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CHRISTIAN CURRICULAR EMPHASES AND ACADEMIC
RIGOR: A MIXED METHODS STUDY

A Thesis
Presented to
the Faculty of
The Southern Baptist Theological Seminary

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
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December 2016

APPROVAL SHEET

CHRISTIAN CURRICULAR EMPHASES AND ACADEMIC
RIGOR: A MIXED METHODS STUDY

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To Elizabeth: my wife, my best beloved, my educational partner; mother of our children and patient reader of all my work, I could not have completed this without your support.

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LIST OF ABBREVIATIONS

AP	Advanced Placement Program
AP _{avail}	Advanced Placement Courses Available at CESA Schools
CCA	Canonical Correlation Analysis
CESA	Council on Educational Standards and Accountability
CR + M	Critical Reading Plus Mathematics SAT scores
EngIFL	English Course Descriptions with IFL Language
IFL	Integration of Faith and Learning
MANOVA	Multivariate Analysis of Variance
MANCOVA	Multivariate Analysis of Variance with Covariates
MathIFL	Math Course Descriptions with IFL Language
MFIA	Median Family Income for all ZIP codes Bordering a School
MFIZ	Median Family Income for the ZIP Code of a School
NVivo	NVivo 11 from the QSR Corporation
SAT	Scholastic Achievement Test (also Scholastic Aptitude Test)
SAT _{med}	Median Score of SAT
SciIFL	Science Course Descriptions with Integration of Faith and Learning Language
SSIFL Language	Social Studies Course Descriptions with Integration of Faith and Learning
SPSS	Statistical Package for the Social Sciences
TopUniv	Top 50 Colleges and Universities Based on Aggregated Rankings

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PREFACE

This project would not have been possible without the encouragement of current and former leaders in my life, and so I extend thanks to them: to my advisor, Anthony Foster, for your patient care for my academic work and my soul as a father and husband; to John David Trentham, for your tireless efforts on behalf of the SBTS EdD program; Timothy Paul Jones for encouraging my academic writing; to all of my current and former career supervisors, Susan Banke, Ron Farrar, and especially John Murray, who believed in me and knew that I could do this; for the encouragement and good humor of my cohort friends, Nathan Gunter and Jonathan Stuckert; to my research pod, Matt Thomas and Kristen Ferguson, for your editorial eyes and moral support; to my parents, David and Cathy Horner, for your financial, moral, spiritual support; to my dutiful colleagues, Jessica Bonnem and Jesse Breite, who have read and encouraged my writing; to my supportive in-laws, Tony and Norma Mosley, for showing an interest in my academic work, no matter how tedious it sounded; to the leadership of CESA, Brian Kennerly and Charles T. Evans, for your welcoming interest in my project; to Hunter and Becky Holliday, for your support in making possible this EdD; and finally, to my beloved Elizabeth, for your rigorous editing, for your patient understanding of my writing time, for sacrificing your own time to enable me to write, and for teaching our children so well.

Jeff Horner

Austell, Georgia

December 2016

CHAPTER 1

RESEARCH CONCERN

In 1995, Mark Noll wrote *The Scandal of the Evangelical Mind*.¹ In it, he laments that evangelical Christians seem to have adopted, uncritically, the habits of mind of the eighteenth century and have ceased to engage critically the thought trends found in the intellectual world.² Overall, Christians (particularly evangelical Christians, often termed “fundamentalists”) in the twenty-first century suffer from the perception that they are not particularly well-educated.³ Indeed, a recent study published in the journal *Intelligence* found a moderate negative correlation between “fundamentalism” and intelligence.⁴ Consequently, as evangelical Christians establish primary and secondary schools, they may face an uphill battle in portraying themselves as academically rigorous institutions to higher educational institutions. For private Christian schools seeking to provide college preparatory education, the balance between academic rigor and their commitment to Christian curricular emphases has proven tricky. This has been

¹Mark A. Noll, *The Scandal of the Evangelical Mind* (Grand Rapids: W.B. Eerdmans), 1994.

²John Bolt wrote in the *Calvin Theological Journal*, “Noll points us to failures or missteps within evangelicalism itself. ‘The scandal of the evangelical mind,’ he observes in an opening sentence potentially as memorable as Allan Bloom’s famous one, ‘is that there is not much of an evangelical mind,’ ” John Bolt, review of *The Scandal of the Evangelical Mind*, by Mark A. Noll, *Calvin Theological Journal* 31, no. 1 (April 1, 1996): 3. “By evangelical mind, Noll (unlike Wells) does not primarily have theology in mind but the application of Christian thinking to the wide array of human learning. In this there has been a colossal ‘failure to exercise the mind for Christ’ ” (ibid., 7). Carl F. H. Henry comments in his review, “Evangelical scholars are adversely conditioned by secular graduate studies. Competition between evangelical colleges limits their cooperative contribution. The American division of higher education into colleges and seminaries impedes theological input and output” (Carl F. H. Henry, review of *The Scandal of the Evangelical Mind*, by Mark A. Noll, *Journal of the Evangelical Theological Society* 38, no. 1 [March 1, 1995]: 110-12).

³For example, see John G. Messerly, “Religion’s Smart People Problem: The Shaky Intellectual Foundations of Absolute Faith,” *Salon.com*, December 21, 2014, accessed February 6, 2015, http://www.salon.com/2014/12/21/religions_smart_people_problem_the_shaky_intellectual_foundations_of_absolute_faith/.

⁴Gary J. Lewis, Stuart J. Ritchie, and Timothy C. Bates, “The Relationship between Intelligence and Multiple Domains of Religious Belief: Evidence from a Large Adult US Sample,” *Intelligence* 39, no. 6 (January 1, 2011): 468-72.

especially true for Christian schools seeking to place their graduates into top-ranked colleges and universities.

Introduction to the Research Problem

What constitutes academically rigorous Christian education? Researchers in the field of Christian education have tackled this question using the tools of both theology and empirical sciences.⁵ Despite this, no consensus has emerged. As indicated on the websites of peer-reviewed journals on the topic of Christian education, some have aimed at enriching both churches and parachurch organizations (*Christian Education Journal*), while others have focused on the world of Christian schools (*Journal of Research on Christian Education* and *The Journal of Christian Education*).⁶ This study focused on questions related to the academic rigor of K-12 Christian schooling. Even when restricting the question to the field of schooling, there have been multiple venues for examination: curriculum, professional development, assessment, auxiliary programs, student life, etc. This study focused more deeply on questions regarding Christian school

⁵*Christian Education Journal*'s website states, "The purpose of the journal is to strengthen the conception and practice of Christian education in church and parachurch settings through: Encouraging reflection on . . . implications for *ministry* practice; Exploring the integration and application of social science theory and research to *educational ministry* concerns; Fostering improved teaching in the field of Christian education at colleges and seminaries; Providing reviews of new books in the field of Christian education and other related disciplines that impact *educational ministry* [emphasis added]," *Christian Education Journal*, accessed February 6, 2015, <http://journals.biola.edu/ns/cej/about/>. These emphases clarify that this journal sees Christian education as primarily a ministry of the church and not to be concerned with schools.

⁶The website of *The Journal of Education and Christian Belief* states, "The Journal of Education and Christian Belief (ISSN: 1366-5456) is a journal concerned with current educational thinking from a Christian perspective," *Journal of Education and Christian Belief*, accessed February 6, 2015 <http://www.calvin.edu/kuyers/jecb/>. The website of the *Journal of Research on Christian Education* states, "The Journal of Research on Christian Education (JRCE) provides a vehicle for the scholarly interchange of research findings relative to every level of Christian education. Particular emphasis is given to Christian schooling within the Protestant tradition as well as to research findings from other traditions which have implications for such schools. The purposes of the JRCE are . . . to serve as a clearinghouse for the organization and diffusion of emerging research on the Christian school, and (3) to communicate research findings that inform Christian educators as well as the wider society." *Journal of Research on Christian Education*. accessed February 6, 2015, <http://www.tandfonline.com/action/journalInformation?show=aimsScope&journalCode=urce20>. The *Journal of Christian Education*'s website states, "The Journal of Christian Education seeks to relate the Christian faith to all aspects of education at all levels in public, independent and faith-based schools, universities and colleges, and church and community settings as indicated in its statement of purpose. The purpose of this international journal is to consider the implications of the Christian faith for the entire field of education, and to examine its contribution, particularly to educational policy making, leadership, teaching and learning, curriculum and resources, and teacher development," *Journal of Christian Education*, accessed February 6, 2015, <http://www.jce.org.au/about.php>. This is the broadest vision of what Christian education encompasses.

curriculum.

With respect to curriculum, George Posner listed five different conceptions of curriculum: the official curriculum, the operational curriculum, the hidden curriculum, the null curriculum, and the extra curriculum. The official curriculum was what schools say that they teach. The operational curriculum was what actually gets taught. The hidden curriculum is what has been taught implicitly and was seen as highly value-laden. The null curriculum was that which does not get taught or is intentionally excluded.⁷ Finally, the extra curriculum was the learning that occurs outside the classroom setting. Posner's conceptions provided a helpful framework for considering what may be included when examining Christian curricular emphases.

In a similar effort, Arthur Ellis divided curricular approaches into three main categories: learner-centered, society-centered, and knowledge-centered.⁸ However, Ellis's categories omitted a major focus for Christian school curriculum, that of Christ-centered curriculum.⁹ For the purposes of this study, *Christ-centered curriculum* provided a shorthand way of describing how neo-evangelicals' focus on the authority of the Bible and their efforts to make the Bible the center of what they do interacted with their approach to school curricula. Therefore, for the purposes of this study, Ellis's three categories were included in a meta-category consistent with evangelical theological emphases: Christian curricular emphases. While the term Bible-centered would also have been accurate, it could too easily have been confused with the Bebbington quadrilateral's term "biblicism," which describes historical evangelical Christianity's emphasis on the Bible.¹⁰ Since evangelicals have tended to believe that the Bible is

⁷See David J. Flinders, Nel Noddings, and Stephen J. Thornton, "The Null Curriculum: Its Theoretical Basis and Practical Implications," *Curriculum Inquiry* 16, no. 1 (March 1, 1986): 33-42.

⁸Arthur K. Ellis, *Exemplars of Curriculum Theory* (Larchmont, NY: Eye on Education, 2004).

⁹For further reading on the authority of the Bible as held by evangelical Christians, see "Chicago Statement on Biblical Inerrancy," *Journal of the Evangelical Theological Society* 21, no. 4 (December 1, 1978): 289-96.

¹⁰For recent use of the Bebbington quadrilateral, see David Guretzki, "What Does It Mean for Evangelicals to Say They Are 'Saved'?" *One in Christ* 46, no. 1 (June 2012): 79-88.

primarily the story of Christ, calling their meta-categorical approach “Christian curricular emphases” seemed most accurate. Of primary interest for this study was the degree to which Christian curricular emphases provide academic rigor for students at Christian schools.

When Christians have entered into the endeavor of schooling, they have navigated with care because they seek to remain faithful to biblical truth while still equipping students with the knowledge necessary for academic success in the twenty-first century. The rest of this chapter has provided some background information regarding evangelicals and education and then has turned its focus to a presentation of the research problem and its current status in recent literature. Finally, it has presented the research questions that shape the bulk of this study, addressing aspects of one main question: what is the relationship between academic rigor and Christian curricular emphases in academically rigorous Christian schools?

Presentation of the Research Problem

Private Christian schools have striven to differentiate between their vision of education and the vision of competing schools in both the public and private sectors. When comparing themselves to elite, non-sectarian, private schools or high-achieving public schools, Christian schools have asserted their unique ability to address matters touching Christian faith throughout the life of the school and in support of the values of their constituent families. However given the arguments of Messerly or findings of Lewis, Ritchie, and Bates presented in the section above, identifying as evangelical Christians has sometimes meant that private Christian schools may be perceived as less academically rigorous than most elite, non-sectarian private schools. This has raised a significant question: how can private Christian schools measure their academic rigor?

The College Board, an organization founded in 1900 to provide colleges with measurements of student academic ability, has noted that schools considered “religiously-affiliated schools” (not only Christian schools) have had composite SAT scores¹¹ that are a

¹¹Composite scores are Critical Reading + Math (CR+M) for the purposes of this thesis. The Writing

median of 57 points lower than those considered “independent schools.”¹² This study has used three different ways to measure a school’s relative academic rigor: their median performance on the SAT, the presence of AP courses in their curriculum, and their students’ admission to highly rated colleges and universities. When striving to establish themselves as academically rigorous, Christian schools often have modeled their curricula after rigorous models at local, state, and national levels. Most schools in the United States, including Christian schools, have curricula derived largely from recommended high school graduation requirements outlined in the report, *A Nation at Risk*.¹³ This means that they have provided coursework including, but not limited to, English (language arts and literature), mathematics, science (natural sciences), and social studies/history.¹⁴ Consequently, it has been these Core Four areas which this study examined for the purposes of identifying Christian curricular emphases.

In 2012, a select group of schools sought to distinguish themselves as different from other private Christian schools by emphasizing both academic rigor and a “framework of the Christian faith” as reflected in the Nicene Creed. This group of schools, known as the Council for Educational Standards and Accountability (hereafter CESA), has established a set of standards by which other schools can attain, through membership, a distinguished brand of Christian education.¹⁵ Therefore, the official curriculum in the Core Four academic disciplines

Score was introduced in 2006 and phased out in 2015 and therefore has been omitted from this research study.

¹²This nearly 60 point difference is the median of the self-reported median income data from the College Board in every year from 2004-2014; see table A16 in appendix 6.

¹³Valerie E. Lee and Douglas D. Ready, “U.S. High School Curriculum: Three Phases of Contemporary Research and Reform,” *Future of Children* 19, no. 1 (March 1, 2009): 135-56.

¹⁴For a variety of sources citing these subjects as essential parts of US high school graduation requirements see, “State College-and Career-Ready High School Graduation Requirements,” *Achieve, Inc*, accessed February 5, 2015, <http://files.eric.ed.gov/fulltext/ED512103.pdf>; “Aligning High School Graduation Requirements with the Real World: A Road Map for States. Policy Brief,” *Achieve, Inc*, accessed February 5, 2015, <http://files.eric.ed.gov/fulltext/ED499852.pdf>; Kyle M. McCallumore and Ervin F. Sparapani, “The Importance of the Ninth Grade on High School Graduation Rates and Student Success in High School,” *Education* 130, no. 3 (Spring 2010): 447-56; John T. King and Steve Thorpe, “Searching for Global Literacy: Oregon's Essential Skills Movement and the Challenges of Transformation,” *Social Studies* 103, no. 3 (May 2012): 125-32.

¹⁵See CESA, Standard 1.3: “CESA member schools shall reflect their commitment to Christian formation, adhering to the Nicene Creed in programming and promotion.” Standard 1.4: “CESA member schools shall require all board members, faculty, and administration to commit to the institution’s Christian statement of faith incorporating the universal Christian beliefs established within the Nicene Creed in both of its forms.” Standard

for secondary grades of all members of CESA (including Members of Council, Provisional Members, and Candidate Members) should have reflected academic priorities and philosophical priorities consonant with a Christian framework of faith. This study sought to establish the relative academic rigor of CESA schools. Upon doing so, this study then sought to identify the correlation between educating along an explicitly Christian framework, as per CESA guidelines, and overall academic rigor.

Current Status of the Research Problem

Using the term “Christian education” quickly provokes clarifying questions. Exactly who or what makes an educational endeavor “Christian”? What is even meant by the term “Christian education”? Some authors use the term to refer to Sunday School curriculum and church education programs.¹⁶ Others use the term to refer to a school (usually private) in which Christianity holds a central focus.¹⁷ Still others, like John E. Hull, write that Christian education often describes the actions of the teachers and little more, instead becoming “Christians educating.”¹⁸ Other scholars use the term “Christian schooling” to describe the activity of K-12 schools that claim a Christian emphasis and make a distinction between Christian schooling and Christian education.¹⁹ After World War II, a series of court cases provided a strict judicial

4.1.1: “CESA member schools shall build academic programs designed to produce learners distinguished by their intellect, service, and Christian character.” Standard 4.1.2: “CESA member schools shall build academic programs that engage, mind, body, and spirit.” Standard 4.2: “CESA member schools shall develop curriculum that reflects the stated mission of the school and which distinguishes students as desirable candidates for both the workplace and higher education.” Standard 4.2.1: “CESA member schools shall develop curriculum that is academically and intellectually challenging at each level, content rich, and skills driven.” “CESA’s Five Accountability Standards,” accessed February 6, 2015, http://cesaschools.org/sites/default/files/Standards_of_Accountability-Final_Draft.pdf.

