Board, 2011). Jeynes' (2012a) extensive meta-analysis of 90 studies found that while charter school students performed no better than their public school counterparts, private Christian school students outperformed public school students on standardized tests.

Jeynes (2008) found that Evangelical Protestant schools make up an increasing percentage of all religious schools in America. Additionally, Jeynes (2003, 2008) found that

private school students perform better on standardized tests than public school students even when social and economic variables were accounted for. Jeynes (2008) also compared Catholic and Protestant schools within the private school realm and found that Protestant students scored higher on several measures in the National Educational and Longitudinal Survey or NELS than Catholic school peers. Researcher Jeynes has not published a direct comparison, however, between Classical Christian schools and non-Classical Christian school student scores on standardized assessments. Such standardized tests instituted under the impetus of the No Child Left Behind Act of 2001 (2002) were intended to ensure higher academic achievement and are Essentialist in design, according to Kessinger (2011).

The problem is there are no current studies comparing academic achievement of students in Classical Christian schools and non-Classical Christian schools.

Purpose Statement

The purpose of this quantitative causal-comparative study was to compare academic achievement mean scores on the standardized PSAT from students educated through the Classical Christian method to mean scores from non-Classical Christian schools to see if there were any significant differences. The present study proposed to address the gap -- there are no comparisons of academic performance on the PSAT between Classical and non-Classical Christian school students. The ACCS (2001) and the ACSI (2012a), by virtue of specific standards and rigorous accrediting protocols, made up the comparison groups in the present study from which random samples were drawn and then statistically analyzed. The population was all high school students attending private Christian schools affiliated with the ACCS or the ACSI who took the PSAT. The independent variable was the type of school, either a Classical

Christian or non-Classical Christian. The dependent variable was the PSAT mean scores by school.

Significance of the Study

While public education reached near-universal expression in the 1960s, that decade also marked when the Bible and prayer were removed from public schools and public school test scores fell dramatically (Jeynes, 2012a). Researchers such as Jeynes, as well as authors in the field of Christian education, see a need to identify and publicize educational methods that are proving fruitful: "In my view it is important not only to distinguish between traditional public schools, charter schools, and Christian schools, but the various kinds of Christian schools as well" (W. Jeynes, personal communication, June, 2015). In a meta-analysis, Jeynes (2012a) found that the positive effects of Christian education have been persistent over time as well as remaining consistent during the more than half century he studied. Jeynes also noted in another article that attending a private Christian religious school decreased the achievement gap for minority Hispanic and African-American students compared to their majority white counterparts by more than 25% (Jeynes, 2012b).

According to the ACCS (2016), students from its schools consistently score in the top tier of all students in America on standardized tests. There are several reasons why educators should be interested in how a Classical Christian education may affect students' PSAT scores, not the least of which is the awarding of National Merit Scholarships (2014) based on these scores. Admittance to the college of choice would be another reason to consider the type of K-12 school students attend. On a combined benchmark of three SAT tests, the ACCS (2016) reported students from its member schools scored 228 points above the benchmark for college and career

readiness compared to 112 points for private schools, 45 for religious schools, and 76 for students attending public schools.

Classical Christian schools use a "particular pedagogical approach" (Wilson, 2003, p. 84-85) which is distinctly Christian in worldview. In addition to the ACCS, there are many Classical Christian homeschools, as evidenced by the dozen or so suppliers of curriculum and services found by a cursory Internet search (Classical Christian Homeschooling, 2015). Sherfinski (2014) reported the Classical Christian homeschooling "resurgence" as most evident among evangelical mother-teachers (p. 1).

Another larger association of Christian schools which accredits conforming member schools, the Association of Christian Schools International or ACSI (2012b), like the ACCS (2001), stated that its mission is to promote, establish, and equip schools (including homeschools and co-ops) committed to education from an Evangelical Protestant Christian worldview. Both the ACCS (2012a) and ACSI (2012a) support instruction grounded in the Old and New Testament Scriptures. The ACCS (2012a, 2012b) added its Classical philosophy of teaching to both its mission statement and accrediting standards as a distinction from other Christian school methods.

As public awareness of the Classical Christian movement grows, "Any disciplined research into the causes and effects of this movement is to be welcomed," (D. Wilson, personal communication, January 10, 2014). The ACCS's retired top executive stated that research comparing various student outcomes "will provide ACCS with a better assessment of how well the Classical Christian method is impacting students' education and development," (P. Blakey, personal communication, January 7, 2014).

Hobbs and Davis (2013) as well as Su et al., (2014) found comparing pedagogies fertile ground for educational research in search of best practices. Based on the groundwork laid by cognitive-developmental theorists and current researchers such as Jeynes (2012a), the current study sought to examine any differences in achievement from students in Classical Christian schools and non-Classical Christian schools.

Dietrich (2010) observed that Classical Christian methodology "differs significantly from postmodern American education" in that "children are taught how to think and learn rather than viewed as great silos that need to be filled to capacity with information" (pp. 28-29).

The present study sought to compare mean scores from private Christian schools between those that utilize the Classical method and those that do not in order to help determine if this method of instruction is still effective and worthy of implementation today.

Research Questions

The following research questions were proposed:

RQ1: Is there a difference in academic performance on PSAT composite scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ2: Is there a difference in academic performance on PSAT mean reading scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ3: Is there a difference in academic performance on PSAT mean math scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ4: Is there a difference in academic performance on PSAT mean writing scores for Classical Christian private schools compared to non-Classical Christian private schools?

Definitions

The following definitions are used for the present study:

1. *Classical Christian education* - Classical Christian education is a combination of philosophy and methods that are age specific, time tested (the Trivium), Christ-centered, nurturing and academically rigorous, as exemplified by schools associated through membership in the ACCS (2012c) and those in ACSI membership citing the Trivium, Sayers (1947), and Gregory (1884) as foundational in the school's instructional alignment and philosophy.

2. *Evangelical Protestant* - The Association of Statisticians of the American Religious Bodies (2012) listed more than 191 denominations falling under the umbrella of Evangelical Protestantism in a 2010 study. In a 2010 Association of Religion Data Archives survey, more than 42% of Christians considering themselves Protestant chose no denominational affiliation. The National Association of Evangelicals (2012) defined the term "evangelical" as someone who considers the Bible the word of God and believes Jesus is the Christ, mankind's savior and Lord. Evangelical Protestantism is defined by researcher Bryant (2011) as adherence to

    (a) a belief in the Bible as the highest and final authority,

    (b) a belief in an individual's conversion to a personal relationship with Jesus Christ resulting in salvation, and

    (c) a belief that sharing faith with others is part of religious practice.

    All schools represented in the present study self-identified as being aligned with Evangelical Protestant doctrine as defined by Bryant (2011), contained in either the ACCS or ACSI statement of faith.

3. *Greco-Roman Trivium* - The educational methodology known as the Trivium (Grammar, Logic, and Rhetoric) is called "the educational foundation of our Western culture" by the

ACCS (2012b) in its mission statement (2012, para 2). In Classical Christian education, the terms Grammar, Logic and Rhetoric can describe topics of study, methods of instruction, and developmental stages through which children pass (Perrin, 2004).

CHAPTER TWO: LITERATURE REVIEW

Overview

Since the Bible states that all humans have a spirit (I Thessalonians 5:23), instruction and guidance in spiritual development is a need of the entire human race. Classical Christian thinkers argue that spiritual development is part and parcel of a God-ordained education (Littlejohn & Evans, 2006; Smithwick, 2013; Wilson, 2003). Classical Christian schools in the ACCS report test scores in the top tiers of all students nationwide on standardized tests according to comparisons on the organization's web page (Association of Classical and Christian Schools, 2016). Anecdotal reports cry out for serious research into philosophical/instructional as well as academic performance measure differences.

While areas such as cognitive and moral development as well as public/private test score comparisons have been studied and theorized, there is a lack of research and analysis in the area of Essentialist rigor compared to Progressive pedagogical methods in Christian education. Essentialists such as Bagley (Gutek, 1995) stand in contrast to Smithwick (2013) and Keane's (2008) emphasis on worldview, Kohlberg and Mayer's (1972) emphasis on cognitive-psychological development, and the Progressive educators' emphasis on child-centered social reformism (Gutek, 1995, p. 488; Ediger, 2012, p. 176).

Jeynes' (2009, 2010a) research established that Bible knowledge is positively associated with both pro-social behavior and academic success. Jeynes (2003) found that students from religious schools performed better on standardized tests than public school counterparts. Jeynes (2002) found that Protestant students scored higher on some measures than Catholic school peers. Jeynes (2012a) found that the positive effects of Christian education have been persistent

over time. A comparison of performance among differing philosophies of education within

Evangelical Protestant Christian schools, however, has not been conducted.

Since the present study seeks to measure academic accomplishment across Evangelical

Protestant Christian schools to add to Jeynes' (2002, 2008, 2012a) studies, analyzing mean

scores from the PSAT—a standard national measure used by schools for application to colleges

and to gain scholarships that is open to graduates of all schools—was appropriate.

Theoretical Framework

The research in this study is guided by the theories of Bagley (1911a) and Piaget's (1976)

stages of learning theory. Piaget (1976) stressed maturational structure in educating children,

moving from the concrete to the abstract. Piaget and Inhelder (1969) pointed out that all children

develop and pass through identifiable stages as they mature, but at somewhat individual rates of

development "according to his degree of intelligence or with the social milieu" (p. 153). Ediger

(2012) agreed, stating "learning cannot be hurried but must wait upon the maturational

sequence" (p. 175). Piaget (1976) recognized the need for both social interaction and individual

thought/cognitive maturity as "two complementary aspects of one and the same whole" (p. 166).

Researchers Council and Cooper (2011) defined the Classical Christian method as "an

interesting combination of old and new educational paradigms" (p. 117). For example, educators

have long applied Piaget's stages theory to academic instructional practices (Miller, 2011).

Piaget's concept of a child's readiness to integrate new knowledge and skills as a pre-requisite to

learning shaped early 20th century social scientists' study of developmental psychology (Miller,

2011).

While Ediger (2012) saw Piagetian theory as sequencing of carefully selected activities

and learning experiences constructed to fit the child's stage of development, he contrasted this

with a formal curriculum where all students progress at the same rate performing the same

activities. Ediger (2012) stressed individual mastery-based learning in that "it differs much as

children mature as to what is taught at diverse age levels" (p. 175). Ediger (2012) did not

propose including maturational stages with differing instructional methods, however, as did

Sayers (1947) and Gregory (1884), both leaning heavily on the Greco-Roman tradition of the

Trivium.

Gregory (1884) stressed mastery as essential to both capturing student attention as well as

encouraging excellence and life-long learning. Bagley, along with fellow professor Layton of the

School of Education at the University of Illinois, edited and revised Gregory's book, *The Seven

Laws of Teaching*, in 1917 (Price, 1994). This 1917 version of Gregory's book included allusions

to the budding field of child psychology: "Certain additions and alterations have been suggested

by the recent developments in educational theory and practice," (Price, 1994, p. iii).

Bagley (1911a) asserted that what is valued in the field of education changes depending

upon a society's educational aims (p. vi). Bagley (1917) further claimed that post WWII, a

nation's strength would vary directly with the attention given to "universal education" (p. 624).

Bagley called for a fundamental and thorough program of studies as contrasted to what he called

the "snap-shot superficialities" of educational panaceas or cure-alls (1917, p. 624). Bagley's

(1911b) Essentialist theory rests on the idea that a command of essential basic knowledge frees

one's mind for higher level thinking and analysis. Bagley's (1911b) view of essential knowledge

included students who worked in an orderly and efficient environment, who were delighted by

drills that enhanced their command of useful basic knowledge that had a "real and vital relation

to other things that they found to be important" (p. 126). Bagley (1911b) emphasized that

educational skills should be mastered and that there is an objective measure of doing things "well" (p. 126).

Bagley (1911b) emphasized the role of repetition and building good scholarly habits in the elementary ages as critical to the student's future success in all areas of life. "The vital point," Bagley (1911b) stated, "is what the student gains from his or her activity or inactivity "in the way of habits, in the way of knowledge, in the way of standards and ideals" (p. 40). Such automaticity is imperative to higher order skills such as composition, Bagley stressed, once skills such as spelling are mastered through correct repetition and reduced to memory recall. What education needs, Bagley (1911b) stated in response to his progressivist critics, is not "less drill" but "better drill" with "richer content" and greater variety" (p. 41).

Bagley (1911b) used an illustration of blazing a trail through thick brush to describe committing to memory, "drill or training," the basic bits of knowledge necessary to free the mind to think on a higher plane as one develops and matures (p. 119). Education, "from the earliest times has recognized the necessity of building up these automatic responses," Bagley (1911b) wrote, "fixing these essential habits in all individuals" (p. 120). Bagley (1911b) recognized that mindless repetition would descend into boredom, but he also warned of the opposite extreme in structureless, Laissez-faire, whatever the child decides to do progressive experimental schools. "The movement that they represent" Bagley (1911b) said of the progressive experimental schools, is "still floundering about in the tamarack swamps, getting farther and farther into the morass" (p. 124-125). Included in the basic knowledge base every student should master, Bagley (1911b) listed instruction in courtesy, respect and politeness; "it should be part of every child's education" he wrote (p. 125). Bagley (1911b) insisted that repetition as well as everyday use were critical to acquisition of basal knowledge as well as social skills in that "good manners

cannot be acquired incidentally any more than multiplication tables can be acquired incidentally"
(p. 125). Bagley saw this repetition as a natural inclination of children, who, as he noticed, loved
to repeat things over and over again long before they understand the meaning of their chants,
songs and recitations.

Bagley (1911b) also championed doing everything as I Corinthians 14:40 states, decently
and in order: praising a school where the principal had organized all studies so that they "played
into the hands of others" creating a "definite and tangible" relationship – drama practice that
related to reading and language study, geography and natural science illuminating and employing
studies in mathematics and language (p. 127). This was what Bagley saw as the proper
integration of subject matter in an orderly, overlapping and meaningful hand-in-glove array.
Bagley (1911b) also saw acquisition of a base level of knowledge motivational in that attaining it
allowed a student, through hard work and discipline, to achieve "strength, and virility and moral
fiber" while attaining mental and moral strength (p. 131).

Putting faith-based instructional methods in context within a pedagogical framework has
been theorized as the study of human morality by different researchers. Kohlberg and Mayer
(1972) termed their cognitive and emotional developmental theory as "progressive" and "as part
of a functional-genetic" philosophy of education that espouses a child's "natural interaction with
a developing society or environment" (p. 454). Dykstra (1981) was critical of Kohlberg's theory
as humanistic and "ultimately inadequate" in a religious context (p. 29). Dykstra (1981) stated,
"Religious faith and belief have been collapsed here into psychological structures," Dykstra (p.
26) of Kohlberg's moral stage theory. Dykstra reinvigorated a transcendent reality outside
human senses and reason as the basis of faith-based morality in contrast to Kohlberg's
metaphoric projection of meaning from self-awareness outward. This humanistic worldview, as

opposed to religious worldview, leaves out any religious application in terms of moral reasoning, Dykstra asserted, and creates a self-affirming research tool in Kohlberg's dilemmas. The Apostle Paul warned of such comparisons in 2 Corinthians 10:12 (New King James Version): "For we dare not class ourselves or compare ourselves with those who commend themselves. But they, measuring themselves by themselves, and comparing themselves among themselves, are not wise."

Developmental psychologist and a contemporary of Kohlberg, Fowler (1981) agreed that religious faith requires an individual belief in that faith object (God) as "objectively real" and the source of "all being and value" (p. 293). Fowler (1981) criticized Kohlberg's moral judgment stage theory as "exceedingly narrow" (p. 300). Fowler (1981) asserted that faith, as the center of value and direction, should be included in moral judgement; that morality is more than Kohlberg's cognitive operations and must include the emotions and "affections" (p. 300). Fowler (1981) asserted his stages of faith as "highly formal stage descriptions" to be used to provide normative criteria for determining how "adequate, responsible and free of idolatrous distortions" our faith traditions are (p. 293). But in discussing religious faith, Fowler cautioned that it is not to be confused with theology nor "reduced to the ethical or to the merely utilitarian," (p. 294). Fowler argued that his theory should be used to discern what is "good" faith—faith that liberates us from our human tendencies toward "self-absorption," "sin," and "despair" (pp. 293-294). Fowler asserted that the "criteria of adequacy for faith include, but are not limited to, the formal structures of faith stages" (p. 301). Further, Fowler wrote that "faith development studies confirm" humans are "gifted at birth with readiness to develop in faith" and that God's intervention of unmerited favor or "extraordinary grace" on our behalf is God's sovereign part in our faith development (p. 303).

Esqueda (2014) emphasized that faith and learning are integrated parts of the whole of education, not separate and isolated areas. While dealing mostly in the arena of higher education, Esqueda made the point that in American schools, faculty tend to work independently as result of cultural divisions between faith and work that are not favorable to academic or spiritual development. Esqueda argued (2014) integration by virtue of a unifying Christian worldview adds meaning to subject as well as subject matter and combats religious compartmentalization between faith and our everyday lives.

By combining the spiritual inculcation of virtue with rigorous intellectual pursuits, the Classical Christian method is designed so students grow "spiritually, intellectually and socially," according to Littlejohn and Evans (2006, p. 18). Classical Christian instructional methods move in increasingly complex steps from facts to logical analysis to synthesis and presentation in the Trivium stages, mirroring aspects of Bloom's taxonomy (Dong, 2014). Metacognitive strategies found in *The Seven Laws of Teaching*, the Classical Christian how-to treatise by Gregory (1884), seem nearly identical to Dong's (2014) appeal to teach students how to learn for themselves based on the content or task at hand. Classical Christian schools take this developmental instructional philosophy, illuminated by a Bible-based world view, then couple it with parent-covenant style partnership based on the concept of in loco parentis (educators as standing in the place of the parent).

Similarly, the Classical Christian method stresses rigor as a part of fulfilling an individual's God-given plan through purposeful effort (Exodus 20:9-10; 2 Thessalonians 3:10; 2 Corinthians 9:8; 2 Thessalonians 3:8). Torff (2014) connected a lack of rigorous instruction with constraining students' academic achievement. While Torff (2014) advocated for more rigor in schools with disadvantaged students, rigor itself has been advocated for by those specializing in

gifted and talented students as well (VanTassel-Baska, 2004). DiCamillo (2010) called for more rigor and less entertainment in teaching methodology for American social studies classes. According to DiCamillo's (2010) case study, direct instruction in analyzing facts within complex contexts is required to develop students' critical judgment; more intellectual challenge, not fun and games, is what delivered the desired results.

Researchers Coker and Erwin (2010) found that direct instruction in the art of persuasive argument benefitted low-income African American middle-school students. The researchers chose to study the art of argument because it was seen as central to the development of critical thought as well as scientific inquiry. Study participant students were chosen from a minority group scoring lowest in persuasive writing nationwide while the researchers noted less than one in five middle school students overall scored proficient on standardized tests (Coker & Erwin, 2010).

Guided by the grounded theories of human development applied to learning, especially those surrounding rigor, mastery of basic factual knowledge to high standards of proficiency, and developmental methods of learning, the researcher of this study expected to find the highest performing Christian students in schools where these elements are emphasized.

Related Literature

The following review of literature is focused on the idea of comparing pedagogies as well as certain themes or tenets of the Classical Christian model that have quantitative study results, including social/cognitive development, mastery of basic knowledge, students' moral development, parental involvement, an integrated curriculum, and Latin instruction.

Comparing Pedagogies

Hobbs and Davis (2013) examined student engagement in the areas of math, science and technology instruction. The researchers used a case study approach to compare results from two independent studies: one looking at a narrative method from an inward focus (student centered within the narrative) in math and science instruction and the other outwardly focused (instruction centered, student fits the narrative into personal and pre-existing life concepts) in the second study on technology instruction (Hobbs & Davis, 2013). In the math and science study, six teachers from two middle schools were observed, interviewed, and "participated in a dialogue with the researcher" during an 18-month period (Hobbs & Davis, 2013, p. 1294). In the technology study participants consisted of a combined class of fourth and sixth graders and their teacher; the researchers analyzed video/audio recordings, field notes, and student-created artifacts (Hobbs & Davis, 2013). Several qualitative methods of analysis were used within each study developing thematic categories which lead to the two perspectives outlined by Hobbs and Davis (2013) in the comparative analysis. Differences compared in the two approaches included connections made "through the process as the focus in the inward-looking perspective" while the "outward-looking perspective" focused on connecting students to the subject matter (Hobbs & Davis, 2013, p. 1302). Comparing pedagogies proved useful, according to Hobbs and Davis (2013), because this type of research "can give important insights into the assumptions underpinning the nature of the knowledge and inquiry" (p. 1304).

In his article in *Journal of Russian and East European Psychology,* cognitive psychologist Miyazaki (2011) compared pedagogies within the Japanese School of the Dialogue of Cultures with American collaborative learning, labeling one more student centered and the other teacher centered (p. 40). In Saitou pedagogy, "the learning of the teaching material"

focuses on finding new perspectives or insights, "not necessarily on learning about views from

historical cultures" as is the case in School of the Dialogue of Cultures (Miyazaki, 2011, p. 41).

The teacher may present a puzzle of sorts in Saitou methodology or challenge the students'

understanding by taking an oppositional point of view, according to Miyazaki (2011); a strategy

Miyazaki (2011) called "completely different" from the American idea of a teacher facilitator (p.