¹⁶Fred P. Edie, “Visions, Means, and Ends in Introductory Courses in Christian Education: Role of Christian Education in Theological Education,” *Religious Education* 106, no. 2 (March 2011): 122-46.

¹⁷Stephen Richard Turley, “Paideia Kyriou: Biblical and Patristic Models for an Integrated Christian Curriculum,” *Journal of Research on Christian Education* 18, no. 2 (May 2009): 125-39.

¹⁸John E. Hull, “Aiming for Christian Education, Settling for Christians Educating: The Christian School’s Replication of a Public School Paradigm,” *Christian Scholars Review* 32, no. 2 (2003): 203-24.

¹⁹Adam Laats, “Forging a Fundamentalist ‘One Best System’: Struggles over Curriculum and Educational Philosophy for Christian Day Schools, 1970–1989,” *History of Education Quarterly* 50, no. 1 (February 2010): 55-83.

interpretation of the separation of church and state with regard to schools. Thus, these rulings relegated efforts at Christian schooling to a sphere outside of the public school system.²⁰ These Supreme Court decisions inspired the founding of many private, Christian schools.²¹ When speaking of Christian schooling, inevitably conversations have turned to considerations of which distinctions exist between private, Christian schools and other types of schools. The US Department of Education has categorized private schools both by denomination and by the generic term “conservative Christian” for both fundamentalist and evangelical schools.²² Therefore, those schools which self-identify as private Christian schools have been given a specific category in government statistics. This was appropriate since, according to the data, they constitute 14 percent of all private schools in the United States.²³

Christian Curricular Emphases

One of the main factors distinguishing private Christian education has become

²⁰“The Court held that the use of tax-supported property for religious instruction and the close cooperation between the school authorities and the religious council violated the Establishment clause. Because pupils were required to attend school and were released in part from this legal duty if they attended the religious classes, the Court found that the Champaign system was ‘beyond question a utilization of the tax-established and tax-supported public school system to aid religious groups and to spread the faith’,” “*McCollum v. Board of Education Dist. 71*,” The Oyez Project at IIT Chicago-Kent College of Law, accessed February 15, 2015, http://www.oyez.org/cases/1940-1949/1947/1947_90. “Neither the prayer’s nondenominational character nor its voluntary character saves it from unconstitutionality. By providing the prayer, New York officially approved religion. This was the first in a series of cases in which the Court used the establishment clause to eliminate religious activities of all sorts, which had traditionally been a part of public ceremonies,” “*Engel v. Vitale*,” The Oyez Project at IIT Chicago-Kent College of Law, accessed February 15, 2015, http://www.oyez.org/cases/1960-1969/1961/1961_468. “The required activities encroached on both the Free Exercise Clause and the Establishment Clause of the First Amendment since the readings and recitations were essentially religious ceremonies and were ‘intended by the State to be so.’ Furthermore, argued Justice Clark, the ability of a parent to excuse a child from these ceremonies by a written note was irrelevant since it did not prevent the school’s actions from violating the Establishment Clause,” “*Abington School District v. Schempp*,” The Oyez Project at IIT Chicago-Kent College of Law, accessed February 16, 2015, http://www.oyez.org/cases/1960-1969/1962/1962_142.

²¹For recent articles regarding the academic benefits of Christian schooling, see William H. Jeynes, “Religion, Intact Families, and the Achievement Gap,” *Interdisciplinary Journal of Research on Religion* 3 (January 2007): 1-24.

²²“68 percent of private schools, enrolling 80 percent of private school students and employing 72 percent of private school FTE teachers in 2011–12, had a religious orientation or purpose,” Stephen P. Broughman and Nancy L. Swaim, *Characteristics of Private Schools in the United States: Results From the 2011–12 Private School Universe Survey*, National Center for Education Statistics, accessed February 7, 2015, <http://nces.ed.gov/pubs2013/2013316.pdf>, 2. “*Conservative Christian* schools are those ‘Other religious’ schools with membership in at least one of four associations: Accelerated Christian Education, American Association of Christian Schools, Association of Christian Schools International, or Oral Roberts University Education Fellowship,” *Ibid.*, A-3.

²³*Ibid.*, 10.

Christian curricular emphases, often described as the integration of faith and learning, hereafter IFL. To raise yet another area of argument with regard to independent Christian schools, the degree to which IFL accurately describes Christian curricula has spurred significant debate among those conducting research in the field of Christian education.²⁴ Researchers have studied both the perceptions of and implementation of IFL among teachers and students.²⁵ This work has included the wholesale clarification of the terminology, as seen in the work of Ken Badley. Badley identified seven different paradigms of IFL. He has labeled them: fusion integration, incorporation integration, correlation integration, dialogical integration, perspectival integration, appliqué integration, and incarnational integration.²⁶ This area includes phenomenological examinations of the practice of IFL, as seen in the work of Elizabeth Sites.²⁷ It also includes calls to reject the terminology, replacing it with something new, as seen in the work of Perry Glanzer.²⁸

²⁴For recent works examining Christian curriculum, see Harro W. Van Brummelen, *Steppingstones to Curriculum: A Biblical Path* (Colorado Springs: Purposeful Design Publications, 2002); John Hull, “A Surrejoinder to Harro Van Brummelen,” *Journal of Education & Christian Belief* 13, no. 2 (October 2009): 175-76.

²⁵For recent dissertations examining IFL, see Daniel Carl Peterson, “A Comparative Analysis of the Integration of Faith and Learning between ACSI and ACCS Accredited Schools” (PhD diss., The Southern Baptist Theological Seminary, 2012); Leslie DeAnn Welch, “An Analysis of the Integration of Faith and Learning in Evangelical Secondary Schools” (EdD diss., The Southern Baptist Theological Seminary, 2008); You Jung Yang, “An Analysis of the Integration of Faith and Learning Implemented by Christian Elementary School Teachers” (PhD diss., The Southern Baptist Theological Seminary, 2011). For recent journal articles examining IFL, see Michael Sherr, George Huff, and Mary Curran, “Student Perceptions of Salient Indicators of Integration of Faith and Learning (IFL): The Christian Vocation Model,” *Journal of Research on Christian Education* 16, no. 1 (March 2007): 15-33; Karl G. D. Bailey, “Faith-Learning Integration, Critical Thinking Skills, and Student Development in Christian Education,” *Journal of Research on Christian Education* 21, no. 2 (May 2012): 153-73.

²⁶In his PhD dissertation, Kenneth R. Badley defines four paradigms of integration—fusion, incorporation, correlation, and dialogical. Kenneth R. Badley, “‘Intergration’ and ‘The Integration of Faith and Learning’ ” (PhD diss., The University of British Columbia, 1986), 64-77. Badley provided a fifth paradigm—perspectival—in an article published in 1994. Kenneth R. Badley, “The Faith/Learning Integration Movement in Christian Higher Education: Slogan or Substance?” *Journal of Research on Christian Education* 3, no. 1 (Spring 1994): 24-25. Yang cited Badley’s 1994 article extensively in his own PhD dissertation. In 2009, Badley updated his work to include two new descriptors—appliqué and incarnational—for a total of seven descriptive conceptions of IFL. Kenneth R. Badley, “Clarifying ‘Faith-Learning Integration’: Essentially Contested Concepts and the Concept-Conception Distinction,” *Journal of Education & Christian Belief* 13, no. 1 (Spring 2009): 7-17.

²⁷Elizabeth C. Sites et al., “A Phenomenology of the Integration of Faith and Learning,” *Journal of Psychology & Theology* 37, no. 1 (Spring 2009): 28-38.

²⁸Perry L. Glanzer, “Why We Should Discard ‘the Integration of Faith and Learning’: Rearticulating the

While case studies and phenomenological studies provide descriptions of the practice of IFL, Christian curricular emphases may find expression in ways not examined in studies of IFL. Glanzer’s rearticulation of IFL has influenced this present study and has therefore been elaborated. Glanzer argues that IFL should be more appropriately termed the “creation and redemption of scholarship . . . unabashedly using theological language.”²⁹ He argues six advantages for using this term: (1) “This language communicates the Christian scholar’s highest calling to imitate the model and actions of the triune God”;³⁰ (2) “It counters narrow conceptions of both the Christian scholar’s task and the Christian student’s calling”;³¹ (3) “Rearticulating the mission of Christian scholars with language drawn from the Christian narrative could help identify problematic understandings and critiques of the Christian scholar’s task”;³² (4) “It avoids two dangerous vices that are reinforced . . . epistemological arrogance and timidity”;³³ (5) “It may help reshape views about the limited relationship between Christianity and disciplines not always seen as amenable to integration”;³⁴ and (6) “It captures both the conservative and progressive perspective the Christian scholar should take when engaging in scholarly work.” Ken Badley, wrote approvingly of Glanzer’s proposal, “[This] is a possibility deserving serious consideration.”³⁵ Glanzer’s “creation and redemption of scholarship” meshes easily with Badley’s most comprehensive paradigm of IFL – perspectival; however, this study has sought only to ascertain the presence of Badley’s paradigms, leaving Glanzer’s helpful proposal for further research. When considering Badley’s categories in light of Glanzer’s proposal, it appears

Mission of the Christian Scholar,” *Journal of Education & Christian Belief* 12, no. 1 (Spring 2008): 41-51.

²⁹Ibid., 43.

³⁰Ibid.

³¹Ibid., 44.

³²Ibid., 45.

³³Ibid., 46-47.

³⁴Ibid., 47.

³⁵Badley, “Clarifying ‘Faith-Learning Integration’,” 8.

that his paradigms of IFL could be explained as Christian curricular emphases. This study has examined the official core academic curriculum as well as the presence or non-presence of a Bible or Christian studies curriculum among CESA schools. Therefore, Badley's terminology has guided the directed content analysis of core curricular descriptions as a means of assessing the Christian curricular emphases of CESA schools.³⁶

Academic Rigor

Similarly to the controversy over the term Christian education, the term "academic rigor" provokes heated debate in the educational world.³⁷ Many researchers have used standardized test scores, such as the SAT, as a proxy for a given school's academic rigor. However, the College Board's own data has revealed gaps between racial groups, income groups, and gender with regard to SAT scores.³⁸ Other researchers have used a competing test company, the ACT, for much the same purposes.³⁹ The two companies have established a

³⁶"In the sphere of campus life, many institutions require students to attend chapel. . . . Curriculum and courses offer another venue for expressions of Christian faith. . . . Professors and teachers will develop and assess assignments in view of the Christian institution's mission," Badley, "Clarifying 'Faith-Learning Integration'," 8.

³⁷For recent articles regarding the academic rigor, see William G. Wraga, "What's the Problem with a 'Rigorous Academic Curriculum'? Setting New Terms for Students' School Experiences," *Clearing House* 84, no. 2 (March 2011): 59-64; David Berliner, "Rational Responses to High Stakes Testing: The Case of Curriculum Narrowing and the Harm That Follows," *Cambridge Journal of Education* 41, no. 3 (September 2011): 287-302; John Draeger et al., "The Anatomy of Academic Rigor: The Story of One Institutional Journey," *Innovative Higher Education* 38, no. 4 (August 2013): 267-79; Kristen Campbell Wilcox and Janet Ives Angelis, "High School Best Practices: Results from Cross-Case Comparisons," *High School Journal* 94, no. 4 (Summer 2011): 138-53. The College Board (creator of the SAT) publishes an annual report on their test and its results in terms of academic rigor: College Board, "9th Annual AP Report to the Nation," 2009.

³⁸The College Board is the parent company that develops and provides opportunities for students to take the SAT. Formerly an acronym for the Scholastic Aptitude Test, this term is now common parlance for the SAT Reasoning Test. See Ida Lawrence et al., "A Historical Perspective on the Content of the SAT," accessed February 16, 2015, <http://www.ets.org/Media/Research/pdf/RR-03-10-Lawrence.pdf>. For recent dissertations that cite the SAT as a measurement of academic excellence see, Secceter Yolanda Phillips Jones, "Analysis of High School Per Pupil Expenditures on Selected Indicators of the Academic Excellence Indicator System" (EdD diss., Texas Southern University, 2007); Dion D. Daly, "The Relationship between College-Level Learning in High School and Post-Secondary Academic Success" (PhD diss., State University of New York at Buffalo, 2009).

³⁹Formerly an acronym for the American College Testing service, this term is now common parlance for the ACT, a college readiness test. See "ACT History," accessed February 16, 2015, <http://www.act.org/aboutact/history.html>. For recent dissertations that examine the ACT as a measurement of academic excellence, see Andrew Marc Jones, "High School Factors That Influence ACT Test Scores" (EdD diss., Cardinal Stritch University, 2008); Lisa Hichens, "College Readiness of 11th Grade Students: Identifying Characteristics Related to Success on the ACT" (EdD diss., Aurora University, 2009). Hichens's work specifically examines the relationship between the ACT and classroom academic rigor.

conversion table that allows for comparisons between the two tests, which are scored on very different scales.⁴⁰ Another proxy for determining academic rigor comes through evaluating the extent of a school's Advanced Placement courses (hereafter, AP courses). AP courses have been designed by the College Board to provide a college-level course and in many cases have been afforded credit by exam for high-level student performance.⁴¹ Numerous studies have used student work done for AP courses as a measure of academic rigor.⁴² A third proxy for examining academic rigor is the ranking of colleges to which students are admitted.⁴³ If students have been admitted to top-ranked colleges and universities, then it is more likely that those higher educational institutions perceived a given secondary school as graduating students who have demonstrated academic rigor. While an imperfect measurement, this has provided some indication of the overall academic rigor of an academic program at a secondary school. Since top-ranked colleges and universities have an interest in admitting students who could flourish academically in their programs, it is likely that they would only admit students judged to have

⁴⁰“ACT–SAT Concordance: A Tool for Comparing Scores,” accessed February 3, 2015, <http://www.act.org/aap/concordance/pdf/reference.pdf>; “ACT and SAT Concordance Tables,” accessed February 3, 2015. <http://research.collegeboard.org/sites/default/files/publications/2012/7/researchnote-2009-40-act-sat-concordance-tables.pdf>

⁴¹*AP Courses and Exams*, accessed February 3, 2015, <http://apcentral.collegeboard.com/apc/public/courses/index.html>.

⁴²For recently published examinations of AP courses in terms of academic rigor, see Timothy P. Scott, Homer Tolson, and Lee Yi-Hsuan, “Assessment of Advanced Placement Participation and University Academic Success in the First Semester: Controlling for Selected High School Academic Abilities,” *Journal of College Admission* no. 208 (Summer 2010): 26-30; Mary E. M. McKillip and Anita Rawls, “A Closer Examination of the Academic Benefits of AP,” *Journal of Educational Research* 106, no. 4 (July 2013): 305-18; Jack Schneider, “Privilege, Equity, and the Advanced Placement Program: Tug of War,” *Journal of Curriculum Studies* 41, no. 6 (December 2009): 813-31; Hope E. Wilson and Jill L. Adelson, “College Choices of Academically Talented Secondary Students,” *Journal of Advanced Academics* 23, no. 1 (February 2012): 32-52; C. Kirabo Jackson, “Do College-Preparatory Programs Improve Long-Term Outcomes?” *Economic Inquiry* 52, no. 1 (January 2014): 72-99; Shannon M. Suldo and Elizabeth Shaunessy-Dedrick, “The Psychosocial Functioning of High School Students in Academically Rigorous Programs,” *Psychology in the Schools* 50, no. 8 (September 2013): 823-43; David M. Lang, “Class Rank, GPA, and Valedictorians: How High Schools Rank Students,” *American Secondary Education* 35, no. 2 (Spring 2007): 36-48.

⁴³For recent research into college selectivity, see Alexis Brooke Redding, “Extreme Pressure: The Negative Consequences of Achievement Culture for Affluent Students during the Elite College Admission Process,” *Journal of College Admission* no. 221 (Fall 2013): 32-37. She defines selective colleges as those who have a selectivity rate less than 25 percent. Richard Sawyer, “Beyond Correlations: Usefulness of High School GPA and Test Scores in Making College Admissions Decisions,” *Applied Measurement in Education* 26, no. 2 (April 2013): 89-112.

the necessary secondary training for higher education. Therefore, ranking the selectivity of the colleges and universities to which a high school's graduates are admitted can provide a rough proxy for the overall academic rigor of that high school. This study intended to evaluate CESA schools in light of these three listed proxies for academic rigor at those schools: median SAT scores, percentage of AP courses offered at a school, and acceptance at highly ranked US colleges and universities. These three proxy measurements for academic rigor provide the foundation from which the relationship between IFL and academic rigor may be ascertained.

Research Purpose

Private Christian schools strive to differentiate themselves from competing schools in both the public and private sectors. However, Christian schools have curricula largely derived from public school categories outlined in the governmental report *A Nation at Risk*.⁴⁴ In 2012, a select group of schools sought to distinguish themselves as different from other private Christian schools by emphasizing academic rigor and a “framework of the Christian faith” as reflected in the Nicene Creed. This group of schools, known as the Council for Educational Standards and Accountability (hereafter CESA), has established a set of standards by which other schools can attain membership and a distinguished brand of Christian education. By comparing these schools’ academic rigor while controlling for the influence of income factors, this study has sought to identify the correlation of educating along an explicitly Christian framework and academic rigor, as per CESA guidelines.⁴⁵ The official course descriptions of the secondary

⁴⁴Items 1-4 list English, mathematics, science, and social studies as the first four priorities for improving American education. Those Core Four subjects are common across almost all schools. “Recommendation A: Content,” *A Nation at Risk*, accessed July 10, 2014, <http://www2.ed.gov/pubs/NatAtRisk/index.html>.

⁴⁵Council on Educational Standards and Accountability (CESA), Standards of Accountability, accessed October 3, 2014, http://cesaschools.org/sites/default/files/Standards_of_Accountability-Final_Draft.pdf CESA Standard of Accountability 1.3: “CESA member schools shall reflect their commitment to Christian formation, adhering to the Nicene Creed in programming and promotion.” CESA Standard of Accountability 1.4: “CESA member schools shall require all board members, faculty and administration to commit to the institution’s Christian statement of faith incorporating the universal Christian beliefs established within the Nicene Creed in both of its forms.”

grades of members of CESA should therefore reflect both academic curricular priorities and philosophical priorities consonant with a Christian framework of faith.

Research Population

CESA members' course descriptions constitute the research population for this study. This study was a census of members of CESA as of February 2016. This includes "Members of Council," "Provisional Members," and "Candidate Members." (1) Brentwood Academy (Brentwood, TN); (2) The Brook Hill School (Bullard, TX); (3) Charlotte Christian School (Charlotte, NC); (4) Christian Academy of Knoxville (Knoxville, TN); (5) Cincinnati Hills Christian Academy (Cincinnati, OH); (6) Cornerstone Academy (Chicago, IL); (7) Cornerstone Christian Academy (Bloomington, IL); (8) Dallas Christian School (Dallas, TX); (9) The First Academy (Orlando, FL); (10) First Presbyterian Day School (Macon, GA); (11) Grace Community School (Tyler, TX); (12) Greater Atlanta Christian School (Norcross, GA); (13) Hill Country Christian School (Austin, TX); (14) Houston Christian High School (Houston, TX); (15) Kansas City Christian School (Prairie View, KS); (16) Legacy Christian Academy (Frisco, TX); (17) Life Christian Academy (Tacoma, WA); (18) Little Rock Christian Academy (Little Rock, AR); (19) Mount Paran Christian School (Kennesaw, GA); (20) Mt. Pisgah Christian School (John's Creek, GA); (21) Norfolk Christian Schools (Norfolk, VA); (22) Northside Christian Academy (Charlotte, NC); (23) Prestonwood Christian Academy (Plano, TX); (24) Providence: A Santa Barbara Christian School (Santa Barbara, CA); (25) Santa Fe Christian Schools (Solana Beach, CA); (26) Savannah Christian Preparatory School (Savannah, GA); (27) Second Baptist School (Houston, TX); (28) Stillwater Christian Academy (Kalispell, MT); (29) Valor Christian School (Highlands Ranch, CO); (30) Village Christian Schools (Sun Valley, CA); (31) Westminster Schools of Augusta (Augusta, GA); (32) Wesleyan School (Norcross, GA); (33) Westminster Christian Academy (St. Louis, MO); (34) Wheaton Academy (West Chicago, IL); (35) Whitefield Academy (Mableton, GA); (36) Whittier Christian High School (Whittier, CA). This list is reproduced with additional levels of detail in table A2 in appendix 2.

Research Questions

The ample amount of recent research in the interlocking fields of Christian education, academic rigor, and Christian curricular emphases proves that these are fruitful areas for study. Therefore, the intersection of these terms raises three overarching questions, especially when examining a self-selected organization that defines itself as both academically rigorous and thoroughly Christian.

1. How are Christian curricular emphases at CESA schools expressed, as reflected in the presence of Bible courses and integration of faith and learning language in core curricula (English/language arts, history/social studies, mathematics, and science)?
2. How academically rigorous are CESA school curricula as reflected by median SAT scores, AP courses, and top-ranked college and university acceptances at Top 50 World University Rankings universities?
3. What is the relationship between the presence of Christian curricular emphases and overall academic rigor at CESA schools?

Delimitations of Research

The research was limited to secondary grades programs at CESA member schools as of February 2016.⁴⁶ However, since this study has considered all CESA schools, it constituted a census of the research population.

The research population consisted of publically available documents: published course descriptions for English, mathematics, science, and social studies courses taught in secondary grades at CESA schools. The research population has also examined the presence or non-presence of Bible and Christian Studies courses at CESA schools. The research population has also considered school profiles, which are publically available documents, from every CESA member school to provide lists of AP courses offered and median SAT and ACT scores. Finally, the tuition data for every CESA school with a secondary program was part of the research population.

⁴⁶See “Institutional Membership Application,” CESA, accessed February 28, 2016, http://cesaschools.org/sites/default/files/Institutional_Membership_Application_13-14_Form_1.pdf.

Terminology

Academic rigor. The measurements of a secondary school's academic program, which for the purposes of this study are number of AP courses available (AP_{avail}), median SAT scores (SAT_{med}), and acceptance to top ranked colleges and universities (TopUniv).

ACT. The test conducted six times a year by the American College Testing company.⁴⁷ It is one of two major college admissions tests taken by American students. This test and its competitor, the SAT, have created a conversion table that allows for between test comparisons.⁴⁸

AP. The Advanced Placement program conducted by the College Board, which is a division of the Educational Testing Service. The College Board provides course audits, syllabi, and annual tests conducted nationally in May of each year since 1954. The College Board offers thirty-three Advanced Placement tests, and many colleges and universities accept scores on those tests as equivalent to one of their own courses.⁴⁹

AP_{avail}. A measure of the number of AP courses offered by a secondary school divided by the number of total AP courses available in the College Board's list of AP courses in the Core Four courses and expressed as a ratio of the number of students. Schools with more students have a greater number of faculty and can offer more AP courses.

CESA. The Council on Educational Standards and Accountability was founded in 2008 to provide an organization with high standards for Christian schools. It currently has approximately 34 members nationally.⁵⁰

Christian curricular emphases. This term attempts to capture one aspect of the

⁴⁷Formerly an acronym for the American College Testing service, this term is now common parlance for the ACT, a college readiness test. See "ACT History," accessed February 16, 2015, <http://www.act.org/aboutact/history.html>.

⁴⁸"ACT[®]-SAT[®] Concordance: A Tool for Comparing Scores," accessed February 3, 2015, <http://www.act.org/aap/concordance/pdf/reference.pdf>; "ACT and SAT[®] Concordance Tables," accessed February 3, 2015, <http://research.collegeboard.org/sites/default/files/publications/2012/7/researchnote-2009-40-act-sat-concordance-tables.pdf>.

⁴⁹"A Brief History of the Advanced Placement Programs," accessed February 28, 2016, http://www.collegeboard.com/prod_downloads/about/news_info/ap/ap_history_english.pdf.

⁵⁰"About CESA," accessed February 28, 2016, <http://cesaschools.org/content/about-cesa>; Charles Evans, "Prologue: The CESA Story," email message to author, September 13, 2015.

integration of faith and learning by highlighting the presence, within Christian school official curriculum, of items of significance for understanding learning from a Christian point of view based on course offerings.

Christian school. A school that professes, as part of its mission statement or purpose, faith in the orthodox, classic Christian doctrines as demonstrated through history. Peterson asserts that a Christian school's "[curriculum] will seek to impart a biblical worldview in all aspects of life. A Christian school will utilize Christian doctrines as set forth in Scripture as the foundation for all teaching."⁵¹

College Board. The division of Educational Testing Services dedicated to distinguishing high achieving, high school students who are well-prepared for college learning.

Core Four. A shorthand way of describing the four main areas of academic study pursued in virtually every American school. These four areas are English, math, social studies, and science.⁵²

Curriculum. This single term provides the grounds for a broad range of understandings within an expansive field of study. The most basic definition, though, comes from Arthur K. Ellis, who writes, "Curriculum means, roughly, a course, as in a running course. Over time and for school purposes, it has come to signify a course of study."⁵³

IFL. This acronym for the integration of faith and learning is also sometimes rendered FIL or F/LI. The term seeks to describe the bringing together of Christian faith and academic learning in various forms.⁵⁴

⁵¹Peterson, "A Comparative Analysis of the Integration of Faith and Learning," 18.

⁵²For a variety of sources citing these subjects as essential parts of US high school graduation, see "State College-and Career-Ready High School Graduation Requirements," *Achieve, Inc* (May 1, 2010), accessed February 5, 2015, <http://files.eric.ed.gov/fulltext/ED512103.pdf>; "Aligning High School Graduation Requirements with the Real World: A Road Map for States. Policy Brief," *Achieve, Inc* (December 1, 2007), accessed February 5, 2015. <http://files.eric.ed.gov/fulltext/ED499852.pdf>; Kyle M. McCallumore and Ervin F. Sparapani, "The Importance of the Ninth Grade on High School Graduation Rates and Student Success in High School," *Education* 130, no. 3 (Spring 2010): 447-56; John T. King and Steve Thorpe, "Searching for Global Literacy: Oregon's Essential Skills Movement and the Challenges of Transformation," *Social Studies* 103, no. 3 (May 2012): 125-32.

⁵³Ellis, *Exemplars of Curriculum Theory*, 3.

⁵⁴See Badley, "Clarifying 'Faith-Learning Integration'"; Glanzer, "Why We Should Discard 'the

SAT. The Scholastic Admissions (sometimes Aptitude) Test administered since 1901 by the College Board. This test originally sought to identify highly qualified high school students for colleges and universities. Currently, the letters SAT do not stand for any set of words but instead are an indicator of the battery of Critical Reading, Writing, and Mathematics tests administered by the College Board seven times a year.⁵⁵

Secondary education. American school grades 9, 10, 11, and 12, distinguished from primary education (grades kindergarten through fifth grade) or middle grades education (grades 6, 7, and 8).

Top-ranked college or university. These are US colleges and universities ranked in the top fifty in one of four different rankings systems for either US or world universities.⁵⁶

World university rankings. A measure by one of several organizations attempting to rank top universities around the world. For the purposes of this study, only universities in the United States are measured according to four different rankings.⁵⁷

Top 50 universities. This represents the aggregate score of university and college rankings for the purpose of assessing a high school's success at helping students achieve admission to top-ranked colleges and universities.⁵⁸

Integration of Faith and Learning””; Peterson, “A Comparative Analysis of the Integration of Faith and Learning”; Yang, “An Analysis of the Integration of Faith and Learning”; and Welch, “An Analysis of the Integration of Faith and Learning in Evangelical Secondary Schools.”

⁵⁵See Ida Lawrence et al., “A Historical Perspective on the Content of the SAT,” accessed February 16, 2015, <http://www.ets.org/Media/Research/pdf/RR-03-10-Lawrence.pdf>.

⁵⁶“Ranking Colleges by Selectivity,” accessed September 13, 2015, <http://www.nytimes.com/interactive/2013/04/04/business/economy/economix-selectivity-table.html>.

⁵⁷See “Metauniversity Ranking,” accessed September 12, 2015, <http://www.metauniversityranking.com/>; “QS World University Rankings,” accessed September 12, 2015, <http://www.topuniversities.com/university-rankings>; “University Ranking by Academic Performance,” accessed September 13, 2015, <http://www.urapcenter.org/2014/world.php?q=MS0yNTA=>; “Academic Ranking of World Universities,” *Shanghai Ranking*, accessed March 15, 2016, <http://www.shanghairanking.com/>; “Public University Honors,” accessed March 15, 2016, <http://publicuniversityhonors.com/2015/06/13/u-s-news-national-university-rankings-2008-present/>.

⁵⁸Moskovkin et al., “Aggregate Rankings of the World's Leading Universities,” accessed September 12, 2015, <http://www.webology.org/2015/v12n1/a133.pdf>.

Methodological Design

The research was descriptive in nature. This mixed method study has used a convergent data-transformation design in which the qualitative research entailed performing a content analysis to determine the presence of Christian curricular emphases and the quantitative research assessed academic rigor from CESA school profile data about SAT, AP courses, and recent college acceptances. The study involved a concurrent data collection process for both quantitative and qualitative data, followed by a data transformation process in which qualitative data was quantitized. After quantitizing the qualitative data, Christian curricular emphases data and academic rigor data were analyzed to assess the relationship between Christian curricular emphases in four core academic fields and median SAT scores, percentage of AP courses offered, and acceptance into highly ranked colleges.⁵⁹

The extent to which CESA schools' Christian curricular emphases correlate to their academic priorities was the basis of this research problem. The qualitative stage involved a directed content analysis of CESA schools' published course descriptions for English, social studies, sciences, and mathematics courses. Course descriptions additionally revealed whether CESA member schools had separate Bible or Christian Studies courses. CESA member schools' course curricula and course descriptions were examined using word frequency counts of terms highlighted as important in Kenneth Badley's five paradigms of Faith/Learning Integration from his 1994 article IFL literature.⁶⁰ The content analysis was applied to the Core Four (English, mathematics, science, and social studies) course descriptions in secondary grades at CESA

⁵⁹“The data transformation variant occurs when researchers implement the convergent design using an unequal priority, placing greater emphasis on the quantitative strand, and using a merging process of data transformation. . . . [this] allows the results from the qualitative data set to be combined with the quantitative data and results through direct comparison, interrelation, and further analyses,” John W. Creswell, “Choosing a Mixed Methods Design,” in *Designing and Conducting Mixed Methods Research*, 2nd ed. (Thousand Oaks, CA: Sage Publications, 2010), chap. 3, p. 81, accessed October 23, 2015, https://us.sagepub.com/sites/default/files/upm-binaries/35066_Chapter3.pdf. Elizabeth G. Creamer and Michelle Ghoston, “Using a Mixed Methods Content Analysis to Analyze Mission Statements from Colleges of Engineering,” *Journal of Mixed Methods Research* 7, no. 2 (April 1, 2013): 110-20.

⁶⁰Though Badley expanded his definition in 2009 to include two additional categories, they are more qualitatively defined (one, *appliqué*, through tone, and one, *incarnational*, through embodied Christian faith) and therefore were harder to ascertain through course descriptions.

schools. The CESA standards led to an expectation of Christian content in the school's courses present through a specific Christian Studies or Bible curriculum and/or an explicit integration of faith through the course descriptions. The content analysis revealed the frequency of use of Christian specifications in course descriptions of the Core Four. If a separate Bible curriculum is absent, then the course descriptions were the primary basis for establishing whether a school has Christian curricular emphases and the extent of those in the instructional life of the school.

The quantitative stage developed a baseline for assigning the term “academic rigor” to CESA schools while controlling for their tuition and demographic data – schools with higher income levels should have seen commensurately higher SAT scores. This stage established a baseline for comparing Christian school rigor from expected SAT scores based on national averages for a given income band. Once established, that baseline was applied to all members of the CESA by examining SAT and ACT scores (as converted to SAT scores through the College Board and ACT Corporations mutual conversion tables), AP course offerings, and college acceptances at highly ranked US colleges. These findings were then analyzed using quantitative data to examine the correlation between academic rigor and Christian curricula. Once the findings were analyzed, grouped and refined, a descriptive master framework of private Christian curricular emphases and academic rigor at CESA schools emerged, based on the findings. These findings enable the development of an exemplar curriculum description which displays both academic rigor and Christian curricular emphases.