40). Miyazaki (2011) contrasted the high culture of the School of the Dialogue of Cultures with

the "commonsense" or diverse views of other professions in Saitou method while emphasizing

both are a teacher led instructional model (p. 40). Both are then compared to the American

collaborative learning model which Miyazaki (2011) characterized as encouraging a "passive

teacher, awaiting the children's initiative" (p. 40). In his biographical introduction, Miyazaki

(2011) stated that through such cross-cultural comparisons, he sought to share some Japanese

educational practitioners' wisdom.

Dai's (2013) review looked at studies that compared "discussion based pedagogy" with

the "traditional lecture method" in adult business communication courses (p. 1). Results included

proposing in-class discussions as part of a more active oral communications instructional method

(Dai, 2013). Dai (2013) argued that comparing instructional methods is important to facilitate

improvement in student learning as well as teacher-course effectiveness.

Su et al., (2014) looked at two instructional methods aimed at introducing programming

language in Taiwanese primary schools. Participants included 135 sixth-graders, made up of 66

boys and 69 girls with a mean age of 12 from four classes in one elementary school (Su et al.,

2014). Two tools and two instructional methods were compared, randomly assigning one

combination of tool and method to each pre-existing class (Su et al., 2014). Three classes had 34

students, one had 33, and each had nearly the same number of boys and girls (one had one more

boy, two had two more girls and one was gender even); more than 90 % reported no prior

programming experience but all had basic familiarity with computer use according to Su et al.,

(2014). The experiment utilized a pretest/posttest design and test items were "verified and

validated" by one senior programming teacher knowledgeable in the code language and "two

university professors" (Su et al., 2014, p. 655). The post test, designed to measure conceptual as

well as strategic knowledge, included five multiple choice, five programming explanation items,

a debugging item and a designing item (Su et al., 2014, p. 656). A quasi-experimental method

was employed covering a six-week period in each of two semesters with "the same treatment

period by the same teacher with the same materials provided" in each (Su et al., 2014, p. 656).

Analysis of covariance (ANCOVA) was used due to non-equivalent starting groups while

statistically controlling for prior knowledge; the two instructional tools (the annotative and

traditional) and the instructional methods (problem-solving-based teaching and traditional) were

the independent variables while performance on the programming post-test was the dependent

variable (Su et al., 2014, p. 656). Results included higher scores from students receiving the

problem-solving teaching method regardless of which tool was used (Su, et al., 2014). Su et al.

(2014) stated that such comparisons of instructional methods is important to "shed light on

higher levels of knowledge understanding with the ultimate aim of improving" student learning

(p. 662).

As outlined above, comparing pedagogies can be fruitful for sharing wisdom, as

Miyazaki (2011) stated, for developing best practices as Dai (2013) contended, or for gaining

insight into teaching methods (Hobbs & David, 2013) while improving understanding and

student learning (Su et al., 2014).

Social/Cognitive Development

Pace (2013), senior director of Knowledge Works foundation in Cincinnati, saw the halls of American education following the rapid upheaval and "reconfiguration" that has occurred in the communications industry in the last decade (p. 32). Pace (2013) believed "competency" and "proficiency-based learning" will become the new normal (p. 32). According to Jeynes (2008), Positive change related to attending religious schools can turn the tide of declining test scores and also reduce risky behaviors such as illicit drug use, alcohol abuse, and teen pregnancy.

Bramer (2010) defined the part Christian education adds to a secular education as spiritual development: "[L]earning habits of the heart and practices of devotion needed to carry out one's vocation in a way that is faithful to God and sustains the person and community" (p. 334). This molding and developing of the student's spirit that was thought since the Reformation to only be for those in ministry, Bramer (2010) argued, is known to be part of every Christian's developmental pattern.

Espinoza and Johnson-Miller (2014) credited developmental learning theories applied to Christian education with illuminating the nature and process of mental, social emotional, moral and spiritual human growth. In an essay published in Christian Education Journal, Espinoza and Johnson-Miller (2014) stressed that "the impact of developmental theory on the field of Christian education cannot be overstated" (p. 8). While acknowledging that there has been pushback from church traditionalists who insist that catechism is still the best method of training a child in the way in which he should go, Espinoza and Johnson-Miller stated that both developmental theory and catechism memorization can be utilized side-by-side. According to Espinoza and Johnson-Miller (2014), "While holding onto the theological significance and vital role of developmental

theory, we propose that catechesis should be given its rightful place as the overarching process for understanding and cultivating Christian formation and lifelong spiritual growth" (p. 8).

The framework for understanding the instructional model used in Classical Christian education (developmentally appropriate instructional methods as well as identifying the student's cognitive stage for class level grouping) is the Trivium (Spencer, 1996). The Trivium takes into account social/emotional behavior states as well as cognitive milestones.

As Sayers' (1947) essay outlined and Spencer (1996) discussed in an article on the Classical model, the Greco-Roman Trivium is a framework for K-12 basic education to prepare young adults for mature endeavors. Sayers' (1947) essay stressed teaching students how to learn, the Grammar of each topic—that is, the language of learning—and not just isolated facts. As recorded by Spencer (1996), the Trivium method is developmental in nature, stressing mastery of factual knowledge and rules in the Grammar stage; organization, integration and analysis in the Dialectic or Logic stage; and self-directed inquiry, synthesis, articulation/presentation, both oral and written, in the Rhetoric stage. Sayers' brilliant contribution, according to Spencer (1996), was the alignment of the ancient Trivium curricular phases with keen observations of modern childhood development stages. Sayers' (1947) labels of Poll-parrot, Pert, and Poetic for the three stages are more descriptive, but the more standard Classical labels of Grammar, Logic, and Rhetoric are most often found in the sources cited in the present study.

In addition to the instructional philosophy of the Trivium, Classical Christian education is intentionally Christ-centered, as explained on the ACCS (2012c) website:

Classical Christian schools teach all subjects based on the principle that God is the Creator of all that exists, and therefore all knowledge is interrelated and points back to

Him. Biblical standards of conduct are applied in all arenas of school life, acknowledging

that Jesus Christ is Lord of all. (para. 4)

Further, to contrast Classical Christian education from what Wilson (2003) called the

government (public) school system in America, the ACCS (2001) stated in its position paper #2

that it is diametrically opposed to the worldview in the predominant culture—that of secular

humanism. As the ACCS (2001) defined it, Christianity is a way of thinking, a worldview that

"shapes our perspective and interpretation of everything" (para. 5).

This way of thinking is the "lens through which we see, understand, and teach all things"

(ACCS, 2001, para. 5). ACCS (2001) stated, "it is antithetical to all other worldviews and thus

requires that we present all ideas and concepts as part of a larger whole defined by Christian

truth" (para. 5).

Jeynes' (2009, 2010a) research established that Bible knowledge is positively associated

with pro-social behavior as well as academic success. According to Jeynes (2003, 2002),

students from religious schools performed better on standardized tests than public school

counterparts while Protestant students scored higher on some measures than Catholic school

peers. Further, Jeynes (2010b, 2012a) found that attending a religious school reduced the

majority/minority achievement gap by 25%, and the positive effects of Christian education have

been persistent over time.

Paige, Sizemore, and Neace (2013) posited that cognitive rigor, which "is a determinant

of academic achievement" involves students being "challenged to think at high levels" (p. 106).

Further, Paige et al. (2013) explained rigor as students being engaged in activities requiring

higher order thinking and the transfer of knowledge. According to Paige et al. (2013), to promote

rigor, a continuum of learning should exist, starting with recall of factual knowledge and ending in complex, "highly creative problem solving" (p. 107).

While Paige et al. (2013) did not cite a theory of cognitive rigor for their study, they stated a reliance on cognitive taxonomies such as Bloom's (1956) taxonomy and Webb's (1997) depth of knowledge (DOK) used to measure student outcomes under Common Core State Standards, or CCSS (National Governor's Association, Council of State Chief State School Officers, 2010). Paige et al.'s (2013) study results based on ninth graders suggested that as the curricular demands became more rigorous regarding thinking demands, students became and sustained more engagement. Researchers then would expect to find higher academic achievement in schools implementing a rigorous instructional philosophy.

Similarly, Kymes (2004) argued that the federal No Child Left Behind Act of 2001 was not based in any learning theory, but was supported by a behaviorist philosophy adopted by government policymakers that "mandated standards will produce standard results in all students" (p. 5). Further, Kymes (2004) argued that the output-oriented, high stakes assessment framework of NCLB was designed to produce skilled workers and not well-developed and creative thinkers. Researchers would expect to find the highest academic performance then from an educational philosophy which combines both academic rigor and development of creativity in individuals.

Brain research described by Westby and Robinson (2014) found that both cognitive and social/emotional frameworks start developing at birth and continue to develop in measureable stages. Westby and Robinson's (2014) research centered on a more comprehensive explanation of theory of mind (ToM) as thinking about the emotions as well as the ideas and motivations of others. Further, Westby and Robinson (2014) concluded from neuroimaging evidence that skills

appearing at one level of the ToM construct continuum are not necessarily prerequisites to move to the next observable level.

Espinoza and Johnson-Miller (2014) credited developmental learning theories applied to Christian education with illuminating the nature and process of mental, social emotional, moral, and spiritual human growth. According to Espinoza and Johnson-Miller (2014), doctrine as information to be memorized as an end unto itself is counter-productive. They stated Christians should engage in "active pursuit of divine communion and meaning" through "hearing, contemplation and critical reflection" (p. 22). Researchers should expect to find the highest performing Christian students in schools where critical thinking, engagement, and application of spiritual truths are emphasized.

Espinoza and Johnson-Miller (2014) further credited developmental theorists such as Kohlberg, Fowler, and Piaget for positing theories of human growth toward maturity in areas often discussed from a theological perspective such as moral integrity and spiritual decision making. Kohlberg and Mayer (1972) seemed to agree with Espinoza and Johnson-Miller (2014) in espousing a cognitive and emotional developmental theory of learning. Kohlberg and Mayer (1972) also seemed to agree with what Westby and Robinson (2014) explained in that they also posited hierarchical stages that have measurable skills—although skills are not prerequisite to moving up to the next stage. According to Kohlberg and Mayer (1972), attaining the next higher cognitive developmental stage is the goal of education, and this attainment presupposes mastery of the previous stage without necessarily mastering every skill measured in the previous stage. Based on the cognitive-developmental theorists, researchers should expect to find higher achievement from students in Christian schools recognizing developmental stages and

encouraging mastery of measureable skills in order to place students at appropriately rigorous and developmentally-appropriate levels.

Jeynes (2012a) suggested that Coleman's (1988) social capital theory may explain why students from faith-based schools score higher on social/psychological measures for well-being. Coleman's theory (1988) sought to provide a framework for how people make rational decisions about behavior choices, including "obligations and expectations, information channels and social norms" (p. 3) within a social context. Sociologists understand human behaviors as a complex interaction between self-interests and pressures from social norms, such as how much attention and energy was expended in the pursuit of information gathering, according to Coleman (1988). An example would be the explosion of social media newsfeeds, which report in less depth but constantly update by the hour, compared with the decline of traditional news media outlets, which require more time and effort to read and process.

Among examples of social capital, Coleman (1988) articulated childhood safety in public places, due to an understanding that all adults look out for and care for the well-being of all children, as a form of social capital lacking in urban U.S. cities. Classical Christian schools exhibit a close-knit family structure based on covenant relationships of Biblical humility and selflessness as described by New College Franklin Chancellor and Pastor George Grant (2010), forming a type of social capital as described by Coleman (1988).

University of Illinois researchers Lubienski and Lubienski (2014) challenged Jeynes' (2012a) findings in a scholarly book mentioned by Education Week writer Yettick (2014) as part of the ongoing debate regarding school choice. Yettick (2014) summarized scholarly critiques of Lubienski and Lubienski's (2014) book, ranging from their recalculating of scores from the assessments cited to the use of varying statistical methods to account for socio-economic status

of students in the samples to small sample sizes and unaccounted factors such as some students having motivated parents. Most notably, Harvard University's John F. Kennedy School of Government Professor Paul E. Peterson reran the Lubienski's analysis using different socio-economic accounting methods and found the opposite conclusions (Yettick, 2014).

Recent research in supporting gifted students by Walsh, Kemp, Hodge, and Bowes (2012) supported the Classical Christian philosophy of education in arguing for differentiation and ability grouping toward more challenging materials even at the earliest ages. Accelerated classes, enrichment of regular educational fare, advanced academic and cognitive stimulation, ability grouping, and utilization of better and earlier identification methods are all advocated by Walsh et al. (2012).

Mastery of Basic Knowledge

Ravitch (2006) labeled Bagley, Bestor, and other 20th century educational theorists as "traditionalists" when they clung to the belief that teachers should be well educated in content areas and curriculum should hold together coherently toward attaining clearly defined and culturally-relevant standards (p. xi-xii). Ravitch (2006) blamed the progressive ideals of Dewey, Kilpatrick, and others invading academia for what she saw as a generation of students who lost self-discipline, content matter mastery, and the precious inheritance of the previous generations' level of knowledge in civic responsibility and Western culture—a generation "inducted by mass media into a shoddy version of commercialized common culture" and who were "ignorant of American history, literature, foreign languages, science" and almost anything formally comprising excellence in education (p. xiii). Ravitch (2006) insisted that the job of schools is not transformational social justice but "making children more intelligent" (p. xiv-xv) and that if

schools attempt to do anything but provide the mastery of the collective cultural knowledge with the ability to read, write, and think for themselves, it will fail.

While Kohlberg and Mayer (1972) tied cultural transmission ideology to what they term "the Classical academic tradition of Western education," they define the Classical method as "transmitting knowledge, skills and social moral rules of the culture" and label it as "society-centered" (pp. 453-454). They contrasted this with the "child-centered romantic school" as well as the progressive "functional-genetic" trains of educational theory (Kohlberg & Mayer, 1972, pp. 453-454). Rather than instruct in what is right and wrong, desirable or detestable, progressives see the goal of education as "attainment of a higher level or stage of development in adulthood," where the educational environment "actively stimulates development through the presentation of resolvable but genuine problems or conflicts" (Kohlberg & Mayer, 1972, p. 454). Kohlberg and Mayer stated that while Classical and progressive camps both stress the acquisition of knowledge and development of morality, progressives see these as pragmatic changes in patterns of thinking and adaptations of responses to "problematic social situations" instead of abiding by society's rules (Kohlberg & Mayer, 1972, p. 455). They seemed to agree with Espinoza and Johnson-Miller (2014), however, in espousing a cognitive and emotional developmental theory of learning. Espinoza and Johnson-Miller (2014) acknowledged both Kohlberg and Mayer's (1972) work in "moral integrity and decision-making" then credited Piaget's cognitive growth theory as well as Erikson's work on aging and spirituality as evidence of models in human development that should illuminate and inform educational practice. Espinoza and Johnson-Miller (2014) stated, "When educators understand developmental stages," they can discern which concepts may be "too abstract or concrete for their students'

developmental capacity" as well as that "different people at different stages of life learn differently" (p. 8).

While Kohlberg and Mayer (1972) stated that morality is "the reciprocity between the individual and others in his social environment" (p. 455) and has nothing to do with cultural values or impulses and emotions, fellow progressive Dewey (1938) seemed to disagree. Kohlberg and Mayer (1972) reduced maturational development to a reorganization of "psychological structures resulting from organism-environment interactions" and cultural transmission to Skinner's behavioral "stimulus-response" theory (p. 456-457). Kohlberg and Mayer (1972) cited Dewey in support of these definitions, while Dewey (1938) seemed to argue for a socially-qualitative, maturational process in that "the trouble with traditional education was not that it emphasized the external conditions" that have some control of the educational experiences, but that "it paid so little attention to the internal factors which also decide what kind of experience is had" (Dewey, 1938, p. 42). Dewey (1938) added that the learner's "needs and capacities" must be taken into account in order to assure an educative, as opposed to non-educative, experience is had (p. 47). Dewey (1938) stated, "education as growth or maturity should be an ever-present process" (p. 50).

Kohlberg and Mayer (1972) also seemed to agree with what Westby and Robinson (2014) explained in that they also posited hierarchical stages that have measurable skills, although skills are not prerequisite to moving up to the next stage. According to Kohlberg and Mayer (1972), attaining the next higher cognitive developmental stage is the goal of education, and this attainment presupposes mastery of the previous stage without necessarily mastering every skill measured in the previous stage.

The theory of mind (ToM) espoused by Westby and Robinson (2014) in their editorial introduction to the journal *Topics in Language Disorders* included multidimensionality by comprising cognitive and affective as well as interpersonal and intrapersonal constructs. Because ToM, or the ability to attribute states of mind to oneself and others, is critical to communication, deficits in theory of mind have been studied in developmental psychology as well as speech pathology (Westby & Robinson, 2014). As Stanzione and Schick (2014) asserted in their review, "ToM is a foundational skill related to understanding the thoughts, beliefs, and desires of oneself and others" (p. 296). Their work with deaf and hard-of hearing children who experience deficits in theory of mind development shed light on how children develop communication skills and cognitive structures. Primary ToM involves feeling what someone else is feeling or being able to put one's self in another's shoes. Second-order ToM, which normally emerges by age seven, involves "thinking about what someone is thinking or feeling about what someone else is thinking or feeling" (Stanzione and Schick, 2014, p. 365). Higher order cognitive and affective (feeling) ToM which typically develop between ages eight and 12 are things like being able to recognize "lies, sarcasm, figurative language, idioms," or understanding multiple levels of cognitive functions within a group such as the scenario, "he thinks that she hopes that they believe she loves the gift" (Stanzione & Schick, 2014, p. 365).

Haberkorn, Lock, Pohl, Ebert, and Weinert (2014) found that metacognitive awareness is faint in younger children but grows as they mature. Metacognition in early childhood education, as measured by their longitudinal study design, "administered to 870 children at the end of first grade and again one year later" (Haberkorn et al., 2014, p. 239) from two German schools took the form of strategies rather than thinking about thinking. Haberkorn et al. (2014) designed a group assessment for their study utilizing instruments that did not include open-ended or

declarative responses in order to account for and equalize verbal and personality differences (introvert/extrovert) among young children. The researchers did recognize the parallel connection between cognitive development and intelligence "throughout the school years" (Haberkorn et al., 2014, p. 243). While the ability to think about learning and remembering items grew throughout early elementary years, only those students "at the end of elementary" or older demonstrated the ability to know about organizational strategies or "paired relational associations strategies" (Haberkorn et al., 2014, p. 244). In the study, Haberkorn et al. (2014) assessed 870 first grade children (53.5 % girls) and 720 second grade children (52.4 % girls) with 664 participating "in the test session in the first as well as in the second grade;" the children "were about 7 and a half years old" with a median age of 89.1 months and a standard deviation of 4.6 months for the first assessment and "8 and a half years old" with a median age of 99.4 months and standard deviation of 4.4 months at the second assessment (p. 245). The researchers reported that all parents had signed consent for participation and that the children attended "schools in the two federal states Bavaria and Hesse" (Haberkorn et al., 2014, p. 245). For the assessments, students were asked to perform metacognitive tasks ("which of the options presented" did they think "would be the best for performing a particular task") for a duration of 15 minutes, with instructions given pictorially as well as orally (Haberkorn et al., 2014, p. 246). Only two strategies for thinking were compared, according to Haberkorn et al. (2014), "instead of ranking several options so as not to overburden the young children's memory capacity" (p. 246). Test items were randomized, administered to groups of 10 students at a time, and were divided in to three categories, "everyday mental activities (Items 1, 2, 4, 6, 11)," such as how to remember to bring a desired item to an activity the next day, "items referring to semantic categorization strategies (Items 7, 9, 10, 12, 13)," such as grouping objects into categories for

easier memory retrieval, and "items testing school related metacognitive knowledge (Items 3, 5, 8, 14, 15)," such as study time/test comprehension/rehearsal of information (Haberkorn et al., 2014, p. 247). Students also were tested on general knowledge and verbal skills to verify a standard distribution of respondents. Results included that students scored significantly higher in second grade than in first grade on cognitive, metacognitive, and language abilities with the everyday thinking items returning the highest correct responses overall (Haberkorn et al., 2014). Test items exhibited "a considerable variation in the probability of solving the items" (Haberkorn et al., 2014, p. 250) with the second grade test items increasing in difficulty when compared to the first grade medium difficulty range. The researchers discussed findings about how metacognitive knowledge in students related to cognitive and language skills, which were included in the overall assessments in order to control for "general cognitive nonverbal abilities" (Haberkorn et al., 2014, p. 251). Haberkorn et al. (2014) found "significant association between linguistic competencies and metacognitive knowledge," (p. 251) an expected slight association between metacognitive knowledge and cognition (researchers noted that they intended for the tests not to assess cognitive abilities in particular), and most importantly that the test items were able to measure "metamnemonic knowledge," a "construct that is empirically well distinguishable from tests assessing language skills" (p. 251). Haberkorn et al. (2014) assessed that the results suggested "that neither language skills nor cognitive abilities strongly confounded the measure of metacognitive knowledge" (p. 255). In other findings, Haberkorn et al. (2014) posited that "knowledge about a certain strategy is more consistent within the children" in the study "than knowledge about a certain mental process like knowledge about factors influencing remembering" (p. 255). Furthermore, Haberkorn et al. (2014) held that "children's metacognitive knowledge comprises distinct components," and is "multidimensional" with weak inter-relations

in young children (p. 255). Calls for more research in the direction of testing "metacognitive monitoring and control processes," (Haberkorn et al., 2014, p. 257) both being noted as influencing students' academic success, concluded the discussion of findings from the study.