Research Assumptions

1. All information accessible to a member of the general public via electronic formats, email, websites, or otherwise, was considered public data.
2. Public data was an accurate reflection of the intention of the institution publishing the data.
3. Public data was accurate as published.
4. Special permissions were not required for anonymous data analysis for research purposes.
5. Badley had accurate characterizations of IFL.

Procedural Overview

This mixed methods study followed a convergent data transformation methodology. I collected SAT, AP course, and college admissions information from the most recently published information on all CESA schools within the delimitations of the study. I next collected the tuition costs for the school and median family income data for the zip codes surrounding the schools. I then collected all course descriptions of English, social studies, mathematics, and science courses for grades nine through twelve. Those course descriptions were converted into PDF format for the *NVivo 11* software to analyze. The content analysis performed by *NVivo 11* followed a directed content analysis format to determine the presence of IFL language in those course descriptions. Once the qualitative data were transformed into dichotomous data, I performed a multivariate analysis of variance with covariates (tuition and aggregate of median family income for the ZIP codes of the school and bordering the school's ZIP code) to determine the relationship between the dependent variables (median SAT, percentage of AP courses, and admission to top-ranked colleges and universities) and the independent variables (presence or non-presence of Bible courses and IFL language in Core Four courses of English, mathematics, science, and social studies).

Conclusion

This study examined the intersection of two distinct phenomena among the members of CESA. The schools of CESA have voluntarily identified themselves as academically rigorous and intentionally Christian schools. Therefore, this new alignment of private Christian schools provided an appropriate pool for examining the relationship between academic rigor and the creation and redemption of scholarship. First, this study identified all the members of CESA in order to conduct a census of their indicators of academic rigor. Once that information was gathered and examined, this study conducted a second census of their degree of Christian curricular emphases using Badley's 1994 paradigms. By examining the integration of faith and learning as articulated by the members of CESA, this study sought to identify the correlation between academic rigor and various indicators of Christ-centered curricula.

CHAPTER 2

PRECEDENT LITERATURE

Both academic rigor and Christian curricular emphases encompass widely varying fields. The literature from those two fields presented here represents merely a sampling of the manifold volumes of books, articles, and published studies available. Nevertheless, this review of the literature sought to fairly and robustly address the major strains of thought in these two broad fields. In order to firmly establish these two fields as pertinent to Christian schools and proper fields of study at a theological institution, this chapter begins by addressing the biblical theological foundations of education and then turns to a discussion of the qualitative and quantitative variables under examination in this mixed methods study.

Foundations of Christian Education for the Study

Before considering the literature concerning the variables examined in this study, this project first examines the biblical and theological foundations for Christian education. In 1981 Graendorf wrote and edited *Introduction to Biblical Christian Education*.¹ Graendorf grounded his work in a belief in the authority of the Bible. He observed, “[Biblical Christian education] has its roots in God’s dealing with His people from back in Genesis 18. As biblical, the education we are discussing finds its orientation in God and looks to His Word for an understanding of its meaning and place.” Graendorf also believed that Christian education took on a multiplicity of forms. He wrote, “The varied forms of Christian education offer an extensive and exciting choice for productive outreach and ministry. The multi-faceted Christian camp, *Christian day school*, sturdy Sunday school, home Bible class, children’s church, and the whole realm of Christian

¹Werner C. Graendorf, “The Challenge of Biblical Christian Education,” in *Introduction to Biblical Christian Education*, ed. Werner C. Graendorf (Chicago: Moody Press, 1981), 13.

higher education – all are educational channels for contemporary Christian impact, [emphasis added].”² Graendorf therefore gave clear support for examining Christian schooling as a part of Christian education. Supplementing Graendorf’s assertions in the same book, Edward L. Hayes bolstered the case for examining how Christian educators integrate the Bible into their courses. Hayes noted, “A basic presupposition for the evangelical Christian educator then, is an authoritative Word.”³ These two assertions provided a basic biblical theological foundation for examining Christian schools.

In 1997, Pazmiño wrote *Foundational Issues in Christian Education* in which he explained both topics with regard to Christian education.⁴ He noted that Christian education has precedent in both the practices of the nation of Israel in the Old Testament and in the practices of the church in the New Testament.⁵ Pazmiño suggested, “All educators have models or approaches that guide their thought and practice. In most cases, these models remain unexamined. The challenge for Christians is to examine their models for education to make them explicit and to undergird them with biblical foundations.”⁶ Therefore, this study uses Pazmiño’s work to make explicit the educational task as a deeply theological act. Pazmiño notes, “Education at its best must be God-centered, seeing God as the source. Educators are called to integrate all areas of knowledge with God’s revelation.”⁷ It is important at this point to observe that Pazmiño’s vision for Christian education largely expresses itself in terms most familiar to

²Graendorf, “The Challenge of Biblical Christian Education,” 20-21.

³Edward L. Hayes, “The Biblical Foundations of Christian Education” in *Introduction to Biblical Christian Education*, ed. Werner C. Graendorf (Chicago: Moody Press, 1981), 25.

⁴Robert W. Pazmiño, *Foundational Issues in Christian Education: An Introduction in Evangelical Perspective* (Grand Rapids: Baker Book House, 1988).

⁵He wrote, “Several foundations can be identified in both the Old and the New Testaments. These biblical sources provide models or approaches even at the basic level of a commonsense reading of the text,” *ibid.*, 19. He discussed Deut 30:11-20; Deut 31:9-13; Deut 30-32:4; Ps 78, Neh 8:1-18; “Wisdom Literature”; “Prophetic Literature” – specifically Ezekiel; the Gospels of Matthew and Luke; 1 Cor 2:6-16; Ephesians; Colossians and Philippians together; the Gospel of John; and Hebrews. *Ibid.*, 24-46.

⁶*Ibid.*, 19.

⁷*Ibid.*, 33.

theological institutions and church-based ministry settings. He did not explicitly address the applicability of his observations to secondary education, as Graendorf's comment might provide warrant for doing. Nevertheless, Pazmiño did allude to the relationship between Christian curricular emphases and academic rigor when he wrote, "The appeal to a strictly theoretical or academic agenda that addresses the mind divorced from affections and actions cannot claim to be faithful to the biblical tradition."⁸ It is this intersection between the affections and the academic agenda that marked Christian education, and by derivation, Christian schooling. Therefore, since Christian schooling stood as a subset of Christian education, Pazmiño's assertions do apply, at the theoretical level, to secondary grades programs at Christian schools.

Pazmiño's work has influenced several doctoral dissertations discussed later in this literature review. For example, Daniel C. Peterson's 2012 dissertation used Pazmiño's definition of Christian education. Pazmiño wrote,

Christian education is the deliberate, systematic, and sustained divine and human effort to share or appropriate the knowledge, values, attitudes, skills, sensitivities, and behaviors that comprise or are consistent with the Christian faith. It fosters the change, renewal, and reformation of persons, groups, and structures by the power of the Holy Spirit to conform to the revealed will of God expressed in the Scriptures and preeminently in the person of Jesus Christ, as well as any outcomes of that effort.⁹

Pazmiño's work also influenced You Jung Jang,¹⁰ Mark Eckel,¹¹ Leslie DeAnn Welch,¹² and Anthony W. Foster,¹³ all of whom used Pazmiño's writings to help form their definitions of

⁸Robert W. Pazmiño, *Foundational Issues in Christian Education: An Introduction in Evangelical Perspective*, 3rd ed. (Grand Rapids: Baker Book House, 2008), 33.

⁹Ibid., 87.

¹⁰You Jung Yang, "An Analysis of the Integration of Faith and Learning Implemented by Christian Elementary School Teachers" (PhD diss., The Southern Baptist Theological Seminary, 2011), 11, 57, 63-65, 84-85.

¹¹Mark David Eckel, "A Comparison of Faith-Learning Integration between Graduates from Christian and Secular Universities in the Christian School Classroom" (PhD diss., The Southern Baptist Theological Seminary, 2009), 26, 30, 32, 64.

¹²Leslie DeAnn Welch, "An Analysis of the Integration of Faith and Learning in Evangelical Secondary Schools" (Ed.D diss., The Southern Baptist Theological Seminary, 2008), 6, 7, 13, 21, 22, 25, 34.

¹³Anthony Wayne Foster, "A Study of Post-Baccalaureate Leadership Curricula at Select Christian Institutions of Higher Education" (PhD diss., The Southern Baptist Theological Seminary, 2010), 21, 59-60.

Christian education in their doctoral work, examined below in the section entitled “Recent Dissertations.” Pazmiño’s assertions align with Katherine Turpin’s work in “Teaching Practical Theology” which addresses religious education broadly, rather than Christian education.¹⁴ Pazmiño also wrote, “Christian education at its best is an area of practical theology.”¹⁵ With specific reference to the aims and goals of evangelical Christians, he notes, “Evangelicals have historically fostered the development of spiritual affections and disciplines . . . a balance of both the emotional and the intellectual dimensions of faith is an ideal of the evangelical educational agenda.”¹⁶ Unfortunately for the purposes of this thesis, despite Pazmiño’s signal contributions to the discussion of Christian education, he does not specifically address Christian schooling to any extent, which can be—but is not necessarily—a ministry of a local church. Nevertheless, his work highlights an important distinction that evangelical Christians have had a uniquely difficult task in establishing schools: both building academic rigor and integrating faith and learning. For the purposes of this thesis, IFL refers to the bringing together of academic content disciplines and the expressed alignment of a school’s curriculum to Christian priorities, referred to here as Christian curricular emphases.

Introductory Overview of Mixed Methods

This research study investigates the relationship between Christian curricular emphases and academic rigor as represented through the published texts of the member schools of the Council of Educational Standards and Accountability (CESA). Because many have conducted significant research in each of these categories, it is important to account for how that research shaped the present study in its theoretical construction, in its methodological approach, and in its establishment of independent and dependent variables. As this mixed methods study

¹⁴Katherine Turpin et al., “Teaching Practical Theology: Introducing Six Perspectives,” *International Journal of Practical Theology* 12, no. 1 (2008): 37.

¹⁵Pazmiño, *Foundational Issues in Christian Education*, 66.

¹⁶ *Ibid.*, 67.

unfolded, the two major components fell into two main areas of interest and divided into two research methodologies. The first research methodology, comprising the independent variables of this study, is qualitative. The second research methodology, comprising the dependent variables of this study, is quantitative. The qualitative research investigates the expression of Christian curricular emphases in CESA schools. The quantitative research investigates measures of academic rigor in CESA schools.

Qualitative Literature Review

The present study is mixed methods research and this portion of the literature review examines the literature undergirding the qualitative portion. Therefore, it examines existing studies of curriculum in general, then it examines Christian schools and their use of Christian curriculum in particular, then considered the conceptual framework of the integration of faith and learning and Christian curricular emphases, then reviews recent work discussing the intersection of academic rigor and Christian schooling, and finishes by examining recent doctoral studies of IFL and Christian curricular emphases.

Curriculum Theory

“Curriculum” shapes this portion of the research study. As a field unto itself, curriculum study has developed nuanced understandings and points of dispute. Of first importance for this study is the concept of “official curriculum.” In 2004, the third edition of George J. Posner’s *Analyzing the Curriculum* examined all aspects of the curriculum and the major conceptions of curriculum. In the same year, Arthur K. Ellis wrote *Exemplars of Curriculum Theory*, in which he provides examples of curriculum, grouped into three main categories: society-centered, learner-centered, and knowledge-centered curriculum.¹⁷ Posner concentrated on “learner-focused” curricula in many of his evaluations, advocating a “reflective

¹⁷Arthur K. Ellis, *Exemplars of Curriculum Theory* (Larchmont, NY: Eye on Education, 2004), xiii.

eclecticism”¹⁸ in constructing curricula, taking the best from all fields, while evaluating the intentions behind them. Posner provides several definitions of curriculum in current use, two of which hold significance for this study: “scope and sequence” (which includes course descriptions) and “course of study” (which sees education as a journey).¹⁹ Posner offers “standards” as an additional definition of curriculum.²⁰ He also describes five “concurrent curricula”: the “official curriculum” (the written, documented curriculum), the “operational curriculum” (the enactment of the official curriculum according to the skill of the teacher and the abilities of the class), the “hidden curriculum” (the unstated agenda of a school), the “null curriculum” (those things not taught, both intentionally and unintentionally), and the “extra curriculum” (those things which happen outside the classroom).²¹ Ellis’s *Exemplars of Curriculum Theory*, differs significantly from Posner, possibly due to the fact that their books were published the same year by different publishers. Ellis appears to favor knowledge-centered curriculum, seen in his provided examples. However, there also may have been more illustrative examples from that category.

One final form of curriculum analysis comes through comparing Posner’s list of five theoretical perspectives with Ellis’s list of curricular perspectives. Posner acknowledges the simplification of his list, but Ellis’s list of three perspectives provides still simpler groupings than Posner’s groupings. Posner’s “traditional” perspective and “structure of the disciplines” perspective show similarity to Ellis’s “knowledge-centered” curriculum perspective. Posner’s “behavioral” perspective and “cognitive” perspective show similarity to Ellis’s “learner-centered” curriculum perspective. Posner’s “experiential” perspective shows similarity to Ellis’s “society-centered” curriculum perspective.

¹⁸George J. Posner, *Analyzing the Curriculum* (New York: McGraw Hill Publishers, 2004), 275.

¹⁹Ibid., 5.

²⁰Ibid., 12.

²¹Ibid., 10-12.

Overall, Posner helpfully framed ways of examining curriculum and informed the development of this research study, which seeks to examine the course descriptions as expressions of curriculum. Where Posner spent more time in the theoretical realm, slowly building the case for his own preferred curriculum theory of “reflective eclecticism,”²² Ellis demonstrates the strengths and weaknesses of each of his three main groups: knowledge-centered, student-centered, and society-centered. Thus, Ellis’s categories give helpful characteristics for grouping curricular styles, and propose a less cumbersome model for evaluating different curricula. Due to Christian schools’ existence as a subset of a larger grouping within the United States, it is likely they emphasize multiple approaches in their curricula. By understanding Christian curricula as the intersection of multiple approaches, academic (knowledge-centered) and Christian (society-centered), this intersection provides the foundation for understanding further research in the area of Christian curricular emphases. In private Christian schools, Christian curricula would likely appear as expressions of official, operational, and extra curriculum, but likely would not be part of the hidden or null curriculum.

Before proceeding further, it is important to address conceptions of both the null curriculum and the hidden curriculum. In 1986, Flinders, Noddings, and Thornton wrote, “The null curriculum explicitly calls our attention to what has long been a matter of common sense—that, when developing a curriculum, we leave things out. It is a truism of the curriculum field that schools cannot teach everything.”²³ They recognize that curriculum consists as much of what is not taught as what is taught. Flinders, Noddings, and Thornton built on Elliott W. Eisner’s ideas published in 1985, asserting many possible expressions (or suppressions) of untaught material including both entire subject areas and also specific details.²⁴ For many schools, Christian emphases have become part of the null curriculum, due to efforts to stay nonsectarian or

²²Posner, *Analyzing the Curriculum*, 275.

²³David J. Flinders, Nel Noddings, and Stephen J. Thornton, “The Null Curriculum: Its Theoretical Basis and Practical Implications,” *Curriculum Inquiry* 16, no. 1 (March 1, 1986): 34.

²⁴*Ibid.*, 35-36.

maintain a separation between church and state. Unfortunately, researchers face great difficulty in examining what is not taught in a curriculum, and therefore the field of null curriculum falls outside the bounds of this present study. Similarly, Mossop, Dennick, Hammond, and Robbé published an article in 2013 exploring how researchers analyze the hidden curriculum, a concept with roots in the 1970s.²⁵ They highlight the problem specifically within medical education in “identifying the components of the hidden curriculum.”²⁶ Their qualitative study uses focus groups complemented by thematic analysis to produce a cultural web. Their work provides a model for this study’s efforts to identify stated curricular emphases using content analysis. They “identified several elements of the hidden curriculum”²⁷ the chief of which, “core assumptions,”²⁸ undergirds a main interest of this present study: the importance of Christian assumptions as an expression of the school’s Christian culture. The rest of their study examines the culture at a particular place, but their effort to identify the culture of a school through exploring its hidden curriculum similarly echoes the interests of this research study. Additionally, their research study clarifies that each schools establishes its own unique features whether British postgraduate veterinary programs (the setting for Mossop’s study), or private Christian secondary schools in the United States, the subject of the present study.