Anderson, Ellis, and Jones (2014) collected drawings, conducted interviews with, and observed "182 students in grades K and 1 in rural southeastern United States" (p. 375), finding that young children held simplistic conceptual understandings about plants and plant life. Anderson et al. (2014) found that young children in kindergarten and first grade had already begun to ask questions and explore the world around them long before entering formal scholastic activities. At this level of cognitive development, young children's perceptions and explanations of the world often do not reflect scientific explanations (Anderson et al., 2014, p. 376). The researchers used both quantitative and qualitative measures to examine first-grade student's concepts of plant life through the use of drawings (Anderson et al., 2014). Findings included that young children perceive the world simplistically and concretely with direct connections to their experiences and sensory information (for example, students explained how plants needed food just as they themselves needed to eat food to survive); they most often identified plants as entities that flower, often did not include air, sunlight or root structures in their drawings but spoke about these things as necessary for plant life in the interviews; and they tended to classify anything people eat as either plant or animal—leaving out fungi or plant byproducts, such as peanut butter (Anderson et al., 2014). More complex understandings of the components of air (carbon monoxide, oxygen, etc.), water, and sunlight were not found among respondents in this study. Anderson et al., (2014) attributed this lack of complex analysis by the students studied to the fact that the state standards did not require these complex concepts to be taught at this early age. A researcher armed with a maturational point of view of child development as espoused by

Piaget (1976), Bagley (1911a), Gregory (1884), Turner (2011), and Gaillard, Barrouillet, Jarrold,

and Camos (2011) would attribute such lack of higher order thinking skills to younger children

operating at a lower stage of cognitive development.

Turner (2011) reviewed strategies to engage at risk elementary and middle school

students and stated that "young children show positive biases to learn types of information

readily and early in life," and "center on broadly defined categories, notably physical and

biological concepts, causality, number, and language" (p. 125). Outside of these domains, Turner

(2011) stated all learners, including young children, depend upon their will and effort in order to

enhance learning (p. 125). Turner (2011) also seemed to echo Bagley (1911a) and Gregory

(1884) and stated that in order to:

> Develop competence in an area of inquiry, students must (a) have a deep foundation of
>
> factual knowledge, (b) understand facts and ideas in the context of a conceptual
>
> framework, and (c) organize knowledge in ways that facilitate retrieval and application.
>
> (p. 125)

Valanides, Papageorgiou, and Angeli (2014) found that younger and "lower ability"

elementary school students "had difficulties with effectively organizing collected data and failed

to coordinate hypotheses with evidence" in their investigation of elementary school children's

"ability to conduct a scientific experiment" (p. 26). Valanides et al. (2014) stated that 10

elementary schools in Cyprus were randomly selected, and a fourth-grade and sixth grade class

was randomly selected from each of these 10 schools. From these randomly selected classes,

nearly 500 elementary school students were tested on their ability to control variables as well as

logical reasoning and placed into groups of higher or lower relative ability before being asked to

"investigate the functioning of a device," "think aloud prior and after any experiment with the

device," and "keep a record of their experimental results" during a 60-minute experimental experience (Valanides et al., 2014, p. 26). The 80-student sample for study was randomly selected from the 250 sixth graders and 248 fourth graders with an equal number of high- and low-performing students from each grade level selected (Valanides et al., 2014). Valanides et al. (2014) stated that children, as opposed to adult students, tend to function based on simplistic models and concrete observations. When involved in self-directed inquiry, children's "performance is characterized by a tendency to generate uninformative experiments and make judgments based on inconclusive or insufficient evidence" (Valanides et al., 2014). According to Valaides et al. (2014), "Research in real classroom settings showed that most sixth-grade students were able to design lucid experiments when given only one independent and one dependent variable," (p. 27) but had difficulties with higher levels of conceptualization such as continuous data or evaluations of complex data. Results of the experiment with Valanides et al.'s (2014) box switches and light bulb combinations showed that the older students had developed more of an investigative ability. According to Valanides et al. (2014), "In order to investigate whether the existing differences were statistically significant, a 2 (ability) x 2 (grade level) ANOVA was performed," (p. 32) returning results that indicated there was a "significant interaction effect between grade level and ability" (p. 32) with the difference between fourth and sixth graders being more pronounced in high-ability students moving to smaller or insignificant for low-ability students. While some of the students were able to determine how the experimental box of lights and switches operated through experimentation, "they failed to test the right combinations of switches, and they were not able to determine the total number of experiments that needed to be carried out in order to solve the problem" (Valanides et al., 2014, p. 32). While more sixth graders and high-performing students were able to solve the issues of

how the experimental device functioned, "the majority of the students not only failed to adequately control variables, but they also failed to a certain extent, to show mature combinatorial reasoning abilities" (Valanides et al., 2014, p. 33). The researchers also pointed to the gap "between high- and low-ability students" as increasing "as students become older" which seems "to indicate that the existing educational system is tailored only to the needs of students who are at a higher stage of their cognitive development" (Valanides et al., 2014, p. 35). Further recommendations included investigating primary school students' curricula and possible "inappropriate strategies for teaching science," to rectify "poor reasoning abilities" (Valanides et al., 2014, p. 35).

Bandini, Santos, and das Graças de Souza (2013) stated that phonological awareness "means that the individual can abstract sound units with different extensions and recognize them in new words and even produce new words" and that these skills are "a prerequisite for learning to read and write" (pp. 329-330). "Phonological working memory" which also is critical, involves temporarily storing "unfamiliar sounds or the sound structures of new words" until new words and sounds are added to the vocabulary (Bandini et al., 2013, p. 330). Bandini et al. (2013) described phonological working memory as having four components: "the phonological loop, the visuospatial sketchpad, the central executive and the episodic buffer" (p. 330). The "phonological loop is responsible for processing verbal material," the "visuospatial sketchpad" is similarly responsible for the "processing of visuospatial material," the central executive coordinates all activities in real time with long-term memory, and the episodic buffer integrates representations of the other elements into long-term memory (Bandini et al., 2013, p. 330). The researchers sought to investigate the roles of phonological awareness and phonological working memory, known to be important in the development of oral language, in the context of

interrelationships among respective components found in the abilities of first year students (Bandini et al., 2013). The student sample included "students of the first year of elementary education of a public school" in Brazil, comprised of "254 children (127 boys and 127 girls)," with ages ranging from "5 years and 10 months" to "6 years and 11 months," with a median age of 6 years and 2 months and a standard deviation of 3 months (Bandini et al., 2013, p. 331). Test students were evaluated individually by researchers with several instruments to "determine the ability of children to manipulate the sounds of the speech," as well as to evaluate the phonological working memory components and abilities (Bandini et al., 2013, p. 331). Results from the non-normal distribution of scores (Kolmogorov-Smirnov, $p < .01$ so a "nonparametric bivariate correlation test was used") included "a greater development of the syllabic abilities than the phonemic abilities" in these young children (Bandini et al., 2013, pp. 331-332). Possible explanations offered by the researchers included that "syllables are the more audible and easily perceived units of the speech, therefore, they are simpler to distinguish" (Bandini, et al., 2013, p. 332). In light of the lowest scores occurring in transposing and otherwise manipulating phonemes, researchers posited that "phonological awareness is acquired in an interdependent relationship with reading and writing" (Bandini et al., 2013, p. 332) and thus possibly more difficult for beginning readers. Bandini et al. (2013) also noted that their results show "there are distinct levels of development of specific phonological awareness abilities" and that "phonological awareness, phonological working memory and language abilities seem to be mutually related" (pp. 333, 335).

Yuksel (2014) examined progress under Turkey's 2013 twin initiative to combat low international performance in mathematics by Turkish students—the two strategies introduced were "mental arithmetic courses in preschool and in the first years of primary school" and math

implementation courses "based on real-life activities" offered beginning in fifth grade (p. 1446).

Students with a higher prior knowledge of math facts performed better overall in both attitude

and aptitude during Yuksel's (2014) testing. In the study, lessons were designed using the

Realistic Mathematics Education Approach (RME) where students "are expected to understand

processes, rather than learning algorithms" (Yuksel, 2014, p. 1447) while solving real world

problems in their real life context. The researcher espoused a constructivist approach for his

theoretical framework (Yuksel, 2014). Yuksel (2014) stated that in assessing scholastic

achievement, "western contexts place emphasis on ability (cognitive factors)," (p. 1447) while

eastern traditions highlight affective factors. Cognitive factors predictive of academic

achievement such as "prior knowledge, self-regulation, attention, working memory, reading

ability" (Yuksel, 2014, p. 1447) had rarely been studied in Turkey. Yuksel (2014) stated that

"prior knowledge in mathematics is a predictor of mathematics performance" (Yuksel, 2014, p.

1448) and critical to learning new concepts. Metacognition, as a self-monitoring skill, is highly

predictive of students' academic success in mathematics (Yuksel, 2014). Self-regulation, also a

cognitive process, is defined by Yuksel (2014) as when "students somehow use specific

processes such as goal setting, strategic planning, self-monitoring, and controlling to improve

their performance" (p. 1448). Until the initiative, Turkish schools relied on rote memorization,

"dependent on memorized procedures to solve problems and follow model procedures given in

the textbook or by the teacher" (Yuksel, 2014, p. 1450) with no activities-based application or

synthesis instructional methods taught. In Yuksel's (2014) study, 41 public elementary school

children of mixed gender and mixed ability who were "mostly aged 10-12" (p. 1451) participated

with parental consent; 21 in the treatment group based on a convenience sample who enrolled in

an elective mathematics course in addition to the traditional course and 20 in the control group

who only participated in the mandatory traditional mathematics class. The study's design was pre-test/post-test and a post hoc power analysis "based on the parameters in the ANCOVA test (sample size, df, number of groups and covariates, effect size, and α err)," (Yuksel, 2014, p. 1451) returned a 0.99 power level indicating appropriate sample size. Yuksel's (2014) study also examined reading levels and attitude toward mathematics. Yuksel (2014) further divided the experimental group into reading levels of low 27%, high 27%, and medium 46% in order to test reading level as well as prior mathematics knowledge (Yuksel, 2014). Yuksel's (2014) instrument to measure cognitive skills was the Fifth Grade Mathematic Achievement Test diagnostic, "developed based on the objectives of the fifth grade national mathematics curriculum," (p. 1451) while the affective measure was the Attitude toward Mathematics Scale and the Self-Regulation Skills Scale with the normal rubric style reading comprehension test being administered to determine reading levels in Turkish. Cronbach's alpha was used to test internal consistency of each instrument. The two groups each had seven hours of mathematics instruction with the experimental or treatment group receiving two hours of the seven in an activities-based content with a collaborative problem-solving framework. Both groups had identical "content and objectives of the fifth grade compulsory mathematics course" that was "based on the fifth grade national mathematics curriculum" (Yuksel, 2014, p. 1453). Both experimental and control groups were given pre and post-tests after the 12 weeks of instruction; the experimental group also was given the "5MAT (as a retention test), and the SRS and RC tests" three weeks later to assess "learning across levels of prior knowledge and reading ability" (Yuksel, 2014, p. 1454). Results utilizing Pearson's correlation and multiple regression analysis showed that "students' posttest scores on 5MAT were significantly and positively related to their prior knowledge of mathematics, self-regulation skills, and reading ability" (Yuksel, 2014, p.

1456), indicating that these areas can be predictive of higher achievement in mathematics. Students' prior attitudes about mathematics were not "significantly associated to their posttest scores" (Yuksel, 2014, p. 1456). In the univariate Analysis of Covariance or ANCOVA, "the difference between the pretest and posttest mean refers to academic achievement, and the difference between the posttest mean and retention test mean refers to retention" (Yuksel, 2014, p. 1457) on the 5MAT test scores. While students who started the process with the least mathematics prior knowledge showed the most increases in test scores, "students with more prior knowledge on mathematics performed better than the other students did in posttest and retention" (Yuksel, 2014, p. 1459) exams, and all students in the treatment group showed significant gains. Yuksel's (2014) analysis of results included that "there was a significant difference in mathematics gains in favor of groups with a high prior knowledge, and high reading ability" (p. 1460).

Findings by Purnomo, Kowiyah, Alyani, and Assiti (2014) supported a developmental view of number sense. Study participants were "80 sixth-graders (12-13 year-old) from three different schools that represent the city, rural, and small town areas" (Purnomo et al., 2014, p. 74) in Indonesia. In the study, less than half of students tested showed strength on "understanding the meaning and concept of numbers" or "applying knowledge and number sense" (Purnomo et al., 2014, p. 74) while showing strength in computations from memorized algorithms. Students for the study were chosen at random and included "46 students from the city school, 21 students from the rural school, and 13 students from the small town school" (Purnomo et al., 2014, p. 75). Cronbach's alpha was used to evaluate test reliability and each question was scored as correct on the answer as well as sub-components involving number sense (Purnomo et al., 2014). Results showed "students' performance in computation was better than

their understanding about the concept of numbers" (Purnomo et al., 2014, p. 77) and especially in conceptualizing density or proportions among factions and decimals – a more abstract conception. Additionally, when given the chance to solve a problem by applying relationships among numbers, students overwhelmingly (nearly 70%) chose to stick to "strict computation rules" (Purnomo et al., 2014, p. 80) which had proved correct on simpler problems. According to Purnomo et al. (2014), "students' understanding was very related to the procedural understanding" rather than conceptual, according to (p. 82).

The researchers concluded math applications and higher order problem solving concepts should be taught in elementary as nearly two thirds of the subjects in the study has attained mastery of rules-based computations (Purnomo et al., 2014). Developmental theorists would agree; Trivium-based practitioners would add that abstract concepts should be taught at about sixth grade at the onset of logic phase and only after mastery of foundational computations (Spencer, 1996).

Lee and Chen (2014) found in a Taiwanese study that prior knowledge improved eighth grade students' performance overall in geometry, even though the experiment was designed to test virtual manipulatives with prior knowledge as a secondary variable. In the study, Lee and Chen (2014) used a "quasi-experimental design of pre-test and post-tests with nonequivalent groups" (p. 179) comprised of randomly assigned students from "four classes in the 8th grade" (p. 179) into two groups. The learning objectives encompassed certain areas of plane geometry, namely "sum of interior angles in polygons, the sum of exterior angles in polygons, and the properties of parallel lines" (Lee & Chen, 2014, p. 179). One group was taught using virtual manipulatives and the other used physical manipulatives. Lee and Chen (2014) used a "two-way factorial analysis of covariance" (p. 179) to compare student scores from those using the two

different types of manipulatives, virtual or physical, as well as either higher or lower prior knowledge. Lee and Chen (2014) used the van Hiele model of instruction for all participants utilizing "five levels of geometric understanding" consisting of "visualization, analysis, informal deduction, formal deduction, and rigor" (p. 182). Lee and Chen (2014) used geometry in the experiment because it "is an important part of mathematics curriculum" which has a "strong focus on the development of careful reasoning and proof," and "helps students gain basic skills such as analysis, comparison, and generalization" (p. 180). According to Lee and Chen (2014), uses of physical manipulatives are well established in the practice of geometry instruction for their ability to aid students in linking abstract concepts to physical reality, understanding procedures, and solving problems. The use of virtual manipulatives is fairy new and untested, and Lee and Chen (2014) designed an experiment to test the "interaction between manipulatives and prior knowledge on students' learning performance" (p. 180). According to Lee and Chen (2014), many junior high school students have not yet reached Piaget's formal operations stage, where symbols are used for reasoning and justification. According to Lee and Chen (2014), "physical manipulatives are representations of conceptual actions which can be explicitly manipulated" (p. 184) while "iconic representation refers to experience learned during observation and the mental manipulation of objects" (p. 184) and "symbolic representation deals with the experience of learning by thinking" (p. 184) even when the symbols used are dissimilar to the concrete object or experience they represent. Manipulatives such as 100s blocks, counting bears, or two dimensional planes on a sheet of paper are often used to teach abstract mathematic concepts. Lee and Chen (2014) stated, "Unlike mental images of physical objects, symbols are abstractions of the characteristics of physical objects or mental images" (p. 184). Lee and Chen (2014) posited that the advantages of virtual manipulatives, such as the learner's ability to

change color and number, view symbolic representations and manipulatives simultaneously on screen, and the unlimited nature of virtual representations, could enhance the already difficult leap from concrete to abstract thought among eighth graders and so compared their use to that of physical manipulatives. Evidence already exists for equal benefits of virtual and physical manipulatives when used with younger children (Lee & Chen, 2014). Lee and Chen (2014) made sure the lessons were taught during the regular course of study and utilized a *t*-test to make sure each of the randomly-assigned groups from the convenience sample of volunteers showed no statistical difference in pretest intelligence and achievement scores. In the quasi-experimental design, Lee and Chen (2014) used a "pretest (learning achievement test and intelligence test)," "posttest (learning achievement test and mathematics attitudes test)," and "delayed posttest (learning achievement test)" (p. 186) that was "conducted 5 weeks after finishing the posttest" (p. 187) on the two groups. Scores on the pretest of learning achievement—test questions developed by researchers and tested for reliability with Cronbach's alpha—were used to divide students in to the groups labeled higher or lower prior knowledge and "virtual and physical manipulatives were based on identical teaching materials" (Lee & Chen, 2014, p. 186). Assumptions for the analysis of covariance were checked and returned non-significant results in both the test for "homogeneity of regression coefficients of the covariate for different types of manipulatives" (Lee & Chen, 2014, p. 191) and the test for "homogeneity of regression coefficients of the covariate for different levels of prior knowledge" (Lee & Chen, 2014, p. 191) and so researchers conducted the two-way analysis of covariance.

Results "demonstrated that students with high prior knowledge" (Lee & Chen, 2014, p. 179) using virtual manipulatives "had better posttest performance than did the physical manipulatives group, and reported taking greater enjoyment in mathematics," they "presented

stronger motivation to study mathematics," and also "perceived the importance of mathematics more strongly than those with low prior knowledge" (Lee & Chen, 2014, p. 179). Lee and Chen (2014) also noted that "among students with low prior knowledge, no significant difference was observed" in perceiving the importance of studying mathematics (p. 198). The researchers posited that "students with high prior knowledge regard virtual manipulatives as the application of mathematics knowledge," (Lee & Chen, 2014, p. 198) while students without a strong base of mathematic knowledge coming into the class "continue to struggle with the basic concepts" (Lee & Chen, 2014, p. 198). Regardless of the virtual or physical manipulatives used, the students with a strong basic knowledge base outperformed those with weaker prior knowledge on all of Lee and Chen's (2014) measures. Lee and Chen (2014) stated, "Prior knowledge has been identified as a key component to consider when evaluating the effects of learning" (p. 181). While Lee and Chen (2014) suggested more social learning type group activities and re-teaching of concrete concepts to bring up the level of low prior knowledge students to improve performance on learning more abstract concepts, Essentialist thought argues toward mastery of basic knowledge prior to learning the complementary abstract concept. As Bagley (1911b) put it, to add the principle to the facts that explain it.

Research on elementary school students' learning about plants corroborates findings by Lee and Chen (2014) in that regardless of the materials (leafs, plants, or pictorial representations on tablets or in print), "high prior knowledge students needed less time to learn and achieved higher performance on both tests than low prior knowledge students" (Liu, Lin, & Paas, 2014, p. 334). Students without a mastery of basic knowledge relating to plants suffered from what Liu et al. (2014) called the redundancy effect, in that they expended mental energy and time comparing three-dimensional plants with two dimensional representations and assimilating essential and

non-essential information alike without being able to discriminate between them. Students with a higher prior knowledge were able to comprehend the pictures and tablet representations as complementary and assimilated only the added information presented by each source. In each of the two experiments, students were tested on prior knowledge and labeled as higher or lower scoring then randomly assigned to one of two groups; none of the students from experiment one participated in experiment two. In experiment one, 78 fifth-grade students consisting of 43 boys and 35 girls from a primary school in Taiwan with a mean age of about 11 participated in groups that either studied text with a photo or text with a photo and a real plant (Liu et al., 2014). Liu et al. (2014) stated, "all participants had been taught the essential concepts about leaf morphology of plants by the same teacher 18 months before the start of the experiment" (p. 330). A 10-question multiple choice test was administered one week prior to the experiment and those earning the cut off score of six (each question was worth one point) were not included in the experiment; the remaining 30 participants who scored less than six were designated as the low prior knowledge group, and out of the 36 participants scoring higher than six, 30 were selected at random to be in the higher prior knowledge group (Liu et al., 2014). When the low and high prior knowledge scoring participants were "randomly assigned to the two conditions with different compositions of multiple representations," the result was "15 participants in each of the four experimental conditions" (Liu et al., 2014, p. 330). After identical lessons using the different representations, students took a comprehension test consisting of two tasks, drawing and assembling: "the drawing task consisted of 8 items," (Liu et al., 2014, p. 332) where students were asked to "draw the four types of venation and four types of margins," (Liu et al., 2014, p. 332) while the assembling task consisting of "placing the correct artificial leaves on five artificial stems" (Liu et al., 2014, p. 332). Students then were required to apply what they had learned by

taking a 12 multiple-choice question test identifying "the features of the leaves of six plants that differed from the plants used in the learning phase" (Liu et al., 2014, p. 332). In the second experiment, Liu et al. (2014) replaced the tablet pictures with hand-drawn schematic representations of the plants in hopes that they would be more intelligible to lower prior knowledge students and be assimilated as complementary instead of competing or additional information. Identical procedures were performed with the exception of the visual representation changes mentioned, and 81 fifth-grade students with a mean age of about 11 years old consisting of 45 boys and 36 girls took the prior knowledge exam in order to participate. Fourteen participants who earned six points were not included in the experiment while 32 of the 35 students who scored higher than six points were randomly selected to be labeled as the higher prior knowledge group and 32 students who scored lower than six points were selected as the lower prior knowledge group. When randomly selected for each of the four conditions, each group consisted of 16 participants (Liu et al., 2014). As in the first experiment, Liu et al. (2014) found that "participants with high prior knowledge performed significantly better than participants with low prior knowledge" (pp. 335-336), although both showed increased scores using the schematic drawings as opposed to the pictures on the tablet to complement the texts provided for learning. Liu et al. (2014) called for more studies to investigate why their findings did not agree with anecdotal calls for authentic objects such as real plants to be used in student observations; prior knowledge seemed to be the stronger influence in student performance. According to Liu et al. (2014), "Previous research makes clear that the different cognitive schemas that novices and more advanced learners possess affect the way in which they deal with learning materials" (p. 337).