No review of curriculum would be complete without briefly discussing the work of both Benjamin Bloom and Harold Gardner.²⁹ A thorough examination of these men’s work would have been its own major study project, but one recent article brings each man’s individual work together in a way that also addresses the concerns of this present research project. In 2004, Toni

²⁵Liz Mossop et al., “Analysing the Hidden Curriculum: Use of a Cultural Web,” *Medical Education* 47, no. 2 (February 2013): 134-43.

²⁶*Ibid.*, 134.

²⁷*Ibid.*

²⁸*Ibid.*, 137.

²⁹Gardner’s *Frames of Mind: the Theory of Multiple Intelligences* is cited by 20,743 other publications in Google Scholar as of this writing; Bloom’s *Taxonomy of Educational Objectives* is cited by 20,344 other publications in Google Scholar as of this writing.

Noble published an article proposing to integrate Bloom’s influential taxonomy of educational learning levels with Howard Gardner’s equally influential concept of multiple intelligences.³⁰ Noble’s particular article did not directly speak to this research study, but her efforts meaningfully brought together two giants of educational research. She found that students, who are made aware of their “intelligence,” as defined by Gardner, are better able to facilitate their own learning. She also notes that those teachers who seek to implement both theories to enhance their instruction find that students experienced greater levels of challenge, as defined by Bloom, and more meaningful learning experiences.³¹ Noble’s application to the present research study emerges in her discussion section: “The one area that teachers in schools have most control over is how they teach the curriculum.”³² Though not the focus of her study, she highlights that curricular emphases often result from the efforts of teachers. Teachers enact the official curriculum differently from one another, therefore demonstrating the importance of emphasizing Christian priorities within the official curriculum.

In 1996, Ball and Cohen also described the gap between what a curriculum offers and what teachers enact within a classroom. They note, “[Educational reformers] have often used instructional materials as a means to shape what students learn. . . . critics argue that this strategy ‘de-skills’ the professional work of teaching and learning.”³³ This use of instructional materials highlights the importance of curriculum for a school. They further note, “Our system typically lacks strong curricular guidance. Consequently, teachers’ understanding of the material, their beliefs about what is important, and their ideas about students and the teacher’s role all strongly

³⁰Toni Noble, “Integrating the Revised Bloom’s Taxonomy with Multiple Intelligences: A Planning Tool for Curriculum Differentiation,” *Teachers College Record* 106, no. 1 (January 2004): 193-211.

³¹*Ibid.*, 207.

³²*Ibid.*, 205.

³³Deborah Loewenberg Ball and David Cohen, “Reform by the Book: What Is – or Might Be – the Role of Curriculum Materials in Teacher Learning and Instructional Reform?” *Educational Researcher* 25, no. 6 (December 1996): 6.

shape their practice.”³⁴ Through this comment, they show the need for articulating Christian emphases as part of the official curriculum. Ball and Cohen suggest causes for observed differences in practice between the official curriculum and the operational curriculum in schools in the United States and critique how teachers enact the official curriculum of their schools. Their analysis applies both to Christian and non-Christian schools alike. Therefore, in the next section, it becomes useful to review a wide range of different curricular analyses in order to understand the approaches various researchers have recently applied to curricular study, touching on issues common to all schools. After that examination, this review considered Christian examinations of curricular emphases as addressed in the literature of faith-learning integration, also known as the Integration of Faith and Learning (IFL).

Curriculum Analyses

This portion of the literature review gives an examination of work published over the last decade. Beginning in 2004, Wayne Au attempted to find common themes across all qualitative evaluations of curriculum and high-stakes testing in the United States. His efforts yield a finding of strong correlation between “implementation of high-stakes testing” and changes in curricular content. He finds that the most common change in schools was a contraction of curricular content.³⁵ This finding suggests that schools with Christian curricular emphases may be providing a more comprehensive education than schools bound to a more narrowly defined curriculum, such as one constrained by the needs of high stakes testing or national level curricular programs such as Common Core State Standards.³⁶ On the other hand, Mark Pike identifies some problems with curricular objectives in Christian schools. In 2005,

³⁴Ball and Cohen, “Reform by the Book,” 6.

³⁵Wayne Au, “High-Stakes Testing and Curriculum Control: A Qualitative Metasynthesis,” in *The Curriculum Studies Reader*, ed. David J. Flinders and Stephen J. Thornton (New York: Routledge/Falmer, 2004), 242-43.

³⁶“Common Core State Standards Initiative,” accessed September 19, 2015, <http://www.corestandards.org/>.

Pike’s article asserted, “It is perhaps easier for Christian schools to explain why they teach children about the Christian worldview (which is central to their educational vision and mission) than to articulate what they should teach about competing ideologies and worldviews.”³⁷ Pike’s contention—that the “why” is easier than the “what”—contributed to this research study. While Pike wrote for a British schooling context, his questions easily apply to Christian schools in the United States. He argues, “[Understanding] non-Christian worldviews should be an indispensable part of what might be termed ‘culturally literate’ Christian education . . . when the exiles were in Babylon they understood that culture and its values better than many who subscribed to them.”³⁸ His assertion that “many in society fail to appreciate and understand the sort of education [students at Christian schools] are receiving,”³⁹ reveals a need for Christian schools to provide some sort of explanation of what it is that their educational emphases impart to students.

In 2005, Kim and Marshall published their study of trends in curriculum scholarship. Their analytical representation of the trend in their findings—especially in comparison of curriculum textbooks to each other—reveals the benefits of qualitative content analysis.⁴⁰ Their content analysis approach to curricular study shows the benefits of that approach to categorizing themes within written text. Macdonald, Hunter, and Tinning argued in 2007 that using “Bernstein’s concepts of the production, recontextualisation and reproduction of knowledge across fields provides a useful heuristic [through] which rich tasks and other curriculum representations of knowledge can be examined.”⁴¹ They discuss the effect of agents with little

³⁷Mark A. Pike, “Citizenship Education and Faith Schools: What Should Children in Christian Schools Understand and Appreciate about a Liberal and Secular Society?” *Journal of Education & Christian Belief* 9, no. 1 (Spring 2005): 36.

³⁸*Ibid.*, 37.

³⁹*Ibid.*, 42.

⁴⁰Pyeong-Gook Kim and J. Dan Marshall, “Synoptic Curriculum Texts: Representation of Contemporary Curriculum Scholarship,” *Journal of Curriculum Studies* 37, no. 3 (May 2005): 296.

⁴¹Doune Macdonald et al., “Curriculum Construction: a Critical Analysis of Rich Tasks in the Recontextualisation Field,” *Australian Journal of Education (ACER Press)* 51, no. 2 (August 2007): 114.

familiarity with the primary field on creating curriculum. The purpose of recontextualization for Christian schools is to engage students in worldview consideration, so that students might better know the relationship of their faith with other worldviews. This group writes that “the rich tasks reflected an engagement by agents in the recontextualizing field with populist, traditional, and media-driven discourses rather than scholarly research-based literature.”⁴² In summary, they contended that curriculum often does not reflect the best knowledge of the field being tested, but rather trends driven from those outside the academy. Even though the specific application of their contention was health and physical education, their concern applies to Christian schools (while recognizing that Christian schools face a limited application due to contextualization’s underlying philosophy of social constructivism). More recently in 2011, David Berliner writes about the dangers of narrowing curriculum to include only the items known to exist on standardized tests (common measurements of educational progress). Echoing Au’s concerns, he identifies the struggles of states to measure academic success and cautioned against the unmeasured restriction of curriculum to those items known to be prioritized by end of course examinations.⁴³ His study measures the amount of decline seen in areas not tested by exams, and posited that such narrowing could crush the educational aspirations of students whose gifts lie in areas unmeasured by standardized tests. His caution speaks to the importance of measuring the Christian emphases within Christian school curriculum, which is not likely to be tested on any national secular exam. If Christian curricular emphases exist in Christian schools that also strive for academic rigor, then those are intentionally broad curriculum, in line with the likely overall educational benefits of Berliner’s suggestions.

With regard to objective curriculum analysis, in 2012 Anna Kempa and Bogna Zacny reported their examination of syllabi for the purpose of planning. Kempa and Zacny intended to

⁴²Macdonald et al., “Curriculum Construction,” 121.

⁴³David Berliner, “Rational Responses to High Stakes Testing: The Case of Curriculum Narrowing and the Harm That Follows,” *Cambridge Journal of Education* 41, no. 3 (January 1, 2011): 294-95.

provide for better identification of overlap. Their work examines the field of collegiate education, specifically in Poland, using statistical methods. While they drew their sample syllabi from the fields of hard sciences, their technique is transferrable to analysis of other textual sources.⁴⁴ This research study seeks common terms of Christian curricular emphases, thus using a similar process to accomplish the opposite result of Kempa and Zacny, who sought to eliminate overlapping courses. Their term-document matrix suggests analytical procedures for ascertaining the usages of terms that express Christian curricular emphases.

This interest in curriculum review is not exclusive of Christian writers. As early as 1980, William Roberts sought a foundational curriculum theory for religious education. He critiqued some empirical models of seeking it, arguing for the art of curriculum review to be performed apart from “a consumer research model.”⁴⁵ He asserts, “My personal professional perspective looks at the objective under discussion from a point of view and with a conviction that the message of the church school is communicated as much through the interactional process as through the curriculum content.”⁴⁶ By saying this, he alludes to the differences highlighted in the earlier discussion of curriculum proper. However, Roberts raises his most significant point when he said, “Empirical research can make a theological contribution if, methodologically, there is a commitment to theological *praxis* which brings personal artistry, factual data, theory, practice and theological vision into mutually informing dialogue [emphasis original].”⁴⁷ He asserts that empirical research constitutes a useful examination of Christian schools, while also alerting researchers to the importance of understanding the distinction between official and operational curricula.

⁴⁴Anna Kempa and Bogna Zacny, “The Curriculum Content Analysis for the Construction of the Teaching Process,” *Studia I Materiały Polskiego Stowarzyszenia Zarządzania Wiedza / Studies & Proceedings Polish Association for Knowledge Management* 60 (April 2012): 99-100.

⁴⁵William L. Roberts, “From Curriculum Research to Foundational Theorizing,” *Religious Education* 75, no. 5 (September 1980): 507.

⁴⁶*Ibid.*, 508.

⁴⁷*Ibid.*, 515.

As researchers have recognized the gap between official and operational curricula, several recent doctoral dissertations have examined the implementation of the integration of faith and learning, substantiating Ball and Cohen's assertion of the gap between official and operational curricula. However, before examining those dissertations, it is imperative to address studies of Christian school curriculum and the areas they especially emphasized. Christian curricular emphases, found at Christian schools, may not be consistently enacted by classroom teachers, but the studies that exist regarding enacted Christian curriculum have been examined below. Regardless, ascertaining the nature of Christian curricular emphases in Christian schools requires some extensive review of existing work in that field, to which this literature review now turns.

Christian Schools and Curriculum

Before the turn of the millennium, Christian curriculum studies in general did not emerge in academic literature very prominently except in one early case, that of Joseph Bayly in 1980. His article highlighted the opportunities and challenges facing evangelical schools, but his primary discussion centered on the materials made available for Sunday schools in churches.⁴⁸ He notes that a small number of evangelical publishing houses tended to control the market in what is published for church curriculum. As is shown later, this finding was echoed in several other more recent research studies (Cox et al.; Guthrie; and Laats). He asserts that educational materials published by non-denominational entities watered down doctrinal distinctives.⁴⁹ However, his particular study applies most specifically to educational materials for churches, and not for Christian schools, whose growth Bayly may not have foreseen. Therefore, his article was instructive, but less formative than other studies.

⁴⁸Joseph Bayly, "Evangelical Curriculum Development," *Religious Education* 75, no. 5 (September 1980): 539.

⁴⁹*Ibid.*, 541.

Turning to curriculum for Christian schools, Adam Laats's more recent article in 2010 sheds a great deal of light on Christian curriculum publishers. Laats's historical survey of fundamentalist and evangelical Christian schools' emergence from the 1950s through the late 1980s sheds much light on an interesting topic. Personal rivalries, divergent visions for the purposes of Christian schooling, and the founding of rival publishing houses show the cause of the diversity among Christian schools.⁵⁰ The most basic struggle for Christian schools therefore has continued even to the present in the effort to define what makes a school "Christian" and what that school's interaction should be with academic standards used by non-Christian curriculum sources. Laats's narrative of the emergence of Christian school associations provides necessary background for understanding the organizations to which those schools belonged. Additionally, his history provides context for why Christian schools would self-identify as "academically rigorous." There seems to be an implication in his article that, as Christian schools increasingly provided a legitimate, safe alternative to public schools, those schools looking to distinguish themselves from other, similar Christian schools then began to assert their academic rigor.⁵¹ One additional consideration is the belief among Christian schools that "mainstream educators and curricular materials, nurtured children away from God."⁵² Laats's work explains the environment into which those in Christian schooling began to implement Christian higher education's considerations of integration of faith and learning. Consequently, Laats's research reveals how Christian curricular emphases, as expressions of the language of integration of faith and learning, could correlate with conceptions of academic rigor.

As Christian schools flourished and scholars recognized those schools' curricular needs, the late Canadian professor Harro Van Brummelen published *Steppingstones to*

⁵⁰Adam Laats, "Forging a Fundamentalist 'One Best System': Struggles over Curriculum and Educational Philosophy for Christian Day Schools, 1970–1989," *History of Education Quarterly* 50, no. 1 (February 2010): 55.

⁵¹Ibid., 61.

⁵²Ibid., 67.

Curriculum: A Biblical Path in 2002. Van Brummelen first considered the philosophical impossibility of neutral value systems when teaching curriculum, especially from a Christian perspective.⁵³ He echoes the same premise as Patrick H. McNamara, who addresses this same topic in his public dispute with Stephen Goettsch in 1985.⁵⁴ McNamara asserts that evaluating a subculture, such as evangelical Christianity, on its own terms better comprehends that subculture's values. This exchange between McNamara and Goettsch provides a rationale for all subsequent examinations of private Christian schools using social scientific methodologies. McNamara specifically make his case, rooted in postpositivism, for examining the "New Christian Right" according to their views of themselves – a case rooted in the term "verstehen."⁵⁵ Goettsch blasts McNamara's position and fails to acknowledge McNamara's point that the observation of a social scientist was not objective, but rather was entirely value-laden and often dismissive of religious entities. Goettsch's conclusion seeks to separate the realms of religion and social science research for, as he claims, "By improperly blending social science and religion, faith becomes subject to empirical tests and the social sciences become subject to religious fiat. Neither of these possibilities is desirable."⁵⁶ McNamara rebuts Goettsch's reasoning, writing, "A sufficiently strong and unexamined bias is evident in a good deal of social science commentary on [New Christian Right] family ideology to warrant the kind of careful reconsideration my article calls for."⁵⁷ Van Brummelen's contention aligns with McNamara, but he also wrote from the operational curriculum position that teachers are primarily responsible for implementing the curriculum. Consequently, it is possible to infer that curricula reflect teachers' input with regard

⁵³Harro Van Brummelen, *Steppingstones to Curriculum: A Biblical Path* (Colorado Springs: Purposeful Design Publications, 2002), 3.

⁵⁴Patrick H. McNamara, "The New Christian Right's View of the Family and Its Social Science Critics: A Study in Differing Presuppositions," *Journal of Marriage and the Family* 47, no. 2 (May 1, 1985): 449-58; Stephen L. Goettsch, "The New Christian Right and the Social Sciences: A Response to McNamara," *Journal of Marriage & Family* 48, no. 2 (May 1986): 447-54.

⁵⁵McNamara, "The New Christian Right's View," 453.

⁵⁶Goettsch, "The New Christian Right and the Social Sciences," 452.

⁵⁷*Ibid.*, 454.

to Christian emphases, though Van Brummelen provides a somewhat less satisfying expression of Christian emphases in the written, official curriculum. He asserts that planning curriculum requires “a common view of life to be able to reach consensus on major curriculum decisions,” leaving open how that consensus finds expression.⁵⁸ The present study seeks to understand the official conceptions of this teacher implementation through examining explicitly Christian curricular emphases instead of the more frequently studied operational curriculum. Also, the majority of Van Brummelen’s book is geared to helping elementary teachers organize their curricula, rather than extending that work to secondary schools. Though interesting in its preliminary, philosophical discussions of curriculum, this text confirms the knowledge-centered focus of Christian schooling, doing little to advance understanding of the effects of Christian curricular emphases on academic rigor. Van Brummelen does not address how or if Christian school curriculum should convey academic rigor.