Roelle, Lehmkuhl, Beyer, and Berthold (2014) wondered if "specific relevance instructions" (p. 2) that have been designed for novices "and thus mainly require them to focus and elaborate on basic concepts or relations in a domain, their effectiveness might decrease and even start to reverse as prior knowledge increases" (p. 2). Roelle et al. (2014) considered that as increased prior knowledge started to guide learning activities, specific instructions that focus attention would lose efficacy in favor of more general instructions such as "study the following explanations to acquire deep understanding of their contents" (p. 1).

In the first experiment, Roelle et al. (2014) utilized 49 female and 31 male eighth-grade students from a German secondary school who fell between the ages of 12 and 15 and had a median age of 13.80 with a standard deviation of 0.51 and whose parents "gave consent for their participation" (p. 5). Participants were assigned randomly to one condition of a 2 x 2 factorial between-subjects design; factors were the "type of relevance instructions (general vs. specific)" and "type of instructional explanations (complete vs. reduced)" (Roelle et al., 2014, p. 5). A computer-based learning environment presented all instructions as well as explanations of "six basic concepts and principles relating to" (Roelle et al., 2014, p. 5) atomic structure. All participants were given general study instructions to process written materials and graphics presented to them and that they would be tested. Researchers prepared two different versions of each instructional explanation: "a complete version" which included "basic information about concepts or principles related to the topic atomic structure and included an inference" (Roelle et al., 2014, p. 5) and a reduced version which included the same basic information but did not include the inference. Participants in the specific relevance instructions group also received focused prompts consisting of "questions that required learners to (re)produce the inferences that were included in the complete explanations and withheld in the reduced explanations" (Roelle et

al., 2014, p. 5). Since learners could either receive complete explanations or reduced that either

contained the inferences referenced or not, those in the complete explanations group could

simply "repeat the argumentation included in the explanations" (Roelle et al., 2014, p. 6) while

for those who received the reduced explanations "the focused processing prompts were designed

to elicit generative learning activities rather than repetitions" (Roelle et al., 2014, p. 6). A pretest

was administered to assess prior knowledge of atomic concepts i.e., "learners were asked to

explain how the mass number, the number of neutrons, and the number of protons of an atom

relate to each other" (Roelle et al., 2014, p. 6). After the participants processed all the prompts, a

posttest consisting of all four of the questions on the pretest plus six additional open-ended

questions "was administered to assess the learners' conceptual knowledge regarding the topic of

atomic structure" (Roelle et al., 2014, p. 8). Researchers noted that they "obtained a high level of

internal consistency of the posttest" utilizing Cronbach's alpha =.83, "which indicates that the

items on the pretest (which were included in the posttest) and the posttest measured the same

construct" (Roelle et al., 2014, p. 8). Researchers stated that they used a Bonferroni-corrected

alpha of .017 "due to multiple comparisons on the same dependent variable (i.e., extraneous

cognitive load and posttest scores)" (Roelle et al., 2014, p. 8). In measuring the learners' prior

conceptual knowledge, "an ANOVA revealed no significant differences between the four

experimental groups" (Roelle et al., 2014, p. 9) making them comparable, and further analysis

showed that all participants had low degrees of prior knowledge at the start of the experiment.

Results showed that while complete or reduced explanations had little effect on learners' posttest

scores, "learners who received focused processing prompts acquired more conceptual

knowledge" (Roelle et al., 2014, p. 9) than those who did not. Furthermore, "focused processing

prompts led to higher scores on the conceptual knowledge test when they were combined with

reduced explanations compared to complete explanations" (Roelle et al., 2014, p. 11). Roelle et al. (2014) posited that the "focused processing prompts were less ambiguous, thus resulting in the learners detecting relevant information more easily," (p. 12) and that "learners who received specific relevance instructions might have had more working memory capacity left to effectively execute the attending processes" (p. 12) rather than searching prior knowledge for relevance. Roelle et al. (2014) also suggested that the generative questioning required by the focused prompts was more beneficial to memory retrieval in the study's eighth-graders than was merely repeating content word-for-word. Since generating inferences and sorting information by relevance is a higher order thinking function, Roelle et al.'s (2014) findings agreed with Spencer's (2010) developmental outline of the logic stage of the Trivium.

In the follow-up experiment. Roelle et al. (2014) utilized 46 female and 31 male students from different classes at the German secondary school whose ages fell within 14 and 18 years of age with a median age of 14.87, a standard deviation of 1.75, and with each parent giving consent for their participation. Experimental design was identical to the first experiment except that in the second round some students had some prior knowledge of the concepts taught in the computer learning environment according to their chemistry teachers (Roelle et al., 2014). Similar results were recorded, in that "learners who received focused processing prompts attended to the prompted inferences more than learners who received complete explanations and general purpose instructions" (Roelle et al., 2014, p. 13). Significantly, Roelle et al. (2014) also found that "providing reduced explanations and focused processing prompts lost its superiority" (p. 15) when encountering students with a higher level of prior knowledge and "even became detrimental for learners who already had basic prior knowledge" (p. 15). This would seem to indicate that once a basic foundation of knowledge is acquired, inferences can be made by a

learner without focused prompts. Thus, students who have a higher prior knowledge level can then focus on repeating the content that was not prompted and so make better use of mental capacity, time, and energy (Roelle et al., 2014).

Closely related to studies of prior knowledge and learning is the study by Kim and Rehder (2011) on selective attention and prior knowledge. According to Kim and Rehder (2011), "little is understood about how knowledge affects attention," (p. 650) but investigating this gap in understanding is important "because any theory of how knowledge influences learning is incomplete without an account of how it alters what category information is attended and thus processed" (p. 650). Since almost nothing is known about the interaction of prior knowledge and attending, the researchers chose eye tracking as a "relatively direct measure of selective attention during knowledge-based category learning" (Kim & Rehder, 2011, p. 650). Researchers Kim and Rehder (2011) decided on three main questions of inquiry, the first of which was: Does knowledge induce any change to what is attended; i.e., to direct toward one at the expense of another? Kim and Rehder (2011) pointed to research showing connections between "encoding and inferential processes but not selective attention" (p. 650) on knowledge and category learning. Another question would be that if attention and prior knowledge are correlated in some way, does prior knowledge serve to preselect attention or offer categories for initial hypotheses for mental investigation? Kim and Rehder (2011) stated, "because prior knowledge consists of representations in semantic memory…people may need to observe multiple category exemplars in order for a common theme to become sufficiently active in memory" (p. 650). A third question concerns how error regulation may change or divert attention or adjust which prior knowledge is accessed. Kim and Rehder (2011) stated, "Assuming that attention shifts as a result of observing category members, a third question concerns whether error feedback is required to mediate those

shifts" (p. 650). The researchers used cartoon-created ant drawings with two distinct pretend ants and added four related features which were "associated with a theme" through a narrative "describing them as useful in either a cold or a hot climate" and with "two neutral features" which were "unrelated to these themes" (Kim & Rehder, 2011, p. 651). Study participants were 30 undergraduate university students from New York University "who volunteered for course credit" and were randomly assigned to related and unrelated conditions, respectively (Kim & Rehder, 2011, p. 653). The three phase experiment covered a knowledge acquisition stage, a category learning stage, and a single-feature test; after this "participants were required to take a multiple-choice test followed by a (verbal) recall test" (Kim & Rehder, 2011, p. 653). If any questions were missed, the participants repeated the knowledge acquisition sections until all items were answered correctly. Participants then were asked to categorize each feature, randomly presented, as belonging to one of the two pretend cartoon ants they had learned about named Dax or Kez and received a training practice with corrective feedback prior to the "single feature test" where no corrective feedback was given after each choice (Kim & Rehder, 2011, p. 653). Kim and Rehder (2011) found that "the neutral dimensions were learned no worse in the related condition as compared to the neutral condition" (p. 654) which was "consistent with previous studies showing that prior knowledge helps learning" (p. 654) without interfering with learning of unrelated information. In the learning block, Kim and Rehder (2011) found that "learning occurred in fewer blocks with fewer total errors in the related than in the unrelated" (p. 654) conditions and the "single-feature tests showed better learning of the related dimensions than the neutral ones" (p. 654). Kim and Rehder (2011) concluded that "together, these results confirm that the knowledge effect is obtained even when the prior knowledge is acquired during an experimental session" (p. 654). The second experiment replicated the first, but added the eye

tracker and used "24 New York University undergraduates who volunteered for $10" (Kim &

Rehder, 2011, pp. 654-655) and were randomly assigned to groups. Using the eye tracking

device, researchers were able to record the number of areas observed by each participant on each

presentation in a binary format, that is, either observed or not observed, for the six identified

areas of interest. Results were similar to experiment one on learning measures with participants

scoring more accurately on related items than the neutral ones, but eye tracking measures

indicated that "learners initially observed about three of four related dimensions and gradually

increased fixations" (Kim & Rehder, 2011, p. 655) during training but they "initially observed

about 1.5 of the two neutral dimensions and those fixations gradually decreased" (Kim &

Rehder, 2011, p. 655) so that after the training was completed, participants were "more than

twice as likely to fixate the related dimensions than the neutral ones" (Kim & Rehder, 2011, p.

655). Kim and Rehder (2011) conducted a 2×2 within-subjects ANOVA on the fixation

probabilities with dimension types of "related" and "neutral" and sub blocks "first" and "last" as

factors. Results confirmed a "greater chance of fixating the related dimensions" (Kim & Rehder,

2011, p. 656) and that "learners were more likely to fixate the related dimensions than the neutral

ones in all sub blocks" (Kim & Rehder, 2011, p. 656) but only after one completed block. Kim

and Rehder (2011) noted, "Learners' preference for the related dimensions emerged only after

the observation of category members (and the receipt of error feedback)" (p. 656). Additionally,

regressions performed by the researchers returned results showing that greater attention resulted

in greater learning and no attention resulted in no learning, leading them to posit that the better

learning of related versus neutral dimensions was partially but not fully mediated by the extra

attention they received (Kim & Rehder, 2011). Also, Kim and Rehder (2011) noted that "learners

showed no initial tendency to fixate related dimensions" (p. 658) but "gradually shifted attention

to related dimensions" (p. 658) and this shift "continued after the classification problem was solved," (p. 658) or "in the absence of negative feedback" (p. 658). Finally, although eye fixations during training were a significant predictor of feature learning at test, they did not fully mediate the better learning of the related dimensions according to Kim and Rehder (2011).

Results as discussed by Kim and Rehder (2011) included that eye fixations "showed that prior knowledge indeed affects what category information is attended," (p. 658) as indicated by learners "allocating more attention to related dimensions than neutral ones" (p. 658). This finding was noted as the "first direct confirmation" that "knowledge directs attention to knowledge-relevant information" (Kim & Rehder, 2011, p. 658). The researchers discussed possible implications for learning in that "knowledge-induced attention shifts can be both a cause and an effect of learning" while "prior knowledge can direct attention to information needed for learning" and "attention shifts can also reflect learning that has already occurred," (Kim & Rehder, 2011, p. 658) as indicated by participants bypassing less important information in order to answer more quickly. While Kim and Rehder's (2011) study involved adult subjects, the results are significant in that it adds to the body of knowledge about how humans learn, how that learning affects and is affected by executive functions such as attention, and how instructors can help activate prior knowledge by presenting concepts in related as opposed to unrelated categories. Kim and Rehder (2011) also supported results from researchers such as Liu et al. (2014), emphasizing the importance of young students developing a solid base of core or essential knowledge to facilitate new learning as they mature.

In support of a maturational view in human cognitive development, Gaillard, Barrouillet, Jarrold, and Camos (2011) found that not only does working memory and cognitive processing develop with the maturity of children, but so also does the act of remembering, or mental tracing

of forgotten facts. Since "recall performance varies as a function of the cognitive load invoked by the processing component of the task" (Gaillard et al., 2011, p. 471), the adding of digits happened at three different speeds "defining three experimental conditions (fast, medium, and slow pace) in a within-participant design" (Gaillard et al., 2011, p. 471). When accounting for age, the researchers found significant but reduced developmental differences in working memory. The difference "was eliminated when the time available to reactivate memory traces was tailored to the processing speed of each age group" (Gaillard et al., 2011, p. 469). The researchers posited that these results indicated "that children employ active mechanisms for maintenance and restoration of memory traces that develop with age" (Gaillard et al., 2011, p. 469).

Gaillard et al. (2011) found that age-related increases in processing efficiency were one of the main factors in the development of working memory; when processing efficiency was kept constant across ages, "there are still developmental differences" (p. 477). They tested their hypothesis using three experiments which manipulated "processing duration within a working memory task" as well as "the time available to restore memory traces" (p. 469). Gaillard et al. (2011) tested a total of 30 third-graders equally split between boys and girls with a mean age of eight years seven months and a standard deviation of five months, and 31 sixth-graders comprised of 15 girls and 16 boys with a mean age of 11 years eight months and a standard deviation of six months drawn from a primary school in Geneva, Switzerland. The students were all volunteers and parents gave informed consent; none of them participated in the pre-test that set the compensations for age related processing times. The audiotaped pretest involved a separate group of students from a primary school in Dijon, France comprised of 19 third graders with a mean age of eight years and eight months and a standard deviation of three months, as

well as 20 sixth-graders with a mean age of 11 years seven months and a standard deviation of three months. The pretest third grade group had seven girls and 12 boys while the sixth grade group had nine girls and 11 boys. The pretest subjects were asked to discriminate among 40 pairs of letters, half repeating the same letter and the other half showing two different letters. Pretest subjects had to discriminate between same or different by pressing one key or another "as quickly and accurately as possible" (Gaillard et al. 2011, p. 471). Secondly, students had to add "1 to 30 digits successively" (Gaillard et al. 2011, p. 471) which were displayed on-screen and give the answer aloud. Lastly, the subjects were asked to add "2, 3, and 4 to each number, respectively," and "recite the numerical string from 1 to 10, as fast as possible, five times in a row" (Gaillard et al., 2011, p. 471). According to Gaillard et al. (2011), "response times were significantly longer for younger children in each task (p <.001) except for the recitation of the numerical string in which the difference did not reach significance, $t(37) = 1.78$, $p = .08$" (p. 471). Also, the third graders took about the same time to add one to each digit as the sixth-graders added 2, which was utilized to "equate processing times" (Gaillard et al., 2011, p. 4731) for experiment two with the Geneva students. The experimental third graders and sixth graders were asked to mentally maintain a series of letters "while adding numbers to series of digits" (Gaillard et al., 2011, p. 469). In the first experiment, "an addition span task was designed where children needed to maintain series of letters and to add 1 to series of digits successively presented on-screen at a fixed rhythm after each letter" (Gaillard et al., 2011, p. 472) as a baseline measurement for developmental differences in processing. An analysis of variance (ANOVA) was performed on the rate of correct responses looking both at respondent ages and pace (fast, medium, or slow) which did not reveal "any significant effect of age" but it did reveal "a significant effect of pace, with faster paces inducing lower performance" (Gaillard et al. 2011,

p. 472) by two percent each step – "thus, we can reasonably assume that both age groups paid comparable attention to the concurrent processing task" (Gaillard et al. 2011, p. 473). Based on the pretest results, in the second experiment conditions were replicated "except that older children were asked to add 2 to each digit, whereas younger children added 1" (Gaillard et al., 2011, p. 474). Results returned the expected better performance in the older group even though processing times were assumed to have been equalized, but the effect size was smaller than in experiment one, "thus, processing efficiency and the time devoted to processing alone cannot account for all of the age-related differences" (Gaillard et al., 2011, p. 475) in working memory spans. When the researchers allowed younger children more time to refresh memory in ratio to processing speed differences in the third experiment, it made them "perform at the same level as their older peers" (Gaillard et al., 2011, p. 276), leading Gaillard et al. (2011) to posit that "the development of working memory, at least between the two ages studied, depends more strongly on quantitative changes such as the speed and efficiency of reactivation of memory traces" (p. 276) than on qualitative techniques or strategies.

With these developmental and quantitative cognitive differences in mind, reviewers Cervetti and Hiebert (2015) stated that current implementation of the new CCSS (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010) misses the mark in that informational texts are emphasized as a genre starting in kindergarten but it is not recognized that the standards were designed to help students acquire an extensive knowledge base necessary for later organization and synthesis as they mature. According to Cervetti and Hiebert (2015), Building a sound knowledge base in all study disciplines or topics is closely linked with reading and writing skills. Cervetti and Hiebert (2015) stated, "the aim is not simply to teach students to read for the sake of having reading proficiency and remembering

content faithfully, but also reading to acquire and expand upon ideas" (p. 257). Moreover, having

a good knowledge base, including topical and real world knowledge, has been shown to help

students in the third grade and older develop inferential reasoning as well as higher order

thinking skills (Cervetti & Hiebert, 2015). According to Cervetti and Heibert (2015), "the finding

that knowledge supports inference is important to bear in mind in light of perspectives on close

reading" (p. 258) that are included as part of best practices under CCSS (National Governors

Association Center for Best Practices, Council of Chief State School Officers, 2010), suggesting

that readers stay "'within the four corners of the text' rather than relying on background

knowledge" (Cervetti & Hiebert, 2015, p. 258). Textbook writers, added Cervetti and Heibert

(2015), "especially writers of complex texts, assume that their readers will be able to fill in gaps

and make connections" utilizing prior knowledge (p. 258). Acquiring a knowledge base can aid

struggling readers as well as help students understand "complex and ambiguous texts—the kinds

of texts that they increasingly encounter in content area learning" (Cervetti & Heibert, 2015, p.

259). Example groups given by Cervetti and Heibert (2015) to illustrate these benefits of prior

knowledge included fourth grade as well as high school students. According to Cervetti and

Heibert (2015), "this emphasis on comprehension as a process of uncovering meaning in the text

is inconsistent with current understandings about the role of a reader's knowledge" (p. 262) as

well as the context of meaning and being "inconsistent with the representation of comprehension

within the Standards themselves" (p. 262). Implications of this misapplication of the standards

has resulted in classroom confusion and a lack of background knowledge delivery by instructors;

Cervetti and Heibert (2015) gave the example of texts referring to historical cultural settings in

foreign lands that 21st-century students would have no real world knowledge of without

developing such a knowledge base in that particular historical and cultural context prior to the

reading. Cervetti and Heibert (2015) advocated for helping students to develop such a knowledge base, since "knowing how to gain information from texts is the essence of proficient reading" (p. 262). Cervetti and Heibert (2015) pointed out that in reaction to the new emphasis on reading competency brought about by the CCSS (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010) and the No Child Left Behind Act, "the biggest injury to knowledge enhancement would be the further expansion" (p. 263) of language arts reading instruction time "at the expense of content area learning" (p. 263). While learning to decode, pronounce, and use grammar is important, Cervetti and Heibert (2015) stressed that "content instruction can also be a supportive context for literacy development" (p. 263). Just as developing a solid knowledge base aids in reading and literacy, argued Cervetti and Heibert (2015), so too does reading subject area texts to gain content knowledge help develop higher order thinking and organizational skills. According to Cervetti and Heibert (2015), "there is compelling evidence that growth in reading engagement and reading comprehension is accelerated" (p. 263) when students read in order to prepare an argument, develop a concept or investigate a phenomenon. Students need to be able to learn content from reading and not just what is assessed on the state and federal standards. According to Cervetti and Heibert (2015), "With the introduction of the CCSS, we have seen a strong focus on text genre rather than a focus on the knowledge that students are to gain from text" (p. 264). Cervetti and Heibert (2015) also noted an overemphasis on non-fiction or informational texts instead of the CCSS-prescribed thematic units, which can be built with texts drawn both from literature as well as content area knowledge. Cervetti and Heibert (2015) stated, "thematic reading is not the sole domain of informational texts or content areas" (p. 264). Cervetti and Heibert (2015) stressed that "knowledge is the commodity of the digital–global age" (p. 264) and that in order for students to

utilize prior knowledge, they must have built up a foundational base of knowledge through reading a variety of texts and not just texts used as an "an exercise to ensure the designated distributions of informational–narrative texts at different grade bands" (p. 265).

Teaching strategies aligned with developmental and reading level considerations must also be balanced between what is purposeful, practical and an evidence-based practice, according to Smith, Schmidt, Edelen-Smith, and Cook (2013). Researchers Smith et al. (2013) posited that evidence-based practices purporting to increase rigor "frequently represent efficacious practices shown to work under ideal conditions, rather than effective practices that work in typical conditions" (p. 147). In contrast, Smith et al. (2013) stated that evidence garnered from actual classroom experience by practitioners would be more typical and have external validity and relevance as opposed to research-based internal validity and rigor. Smith et al. (2013) saw stress between the conflicting views of rigor and relevance in educational circles but held that each share the same goal and end result—improved educational outcomes for students. While writing to special needs educators primarily, Smith et al. (2013) called for a combination of rigor and relevance for all educators, that is, collaboration between researchers and practitioners to include research-based academic strategies and methods added to practice-based anecdotal evidence gleaned from everyday classrooms. Smith et al. (2013) called for "rigorous educational research" (p. 153) taking place "in complex educational contexts" (p. 153) such as typical classrooms with limited resources (time, money, etc.) in order to arrive at a truer picture of what will work in innovative instructional methods. Smith et al. (2013) called for "mutual recognition and appreciation" (p. 154) as a pre-condition of participation in the collaboration between academics and practitioners—two groups of professionals who may share a common goal but also may have varying experiences and knowledge.

Ritchie, Sala, and McIntosh (2013) found in two elementary school experiments in the United Kingdom of primary school children ages eight to 12 that traditional study techniques including rehearsing facts, note-taking, self-quizzing, and low stakes instructor quizzing produced superior recall of facts over time than visual organizers such as mind-mapping. In the first experiment of 109 student volunteers with parental permission, 59 of whom were female, from primary school grades five and seven pulled from two classes each, from Towerbank Primary School in Edinburgh, had a median age of 10.29 years with a standard deviation of 1.07 years and were randomly assigned to either the retrieval or mapping group (Ritchie et al., 2013, para. 11). According to Gall, Gall, and Borg (2007), random assignment is "the best technique available for assuring initial equivalence between different treatment groups" (p. 397). Children "in the retrieval practice condition" (Ritchie et al., 2013, para.1) group were able to recall "significantly more facts four days later" (Ritchie et al., 2013, para.1). In the second and subsequent experiment, participants were 209 children, 99 of whom were female, ranging in age from eight to 12 years-old with a median age of 10.15 years and a standard deviation of 1.19, from primary grades four, five, six, and seven, utilizing two classes from each grade from Bruntsfield Primary School in Edinburgh (Ritchie et al., 2013, para. 27). Researchers "increased the difficulty of the tasks" (Ritchie et al., 2013, para. 26) in the second experiment by increasing the number of facts to be learned, reducing the learning times, and "extending the interval between the learning and testing phases to one week for a first test, and five weeks for a second" (Ritchie et al., 2013, para. 26) to assess longer term outcomes. Results, according to Ritchie et al. (2013) were that "children in the retrieval practice condition recalled significantly more facts at the one- and five-week tests, albeit with a smaller effect size than for the four-day test

administered in Experiment 1" (para. 42). No effect of the mind mapping technique was found when results were measured. Ritchie et al. (2013) stated,

> The popular technique of mind mapping may be an interesting and enjoyable way for children to visually represent their learning, but teachers should not expect it to boost fact learning-at least of the type studied here-in the short- or long-term. (2013, para. 50)

The results "underline the effectiveness of retrieval practice for fact learning in young children" (Ritchie et al., 2013, para. 1).

Based on the cognitive-developmental theorists and previous research, current researchers should expect to find higher achievement from students in Christian schools recognizing developmental stages and encouraging mastery of measureable skills in order to place students at challenging and developmentally-appropriate levels.

Moral Development

Phillips (2015) credited the blackboard as first used at West Point, with being the symbol of both "mental discipline" as well as "moral and physical deportment" developed by widespread and common education during the beginning of the American nineteenth century. This development of mind and morals shaping citizen scholars was said to be the foundation of the American representative democracy. At this time, morality and academic merit were intertwined and not seen as mutually exclusive; Bagley (1911b) asserted that the love of truth, work, respect for law and order and a spirit of cooperation must come "predominantly from school influences" (p. 44).

Null (2006) called teaching a "moral act" and stated that good teachers must always have "an ideal of excellence in mind as they go about integrating subjects" (p. xxiii-xxiv) and teaching students. Null (2006) also criticized the American functional psychologists of the behaviorist

school of thought, including Dewey, for refusing to discuss the possibility of a soul or mind with free will (p. xxiii). Null (2006) called proponents of this moral tradition of teaching toward an end (good citizenship, loving your neighbor, virtue) which is larger than scientifically measureable outcomes, the school of "democratic traditionalists" (p. xxiv). Null (2006) proposed that these moralists align more closely with the Greek philosophers Plato and Aristotle in that they are concerned with moral decision making and not simply with understanding knowledge. Scientists may deal in abstractions of knowledge and information, according to Null (2006), but teachers wrestle with moral decisions day in and day out. May (2010) agreed, stating that "the ability to engage in excellent contemplative activity is developed, and therefore depends upon certain 'inner resources,' both intellectual and affective, for its realization" (p. xi). Null (2006) called for the return of morality in the teaching of teachers, pointing to the 20th century as the turning of the tide when morality was "discarded" (p. xxviii) by American institutions of higher education.

In a mixed methods study, Yap (2014) explained that "socio-scientific issues" (p. 300), including genetic alterations of human beings, life and death, health care, and reproductive procedures are moral issues. Yap (2014) further described morality by way of "domain theorists" (p. 300) who suggested that "social knowledge and decision making" (p. 300) work across cultures and "reside in one of three universal domains: conventional, personal and moral" (p. 300). Issues falling into the conventional domain are those "best handled with the application of social norms" (Yap, 2014, p. 300). Issues falling into the personal domain are left up to "personal choice and preference" (Yap, 2014, p. 300). Issues relegated to the moral domain are considered as universally recognized "based on conceptions of human welfare, justice and rights" (Yap, 2014, p. 300). Yap (2014) placed socio-scientific issues into the latter category. Decision making

in these situations falls into one of four categories, according to Yap (2014), with religious

beliefs being only an alternate or diminished fourth considered by socio-scientists. The top three

ethical frameworks for decision-making methods listed by Yap were "rights and duties

[deontological], maximum benefits [utilitarian/consequentialism], virtue-based and making

decisions for oneself" (p. 300). Yap (2014) then explained that in order for individuals to

respond to a socio-scientific issues from a care perspective he/she must first construe, "perceive

or interpret" (p. 300), that the issue at hand is a moral one. Construing such a moral issue may or

may not be a conscious decision, according to Yap (2014), and often is unconsciously "informed

by emotions, previous experiences, and habits" (p. 300).

Yap's (2014) quasi-experimental design involved "a comparison group of 32 students

taught by a biological science teacher," (p. 301) and the experimental group of 31 students was

taught by the researcher. All students were considered typical "14 to 15 years of age with quite

similar socio-economic and religious backgrounds" (Yap, 2014, p. 301). Data were collected by

questionnaire and the teachers worked together to ensure that teaching methods were consistent

except for the experimental design.

While Yap's (2014) study involved college students at a Christian campus in Australia,

its implications for education as a whole can be seen in the stated purpose of the study: "In order

to move to a place where pedagogy and curriculum enable students to integrate ideas about

scientific issues and their own values and ethics, the community needs to understand how an

individual naturally construes these issues" (p. 301). Among Yap's (2014) findings were that

students who were provided with several frameworks within which to analyze cost/benefits of

moral issues such as genetic engineering of foods and human embryos tended to use them and

tended to try to balance rights, maximize benefits, and reconcile decisions based on Christian

values. Yap (2014) found that students were able to develop "critical thinking strategies with an emphasis that includes both the affective and the cognitive aspects in science learning" (p. 315) by using the ethical frameworks given to the experimental group. As a pedagogical tool, Yap (2014) called for reinstating and incorporating "values in science education" (p. 315) and pointed to "an increase in the number of informal reasoning approaches" (p. 315) used by adults "primarily intuitive, rationalistic and moral (including faith/values)" (p. 315). In addition to adding dilemma related decision-making frameworks to school curricula in order to promote critical thinking in young adults, Yap (2014) also pointed out that "the incorporation of faith values in the ethical frameworks confirmed previous research" (p. 315) that "other concepts besides that of justice and fairness could be the key in determining how one judges what is morally right" (p. 315).

Keane (2008) agreed, finding that "worldview needs to be understood as an aspect of knowledge creation" (p. 587). In a qualitative "participative research and development project" (Keane, 2008, p. 587) study of Zulu culture in South Africa under the direction of Dr. Cliff Malcolm (professor of science education at the University of the Witwatersrand, Johannesburg from1997-2000 and the University of Kwa-Zulu Natal Durban 2000-2006, director of the Centre for Education Research in Durban, and editor of the African Journal of Research in Mathematics, Science and Technology Education), Keane (2008) found that culture and worldview were "critical to community identity, to visioning educational outcomes, and to learning in school science" (2008, p. 621). While Keane's (2008) goal was to utilize both Western and African worldviews to enrich science curriculum in rural South Africa, Keane's (2008) understanding that worldview matters in educational structures and organizations strengthens the argument to include worldview emphasis in teacher colleges and as a critical element in educational research.

Dernlan (2013) found that eighth and 12th grade students in Classical Christian schools exhibited a higher level of spiritual formation (defined as the maturation process of Christian faith involving knowledge, beliefs, and actions after conversion to Christianity) as well as belief in moral absolutes than those attending the "modern Christian school" (pp. 68-69) that was identified as not Classical, but Evangelical Protestant in nature. Dernlan (2013) found these results cause for concern for parents, defining the modern Christian school as a reflection of the modern public school with the exception of a Bible class or chapel inserted into the curriculum, as designated by Boerema (2011). Boerema (2011) stated further that "as an alternative to the public school system, Christian schools have taken on the task of explicitly adding a faith component to their educational program" (p. 36) but all too often find themselves falling into the pit of equating the textbooks with the curriculum. Boerema (2011) added that "in spite of being based on fundamentally different worldviews, Christian schools still look, to a large extent, the same as their public school counterparts" (p. 42). Dernlan (2013) selected a purposeful convenience sample from two matched schools in the Midwest with comparable demographics, school history, and tuition schedules for his quasi-experimental study.

While public education reached near-universal expression in the 1960s, that decade also marked the historical red line when the Bible and prayer were banished from public schools and public school test scores started to decline (Jeynes, 2012a). Jeynes considered whether a decline in Christian religious instruction might affect academic performance. Jeynes' (2012a) extensive meta-analysis of 90 studies found that while charter school students performed no better than their traditional-method public school counterparts, private Christian school students outperformed public school students on standardized tests. Among minority populations targeted to close any historical gap in achievement scores, Jeynes (2010) found in a synthesis of three

meta-analyses that any achievement gap among minority students was erased by personal

religious commitment coupled with living in an intact, two-parent home. Jeynes (2010b) found

that attending a religious school reduced the majority-minority achievement gap by 25%.

Jeynes (2003, 2010b) cited previous studies in support of private Christian school students

outperforming those in public and charter schools on academic measures. University of Illinois

researchers Lubienski and Lubienski (2014) challenged Jeynes' (2012b) findings in a scholarly

book mentioned by Education Week writer Yettick (2014) as part of the ongoing debate

regarding school choice. Yettick's (2014) summarized scholarly critiques of Lubienski and

Lubienski's (2014) book ranging from their recalculating of scores from the assessments cited to

the use of varying statistical methods to account for socio-economic status of students in the

samples to small sample sizes and unaccounted factors such as some students having motivated

parents. Most notably, Harvard University's John F. Kennedy School of Government Professor

Paul E. Peterson reran the Lubienski's analysis using different socio-economic accounting

methods and found the opposite conclusions (Yettick, 2014).

In researchers Kim and Sankey's (2009) review of research into morality and

developmental psychology, the authors described a recursive and integrative model for use in

understanding the development of moral judgment in youngsters post-Piaget. They addressed

whether or not it is useful to stress moral instruction outside of the home and in formal

education. The basic process of making value choices seems to be inherent in humans but can be

directed and developed, according to Kim and Sankey (2009). There is "a value component in all

learning, memory and action" (Kim & Sankey, 2009, p. 296), and Kim and Sankey (2009) called

for a renewed emphasis on moral instruction in schools. Since morality can be learned and

societal values inculcated and passed on to the next generation, academic exercises in weighing moral dilemmas as well as instruction in guidelines for proper behaviors is warranted.

Researchers Stein and Fischer (2011) also saw the need for moral instruction in schools. In their article in *Educational Philosophy and Theory*, they called for a renewed collaboration between researchers and practitioners in education in supporting both cognitive and psychological approaches to serve and understand students. According to Stein and Fischer (2011), Mind, Brain, and Education (MBE) is a new field of study and is an interdisciplinary field seeking to combine research and practice among the biological, psychological, and educational sciences. In the search for comprehensive and practical applications, MBE attempts "explanations that are grounded in multiple methodologies and focus on processes of learning and development" (Stein & Fischer, 2011, p. 61) in education. Piaget's work is given as an example by Stein and Fischer (2011) of a good model of a comprehensive model of human development and cognitive maturation. In this call for comprehensive models, Stein and Fischer (2011) not only insisted that the study of morality be included in educational research and practice, they insisted there is such a standard as "good" (p. 57).

In this, Stein and Fischer's (2011) definition of worthiness, Classical Christian thought is in agreement—it is in the measuring stick used that the two views differ. Classical Christians, as defined by the term Evangelical (Bryant, 2011), trust the Bible as the yardstick of what is good, true, and worthy. For example, the Apostle Paul outlined in Philippians 4:8, "…whatever things are true, whatever things are noble, whatever things are just, whatever things are pure, whatever things are lovely, whatever things are of good report" (NKJV). These are what is worthy of a believer's attention and study. Sayers (1947) stated that Christian morality is intrinsically

rational, that is, reflecting the nature of the Christian God who is unmalleable, as recorded in James 1:17.

Stein and Fischer (2011) placed their trust in "comprehensive models of human development that span multiple levels of analysis" (p. 57) based on a pragmatic utility that include humanistic (measured by human values) moral considerations. The example given is to include analysis of the worth of student behaviors by researchers and educators as "unacceptable" or "not anything to be alarmed about" (Stein & Fischer, 2011, p. 59).

Stein and Fischer (2011) reiterated Fischer's earlier work developing the dynamic skill theory to point out that patterns of human development, including learning, are complex and therefore require complex models which include both biological, cognitive, and social/behavioral aspects and analyses. Importantly, Stein and Fischer (2011) stressed that while they are often minimalized, social/behavioral sciences have just as much to contribute to MBE as brain scanning, microbiology, and neurosciences.

Classical Christian thinkers echo this litany by describing the complex and inter-relating roles of the student, the teacher, and the learning environment (Gregory, 1884; Sayers, 1947). Sayers (1947) wrote about students losing the critical tools of learning when commenting on the modern trends in education of reducing all knowledge to compartmentalized subject areas to be memorized and regurgitated for exams and then quickly forgotten. Sayers (1947) equated such poor scholarship with de facto cultural illiteracy and poor citizenship. The Bible declared in Proverbs 23:7 that as a man thinks, so is he. Gregory (1884) stated that children need to develop physically as well as mentally. They require both training ("physical, mental, moral") and teaching (communicate "the experiences of the human race") (Gregory, 1884, paras. 8-9).

Gregory (1884) insisted that teaching and training were interrelated and equally important in the whole of the educational endeavor.

While Classical Christian educators see the emphasis in what Stein and Fischer (2011) called "comprehensive explanations" (p. 61) for the "processes of learning and development" (p. 61) as needing to be Christ-centered (Association of Classical and Christian Schools, 2012c), Stein and Fischer (2011) saw it as "problem-focused" (p. 60), and many current practitioners in education see it as a student-centered focus (Lasry, Charles, & Whittaker, 2014).

Lasry et al. (2014) focused on the stresses caused by teacher-centered instructors placed in student-centered classroom to enhance student engagement. Engaging the student in actively participating was the primary goal. Lasry et al. (2014) studied four classroom conditions taught by six instructors in a quasi-experimental design with student groups who were not truly randomly assigned, but as the researchers put it, "in first year courses our registrar arbitrarily assigned all first semester students to a section of the course and was unaware that different sections would be exposed to different instructional contexts" (p. 010116-3). When discussing results, Lasry et al. (2014) found that both on "normalized gains and ANCOVA adjusted mean" (p. 010116-2) post test scores, respectively, data "suggest that pedagogy has a significant effect while the classroom architecture by itself does not" (p. 010116-2). Lasry et al. (2014) also found that the "impact of the pedagogy is weakest for students with high prior knowledge" (p. p. 010116-5), suggesting that a solid base of prior knowledge might allow college students to succeed regardless of the pedagogical or physical design of the classroom.

Although studied in college-aged students, Lasry et al.'s (2014) findings that student-centered classrooms are effective only when instructors' epistemic framework of teaching and learning match with a student-centered pedagogy may apply to worldview considerations when

supported by Smithwick's (2014) assertions that predominantly humanist state universities

certify most K-12 teachers, including those in Christian schools. Christ-centered, parent-

honoring, more traditional models of classroom pedagogy with the teacher-as-expert would not

be expected to function well in a student-centered classroom layout. Lasry et al.'s (2014) results

drove home the importance of being intentional in choosing an instructional model in America's

classrooms. Dewey (1938) warned of an over-emphasis toward student-centered classroom

design descending into a lack of decorum, calling such extremes a "failure in education," (p. 60)

by neglecting "mutual accommodation and adaptation" (p. 60) when children's "attitudes and

habits" (p. 60) are in the formative stages. The Essentialists led by Bagley (1911b) highly

regarded the morality of truth seeking, social service, effort and discipline which Bagley (1911b)

promoted in a response to what he saw as the pragmatic, progressivists' confusion of

"fundamental principles" (p. 75) with the "shackles of tradition" (p. 75) – the first to be lauded

and preserved while throwing off the latter.

Indeed, Piaget (1976) recognized both the biological and logical (including social

interactions as sociological and included in both) as part of the "dual nature of intelligence" (p.

3). In the Greek Lexicon Strong's G3056 (n.d.), logos is the term most often translated into

English as a spoken or written word and has the added meaning of a preexistent ideal, a moral

precept given by God and the reason or order seen in the universe by God's design.

Piaget (1976) posed his preliminary question in the study of human intellect asking if it

could possibly be an irreducible "mirror of a reality prior to all experience, namely logic" (p. 17).

While Piaget (2002) illustrated higher order thinking in a child by using matchsticks and a

problem presented in two dimensional terms while the solution required a jump to a three

dimensional construction, so too does Scripture answer Piaget's question in I Corinthians 13:12

when it states that what we see and know in this earthly plane are imperfect representations of truth and reality -- just as a reflection in a mirror gives us an idea, only in part, of a person's features that come alive in three dimensions with the aid of our two eyes and depth perception. Piaget (1976) defined intelligence as the ability to realize "adaptations which are both unlimited and mutually equilibrated, adaptations which are impossible to realize at the organic level" (p. 173). Just as the definition of information in biological cell reproduction is the absence of randomness (Meyer, 2009), intelligence, as the logos of God's moral code, proceeds not from organic methods of chance mutation and disorder but from order imposed from another plane. Any study of human intelligence, society, and culture would then by definition require a study of morality.

Jeynes (2012a) argued both for morality instruction in schools as well as for public policy to consider the morality of equal access to a quality education, especially in poorer inner city neighborhoods where population demographics are heavily weighted with minority students. Jeynes (2012a) cited a study of school choice which included charter, private Christian, and public schools that found inculcating the importance of faith and family traits such as a stable two parent household, attending church and personally espousing a belief in the Christian God— which are promoted in Christian private schools—showed statistical significance in increasing academic performance.

Parental Involvement

Parental involvement in all areas of education by way of educational covenant (a strong promise of partnering) is a hallmark of Classical Christian methodology. Patall, Cooper, and Robinson (2008) found a positive correlation between training parents to work with students on homework (interactive) and higher student achievement and well-being; students not only

achieve more, but they also feel that they do better in school when parents are involved in helping complete homework. Jeynes (2007) found in his meta-analysis of 52 studies that parental involvement had a statistically significant effect on academic performance for both white and minority students.

However, most American parents are not intimately involved in the day-to-day instruction of their children (Hiatt-Michael (2001). A divesting of parental control toward a professional educational bureaucracy began with the industrial revolution in the United States and can be seen in the nearly 10-to-one ratio of parents sending their children to government-regulated free schools rather than private ones (United States Department of Education, 2017). Hiatt-Michael (2001) stated that the tension still exists "between professionals, on the one hand, who espouse the concept that they alone are qualified to make complex decisions affecting the education of our nation's children" (p. 257) and parental control.

At the same time, in another meta-analysis, Jeynes (2012b) stated that minority students who come from two-parent families of faith have no achievement gap and "among children of color raised in single-parent families when those adolescents and younger are people of faith, the achievement gap is cut in half" (p. 167). Jeynes (2012b) posited that parental involvement may be part of the reason for success in eliminating any achievement gaps among low socio-economic populations, "to the extent that faith-based schools are more likely to promote faith and family, this could produce a religious school impact that is even greater than previously imagined" (p. 169). Jeynes (2012b) lamented that the impact of Christian schools, especially in the inner cities, has been waning due to economic disadvantages imposed by government support of public schools with tax dollars—in effect making parents of private Christian students pay twice for K-12 education.

Jeynes (2012b) found that the most economically-disadvantaged students received the most benefit from faith-based schools: "It appears that one of the most accessible means of narrowing the achievement gap will not require billions of dollars of additional government funding, but rather simply facilitating schools of faith to do what they already do quite well" (p. 167). Many private, Christian schools closed their doors in recent years during the economic downturn, and poor, mostly minority families were hit hardest because of the unfair effect of the public school tax burden (Jeynes 2012b). Jeynes (2012b) called on educators in the public and private sector to see each other as co-laborers and not competitors in the interest of serving America's children. Jeynes (2012b) called all those who care about America and its children to view these study results as a call to action, stating that everyone should "encourage the presence of faith-based schools on the educational landscape" (p. 171). This holds for Christian schools because nearly all the faith-based schools in the U.S. are Christian according to Jeynes (2012b), and "religious schools bridge the various educational gaps" (p. 167) across race, socio-economic status, and school-based success measurements. Jeynes (2012b) stated, "the government and public school educators should value faith-based schools for their unique contribution to American education rather than demonstrate intolerance toward these schools, by disparaging their efforts" (p. 175).