One final, interesting component of his work emerges when Van Brummelen asserts a distinction between traditional curriculum and Christian curriculum. His distinction between those two points is unclear. He describes Christian curriculum, writing that it “fosters students’ positive response and responsibilities toward God, their fellow creatures, society, and themselves.”⁵⁹ Thus, Van Brummelen views Christian curricular emphases as extending beyond the content of the course and emerging in attitudes and behaviors as individuals and groups—showing that Van Brummelen has a more expansive definition of curriculum than simply the official curriculum. He shows the influence of student-centered and experiential learning, as well. Again, his overall focus is more on the Christian aspect of curriculum, and less on the academic rigor of it.

⁵⁸Van Brummelen, *Steppingstones to Curriculum*, 6.

⁵⁹*Ibid.*, 26.

In 2009, Van Brummelen engaged in a public dispute with John E. Hull over the nature of curriculum development.⁶⁰ Van Brummelen held the term “curriculum orientation” to mean open-ended and “providing a sense of direction,”⁶¹ as distinct from curriculum conception (paradigm) which he contended is a fixed theoretical construct.⁶² He contends that “orientation” merely posted guidelines, but is not a formal structure for curriculum and therefore Christian schools can operate with non-Christian curriculum. He writes, “Christian education has a different orientation or direction, but it does not mean that it does not overlap with the education provided by those who have a different orientation.”⁶³ Hull’s primary argument with Van Brummelen is over this very point. Hull notes that curricula should result in “fruitful discipleship.”⁶⁴ He writes,

The additive approach to curriculum development is a major source of disorientation for Christian school educators. . . . Buried in [the “curriculum as technology”] orientation, however, are powerful notions about who is a good student, what is most worth knowing, what constitutes a good education, what should be taught and for how long, and if there will be winners and losers. Christian discipleship will surely have a different set of answers.⁶⁵

Hull seeks to define a “good education” for Christians, and opens the conversation for an assessment of how that education should be measured. Hull’s interaction with Van Brummelen is not his only significant contribution to the discussion of Christian schools and curriculum. Hull published a highly cited article in 2003, used by numbers of subsequent researchers examining Christian education and Christian schooling.⁶⁶ He argues that much of “Christian education” was simply “Christians educating,” in other words, “A Christianity-enhanced public school brand of

⁶⁰Harro Van Brummelen, “Of Curriculum Conceptions, Orientations, and Cultures: A Rejoinder to John E. Hull,” *Journal of Education & Christian Belief* 13, no. 2 (October 2009): 169-73; John E. Hull, “A Surrejoinder to Harro Van Brummelen,” *Journal of Education & Christian Belief* 13, no. 2 (October 2009): 175-76.

⁶¹Van Brummelen, “Of Curriculum Conceptions, Orientations, and Cultures,” 169.

⁶²*Ibid.*, 170.

⁶³*Ibid.*, 172.

⁶⁴Hull, “A Surrejoinder to Harro Van Brummelen,” 176.

⁶⁵*Ibid.*

⁶⁶A Google Scholar search revealed 30 citations as of this writing.

education.”⁶⁷ His work opens the way for researchers to discover the difference in academic rigor (as measured by commonly used test instruments) between schools that provide a thorough Christian curricular emphasis (through their official curriculum) and those that “add to students’ educational experience by means of their moral integrity, devotional piety, and biblical insights into a select group of controversial topics” (through the operational curriculum).⁶⁸ Lastly, Hull disdains the “additive approach” to most American schooling, calling for a complete overhaul of what Christian schooling does.⁶⁹ Through issuing a strident critique, Hull asked important questions that could be resolved with a clearer understanding of the impact of curricular emphases on Christian schools.

Christian school curricula through textbooks. Finally, this section closes by reviewing three recent examinations of curriculum by Christian researchers: one in a STEM discipline and two in the humanities.⁷⁰ Cox, Hameloth, and Talbot undertook a study of textbooks used in a very narrowly specified set of schools nearby their graduate program’s geographical location, a decision dangerously close to convenience sampling.⁷¹ They then sought to assess the biblical fidelity of those textbooks (drawn from most academic disciplines) according to their own schema, asserting “instructional content lacking in and/or antithetical to biblical substance is essentially inappropriate for endorsement in Christian education” and “there should be a clear delineation between the educational content and thus textbooks of secular versus Christian education.”⁷² While this statement is unsupported by other studies, it does

⁶⁷John Hull, “Aiming for Christian Education, Settling for Christians Educating: The Christian School’s Replication of a Public School Paradigm,” *Christian Scholars Review* 32, no. 2 (2003): 204.

⁶⁸*Ibid.*, 206.

⁶⁹*Ibid.*, 217ff.

⁷⁰STEM: an acronym for Science, Technology, Engineering, and Mathematics.

⁷¹William F. Cox, Jr., Nancy J. Hameloth, and Daniel P. Talbot, “Biblical Fidelity of Christian School Textbooks,” *Journal of Research on Christian Education* 16, no. 2 (September 2007): 181-210.

⁷²*Ibid.*, 182.

betray, perhaps, an assumption that Christian education is tied to the textbooks and not separated from curricular emphases and teacher application of the curriculum. They cite Hull (2003) when stating that Christian education “is often taken from its public school (secular) counterpart.”⁷³ Cox, Hameloth, and Talbot then selected local schools known for their reputation for excellence. Their phrase “reputation for excellence” lacked clear definition and therefore proved unsatisfactory. Consequently, this research study seeks some form of standard quantification for that type of judgment.

In 2011, Janice Guthrie examined the preparation level of students for rigorous college science courses based on their use of Christian-published science textbooks.⁷⁴ Her study proves superior to the study of Cox et al. because of its sample selection, methodology, and execution. She noted that “little research has been conducted on the relationship between curriculum materials and student achievement.”⁷⁵ Although textbooks and curriculum are not identical, textbooks provide a foundation for curriculum. Therefore, one question arose from her study: how do private, academically rigorous, Christian schools overcome non-Christian bias if evident in their textbooks? Additionally Guthrie asserts in her implications section that “Christian education [in distinction from constructivist learning theory] is anchored in the absolutes which reflect the principles of Scripture.”⁷⁶ Her study calls attention to the importance of identifying biased language in all aspects of curriculum. The third article comes from Justin Cook’s proposal for a new and different English curriculum. Cook proposes a learning community rooted in “[awakening students] to the biblical story, [loving] each other and creation within their Christ-given identity in that story, [thinking] about their own narratives within the context of literature,

⁷³Cox et al., “Biblical Fidelity of Christian School Textbooks,” 184.

⁷⁴Janice Guthrie, “Christian-Published Textbooks and the Preparation of Teens for the Rigors of College Science Courses,” *Journal of Research on Christian Education* 20, no. 1 (January 2011): 46-72.

⁷⁵*Ibid.*, 53.

⁷⁶*Ibid.*, 67.

and [speaking] in the larger community with voices shaped by that literary understanding.”⁷⁷ He asserts, “It is essential to articulate the worldview by which an educational community is defined.”⁷⁸ He argues that, for his proposal, “faith commitment to the biblical story is also a curricular commitment.”⁷⁹ Cook’s overall proposal works particularly well for a humanities-oriented school, though its implications for a broader scholastic application are unclear. Nevertheless, his assertion underlined the importance for Christian schools to identify curricula that established not only their unique academic identity but also their unique Christian identity. Having now examined elements of curriculum, this literature review now has considered the specific intersection of curriculum and integration of faith and learning (also written as faith-learning integration, or IFL).

Integration of Faith and Learning

The “integration of faith and learning” is a complex term with a rich history. Rather than recount the extensive work written in this field, this portion of the literature review focused on foundational ideas for the integration of faith and learning, then reviewed more recent studies of the meanings of “integration of faith and learning.” First, Frank E. Gaebelein’s lectures in 1954 at Dallas Seminary have proven to be a touchstone for Christian educators.⁸⁰ In this collection of lectures, the late headmaster of the Stony Brook School in New York laid down a strong case for Christian curricular emphases in the midst of a stellar education. Gaebelein’s assertion, “True Christian education does not need to keep looking for the integrating factor; it already has it,”⁸¹ provides a basis for seeking to uncover the presence of that integrating factor at

⁷⁷Justin Cook, “‘Awake. Love. Think. Speak.’: A Narrative Foundation for Secondary School English Curriculum,” *Journal of Education & Christian Belief* 15, no. 2 (October 2011): 121.

⁷⁸*Ibid.*, 110.

⁷⁹*Ibid.*

⁸⁰Frank E. Gaebelein, “The Pattern of God’s Truth,” *Bibliotheca Sacra* 111, no. 441 (January 1, 1954): 63-74.

⁸¹*Ibid.*, 66.

Christian schools. In 1986, Ken Badley undertook the task of identifying various uses of the term “integration” as applied in the phrase “the integration of faith and learning.” His doctoral dissertation identifies four different paradigms of faith-learning integration: fusion, integration, correlation, and dialogical.⁸² Over the following thirty-three years, Badley continued to refine his list of paradigms, resulting in the addition of a fifth paradigm, perspectival, in a 1994 article.⁸³ Still more recently in 2009, Badley added two further paradigms: “appliqué” and “incarnational.”⁸⁴ His descriptions of the practice of faith-learning integration have proven formative for later researchers.⁸⁵ Raquel Bouvet de Korniejczuk, whose dissertation developed a validated survey instrument, cited Badley’s influential work because of his advocacy for perspectival integration. She found his espousal of worldview to be the primary integrating paradigm.⁸⁶ In turn, the validated instrument she developed in her own dissertation has been used to guide several recent dissertations dedicated to examining the integration of faith and learning in Christian schools. Those dissertations have been reviewed in a later section of this chapter. In 2008, Perry Glanzer published an article advocating the elimination of the term “integration of faith and learning” in favor of a more biblically rooted term: “creation and redemption of scholarship.”⁸⁷ His use of this new term echoes the perspectival integration identified by Badley. Notably, Badley and Glanzer’s discussions of integration of faith and learning have mostly been

⁸²Kenneth R. Badley, “Integration and the Integration of Faith and Learning” (PhD diss., University of British Columbia, 1986), 65-75.

⁸³Kenneth R. Badley, “The Faith/Learning Integration Movement in Christian Higher Education: Slogan or Substance?” *Journal of Research on Christian Education* 3, no. 1 (Spring 1994): 25.

⁸⁴Kenneth R. Badley, “Clarifying ‘Faith-Learning Integration’: Essentially Contested Concepts and the Concept-Conception Distinction,” *Journal of Education & Christian Belief* 13, no. 1 (Spring 2009): 8.

⁸⁵Google Scholar notes 37 citations of the 1994 article; 11 citations of the 2009 article; and 7 citations of his 1986 PhD dissertation and its 1993 unpublished manuscript.

⁸⁶Raquel Bouvet de Korniejczuk, “Stages of Deliberate Teacher Integration of Faith and Learning: The Development and Empirical Validation of a Model for Christian Education” (PhD diss., Andrews University, 1999), 2.

⁸⁷Perry L. Glanzer, “Why We Should Discard ‘the Integration of Faith and Learning’: Rearticulating the Mission of the Christian Scholar,” *Journal of Education & Christian Belief* 12, no. 1 (Spring 2008): 43. Google Scholar notes 17 citations of his article as of this writing.

intended for higher education. With the exception of Korniejczuk, none of the more recent writers have thoroughly carried forward Frank Gaebelein’s vision by examining the use of integration of faith and learning in primary and secondary schools, despite the helpfulness of their clarifications of the term “integration of faith and learning.” Therefore having examined the more influential, recent works on the topic of the integration of faith and learning, this literature review turns to a few specific applications of the integration of faith and learning for both curricula and primary schools and secondary schools.

Institutional integration of faith and learning. Michael Hand’s 2012 article asserted that religious schools in Great Britain have significant new opportunities for teaching broadly evangelical, faith-based curriculum due to reforms in the British government’s oversight of academies.⁸⁸ His concerns about the freedom of the academies (a special designation under recent British legislation) also applied to Christian schools in the United States, who likewise have operated semi-independently of the government. He relates two main conceptions of the curriculum in Britain:

Church schools have understood themselves to offer a general education, delivered through a conventional set of academic subjects, and a confessional Christian education, delivered through Religious Education [a special area of study] . . . they have taken the confessional element of the curriculum to be what distinguishes them from schools of other kinds . . . for the simple reason that [the rest of the school curriculum] is assumed not to differ in any important respect from curricula elsewhere.⁸⁹

Hand argues that confessionally-based education is “indoctrinatory,” and therefore religious schools should “devise distinctive curricula for their schools that are faith-based but non-confessional.” In the conclusion, he distinguishes between “imparting religious beliefs and using curriculum selection criteria drawn from religious beliefs.”⁹⁰ Thus, he shows the possibility of

⁸⁸Michael Hand, “A New Dawn for Faith-based Education? Opportunities for Religious Organisations in the UK’s New School System,” *Journal of Philosophy of Education* 46, no. 4 (November 2012): 546-59.

⁸⁹Ibid., 550.

⁹⁰Ibid., 551.

identifying curricular emphases that are broadly Christian, but his evident bias against bringing students to belief in the specific tenets of the Christian faith colored the rest of his article. He notes, “Encouraging [religious organizations] to use theological criteria to select curriculum activities opens the door to a subtler form of indoctrination.”⁹¹ Hand distinguishes between selecting curriculum according to an orienting worldview and the purposeful inclusion of the Christian faith’s propositions in a curriculum as part of that worldview. In this, he differed markedly from Badley, Glanzer, and the others reviewed in the previous section by underestimating the importance of the worldview to the whole of the educational process, aligning him with Goettsch’s arguments, seen earlier. Hand also wrote his proposals for a British context in which religious organizations are given charge over some schools but with continued funding from the government, much like the United States’s experience with charter schools. This signals a marked difference from private, Christian independent schools in the United States.

Further illustrating the flaws in Hand’s article, Michael Sherr, George Huff, and Mary Curran, surveyed students at Council for Christian Colleges and Universities (CCCU) institutions.⁹² Though somewhat different from primary and secondary schools, their article contains several transferrable concepts. The integration of faith and learning is a multilayered project, inclusive of Christian emphases, and this particular project assessed student perceptions of how integration of faith and learning emerges in their own coursework.⁹³ One of the assumptions, therefore, of their research is that integration of faith and learning is real and that it was measureable through phenomenological interviews with individuals and focus groups. The findings reported in their study include a set of common experiences students have had with teachers who practiced integration of faith and learning. Of those findings, a few revealed

⁹¹Hand, “A New Dawn for Faith-based Education?” 557.

⁹²Michael Sherr et al., “Student Perceptions of Salient Indicators of Integration of Faith and Learning (IFL): The Christian Vocation Model,” *Journal of Research on Christian Education* 16, no. 1 (March 2007): 15-33.

⁹³Ibid., 18.

curricular emphases: “teaching concepts using Scripture as a primary base of reference” and “educating and confirming beliefs in certain absolute truths.”⁹⁴ Sherr et al. additionally identified as a marker of IFL; that “professors must have expertise and experience in the core curriculum areas” is important for displaying the integration of faith and learning.⁹⁵ Therefore, integration of faith and learning should be measurable, especially if CESA schools prioritized public articulation of the integration of faith and learning.

However, a phenomenological study of student perceptions of the integration of faith and learning as experienced in officially Christian colleges and universities does not fully apply to Christian secondary school programs. A second phenomenological study in 2009 by Sites, Milacci, Garzon, and Boothe examined the practice of IFL among eight professors, identified by students as exemplars of the integration of faith and learning.⁹⁶ Their research confirms what Sherr et al. found. Sites’s group wrote that “we conceptualize IFL as a multidimensional scholarly yet holistic task.”⁹⁷ They found that IFL research had not deeply investigated which practices instructors used to integrate. Some limited studies have examined faculty perceptions at denominational colleges, the spectrum of faculty understanding of IFL, and the beliefs and practices of professors at both Christian and non-Christian colleges. One study examined how primary schools as institutions have published their faith integration.

Many Christian schools acknowledge their perspective through their mission statements, thereby making official their Christian emphasis. In 2012, Anne Zandstra compared a limited sample of American and Dutch Christian elementary school mission statements, revealing more religious language occurred in American school mission statements.⁹⁸ Most

⁹⁴Sherr et al., “Student Perceptions of Salient Indicators,” 23.