Parental involvement, especially with the covenant agreement and tuition commitment, is fundamental to the Classical Christian model of instruction. While some Evangelical Protestant schools accept funding from government sources, the ACCS (Blakey, n.d.) rejects all but private sources of revenue in order to assure autonomy; this separates it from public charter schools and other religious schools that accept vouchers or other government funds. This distinction, according to retired ACCS Executive Director Blakey (n.d.) makes parental commitment and

involvement paramount to the Classical Christian educational model's success. In Council and Cooper's study (2011), close relationships with parents, community, and staff were highly correlated by Classical Christian school headmasters with both job satisfaction and job performance measures.

In the "first study to investigate the relationship in healthy children using a longitudinal design" (Asano et al. 2014, p. 806) between "study time at home and structural brain changes" (Asano et al., 2014, p. 807), researchers used magnetic resonance imaging (MRI) to observe and measure any changes. In the study, Asano et al. (2014) looked at MRI data from more than 200 "healthy children aged 5.6-18.4 years" (p. 801). After a three-year longitudinal study, Asano et al. (2014) found that "children's study habits at home influenced not only their cognitive ability but also the structure of their brains at some point" (p. 809). Asano et al. (2014) studied right-handed, healthy Japanese students from families who volunteered and whose study habits at home, educational background, IQ, and socio-economic status were statistically accounted for in the study to be essentially the same: "302 children participated in the experiment at time 1, and 235 of these children participated in the experiment at time 2" (p. 802). The children had no hearing or vision defects, "none had a history of neurological or psychiatric illness" (Asano et al., 2014, p. 802), and they ranged in age from 5.6 to 18.4 years at the time of the study with a mean age of 12.20 years and a standard deviation of 3.08 years. Asano et al. (2014) found that "study habits at home and, more specifically, the retrieval of memories, may affect the structure of the precuneus" (pp. 806-808), a part of the brain believed to be involved in memory. According to Asano et al. (2014), "furthermore, study time at home may have nonlinear effects on changes in brain structures… that is, studying may significantly affect brain structures only when enough time has been devoted to this activity (e.g., more than 90 min)" (p. 808).

Researchers concluded that there was evidence to find "a significant positive correlation between study time at home and change in the verbal comprehension index (VCI), one of the subscales of the Wechsler Intelligence Scale for Children–third edition (WISC–III)" (Asano et al., 2014, p. 801) as well as that increasing study times to 90 minutes or more may increase memory capacity and retrieval times due to "greater increases in the number of axons and more axon branching and myelination, causing plastic changes in the neural network involved in memory processes" (Asano et al., 2014, p. 808).

In Patall, Cooper, and Robinson's (2008) meta-analysis and synthesis "of 14 studies that manipulated parent training for homework involvement" (p. 1039) as well as "a meta-analysis of 22 samples from 20 studies correlating parent involvement and achievement-related outcomes" (p. 1039), a positive correlation was indicated between training parents to work with students on homework (interactive) and higher student achievement and well-being, especially for younger students. The researchers concluded that students who complete homework outperform those who do not, but as far as parental help with homework, results depended upon parental expertise in the subject matter. Patall et al. (2008) stated, "clearly, it is important to consider the developmental stage of the student when parents become involved in homework" (p. 1056).

Jeynes (2004) found that for urban students, positive home to school relationships improved academic performance across grades, ages and social classes, including minority populations. In a meta-analysis which included 56 studies, Jeynes (2004) wrote "some social scientists claim that as a result of their religious nature, schools of faith have higher levels of love and discipline at school" (p. 199). While the meta-analysis showed no significant change over the 20-30-year period studied, this indicated that "the influence of religious schools versus public schools on student educational outcomes has remained quite consistent over time"

(Jeynes, 2004, p. 197). School programs that compelled parental involvement showed the largest increases; Jeynes (2007) posited in a meta-analysis of 52 studies that parental involvement wanes for various reasons as children age, including more challenging work schedules and the belief that parental involvement is not needed as much as children age.

Goodall and Montgomery (2014) sought to create a framework of understanding designed as a continuum beyond simple involvement of parents with a child's school toward engagement in the entire learning process. Parental engagement, according to Goodall and Montgomery (2014), would "encompass more than just activity – there is some feeling of ownership of that activity which is greater than is present with simple involvement" (p. 400). In their framework for understanding parental engagement, Goodall and Montgomery (2014) acknowledged that parents "particularly those from ethnic minorities or those facing economic challenge" (p. 400) find it difficult to spend time at school, but still engage with the child's learning process at home. Goodall and Montgomery (2014) found evidence in the literature supporting parental engagement in student learning as resulting in "raised achievement, raised self-esteem, increased motivation and engagement" (p. 406) of students. Where Goddall and Montgomery (2014) differed from a Classical Christian school worldview is when they described the shift from parental agency in learning to the school's expertise "allowing parents a share in a process staff see as rightly theirs" (p. 406). As explained by the ACCS (2012c), Classical Christian educators "acknowledge that God has given parents the responsibility for the education of their children and that the schools instruct those students under the parents' delegated authority" (para. 4).

In seeking to study why some parents do not get more involved in their children's schooling, Shah's (2009) study of "data from 324 Latino parents with children in the Chicago

Public Schools" (p. 214) found the strongest evidence for parental involvement correlated to school attempts at contacting and accommodating parents. According to Shah (2009), other factors found to positively influence parental involvement included a "symbolic effect" (p. 224) of Latino representation among staff, administration, and school board personnel. Students attending a magnet school of parental choice and students whose parents are more involved in the community also had a stronger bond and sense of connectedness resulting in more parental involvement (Shah, 2009). Shah (2009) controlled for parental and school characteristics including socio-economic status and school policy differences utilizing Cronbach's alpha to measure internal consistency and validity of survey questions and concluded that "Latino representation within the school can have a positive effect on the psychological orientations of Latino parents that lead to an increase in their involvement" (p. 226).

In Huang and Cho's (2009) mixed methods study on seven high functioning after school homework programs (not in homes), indications were that instruction on how to study and how to learn were as beneficial as the help completing homework itself. Citing Cooper, Jorgianne, and Patall's (2006) work, Huang and Cho (2009) agreed that completing homework has been shown to increase academic performance for the average student; they emphasized that when parental involvement is lacking due to various socio-economic factors, after school programs may be able to fill in the gap. Utilizing both surveys and observations, Huang and Cho's (2009) study looked at only seven programs selected through a process from data collected as part of a larger government study by the national Center for Research on Evaluation Standards and Student Testing (CRESST). While 79 programs were selected by correlating stated goals and academic measures, only seven programs were studied based on "internal and external program evaluations, and evidence of specific content impact on student achievement, learning retention

and attendance" (Huang & Cho, 2009, p. 385). While tutors in the after school programs studied by Huang and Cho (2009) mostly provided study skills instruction such as time management, organizational skills, and use of references, motivational tools such as prizes were used as well as incentives to complete homework. Huang and Cho (2009) also emphasized communication between after school tutors and school instructors as well as parents, who reported noticing academic gains as well as better motivation and high student self-esteem. While afterschool activities, such as homework, are but a part of the academic puzzle, connected and intrinsic to the concept of home learning experiences as well as academic homework is the modeling, participation, and direction of the parents in the child's learning.

In writing to the school counselors' practice, research theorists Hoover-Dempsey, Shenker, and Walker (2010) found that among the four domains of social context, motivational beliefs, perceived invitations from any stakeholder to become involved, "perceived life context (time and energy, skills and knowledge)" (p. 29), and individual family's culture, it was the "parents' perceptions of invitations from children and teachers" (p. 29) that were the most "robust and consistent predictors of parents' home-based and school-based involvement behaviors across grade levels and across ethnic groups" (p. 29). In effect, parents need to believe they are welcome to participate in education both at home and at school for them to become more involved in their children's education. Hoover-Dempsey et al. (2010) posited a framework to understand parental involvement and to "articulate how school counselors can educate teachers and parents about the importance of teacher and school invitations to involvement" (p. 27).

Neymotin (2013) found from the 1988 National Educational and Longitudinal Survey (NELS) data that "parental involvement led to better child behavioral outcomes at the high

school level" (p. 433). Neymotin (2013) stated, "the outcomes of interest in most studies of parental involvement have been cognitive in nature (for example, test scores), with little attention paid to behavioral outcomes" (p. 434). According to Neymotin's (2013) premise, "if a parent is involved in schooling, this could help reduce the behavioral problems a child faces and allow him or her to focus more attention on school work" (p. 435). Neymotin (2013) used the first follow up survey data from 10th grade responses to the NELS to "examine the effect of parental involvement" (p. 434) on behavior issues such as "getting in trouble at school, in-school suspension, and arrest" (p. 434) and by measuring parental involvement by noting whether or not parents checked homework, volunteered at school or if the student's teacher "reported the parents as 'educationally involved'" (p. 434). Neymotin (2013) outlined two proposed motivations for parental involvement in the high school years, when parental involvement tends to wane: compensatory and enhancement. The compensatory motivation would be to compensate for a student's poor academic or behavior performance at school while the enhancement motivation for parental involvement would be to increase or enhance a student's performance that already is average or above average. Neymotin (2013) also accounted for low income levels and single parent homes on the basis that these been reported as less involved in education due to barriers of transportation, work hours, or less parental ability. While Neymotin (2013) employed student reflective surveys based on the 1990 first wave of NELS 10th grade responses, slightly fewer than 27,508 respondents were included in the study due to non-response. In analyzing data, Neymotin (2013) used a separate regression for each measure of parental involvement "due to the possibility of high collinearity between the various measures and the difficulty in teasing out the true effect of each of the measures" (p. 443). Neymotin (2013) stated that after trying to balance for community characteristics as well as parental involvement in other community

institutions, the sample of parents answering all relevant survey questions resulted in "a somewhat selected fraction of the population" (p. 443) instead of an average, "that is, a group that possessed higher income, was less diverse, displayed more involvement, and achieved better student outcomes individually, but resided in communities that were slightly less wealthy" (p. 443). Results also are affected by self-reporting: "Although parents may have elected to be involved with a child's education directly via school-based activities" (Neymotin, 2013, p. 438) measured by teacher reporting, "volunteering (parental measures used), or checking homework (child reports employed)" (Neymotin, 2013, p. 438), these measures may cumulatively have under-reported the amount of parental involvement.

Results after regression showed "that parental involvement had a positive impact on children's behavioral outcomes. More parental involvement led to a lower likelihood of arrest, suspension or getting in trouble" (Neymotin, 2013, p. 444). Neymotin (2013) took into account how the instruments scored "on tests of power, relevance and validity" (p. 450) and used multiple measures to compensate for any weaknesses in these areas. Overall, Neymotin (2013) found the study results were non-trivial and stated that "non-school-based involvement" (p. 446) (such as checking homework) increased the positive "effects of parental involvement" (p. 446) on surveyed high school students' behaviors.

Parental involvement has been found to be significant across ethnic and ability levels. Gonzalez, Borders, Hines, Villalba, and Henderson (2013) wrote in their review that Latino migrant parental involvement with children's education increases student initiative and is critical to both family-school relationships and academic improvement. Some cultures such as Latinos tend to have a hands-off approach toward children's education (Gonzalez et al., 2013). According to Gonzalez et al. (2013), instructional models that encourage parental input with

outreach, communication, training, and the explicit expectation of parental and family involvement in schools helped both family attitudes and educational outcomes. Landis and Reschly (2013) stressed parental involvement as well as student engagement as key success indicators in academics and life for gifted students and their families in their review article. According to Landis and Reschly (2013), families of gifted students can be plagued by underachievement and dropping out of school due to a variety of motivational factors. Parental involvement through "homework completion, parental monitoring, parental support for learning, attendance, and extracurricular participation" (Landis and Reschley, 2013, p. 224) are all ways in which families can intervene on the student's behalf to keep him/her from underachieving or dropping out before completion.

Integrated Curriculum

Other components of Classical Christian education advocated by Sayers (1947) and Wilson (2003) and shared by VanTassel-Baska (2004) and Null (2006) are the ideas of an integrated curriculum (cross-curricular instruction) and the advantages of instruction in Latin.

Null (2006), in opposing progressivists attempts at fixing human nature through behavioristic explanations of motivation, also attacked the segmentation of topics into isolated subjects to be taught willy-nilly at uncoordinated and disjointed ages and times throughout the curricular cycle. This method of instruction fails, according to Null (2006), because "the moral philosophy that feeds our profession cannot and should not be separated from the various intellectual disciplines" (p. xxi) such as history, civics, politics, mathematics, science, other languages, reading, writing and philosophy. As Colossians 1:17 puts it, in Christ all things consist or hold together. So, too, should a curricular model.

Edicer (2012), in an article on careful listening, expounded on many of the tenets of Classical Christian education in a journal on improving students' reading. The article championed metacognitive exercises to teach children to think about their thinking and making lessons that relate to other knowledge and lessons (integrating and coordinating the curriculum) so that material is presented in deeper context—not broadly/shallowly covered—while insisting that teachers and students take time to master concepts and knowledge before moving on to new horizons (Edicer, 2012). Nasrollahi-Mouziraji and Nasrollahi-Mouziraji (2015) found in their review that mastery of fundamental knowledge by memorization at younger ages is normal and should be utilized. Nasrollahi-Mouziraji and Nasrollahi-Mouziraji (2015) stated, "young children will naturally memorize language patterns from their environment…rather than considering rote memorization as a direct opposition to understanding, it can be viewed in a complementary role" (p. 871). From a neurological standpoint, "memorization develops the brain in a way nothing else can" (Nasrollahi-Mouziraji & Mouziraji, 2015, p. 271), while from an information processing perspective it is important to rehearse new information and not to "bombard the learners with too much information" (Nasrollahi-Mouziraji & Mouziraji, 2015, p. 271). "If the new information is not transferred to the long term memory through rehearsal activities, it will be easily decayed and lost" (Nasrollahi-Mouziraji & Mouziraji, 2015, p. 272). Memorization, according to Nasrollahi-Mouziraji and Nasrollahi-Mouziraji (2015), "can be considered as the way through which controlled processes are changed into automatic ones, and hence available for easy retrieval" (p. 873)

Draghicescu, Gorghiu, Gorghui, and Petrescu (2013) titled their journal article as pleading for an integrated approach to training science teachers. Draghicescu et al. (2013) argued that combining and integrating subject areas, or disciplines, in education is critical to build

competencies and must include abilities and values in addition to content area knowledge. This sounds strikingly similar to Gregory (1884) calling for both training and teaching as an interrelated pair. Bagley (1911b) argued that no area of teaching is isolated, calling some "trivial and transitory" (p. 67) on their face but "fundamental and eternal" (p. 67) in reality. In the study of history, for example, Bagley (1911b) insisted that there be "vastly more than a bare recital of dates and events" (pp. 66-67) to include all other areas of human study such as science, mathematics, geography, and social struggles enlivened by eloquent descriptions of human triumph. According to Bagley (1911b), "there is no study worth teaching that is not practical at basis, and there is no practical study that has not its human interest and its humanizing influence" (p. 67).

While Draghicescu et al. (2013) wrote from a Romanian perspective, they addressed the world scientific audience in calling for bridges to connect formerly isolated disciplines into a more integrated body of knowledge and competencies. They argued this approach better reflects the realities of the world rather than keeping with the traditional form of compartmentalizing subject matter knowledge to be presented and acquired in separate pieces. Draghicescu et al. (2013) stated that this interconnectedness promotes meaning, substance, and relevance. Utilizing an integrated curriculum also enhances the pupil's well-being in meeting the pupil's needs for personal development while presenting material in a context that reawakens prior knowledge, thus cementing new knowledge within a pre-existing framework (Draghicescu et al., 2013, p. 91).

Yoon, Dyehouse, Lucietto, Diefes-Dux, and Capobianco (2014) tested 831 second-, third-, and fourth-grade students on "the effects of integrated science, technology, and engineering (STE) education" (p. 380) content knowledge and "aspirations concerning

engineering" (p. 380) during the 2009-2010 school year in a "large, southcentral U.S. school district" (p. 380). Yoon et al. (2014) saw "integrated education" (p. 380) as beneficial "as early as the elementary level to strengthen students' content knowledge in science, technology, engineering, and mathematics" (p. 380). In their study, the researchers sought to discover "the effects of a set of integrated engineering lessons on elementary students' content knowledge" (Yoon et al., 2014, p. 382) and if any attitudes or results differed by gender or grade level. The lessons were first presented to teachers during an in-service for use during the 2009-2010 school year and showed instructors how to incorporate scientific thinking and engineering problem solving methods such as "science inquiry, model development, and design" (Yoon et al., 2014, p. 382) into their normal classroom routines. Participants included 831 students with approximately equal gender balances (389 female to 374 males) in grades two through four; participants were ethnically diverse with a majority of Hispanic students at 277 or 33.7%, 238 Caucasians at 29.0%, 141 African Americans or 17.2%, 76 Asian/Pacific Islanders at 9.3%, 10 Native American/Alaskan Natives at 1.2%, and one mixed race student. Fifty-nine teachers "implemented engineering integrated lessons in the second- through fourth-grade classrooms" (Yoon et al., 2014, p. 383). Data were collected from 54 in the treatment group, and eight classrooms matched by grade level and demographics were the control group from other district schools where the integrated lessons were not used (Yoon et al., 2014). School year beginning and ending pre- and post-test framework was used and items were adjusted for developmental levels, vocabulary, and was translated upon request for English language learners (Yoon et al., 2014). Test items were assessed using Cronbach's α for internal consistency reliability; "to examine pre-post differences between groups, the data were analyzed using two-way" (Yoon et

al., 2014, p. 384) analysis of variance or ANCOVA "to control for pre-test differences" (Yoon et al., 2014, p. 384) for group (control or treatment) and gender.

Results for the student knowledge tests for all three grades found significant differences between the treatment and control groups meaning students in grades two, three, and four in the treatment group "scored significantly higher than students in the control group (Yoon et al., 2014, p. 385). No significant differences were found for gender or combined gender-group effect (Yoon et al., 2014). While students increased scores more in technology and showed fewer gains in science in the disaggregated data, average score increases were between 20% to nearly 30%, but at each grade level "there was still room for improvement" (Yoon et al. 2014, p. 385) with average proportion of correctly answered questions hovering just about 60% (Yoon et al. 2014). In analyzing areas of relative weakness, Yoon et al. (2014) found that second-grade students performed better on questions testing science knowledge than technology or engineering third-grade students "gained more knowledge of technology" (p. 387), and fourth-grade students performed evenly across topics but had "relatively smaller gains in science and larger gains in technology" (p. 387). Yoon et al. (2014) noted study limitations of unequal ethnic makeup in classrooms as well as "the smaller number of control versus treatment group students" (p. 388) and the fact that assignment to control or treatment classrooms was not random. Yoon et al., (2014) called for more research as well as more integration of science and engineering lessons across the curriculum to see if the 20-30% increase from one unit taught during the school year could return even higher scores with more lessons and units taught throughout the school year.

Another term for an integrated approach to instruction is cross-curricular, or teaching across curriculum or subject areas. Wassell (2015) argued for integration of fine arts along with cross-curricular instruction in reading, history, geography, studies of native cultures, and national

history in an article adapted from a presentation for the 34th World Congress of the International Society for Education through Art a year earlier. Cross-curricular requirements can also be found in the United States' CCSS (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010), including the requirement to "read, write, and research across the curriculum, including in history and science" (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010, p. 7).

The Classical Christian method includes an integration or combination of topics across subject matter, including foreign languages, sciences, music, drama, and fine arts while utilizing a developmental trajectory. As Spencer (1996) stated in his article on the Classical model, the Greco-Roman Trivium is a framework for K-12 basic education to prepare young adults for mature endeavors. Sayers (1947) stressed teaching students how to learn the Grammar of each topic – that is, the language of learning—and not just isolated facts—before learning how to apply and synthesize. As recorded by Spencer (1996), the Trivium method is developmental in nature, stressing mastery of factual knowledge and rules in the Grammar stage, organization and analysis in the Dialectic or Logic stage, and articulation/presentation, both oral and written, in the Rhetoric stage. Sayers' (1947) brilliant contribution, according to Spencer (1996), was the alignment of the ancient Trivium curricular phases with keen observations of modern childhood development stages. Sayers' (1947) labels of Poll-parrot, Pert, and Poetic for the three stages were more descriptive, but the more standard Classical labels of Grammar, Logic, and Rhetoric are most often found in the sources cited in the present study.

Latin Instruction

According to VanTassel-Baska (2004), Latin instruction increases vocabulary, grammar and reading comprehension skills as well as other language acquisition skills. The manifold

benefits of studying Latin "are deeply ingrained in the intellectual fabric of our contemporary world" (VanTassel-Baska, 2004, p. 56). Latin is both complex and logical, making Latin instruction a springboard for higher-order thinking; its methodology is cross- and multi-disciplinary by integrating history, cultural, and linguistic studies (VanTassel-Baska 2004). These findings refute those of Holliday (2012), who argued from studies based mostly in the 1990s and earlier, that it is how Latin is taught and not Latin instruction per se that is the key to higher scores on standardized tests.

Coffee (2012) noted that while Latin instruction was predominantly relegated to the Jesuits after the Renaissance and received a brief resurgence prior to the 1960s in the U.S., it has taken foreign language standards such as New York State's to bring about a more widespread blossoming of spoken Latin instruction in some public and predominately private schools. Coffee (2012) noted that many participants at Latin seminars held at the University of Kentucky stated they came to enrich their knowledge of Christian texts. Coffee (2012) argued for continuing both the conventional memorization and drill practice method of instruction in addition to oral and conversation Latin studies, stating "the customary drilling of students on grammar inculcates a precision of thought that greatly benefits further scholarly study but also carries over as a skill into other areas" (p. 264). Coffee (2012) saw Latin study as important for training the mind as well as mining the West's cultural riches. Coffee stated,

> I have also seen how speaking and writing Latin can bring a much deeper and more fluent knowledge of the Latin idiom that not only significantly improves reading comprehension, but itself forms part of the bedrock of cultural understanding that is the larger goal of Classical studies. (p. 264)

Holliday (2012) saw Latin instruction as essentially equivalent to any other foreign language acquisition. Citing as many studies criticizing claims made by proponents of Latin as those agreeing with its promotion, Holliday's (2012) review concluded that "overall, there is evidence to support that the study of Latin has several benefits, including increased English vocabulary and grammatical knowledge" (para. 16). While arguing to minimize recognition of Latin in the cognitive and language acquisition transfer arena in grammar and secondary schools, Holliday (2012) stated that one reason Latin was widely taught in America's early school systems (up through the 1920s) was due to the moral instruction in virtues. Classical Christian thinkers point to this loss of moral instruction as good reason to reinstate Latin as a desired and widespread school discipline (Wilson, 2003).

Nasrollahi-Mouziraji and Nasrollahi-Mouziraji (2015) found memorization as a "helpful strategy" (p. 870) in the acquisition of language that also increases recall in other cognitive disciplines. Specifically, Nasrollahi-Mouziraji and Nasrollahi-Mouziraji's (2015) research found that memorization "is the first step to understanding, enhances association in memory, causes cognitive development as a learning strategy, provides rehearsal and is especially helpful in early stages of learning" (p. 870). Nasrollahi-Mouziraji and Nasrollahi-Mouziraji (2015) specifically addressed and discounted progressivist claims that memorization itself is outdated and harmful, pointing instead to its historic track record of success for "the whole of recorded history" (p. 870) up to the present. They posited instead that before there can be "understanding, analysis or retention" (pp. 870) in the educative process, there must be "a large database" (p. 871) of knowledge already acquired by the child.

Latin language has deep roots in Western culture. According to Herber (2013), an academic director at Friedrich-Alexander University in Erlangen-Nuremberg, "the success of

Roman law was based on the success of the Latin language, whose grammar, syntax and phonology is rather easy" (p.1). "Latin was the lingua franca" (Herber, 2013, p. 1) or common language of ancient Europe and medieval Europe, allowing trade and cultural exchanges among nations whose citizens spoke various languages. Current efforts to include many member nations in the European Union have run into difficulties, according to Herber (2013), because there is not a lingua franca to perform the duties Latin had served previously. "Nevertheless," Herber (2013) insisted, "the Latin language is not dead and the Roman law is not outdated" (p. 1). Herber (2013) stated, "The main ideas and concepts of Roman law are the links between the national codes of civil law" (p. 2) and are present today in "almost every corner" (p. 2) of European law. Herber (2013) concluded that Roman law and Latin language terms are the fundamentals "of the European Civil Law Code" (p. 2), as well as American and Dutch civil law.

Some researchers have recognized the study of Latin as important to an appreciation of Western literature as well as law. While writing to advocate Latin instruction for "precocious students" (VanTassel-Baska, 2004, p. 56), VanTassel-Baska (2004) argued that Latin has intrinsic value for all serious students of literature and Western culture. According to VanTassel-Baska, 2004), the mastery of Latin carries with it an "enduring personal relevance" (p. 56) and "educational value" (p. 56) attributed to a study of the classics, according to Van Tassel-Baska.

VanTassel-Baska (2004) cited The College Board, reporting a more than 90% increase in students taking the Latin exam for college credit. Latin instruction promotes higher order thinking, an integration of history, language, philosophy, literature, and art (VanTassel-Baska, 2004). Moreover, it allows those who master it the joy of performing plays, reading manuscripts, and participating in modern dialogs in the language of the original authors of the Roman classics (VanTassel-Baska, 2004).

Wingate (2013) wrote that Latin was the nearly universal language of the universities in the sixteenth century Europe. Pupils would spend years acquiring syntax, pronunciation, and basic vocabulary before venturing into Latin-only classrooms of upper division study. While arguing against this method and for the natural or direct method of Latin instruction in which pupils are immersed in a Latin-only classroom from the start, Wingate (2013) challenged the notion that Latin translation skills led to higher learning in favor of Latin itself offering students more open windows into an appreciation of the classics.

Wagner and Perels (2012) chose Latin instruction to study self-regulation and which interventions and processes might promote translation skills precisely because the study of Latin is thought of as old and outdated by many non-Classical modern scholars. Wagner and Perels (2012) saw the beauty and transferability of Latin skills, however, and wrote interventions to help students self-regulate studies in Latin and then use these new competencies to improve study skills in other endeavors toward "lifelong learning" (p. 1). Latin translation skills, argued Wagner and Perels (2012), closely resemble the complex analytical and synthesis competencies involved in problem solving, a much sought after tool in the 21st-century skill set toolbox. Accordingly, Wagner and Perels (2012) advocated for a "refocus" (p. 2) in Latin instruction to stress the value of the learning process in mastering Latin translation skills over the debatable utility of the language itself and its transferability to acquiring other languages.

Summary

Research by Jeynes (2002, 2008, 2012a, 2012b) established that students attending private Christian schools score higher on academic as well as behavioral/psychological well-being measures. Classical Christian schools combine the Greco-Roman Trivium as a developmental framework to acquire a fundamental knowledge base in primary years following

an integration of subject matter centered in Scripture to provide a Christian worldview while developing metacognitive, reasoning, organizational, and mastery-based skills in maturing students so they can become self-directed learners as they grow and develop academically, physically, and spiritually.

Christian schools include religious instruction to some degree by definition, so in this way they are generally alike in training students to respect themselves, their family, and others, along with the basic precepts of civil society found in the Ten Commandments (Boerema, 2011). Bagley's (1911b) Essentialist theory of education (1911b) favored a pedagogical method that stressed rigor and mastery of a critical knowledge base before instructional emphasis shifts to organization, synthesis, and eloquent articulation (Ediger, 2012, p. 176). In the literature presented, these theories can explain results across cultures (Romanian, Turkish, Indonesian, Cyprian, Brazilian, Iranian, the United Kingdom, and United States) and ability levels (special needs and non-special needs and minority and non-minority students). Null (2006) predicted as much when he stated that progressivists are wrong because they ignore "the most essential aspect of human nature—the soul—and instead focused exclusively on behavior" (p. xxi).

This researcher sought to find if there is a difference in measures of academic performance on the PSAT based on an analysis of the literature presented between students educated in the Classical Christian method, including rigorous mastery of basic knowledge and training of the mind in analysis and eloquent articulation, compared to the modern American preference found in other Christian schools for progressive, child-centered learning. Differences identified in this study serve to inform educational methods as well as theory in regard to the value of rigorous standards, learning how to learn/metacognition, and developmentally-structured instruction in classrooms today.

CHAPTER THREE: METHODS

Overview

The researcher utilized pre-existing groups from private Protestant Evangelical Christian schools that collected PSAT mean scores in order to compare mean scores between those that teach classically and those that do not. Often in educational research, it is cumbersome to collect student test scores without endangering confidentiality. Collecting existing test scores from self-selecting, pre-existing groups is one way to overcome such obstacles (Gall et al., 2007).

Design

This study was a quantitative, non-experimental, causal-comparative design, which is appropriate for pre-existing groups in which the independent variable is not manipulated (Gall et al., 2007). This design is appropriate for measuring the possible relationship between preexisting educational methods chosen by families in an analysis of standardized test score means by school. In this study, the dependent variable was school mean scores on PSAT overall, verbal and mathematic assessments. The PSAT is recognized by college scholarship awarding agencies as a good predictor of academic success measured by college readiness (The College Board, 2011. The independent variable was the type of educational philosophy, either Classical Christian or non-Classical Christian private school education. According to Pyrczak (2008), assigning individuals to treatment at random is far superior to assigning previously existing groups to a treatment at random. Also, Pyrczak (2008) stated that since students are not usually randomly assigned to groups, it is normal and a best practice to assign another equal class as the control group – one which does not receive the treatment. The present study compares two pre-existing groups of Evangelical Protestant Christian private school students; one group had an added distinction in educational philosophy, the Classical method, whereas the other did not.

Research Questions

The following research questions were proposed:

RQ1: Is there a difference in academic performance on PSAT composite scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ2: Is there a difference in academic performance on PSAT mean math scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ3: Is there a difference in academic performance on PSAT mean reading scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ4: Is there a difference in academic performance on PSAT mean writing scores for Classical Christian private schools compared to non-Classical Christian private schools?

Hypotheses

The following null hypotheses were proposed:

H_01: There is no significant difference in academic performance on PSAT composite scores for Classical Christian private schools compared to non-Classical Christian private schools.

H_02: There is no significant difference in academic performance on PSAT mean math scores for Classical Christian private schools compared to non-Classical Christian private schools.

H_03: There is no significant difference in academic performance on PSAT mean reading scores for Classical Christian private schools compared to non-Classical Christian private schools.

H₀4: There is no significant difference in academic performance on PSAT mean writing scores for Classical Christian private schools compared to non-Classical Christian private schools.

Participants and Setting

The participants for the study consisted of a random sample from all ACCS (Classical Christian) and accredited ACSI (Classical and non-Classical Evangelical Protestant Christian private schools) member schools in the United States and abroad that answered the study survey. The sample size was drawn from a randomized listing from an Excel spreadsheet of schools answering the survey: 718 weighted mean scores from the 10-year period 2003-2013 and 3,768 weighted mean scores from non-Classical Christian schools from the same 10-year period. One hundred fifty-five is an appropriate sample size for a medium effect size at .7 statistical power with an alpha of .05 for an independent samples t-test (Gall et al. 2007, p. 145); sampling far exceeding this measure once all weighted mean scores for all 10 years were combined and not evaluated year-by-year.

About half of the schools that responded provided some demographic information that was incomplete from year to year, with the most recent containing the most complete. Of the half that did include demographic data, the Classical Christian schools in general (from the 2012-2013 school year) consisted of students who were 75% white, 1.17% black or African American, 9.6% Asian, 0.08% American Indian or Alaska Native, 1.25% Native Hawaiian or other Pacific Islander, 1.67% Hispanic or Latino, 22.5% other race; 57% male and 43% female. The Classical Christian schools had an average student age of 16 years old; 14% of schools were in the Midwest, 13% in the south, 17% in the Northeast, 33% percent in the Northwest, and 22% in the Southwest. Classical Christian schools that responded to the survey averaged 21 years in

operation with all of the schools being in operation for 10 years or more. The non-Classical

schools in general (from the 2012-2013 school year) consisted of students who were 71% white,

5.2% black or African American, 15.8% Asian, 0.62% American Indian or Alaska Native, 0.12%

Native Hawaiian or other Pacific Islander, 3.2% Hispanic or Latino, 0.96% other race; 50% male

and 50% female. The non-Classical Christian schools had an average student age of 16 years old;

three percent of schools were in the Midwest, 22% in the south, 13% in the Northeast, nine

percent in the Northwest, 38% in the west, and nine percent international. Non-Classical

Christian schools responding to the survey averaged 41 years in operation with 100 percent of

the schools having been in operation for 10 years.

Instrumentation

The instrument used in this study was the Preliminary Scholastic Aptitude Test (PSAT,

The College Board, 2014b). The variables the instrument was used to measure in the study were:

academic achievement overall (called "composite" in this study), critical reading skills (called

reading in this study), math problem-solving (called math in this study), and writing skills (called

writing in this study).

While the National Merit Scholarship Program started in 1955, the National Merit

Scholarship Corporation (2014) adopted the College Board's Preliminary SAT exam (PSAT) as

the qualifying test for its consideration in 1971 (College Compass, 2011). The PSAT/NMSQT

includes five sections: two 25-minute critical reading sections, two 25-minute math sections, and

one 30-minute writing skills section. The entire test takes two hours and 10 minutes (The College

Board, 2014b). According to Proctor, Wyatt and Wiley (2010), The College Board's

PSAT/NMSQT standardized tests are recognized as valid and reliable measures for college

readiness among high school juniors. Proctor, Wyatt and Wiley (2010) developed high school

benchmarks while Kim, Hendrickson, Patel, Melican & Sweeney (2014) developed a scale for eighth-graders based on the reliability of PSAT/NMQT so that high school educators and advisors could better predict students' trajectory toward college readiness. According to The College Board (2014b), validity studies show a strong correlation of .50 between its assessments and first-year college grade point averages (Shaw, 2015). Among the national scholarships awarded based on performance on this measure are the National Hispanic Recognition Program (NHRP), the National Scholarship Service, and the Telluride Association (The College Board, 2014b).

The PSAT is scored to aid in comparing standard scores of all students taking the test while accounting for various versions of the assessment over time and geographic location. To score the test, first a raw score is computed, one point for each correct answer. One quarter point is deducted for incorrect answers on multiple-choice questions, and there is no deduction for incorrect on student created/gridded in answer. The raw score is converted to a score on the PSAT/NMSQT scale of 20 to 80 points with no subscale reporting. This statistical procedure used is equating, which adjusts for differences in difficulty among test editions (The College Board, 2014b).

According to The College Board (2014b):

Comprehensive reviews and analyses ensure that questions and tests are fair for different groups of students. Although differences in test performance may be the result of many factors, long-term educational preparation is the primary cause. The test itself reflects such differences but does not cause them. ("Answers to your questions about how the PSAT/NMSQT is scored," para. 2)

Also, The College Board (2014b) added:

When comparing scores between students in the same skill area, true differences in skill levels can be determined using the standard error of the difference (SED). Differences of fewer than 8 points (or 1.5 SED) are not significant, while differences of 8 points or more reflect true differences in skills. ("Answers to your questions about how the PSAT/NMSQT is scored," para. 3)

The purpose of the reading section is to measure critical reading skills such as comprehension, inference, and a word's contextual meaning. All 48 questions are multiple choice and based on provided passages. The time allowed to complete this section is 50 minutes (The College Board, 2015). The purpose of the math section is to measure math problem-solving skills, and it includes multiple choice questions as well as about seven of the 38 questions where students must provide an answer using a bubble-in grid. The time allowed to complete this section is 50 minutes (The College Board, 2015). The purpose of the writing section is to measure writing skills such as finding errors and weaknesses and correcting them. All 39 questions are multiple choice and based on samples provided. The time allowed to complete this section is 30 minutes (The College Board, 2015). Interpretations of PSAT scores are recognized as valid and reliable measures of academic skill level achievement by the National Merit Scholarship Corporation (2014) which uses these scores to determine eligibility for college scholarships.

Procedures

After receiving permission from Liberty University and IRB approval (see Appendix C), this study utilized a causal-comparative design. The procedures included receiving permission from both the ACCS and ACSI (see Appendix D) boards to request data from member schools, then the process of collecting school existing PSAT mean scores covering a 10-year period from

2003-2004 through the 2012-2013 school years. A mailed survey (see Appendix A) requested the

school's PSAT scores for students each year to be averaged and reported as a school mean. The

survey also requested self-identification as Classical or non-Classical, denominational or

nondenominational, demographic information by percentage, as well as an affirmation of

Evangelical Protestant doctrinal alignment to confirm group identification.

A professional cover letter was sent (see Appendix B) with the survey to all 247 member

schools in the ACCS as well as all named Classical Christian schools among the 3,000 in the

ACSI accredited schools list and an equal number of non-Classical named schools in the ACSI

list. After a low rate of response to the initial mail out, all remaining accredited ACSI schools

with an upper school/high school were included in a subsequent mailing. Once a response was

received, anonymity was assured through coding of respondents in Excel spreadsheets by the

number of envelopes received; school names were not used for any further identification. Pre-

contacts were made by email and/or phone call. Cover letters (see Appendix B) and self-

addressed stamped envelopes accompanied all surveys. Follow-up requests were made after 30

days, 60 days, and 90 days had passed from the initial mailing.

Respondent questionnaires have several advantages (Gall et al., 2007) including low cost

of sampling across large geographic areas and a relatively quick response time compared to

personal interviews which, while time consuming, have more adaptability (Gall et al., 2007, p.

228).

Data Analysis

In this study, the null hypotheses indicated a comparison of weighted mean scores taken

from schools within the ACCS and ASCI. Descriptive statistics for each comparison group were

compiled. The independent variable was the method of instruction, Classical Christian or non-

Classical, and the dependent variables were the PSAT mean scores by school. Since fewer than 30 responses were returned for any given year (many years had 20 or fewer school responses) over the 10-year period requested in the headmaster survey, and some schools did not return mean scores in some topic areas, all mean scores regardless of year were analyzed per school, allowing for larger sample sizes in the present study. Mean scores were weighted by the number of students taking the test as reported by schools. The level of measurement for the dependent variable was measured on the interval or ratio scales, the observations within each variable are independent, the samples were a random sample from the populations, and the populations were normally distributed. Statistical analysis was conducted using SPSS® software where possible. Since weighting of mean scores was performed to account for large differences in numbers of students (school score mean comprised of the most students was 332 while the smallest was two), weighted variances also must be used. After being entered, the data was coded and screened (school numbers and years were dropped, mean scores without number of students making up average score or scores with percentiles were eliminated). Assumptions of normality were tested using histograms and boxplots (see Figures 1,2,3,4) to make sure there were no extreme outliers and variance homogeneity was assessed using Levene's test, see Table 2, (Gall et al., 2007). Originally, the researcher planned to conduct a *t*-test for independent samples, but when Levene's test returned non-tenable results ($p = .000$) in all tested hypothesis topics indicating that homogeneity of variances could not be assumed, a Welch's *t*-test for unequal variances was performed instead. According to Satterthwaite (1946), issues with homogeneity of variance can be avoided by utilizing a linear function of mean squares to estimate variance. Delacre, Lakens, and Leys (2017) suggested that the Welch's *t*-test for unequal variances is appropriate under these circumstances and will return results that are less likely to result in a

Type 1 error of rejecting a null hypothesis when it is true if the study data assumption of homogeneity is not met.

A two-tailed Welch's *t*-test was used. After analysis, a one-tailed Welch's *t*-test was added to identify the greater of the two weighted, mean scores categories. This design was appropriate for pre-existing groups (Gall et al., 2007). The significance level of $p < .05$ was used as a measure indicating rejection of the null hypotheses which is the conventional and standard level (Gall et al., 2007). Due to multiple dependent variables, a Bonferroni correction was made and the alpha level was to be set at $p < .0125$ to help avoid a Type I error. Effect size, or "estimate of the magnitude of the difference" (Gall et al. 2007, pp. 143-146) was measured using eta squared and Cohen's *d* (Gall et al. 2007).

CHAPTER FOUR: FINDINGS

Overview

This chapter contains the research questions and null hypotheses. Descriptive statistics are provided followed by the results of the inferential statistics, including assumptions test results. The purpose of the analysis was to determine if a statistically significant difference exists between mean scores for Classical Christian private schools compared to non-Classical Christian private schools on the PSAT.

Research Questions

RQ1: Is there a difference in academic performance on PSAT composite scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ2: Is there a difference in academic performance on PSAT mean reading scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ3: Is there a difference in academic performance on PSAT mean math scores for Classical Christian private schools compared to non-Classical Christian private schools?

RQ4: Is there a difference in academic performance on PSAT mean writing scores for Classical Christian private schools compared to non-Classical Christian private schools?

Null Hypotheses

H$_0$1: There is no significant difference in academic performance on PSAT composite scores for Classical Christian private schools compared to non-Classical Christian private schools.

H$_0$2: There is no significant difference in academic performance on PSAT mean reading scores for Classical Christian private schools compared to non-Classical Christian private schools.

H_o3: There is no significant difference in academic performance on PSAT mean math scores for Classical Christian private schools compared to non-Classical Christian private schools.

H_o4: There is no significant difference in academic performance on PSAT mean writing scores for Classical Christian private schools compared to non-Classical Christian private schools.

Descriptive Statistics

Before weighting of mean scores by multiplying the number of students times the averaged school score reported and grouping all years together, the researcher analyzed descriptive statistics from each academic area by school: reading, math, and writing. In reading, the descriptive statistics for the mean scores from the Classical Christian schools were M=56.52, SD=6.03, and n=152. The descriptive statistics for the mean scores from the Non-Classical Christian schools were M= 48.87, SD= 3.92, and n= 196. In math, the descriptive statistics for the mean scores from the Classical Christian schools were M=54.43, SD= 5.86, and n=152. The descriptive statistics for the mean scores from the Non-Classical Christian schools were M=49.31, SD=4.08, n=196. In writing, the descriptive statistics for the mean scores from the Classical Christian schools were M=56.54, SD=7.10, and n=144. The descriptive statistics for the mean scores from the Non-Classical Christian schools were M=48.82, SD=4.74, and n=196. Boxplots indicated one or two outliers as shown in Figure 1 and Figure 2, but these could be reasonably explained by naturally occurring variation in student scores.