⁹⁵Ibid., 27.

⁹⁶Elizabeth C. Sites et al., “A Phenomenology of the Integration of Faith and Learning,” *Journal of Psychology & Theology* 37, no. 1 (2009 2009): 28-38.

⁹⁷Ibid., 28.

⁹⁸Anne M. Zandstra, “Mission Statements of Christian Elementary Schools in the United States and the Netherlands,” *Journal of Research on Christian Education* (August 1, 2012): 116-31.

especially, American Christian schools used ten different variations on the words “Christ” or “Christian” as a prominent component of their mission statements, whereas Dutch schools only used four.⁹⁹ Zandstra’s limited sample highlights not only a researcher who examines publically available statements from a school in order to ascertain IFL data about that school, but also the overall lack of examination of IFL from a content standpoint in the existing literature. However, all of these studies have focused on higher education or elementary education with scant examination of secondary education. Having now examined studies regarding IFL, the next section has reviewed existing literature examining Christian curricular emphases.

Christian Curricular Emphases

The term “Christian curricular emphases” did not appear in the existing literature, but has been used as an umbrella term to encompass curriculum that purposefully emphasizes Christian principles and understandings. In order to synthesize the idea of curriculum forwarded in the “Curriculum Proper” component above and the immediately preceding discussion of the “Integration of Faith and Learning,” this study examined one particularly telling article, that of Elliot Eisner, which illuminates the troubles incumbent in evaluating school performances in different districts and states.¹⁰⁰ In a 2004 essay, Eisner refers to the process of improving schools as “rationalized” in order to create a framework for understanding the school improvement process. He names standards-based outcomes, instruments for quantifying and measuring improvement, and “commensurability” as key components for evaluating schools in light of one another.¹⁰¹ He notes, “The introduction of the concept of core subjects explicitly marginalizes subjects that are not part of the core.”¹⁰² This observation was consonant with Au’s concern

⁹⁹Zandstra, “Mission Statements of Christian Elementary Schools,” 121.

¹⁰⁰Elliot W. Eisner, “What Does It Mean to Say a School Is Doing Well?” in *The Curriculum Studies Reader*, ed. David J. Flinders and Stephen J. Thornton (New York: Routledge/Falmer, 2004): 279-87.

¹⁰¹Ibid., 280.

¹⁰²Ibid., 281.

reviewed in the curriculum section, and called attention to the importance of Christian curricular emphases for a Christian schooling experience. While private schools do not necessarily find themselves subject to high-stakes testing exercised in state schools, many still engage in national testing through the SAT, ACT, and AP programs. These academic measurements provided some means for comparing schools, but they only measured academic work, not the presence of faith-learning integration. Indeed, there did not appear to be a commonly accepted standard for measuring the presence of IFL language in the official curriculum of Christian schools in any existing study.

As early as 1966, Edward Uthe raised a key question about designing Christian curriculum.¹⁰³ As a leader in Lutheran education at the time, he advocates using the best ideas emerging from curriculum theory in non-Christian schools to develop curricula for Christian education. He notes, “Should the components of the curriculum be chiefly subject-centered or chiefly problem-centered?”¹⁰⁴ He proposes that educational philosophy should be one of the main areas considered in designing curriculum. His emphasis on the underlying philosophy emerges more fully in the later efforts of Badley and Glanzer to promote worldview (or perspectival) thinking as an aspirational model of integration of faith and learning. For example, Claudia Grauf-Grounds, Scott Edwards, Don Macdonald, Karen Mui-Teng Quek, and Tina Schermer Sellers offer a philosophical grounding for Christian worldview and professional training in graduate programs.¹⁰⁵ Some of their conceptual work generalizes to this research study, but their primary focus is higher education and not primary or secondary education. They provide a better understanding of how academic disciplines may differ in how their curricula demonstrate a Christian worldview. They write, “Each faculty member embodies and interprets

¹⁰³Edward W. Uthe, “Developing Curriculum Design for Christian Education,” *Religious Education* 61, no. 3 (May 1, 1966): 163-69.

¹⁰⁴Ibid., 164.

¹⁰⁵Claudia Grauf-Grounds et al., “Developing Graduate Curricula Faithful to Professional Training and a Christian Worldview,” *Christian Higher Education* (March 1, 2009): 1-17.

Christian faith and touches students' lives in distinctive ways."¹⁰⁶ Their article establishes that Christian curriculum must have a philosophical undergirding consonant with Christian belief.

Therefore, Uthe's acceptance of non-Christian models for use in Christian schooling, demonstrates an earlier underdevelopment of Christian educational thinking remedied by more recent efforts such as work by Mary J. Osterman in 1980. Her article reflects upon the emergence of differing Sunday school curricula across the United States and she identifies several different phases in that history.¹⁰⁷ However, she equates religious education with Sunday school, or church-based instruction, not with Christian schooling. Her article's findings examine Christian schooling only in very limited fashion, as the explosion of Christian schools was a relatively recent phenomenon by 1980. She documents John Dewey's influence over curriculum—even church-based curriculum—by showing that curriculum has been redefined to mean “experiences.” However, her most significant assertion is that “religious education is larger than curriculum.”¹⁰⁸ She discards the assumption that curriculum is knowledge content, calling for a new definition of curriculum, thereby opening the path for others. One such researcher, Karl Bailey, while more specifically addressing IFL in his 2012 article, also focuses more on student-centered outcomes and less on the official curriculum.¹⁰⁹ He notes Badley's assertion that there is little common language regarding IFL, but rather a variety of distinguishable, though relatable meanings.¹¹⁰ He demonstrates the influence of what Ellis identifies as “learner-centered” curriculum through seeking to shift the locus of IFL from the official curriculum and the efforts of instructors instead to students.¹¹¹

¹⁰⁶Grauf-Grounds et al., “Developing Graduate Curricula Faithful to Professional Training,” 4.

¹⁰⁷Mary J. Osterman, “The Two Hundred Year Struggle for Protestant Religious Education Curriculum Theory,” *Religious Education* 75, no. 5 (September 1, 1980): 528-38.

¹⁰⁸Ibid., 535.

¹⁰⁹Karl G. D. Bailey, “Faith-Learning Integration, Critical Thinking Skills, and Student Development in Christian Education,” *Journal of Research on Christian Education* 21, no. 2 (May 2012): 153-73.

¹¹⁰Ibid., 154.

¹¹¹Ibid., 155-56.

In a 2009 article, Stephen R. Turley, advocates a Christian viewpoint and usage of Mortimer Adler's *Paideia Proposal*, as filtered through the New Testament term "ekklesia."¹¹² His understanding of the model for an integrated Christian curriculum places the Bible centrally within the curriculum and uses ancient traditions to forward learning. He asserts, "All narratives read in the Christian classrooms should be read in terms of the student thinking through how they shed light on, imitate, or are critiqued by the scriptures."¹¹³ This statement captures one means of expressing Christian curricular emphases. Turley's proposal for a classical school model emerges from an effort to reinforce Christian faith in all the coursework required of students. He grounds his proposal's interdisciplinary approach in an effort to reread existing narratives through a biblical lens. Of an early Christian instructional approach, Turley notes, "Christian apologists deliberately attempted to subordinate the sacred writings of the Greeks (e.g., Homer, Hesiod) to the philosophical, chronological, and theological primacy of the (developing) Christian canon."¹¹⁴ That filter interprets all narratives (and meta-narratives) present in culture, confirming the ancient heritage of this argument. He argues, "Christian education, if it is going to be distinctly Christian, must understand itself in relation to the divine narrative that climaxes in the messianic ministry and reign of Christ. . . . [It is essential] that the biblical narrative remains foundational to the endeavors of Christian education."¹¹⁵ His decidedly classicist viewpoint of education does not strictly apply to most Christian schools, but his article further justifies examining Christian curricular emphases in Christian schooling.

Finally, the work of LeRoy Ford looms large in Christian curricular development. Ford's book *A Curriculum Design Manual for Theological Education* outlines a process for

¹¹²Stephen Richard Turley, "Paideia Kyriou: Biblical and Patristic Models for an Integrated Christian Curriculum," *Journal of Research on Christian Education* 18, no. 2 (May 2009): 125-39.

¹¹³Ibid., 132.

¹¹⁴Ibid., 133.

¹¹⁵Ibid., 136.

formulating theological curricula and for establishing curricular priorities.¹¹⁶ While helpful for the purposes of developing curriculum, Ford's book focused specifically on theological education, which manifested the integration of faith and learning simply due to the nature of the academic field, and does not examine scientific or humanities course work. However, Ford's efforts at intentionally constructing curriculum provide clarity for assessing Christian curricular emphases. He shows that the course description and content are directly influenced by the institutional emphases and priorities.¹¹⁷ Therefore, curriculum developers implement a school's educational philosophy by expressing curricular priorities across all academic disciplines. One tangible manifestation of those priorities emerged through course descriptions.¹¹⁸ Course descriptions should explain what a student can expect, academically, from a given course. Christian school course descriptions should express, officially, the presence of both the school's academic priorities and Christian priorities. Turning now to academic rigor's intersection with Christian curricular emphases, this review has examined several recent studies of academic ability and intelligence and their relationship to religiosity and Christian schooling.

Academic rigor and Christian faith. As Christian schools have sought to emphasize the unique aspects of their academic program, they still face questions about the overall rigor of that program. Some writers question the degree to which a school can emphasize both academic and Christian priorities. In 2009 Charles Justins examined educational excellence, a term that encompasses academic rigor, from an Australian perspective.¹¹⁹ His study critiques the commonly used definition of educational excellence, observing that Christian schools with biblical orientations have different priorities than non-Christian schools, "including service,

¹¹⁶LeRoy Ford, *A Curriculum Design Manual for Theological Education: A Learning Outcomes Focus* (Eugene, OR: Wipf and Stock, 2003).

¹¹⁷Ibid., 216.

¹¹⁸Ibid., 217, 220.

¹¹⁹Charles Justins, "Christian Schooling and Educational Excellence: An Australian Perspective," *Journal of Education & Christian Belief* 13, no. 1 (Spring 2009): 49-64.

servanthood, community, grace, mercy and support for students (among others) who are vulnerable and marginalised.”¹²⁰ He regards the prevalence of language about educational excellence as “contra-biblical” and charts its presence in a number of school mission statements as indicative of this overarching language.¹²¹ He also provides an international voice to the consideration of academic rigor and Christian school excellence. Justins examines whether it is consistent with Christian values to emphasize academic excellence (a parallel term for academic rigor). He also questions the tension between hiring either academically excellent faculty or those who are faithful Christians, and which gains ascendancy in a Christian environment prioritizing academic excellence. His survey and case study focus on the leadership of those schools, and therefore does not provide an examination of their curricula. Justins concludes by arguing that only two positions regarding educational excellence can be maintained with integrity by Christian educators: “to infuse [the language of educational excellence] with new meaning consistent with gospel faith”¹²² or “to accept that Christian institutions . . . will always live on the periphery of a culture because of their commitment to God rather than the gods.”¹²³ Both of these alternatives convey that Christian schools maintaining a distinctively Christian emphasis should have some observable means of determining their faith commitments in addition to their academic pursuits. However, Justins’s assertions that academic excellence comes at a cost to Christian life, while compelling, falls outside of the bounds of the present study.

Indeed in contrast, Margarita Mooney wrote an article in 2010 noting that evangelical Protestant students tend to perform better academically at highly selective colleges and universities.¹²⁴ She argued,

¹²⁰Justins, “Christian Schooling and Educational Excellence,” 50.

¹²¹Ibid., 50, 52.

¹²²Ibid., 61.

¹²³Ibid., 62.

¹²⁴Margarita Mooney, “Religion, College Grades, and Satisfaction among Students at Elite Colleges and

Prior studies have identified that race, class, gender, and family background all influence college grades and satisfaction, yet I find that, even when controlling for these factors, religiosity influences achievement and satisfaction among students at the most selective colleges and universities in the United States. Students who attended religious services once a week or more during their last year of high school reported higher grades at college than non-regular religious attendees.¹²⁵

In short, her study finds that “religiosity influences achievement,” even after controlling for known factors that influence academic achievement.¹²⁶ Her findings contrast significantly with the study by Lewis, Ritchie, and Bates in 2011 which found that strong religiosity correlates with lower intelligence.¹²⁷ Their study shows a modest, negative correlation between intelligence and religiosity. Their study’s greatest flaw is its association of openness with intelligence, which reflects modern, Enlightenment attitudes about intelligence, and may not be reflective of overall intelligence. For example, they consider scientists as the measure of high intelligence and low religiosity, about which Mooney countered, “It also could be the case that religious students are more likely to major in heavily creative, speculative, and humanistic disciplines like philosophy and literature rather than sciences.”¹²⁸ Overall, Lewis, Ritchie, and Bates’s finding was strongest in people judged by their criteria to be fundamentalists, but they did not have a significant explanation of the reasoning for assigning that term to any of their sample, especially given that fundamentalism was measured only using two questions. This stands in contrast to every other religiosity scale, which was measured using additional questions. Their criteria flaw demonstrates the need for allowing the data regarding qualitative measurements to emerge from a more nuanced study.

To conclude, Christian curricular emphases ultimately reflected many different expressions of a Christian school’s curriculum. How teachers implemented those emphases has

Universities*,” *Sociology of Religion* 71, no. 2 (Summer 2010): 197-215.

¹²⁵Ibid., 210.

¹²⁶Ibid.

¹²⁷Gary J. Lewis et al., “The Relationship between Intelligence and Multiple Domains of Religious Belief: Evidence from a Large Adult US Sample,” *Intelligence* 39, no. 6 (January 1, 2011): 468-72.

¹²⁸Mooney, “Religion, College Grades, and Satisfaction,” 212.

been examined by several different recent doctoral dissertations. Those studies have sought to identify teacher implementation of the integration of faith and learning (an expression of the operational curriculum) and how teachers practice those emphases, rather than expressions of official curriculum, showing a further gap in this area of study. Therefore, this qualitative section has concluded with an examination of those recent dissertations.

Recent Dissertations

This review of recent doctoral dissertations has begun with the one furthest afield from the topic of academic rigor and Christian curricular emphases in order to examine work nevertheless similar in methodology and process to this research study, if somewhat distant in research population—that of Anthony Foster. The next four dissertations reviewed address various aspects of Christian schools surrounding the concept of the integration of faith and learning: Welch, who examined administrator perceptions of IFL; Eckel, who compared IFL by Christian college graduates to IFL by secular university graduates; Yang, who examined elementary school teacher perceptions of their own practice of IFL; and Peterson, who compared two different educational philosophies as manifested in two types of school organizations, classical (ACCS – Association of Classical Christian Schools) schools and traditional (ACSI – Association of Christian Schools International) schools.

Anthony Foster’s research topic of leadership programs at Christian colleges and universities is farther afield from the secondary school focus of this research project than the other dissertations examined, but his treatment of collecting data and the process by which he measured it have guided the methodological approach of the present study.¹²⁹ His delimitation of his study to publically available data collected by a specified group of Christian colleges has guided this proposals’ approach to data collection. Additionally, this provides an exemplar for using published, web-based data as the basis for a study of an institution through clearly defined

¹²⁹Foster, “A Study of Post-Baccalaureate Leadership Curricula.”

data.¹³⁰ Foster's use of digital software to provide a thorough content analysis of his research population has shown the way forward to "quantitative study of qualitative data."¹³¹ Additionally, I followed a similar, though reversed, methodology to Foster: descriptive quantitative research mixed with and enhanced by qualitative content analysis. The rest of the reviewed dissertations performed case studies of IFL in specific contexts using the validated IFL survey instrument from Raquel Bouvet de Korniejczuk's 1994 doctoral dissertation, which was reviewed earlier. Their collective approach to the integration of faith and learning is reviewed in the next section.

Applications of Korniejczuk's instrument. Leslie D. Welch's dissertation examined the integration of faith and learning among secondary school administrators in schools affiliated with ACSI.¹³² Her analysis focuses on administrator perception of the relative importance of IFL using Korniejczuk's measurement of the integration of faith and learning. She establishes that administrators ranked curriculum fifth among ACSI schools surveyed in terms of important factors for student learning.¹³³ However, she does not specify the type of curriculum included other than to note that administrators believe it important to have a separate Bible course for a secondary school curriculum, while citing no evidence as to why they believe so.¹³⁴ Welch's findings also reveal that curriculum is the only written expression of important student learning factors. Another interesting finding is the relatively low importance placed on requiring theological training for teachers by ACSI secondary school administrators.¹³⁵ These findings reveal the need for assessing the presence or absence of a Bible curriculum as part of the

¹³⁰Foster, "A Study of Post-Baccalaureate Leadership Curricula," 115-16.