Table 1

Descriptive Statistics of PSAT Classical Christian School Mean Scores

		N	*M*	*SD*	SE Mean
Reading	Non-classical Christian	196	48.870	3.920	.280
	Classical Christian	152	56.521	6.025	.489
Math	Non-classical Christian	196	49.305	4.082	.292
	Classical Christian	152	54.426	5.860	.475
Writing	Non-classical Christian	196	48.825	4.741	.339
	Classical Christian	144	56.542	7.105	.592

Results

Assumption Tests

Histograms and boxplots indicated approximate normality of distributions in all three samples. Levene's test returned non-tenable results ($p = .000$) in all tested hypothesis topics indicating that homogeneity of variances could not be assumed.
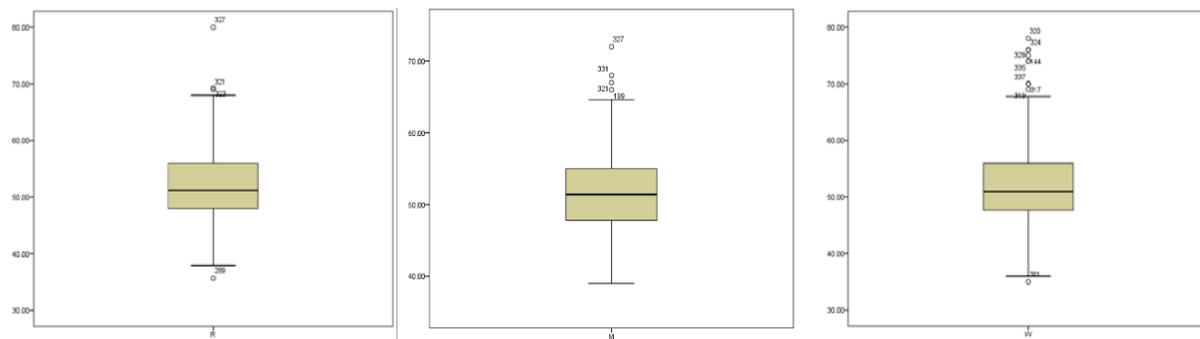

Figure 1. Box plots of PSAT non-Classical Christian school mean scores (left) for Reading (R), Math (M) and Writing (W).
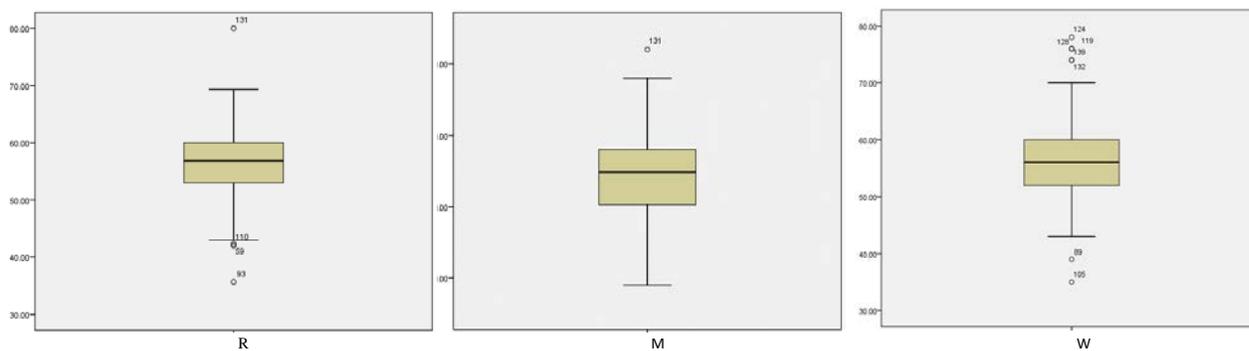

Figure 2. Box plots of PSAT Classical Christian school mean scores for Reading (R), Math (M) and Writing (W).

Table 2

Levene's Test Results

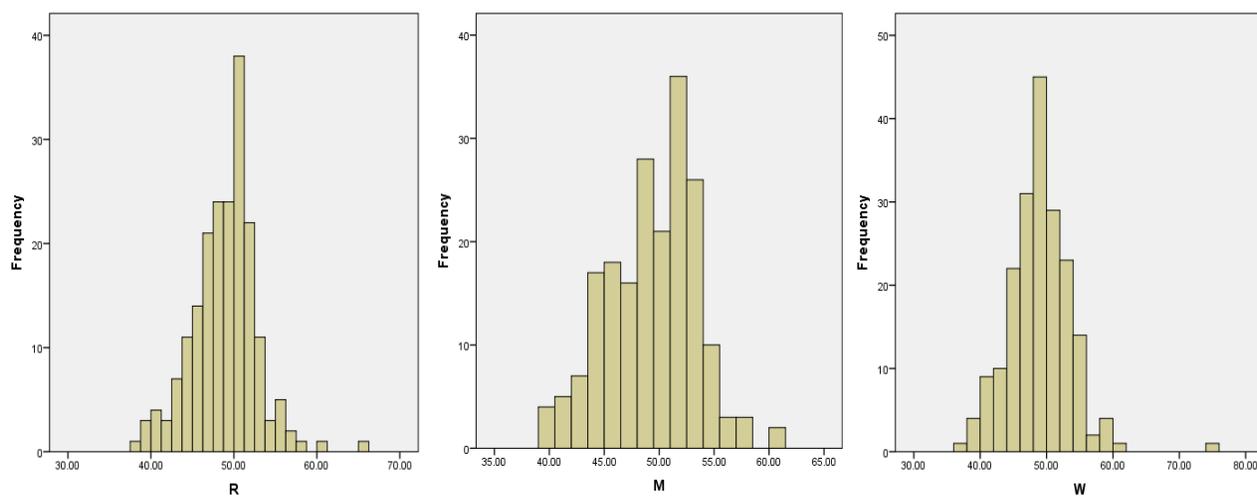|		*F*	Sig.
Reading	Equal variances assumed	24.181	.000
	Equal variances not assumed		
Math	Equal variances assumed	18.366	.000
	Equal variances not assumed		
Writing	Equal variances assumed	19.000	.000
	Equal variances not assumed		

Figure 3. Histograms of PSAT Non-Classical Christian school mean scores for Reading (R), Math (M) and Writing (W).
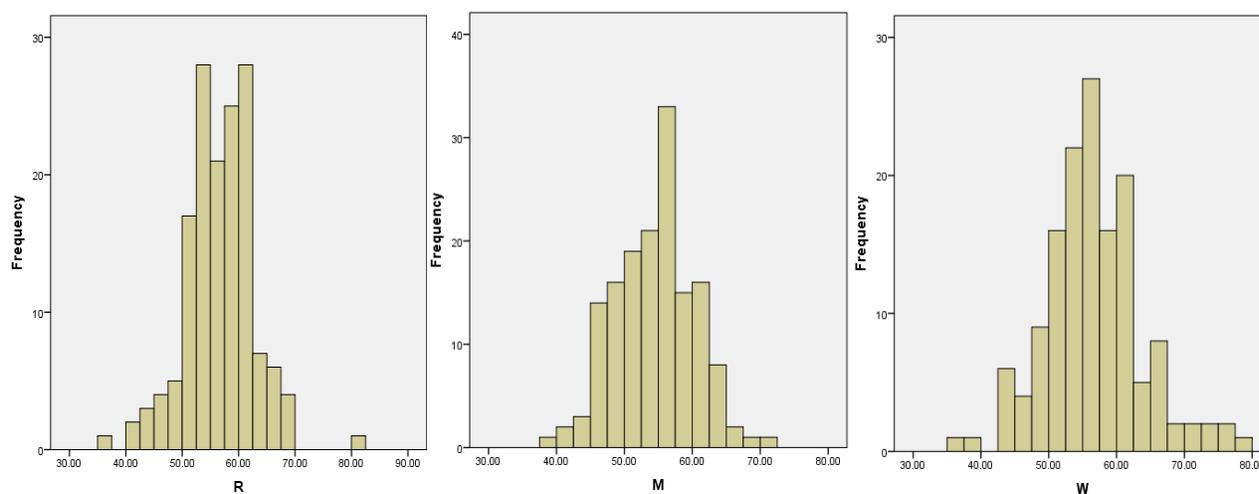
Figure 4. Histograms of PSAT Classical Christian school mean scores for Reading (R), Math (M) and Writing (W).

Hypotheses

$H_0 1$. Due to a lack of scores returned, Null Hypothesis One, there is no significant difference in academic performance on PSAT composite scores for Classical Christian private schools compared to non-Classical Christian private schools, was not analyzed.

$H_0 2$. Null Hypothesis Two stated there is no significant difference in academic performance on PSAT mean reading scores for Classical Christian private schools compared to non-Classical Christian private schools. For $H_0 2$, the histogram returned a reasonably normal bell-shaped curve indicating assumption of normality is tenable but homogeneity of variance was not met when applying Levene's test in SPSS® returning a significance level of .000 (Szapkiw, 2010). The two-tailed test results were Welch's t(df) = 36.36 (3768), $p < .001$. Thus, the null hypothesis was rejected, both at the alpha level .05 and .017 with Bonferroni correction. The one-tailed test to determine the higher test score mean returned $p < .001$. In mean reading scores, students from Classical Christian schools (M=55.23, SD =21.59, n=718) scored significantly higher than students from non-Classical Christian schools (M=48.56, SD =3.68, n=3,768). The

effect size was high (d= 1.73). Eta squared returned η^2 = .428, indicating that 43% of variation in dependent variable was explained by independent variable.

H₀3. Null Hypothesis Three stated, there is no significant difference in academic performance on PSAT mean math scores for Classical Christian private schools compared to non-Classical Christian private schools. For **H₀3**, the histogram returned a reasonably normal bell-shaped curve indicating assumption of normality is tenable but homogeneity of variance was not met when applying Levene's test in SPSS® returning a significance level of .000 (Szapkiw, 2010). The two-tailed test results were Welch's t(df) = 21.04 (858), p< .001. Thus, the null hypothesis was rejected, both at the alpha level .05 and .017 with Bonferroni correction. The one-tailed test to determine the higher test score mean returned p< .001. In mean math scores, students from Classical Christian schools (M=53.77, SD=4.88, n=718) scored significantly higher than students from non-Classical Christian schools (M=49.76, SD=3.45, n=3,768). The effect size was high (d= 1.08). Eta squared returned η^2 = .225, indicating that 23% of variation in dependent variable was explained by independent variable.

H₀4. Null Hypothesis Four stated, there is no significant difference in academic performance on PSAT mean writing scores for Classical Christian private schools compared to non-Classical Christian private schools. For **H₀4**, the histogram returned a reasonably normal bell-shaped curve indicating assumption of normality is tenable but homogeneity of variance was not met when applying Levene's test in SPSS® returning a significance level of .000 (Szapkiw, 2010). The two tailed test results were Welch's t(df) = 29.73 (897), p< .001. Thus, the null hypothesis was rejected, both at the alpha level .05 and .017 with Bonferroni correction. One-tailed test to determine the higher test score mean returned p< .001. In mean writing scores, students from Classical Christian schools (M=55.11, SD=5.74, n=701) scored significantly

higher than students from non-Classical Christian schools (*M*=48.24, *SD*=4 .88, *n*=3,768). The

effect size was high (*d*= 1.37). Eta squared returned $\eta^2 = .318$, indicating that 32% of variation in

dependent variable was explained by independent variable.

CHAPTER FIVE: CONCLUSIONS

Overview

This study indicated that students who are educated utilizing the Essentialist philosophy of acquiring a base of knowledge before moving to higher cognitive levels of analysis, synthesis, and application as illustrated by the developmental model of the Greco-Roman Trivium utilized in Classical Christian schools scored significantly higher on the PSAT than students who were educated utilizing non-Classical methods in Christian schools.

Discussion

The purpose of this quantitative study was to compare mean scores on the PSAT between Classical Christian schools and non-Classical Christian schools to see if there was any difference in academic performance. A statistically significant difference was found after analyzing the data, indicating both a positive effect of the independent variable of instructional method on the dependent variable of PSAT mean score as well as a need for further research to determine which variables correlate to the significant difference found.

As Ritchie et al. (2013) found, traditional methods for memorization of facts indicated superior recall results, which agrees with the developmental design of the Trivium. Edicer (2012) promoted metacognitive exercises (thinking about thinking) as well as integrated and cross-curricular lessons to deepen context. Edicer (2012) also argued that students should master the base knowledge of topics before moving to higher levels of analysis. Nasrollahi-Mouziraji and Nasrollahi-Mouziraji (2015) agreed, stating that younger students should master a base of core knowledge by memorization. These methods are included in the developmental design of the Greco-Roman Trivium practiced by Classical Christian instructors.

The statistically significant difference found in academic performance on PSAT mean reading, math and writing scores for Classical Christian private schools compared to non-Classical Christian private schools attributed to instructional method supports what Yuksel (2014) posited about both prior knowledge and reading ability contributing to substantial gains in mathematics knowledge. Additionally, higher levels of both reading and writing skills combine with a sufficient base of knowledge to aid in development of inferential and critical thinking/higher level cognitive skills (Cervetti and Hiebert, 2015). Wagner and Perels (2012) agreed, arguing that translation skills acquired in Latin instruction transfer to cross-curricular problem solving skills including analysis and synthesis. Acquiring a sufficient base of knowledge prior to developing analytical skills as well as instruction in Latin are hallmarks of the Classical Christian method.

Specifically, the study results of statistically significant higher PSAT mean reading scores for Classical Christian private schools compared to non-Classical Christian private schools supports the findings of Cervetti and Hiebert (2015) that reading skills underlie both inferential reasoning and assessment competencies as well as Edicer's (2012) call for deeper context across disciplines in reading instruction.

Similarly, the statistically significant higher PSAT mean math scores for Classical Christian private schools compared to non-Classical Christian private schools supports the findings of Yuksel (2014) in both prior knowledge base and reading ability contributing to higher performance in mathematics as well as Purnomo et al., (2014) findings that math is best taught to children in procedural order, that is the ordering of instruction from concrete to abstract.

In writing, the statistically significant higher PSAT mean scores for Classical Christian private schools compared to non-Classical Christian private schools supports the findings of

Cervetti and Hiebert (2015) and Coker and Erwin (2010) who found that direct instruction in writing logical arguments improved both cognitive and written language skills. Bandini et al., (2013) argued that reading and writing skills are interdependent in nature, as supported by similar findings in the present study of statistically significant higher mean scores in both of these academic areas for Classical Christian schools.

Results of the statistical analysis of PSAT mean scores also support Henry's (1706b) explanation of the Apostle Paul's instructional method "to consult the capacities of his hearers and teach them as they can bear" (lines 15-16). Henry (1706c) stated that Paul used the illustration of how children learn, first simple precepts and then more difficult concepts as he grows and develops, in his commentary on Hebrews 5:12-14. Bagley's (1911b) Essentialist theory posited that a command of essential basic knowledge frees one's mind for higher level thinking and analysis; results of this study seem to support that theory with significantly higher mean scores on the PSAT college entrance exam as a measure. More investigation is needed into the Essentialist theory of acquiring a core knowledge base prior to introducing more abstract concepts as compared to Progressive pedagogical methods which are more child-centered with student-directed curriculum choices (Kessinger, 2011).

Implications

The implications of this study reach beyond the classroom to include improved teacher training, more institutions training classroom teachers in the Classical Christian methods and philosophy, and more research to identify which variables may hold the most promise as correlated to standardized test performance. Secular teacher training programs should also take note and investigate where techniques, methodologies, and philosophies might be incorporated into current thought or replace current paradigms completely.

Jeynes (2012a, 2012b) found that students scored higher when attending Christian private schools, these associated academic benefits were stable over time, and these associated academic benefits improved minority student scores, closing the perceived gap between majority race counterparts. Classical Christian schools are a subset of Christian private schools and scored significantly higher on the PSAT standardized test in this study. In light of these qualities, it would be important for education policy makers, parents and educators to consider or reconsider the merits of the Essentialist-based developmental approach of the Trivium practiced in Classical Christian schools.

Limitations

Limitations this study included both internal and external validity as well as researcher bias. Internal threats to validity included the maturity, state of mind, health, and attentiveness of each student taking the PSAT as well as the common practice of taking the PSAT more than once in preparation for the SAT (Testmasters, 2017). The present study received averaged scores from school headmasters to allow for the utmost in privacy (no student names can be attributed to any reported score) with scores covering a 10-year period. The researcher had no way of identifying how many times each student took the tests that made up the averaged scores. While teacher preparation was controlled to some extent due to the use of only accredited member schools polled in the ACSI where a minimum of a bachelor's degree is required, the ACCS schools had no such requirement. Similarly, the schools polled for data included all accredited ACSI schools internationally while the only ACCS schools with students old enough and offering the PSAT were located in the United States. While this study utilized real, classroom-generated scores, generalizing the results of the present study to all grade 11 students or another defined population would be an overgeneralization, or a limitation of external validity, according

to Gall et al., (2007, p. 389). The researcher in this study has used rigorous statistical measures (existing mean scores provided by schools, coding for confidentiality, Bonferroni adjustment) to ensure bias would not affect the outcome or reporting. The researcher disclosed that she serves as treasurer in a public charity that aids homeschools and parent groups starting schools who wish to investigate and possibly implement the Classical Christian method.

Recommendations for Future Research

Since Jeynes' (2012a) meta-analysis of 90 studies found that charter school and public school students fell behind their private Christian school counterparts on standardized tests, and this study suggests that the Classical Christian method shows promise in raising standardized test scores, more research should include other standardized test measures to corroborate findings. While Jeynes' (2003, 2008) accounted for social and economic variables, this study did not receive enough returned data to analyze demographic information (16 out of 32 non-Classical and 12 out of 23 Classical Christian schools returned limited demographic data). Most schools reported they did not have such data on hand since private schools are not required to report demographics to the federal government. Field work in a future study could reveal such data from school files. A correlational study would be appropriate at that time to try to identify which variables within the Classical Christian method may hold the most promise for future classroom implementation. The researcher will publish the results of this study as her second scholarly article in a peer-reviewed journal and will be submitting for presentation at conferences to share this study and to provide discussion of how others could use this information.

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APPENDIX A

PSAT Results Survey

2012-2013 (Example of separate form for each of the 10 years requested)

_____ Number of students tested in average scores

Please report average scores for students tested: _____ Cumulative

_____ Critical Reading

_____ Mathematics

_____ Writing

Demographics for 2012-13 year

____ % white ____ % black/African American ____ % Asian

____ % American Indian/Alaska Native ____ % Native Hawaiian or other Pacific Islander

____ % Hispanic or Latino ____ % other race;   ____ average age

_____ % Free or reduced priced lunch; %____ male, %_____ female

(According to the USDA, children from families with incomes at or below 130 percent of the poverty level are eligible for free meals. Those with incomes between 130 percent and 185 percent of the poverty level are eligible for reduced-price meals, for which students can be charged no more than 40 cents. For the period July 1, 2013, through June 30, 2014, 130 percent of the poverty level is $30,615 for a family of four; 185 percent is $43,568. Source: United States Department of Agriculture, National School Lunch Program, http://www.fns.usda.gov/sites/default/files/NSLPFactSheet.pdf)

My school has been providing a _____ Classical _____ non-Classical (please check only one) Christian education for _____ years, aligned with Evangelical Protestant doctrine as professed by the _____ Association of Classical and Christian Schools or the _____ Association of Christian Schools International (may check both). My school __ is __is not (check one) non-denominational. Instructors at our school average _____ years of experience in Christian education, ____ in secular education, and _____ % have a bachelor's, _____ % master's and _____ % doctorate level degree in a content area; _____ % have a bachelor's, _____ % master's and _____ % doctorate level education degree. Students (regardless of level placed) do ____ do not ____ need to pass (check one) a GPA or academic achievement test at a certain level in order to be admitted. Teachers average ____ years of service at my school.

APPENDIX B

Cover Letter

Date: [Insert Date]

[Recipient]
[Title]
[Company]
[Address 1]
[Address 2]
[Address 3]

Dear [Recipient]:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for an Ed.D. The title of my research project is: DIFFERENCES IN SCORES ON PRELIMINARY SCHOLASTIC APTITUDE TEST (PSAT) FOR CLASSICAL CHRISTIAN SCHOOLS COMPARED TO NON-CLASSICAL CHRISTIAN SCHOOLS, and the purpose of my research is to study the effect, if any, of combining Classical teaching methods with those of non-denominational, evangelical Protestant Christian schools.

I am writing to request your participation. It is critical that I receive mean scores from heads of school for statistical analysis. The data will be used to compare PSAT mean school scores from the school years 2003-2004 through 2012-2013.

Informed consent procedures appear on the enclosed sheet. Please take a moment now to read it. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time. I will be pleased to send a summary of the results if you desire.

Thank you for considering my request. If you choose to participate, please respond by mail using the enclosed self-addressed stamped envelope to [researcher's mail address] by [date].

Sincerely,

[Your Name]
[Your Title]

APPENDIX C

IRB Approval

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

January 21, 2016

Christy Anne Vaughan
IRB Application 2408: PSAT

Dear Christy Anne,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because it will not involve the collection of identifiable, private information.

Please note that this decision only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

If you have any questions about this determination or need assistance in identifying whether possible changes to your protocol would change your application's status, please email us at irb@liberty.edu.

LIBERTY
UNIVERSITY.

APPENDIX D

ACSI
STRONGER TOGETHER
Association of Christian Schools International

April, 2016

Office of the Vice President, Academic Affairs

Participation in Research Study for: Christy Anne Vaughan

Derek J. Keenan Ed.D.
Executive Director
ACSI Commission on
Accreditation

Dear School Administrator,

This letter is to urge your positive response to the request to complete a research study for this doctoral candidate. Her topic is comparing the PSAT scores for classical Christian schools to non-classical Christian schools. Christy is conducting this study to complete the requirements for her doctoral studies at Liberty University. The results will be published and will benefit the Christian school movement in the challenging days in which we are serving.

ACSI Headquarters
PO Box 65130
Colorado Springs, CO
80962-5130

I have documented the professional standards and confidential manner in which this research will be conducted. The collection of data and the privacy and reporting of such data will meet the standards for academic research.

Phone
Office 719.528.6906
Fax 719.531.0631

I would encourage you to participate in this study as a value to your school; your own professional development, as well as making a significant contribution to the research base for the Christian school movement. ACSI heartily endorses this research project and we appreciate you giving it serious consideration.

Web