¹³¹Ibid., 185-86.

¹³²Welch, "An Analysis of the Integration of Faith and Learning in Evangelical Secondary Schools."

¹³³Ibid., 153.

¹³⁴Ibid., 181-82.

¹³⁵Ibid., 195.

qualitative content analysis component of the research study. Welch noted this factor, but did not explore it.

Mark Eckel did explore a related topic in his doctoral dissertation in 2009. He specifically examined the nature of integration of faith and learning among teachers who received training at two different types of college or university settings: secular colleges and universities and Christian colleges and universities.¹³⁶ Eckel used the acronym “FLI” instead of “IFL,” but clearly intended the same meaning as found in Badley, Glanzer, and others. He reports that graduation from a Christian university proved statistically significant among respondent teachers’ self-reported IFL ranking, but that the variable accounting for the largest amount of disparity in their IFL scores was administrative encouragement of IFL practices. Of note for this study, Eckel does not examine the curriculum or its emphases to ascertain any official expression of the IFL values among schools’ academic priorities.

You Jung Yang’s dissertation in 2011 examined the means by which ACSI elementary school teachers implement the integration of faith and learning.¹³⁷ Yang addresses the curricular aspect of the presence of faith and learning tangentially, but also explores the ways that schools described their Christian curriculum. Yang notes that “Christian schools claim a Christ-centered curriculum in their mission statements, [but then] they look for teachers who meet government regulations and who are excellent in their subject rather than teachers who have the ability to discern disciplines christianly [*sic*].”¹³⁸ Yang further writes, “Many Christian schools and educators often ask the question, ‘Can we be Christian and excellent too?’ and try to pursue the excellence. . . . Academic standards are not a replacement for biblical integration.”¹³⁹ Yang examines primary school implementations of IFL, rather than secondary school implementations,

¹³⁶Eckel, “A Comparison of Faith-Learning Integration between Graduates.”

¹³⁷Yang, “An Analysis of the Integration of Faith and Learning.”

¹³⁸Ibid., 5.

¹³⁹Ibid., 6.

therefore leaving space for the present research project. However, Yang's delimitation to "common academic disciplines taught in a classroom" and not "music, health, or art" provided further guidance for the research population for this research study.¹⁴⁰

Similarly, Daniel C. Peterson's dissertation explored the differences between ACSI and ACCS schools' integration of faith and learning.¹⁴¹ He notes that ACCS schools focus primarily on teaching methodology through the classical Trivium, and contained within that focus is curriculum. Peterson writes that one goal of classical schooling is "to teach a unified and integrated curriculum."¹⁴² Since he compares two different models of education, he focuses on survey data when comparing the understanding of IFL between these two organizations instead of publically available data provided by the schools. Peterson examines Christian school outside of ACSI, branching into a newer alignment of schools (ACCS). Peterson's study of a newer school association shows the need for exploring other Christian school organizations, one of the aims of this research study.

This review of recent dissertations has concluded the consideration of qualitative studies examining Christian curricular emphases, especially those examining understandings of the integration of faith and learning. The next portion of this chapter has reviewed the literature pertaining to the dependent variables in the quantitative portion, namely measurements of academic rigor.

Quantitative Literature Review

This portion of the literature review examines existing studies of academic rigor in general, then moves on to particular studies of the AP program, selective university admissions,

¹⁴⁰Yang, "An Analysis of the Integration of Faith and Learning," 9.

¹⁴¹Peterson, "A Comparative Analysis of the Integration of Faith and Learning."

¹⁴²Ibid., 91.

and the SAT, and later concludes by considering studies of the impact of a mediating variable, family income, on those dependent variables.

Academic Rigor

This portion of the literature review examines critiques and evaluations of the AP program, admission to selective colleges and universities, and the SAT. These three areas are the dependent variables against which the qualitative data are evaluated and therefore require independent discussion from Christian curricular emphases. John Draeger, Pixita Prado Hill, Lisa Hunter, and Ronnie Mahler's 2013 study examined collegiate academic rigor, and therefore are not wholly applicable to a study of high school students, who are still gaining abstract thinking skills. However, they list several transferrable concepts that describe academic rigor. These concepts are "level of academic challenge"; "active and collaborative learning"; "student-faculty interaction"; "enriching educational experiences"; and "supportive campus environment." These all exist as sub-scales on the National Survey of Student Engagement. They used these to establish an "academic challenge sub-scale." Those skills can be used to explain academic rigor in a university or college setting, but they are unmeasured at the high school level and therefore some sort of alternate common measurement system is necessary to quantify student academic rigor in secondary schools. Therefore, this review examines studies of AP courses, acceptance into highly selective colleges and universities, SAT scores as measurements of academic rigor, due to their use across most schools and their wide presence in publically available profiles.

Biblical literacy and academic rigor. In a 2007 study that bridges the relationship between Christian curricular emphases and academic rigor, William H. Jeynes examines the correlation between students' biblical literacy and academic achievement.¹⁴³ He frames students' Christian characteristics in terms of academic achievement, providing further rationale for

¹⁴³William H. Jeynes, "Religion, Intact Families, and the Achievement Gap," *Interdisciplinary Journal of Research on Religion* 3 (January 2007): 1-24.

measuring the relationship between academic rigor and Christian curricular emphases. He proposes that one explanation of his finding is the existence of a Christian/religious work ethic, corroborating Margarita Mooney's article reviewed in the previous section. He describes a positive correlation between high biblical literacy and high academic achievement, a finding that holds constant in both public and Christian schools. However, he does not examine the curriculum studied in private Christian schools, nor does he control for family income levels and their possible impact on academic achievement. Consequently, it becomes necessary to examine curricula that reflect a high academic standard.

Advanced Placement. Beginning in the 1955-56 school year, the College Board partnered with several elite private schools and colleges in developing a series of exams designed to grant credit for qualifying students.¹⁴⁴ This program became known as the Advanced Placement (hereafter, AP) program and gained a reputation for overall academic rigor. Shannon M. Suldo and Elizabeth Shaunessy-Dedrick's study on the stressors incumbent on high school students in academically rigorous programs highlighted the AP program in their study, thus providing independent confirmation of the AP program's challenge for secondary students.¹⁴⁵ The College Board, parent organization for the AP program, publishes annual reports regarding the student participation and the overall success rates of students at the national and state level. The College Board's promotional material asserted that students have a right to rigor, especially rigor as captured by the AP courses administered and overseen by the College Board.¹⁴⁶ The College Board has provided annual examinations in over 30 subject areas during the first two full

¹⁴⁴"A Brief History of the Advanced Placement® Program," accessed September 24, 2015, http://www.collegeboard.com/prod_downloads/about/news_info/ap/ap_history_english.pdf.

¹⁴⁵Shannon M. Suldo and Elizabeth Shaunessy-Dedrick, "The Psychosocial Functioning of High School Students in Academically Rigorous Programs," *Psychology in the Schools* 50, no. 8 (September 2013): 823.

¹⁴⁶"The 10th Annual AP® Report to the Nation," February 11, 2014, accessed October 12, 2014, <http://media.collegeboard.com/digitalServices/pdf/ap/rtn/10th-annual/10th-annual-ap-report-to-the-nation-single-page.pdf>, 28.

weeks of May each year.¹⁴⁷ These examinations allow colleges to evaluate student achievement and also provide guidance for many colleges to award advanced academic standing to incoming college freshmen based on their AP scores. This particular organization has had a strong history of rigorous standards and has undertaken multiple measurements of their data to ensure statistically reliable and valid results, thereby giving colleges assurance of the overall quality of their products.¹⁴⁸ Therefore because of its widespread use in the United States, this project uses school participation in the AP program in four core curricular areas as one measurement of academic rigor.

In 2010, Timothy P. Scott, Homer Tolson, and Lee Yi-Hsuan studied the relationship between student participation in AP courses and future university success.¹⁴⁹ They write, “Advanced academic coursework through AP programs provides many benefits to students, high schools, teachers, and higher education. Students who participate in these programs are found to be better prepared for coursework and success in college.”¹⁵⁰ In another study, Mary E. M. McKillip and Anita Rawls examined the relationship between taking AP Exams and SAT score improvement.¹⁵¹ McKillip and Rawls find that “each AP course subject considered has a positive relationship with SAT outcomes, such that as AP exam scores increase SAT scores also increase.”¹⁵² Therefore, the relationship between these two tests requires that they be examined together when looking for indicators of academic rigor in secondary schools. Not to exclude evaluations of another major college admissions testing company—American College Testing

¹⁴⁷“AP Courses and Exams,” accessed September 24, 2015, <http://apcentral.collegeboard.com/apc/public/courses/index.html>.

¹⁴⁸“The 10th Annual AP[®] Report to the Nation,” 17-19.

¹⁴⁹Timothy P. Scott et al., “Assessment of Advanced Placement Participation and University Academic Success in the First Semester: Controlling for Selected High School Academic Abilities,” *Journal of College Admission* 208 (Summer 2010): 26-30.

¹⁵⁰*Ibid.*, 27.

¹⁵¹Mary E. M. McKillip and Anita Rawls, “A Closer Examination of the Academic Benefits of AP,” *Journal of Educational Research* 106, no. 4 (July 2013): 305-18.

¹⁵²*Ibid.*, 316.

(ACT)—this review also considers Lun Mo, Fang Yang, Xiangen Hu, Florence Calaway, and John Nickey’s study of the relationship between student ACT performance and AP performance.¹⁵³ They note, “One important finding is that taking AP mathematics greatly increased the likelihood of passing all subject benchmarks.”¹⁵⁴ Therefore, research has established a strong correlation between performance on AP exams and multiple different measurements of academic success, whether on other tests by the College Board, the ACT, or in university classrooms.

In 2009, Jack Schneider, studied the prestige accompanying AP course work.¹⁵⁵ He argued, “Even high-status high schools remained hamstrung by the degree to which colleges and universities still accepted AP as the acme of rigour in secondary education, and rewarded it in the admissions process.”¹⁵⁶ These studies show that secondary schools seek to distinguish themselves academically, but this comes at a cost to the AP program. “Not all schools can be high-status, and those that wish to be must scramble to distinguish themselves and their curricula from others. Expansion of AP has consequently brought about uncertainty regarding its connection to elite education—is AP a mark of a ‘top’ school or the mark of an average one?”¹⁵⁷ Therefore, the presence of AP courses alone might have been a somewhat less reliable marker of academic rigor, if taken by itself.

However, student performance on such standardized tests was not the only predictor of collegiate success. Richard Sawyer sought to understand how standardized test scores in general interacted with college admissions decisions.¹⁵⁸ He reports, “[*High School Average*] by itself is

¹⁵³Lun Mo et al., “ACT Test Performance by Advanced Placement Students in Memphis City Schools,” *Journal of Educational Research* 104, no. 5 (January 1, 2011): 354-59.

¹⁵⁴*Ibid.*, 358.

¹⁵⁵Jack Schneider, “Privilege, Equity, and the Advanced Placement Program: Tug of War,” *Journal of Curriculum Studies* 41, no. 6 (December 2009): 813-31.

¹⁵⁶*Ibid.*, 814.

¹⁵⁷*Ibid.*, 822.

¹⁵⁸Richard Sawyer, “Beyond Correlations: Usefulness of High School GPA and Test Scores in Making College Admissions Decisions,” *Applied Measurement in Education* 26, no. 2 (April 2013): 89-112.

better than [*ACT-Composite*] by itself for some, but not for all, degrees of selectivity and definitions of success. In some situations (e.g., where an institution is interested in high levels of success), [*ACT-Composite*] is more useful.”¹⁵⁹ The College Board and ACT mutually agreed upon standardized tables for converting scores from one company into those of another. Therefore findings using one company’s test scores should hold true for the other.¹⁶⁰ Thus, Sawyer’s research found that while there is more to student success than their ability to perform well in a single testing situation, standardized tests are predictive of some levels of collegiate success among the more academically able. Due to this finding, it is important to examine further research about collegiate admissions and its relationship to secondary schools’ academic rigor.

Admission to selective colleges and universities. The study of collegiate admissions has become complex and for this literature review has been restricted to examinations of the relationship between measurements of secondary school student academic achievement and admissions. In 2007, Steven Syverson studied universities that used test-optional admissions policies.¹⁶¹ Regarding the near ubiquity of standardized test scores in college, he writes, “The SAT and ACT have taken on an almost mystical importance in modern American society, being used as a yardstick for assessing the quality of high schools and colleges and having a major impact on everything from a student’s self-image to the price of homes in a particular neighborhood.”¹⁶² He comments, “The presumed association between the average test scores of a college’s freshman class and its perceived prestige is of great import in the minds of many admissions office staff.”¹⁶³ He finds that schools with “test-optional” admission policies tended

¹⁵⁹Richard Sawyer, “Beyond Correlations,” 108.

¹⁶⁰“ACT®–SAT® Concordance: A Tool for Comparing Scores,” accessed February 3, 2015, <http://www.act.org/aap/concordance/pdf/reference.pdf>; “ACT and SAT® Concordance Tables,” accessed February 3, 2015, <http://research.collegeboard.org/sites/default/files/publications/2012/7/researchnote-2009-40-act-sat-concordance-tables.pdf>.

¹⁶¹Steven Syverson, “The Role of Standardized Tests in College Admissions: Test-Optional Admissions,” *New Directions for Student Services* no. 118 (Summer 2007): 55-70.

¹⁶²*Ibid.*, 57.

¹⁶³*Ibid.*, 58.

to report that, “Nonsubmitters graduate at a rate virtually identical to that of submitters and achieve comparable grades.”¹⁶⁴ While this casts the use of standardized test as a measurement of a student’s academic rigor into some doubt, it also highlights that student admission rates to top-ranked colleges and universities should be considered as another measure of a secondary school’s overall academic rigor.

Sharon Paulson and Gregory Marchant’s 2009 study of the mediating variables in standardized test scores also revealed significant differences in public school test performance based primarily on family income levels.¹⁶⁵ Their research shows that for the fifteen highest-performing public high schools in the United States, over 64 percent of the students in those schools have family incomes over \$80,000 per annum.¹⁶⁶ Supplementing Syverson’s study, Saul Geiser’s 2009 article advocated for the use of alternate “achievement tests” in the admissions process instead of the SAT or ACT.¹⁶⁷ He maintains, “Family income and parents’ education, for example, are highly correlated both with SAT scores and with performance in college, so that much of the apparent predictive power of the SAT actually reflects the proxy effects of socioeconomic status.”¹⁶⁸ However, Geiser’s proposal shows a concern for collegiate admission among lower-income and underrepresented groups rather than casting doubt on the rigor expressed in the tests themselves. Krista Mattern and Brian Patterson, writing for a study sponsored by the College Board, also report that having a higher high school GPA correlated more strongly with student persistence in completing college than SAT scores.¹⁶⁹

¹⁶⁴Syverson, “The Role of Standardized Tests in College Admissions,” 67.

¹⁶⁵Sharon E. Paulson and Gregory J. Marchant, “Background Variables, Levels of Aggregation, and Standardized Test Scores,” *Education Policy Analysis Archives* 17, no. 22 (November 20, 2009): 1-21.

¹⁶⁶*Ibid.*, 12.

¹⁶⁷Saul Geiser, “Back to the Basics: In Defense of Achievement (and Achievement Tests) in College Admissions,” *Change* 41, no. 1 (January 2009): 16-23.

¹⁶⁸*Ibid.*, 19.

¹⁶⁹Krista D. Mattern, Brian F. Patterson, and College Board, “Synthesis of Recent SAT Validity Findings: Trend Data over Time and Cohorts: Research in Review 2014-1,” *College Board* (January 1, 2014): 41.

Using standardized testing data, Hope E. Wilson and Jill L. Adelson studied academically talented secondary students' college choices in 2012.¹⁷⁰ They find,

Students in this sample most often chose colleges that were close to home or in-state, although their stated reasons for choosing colleges were most often for the prestige of the school and availability of special programs and scholarships. This may be due to the fact that students are most familiar with colleges closer to home, and because choosing a college for prestige and availability of programs and scholarships are socially acceptable answers.¹⁷¹

Interestingly, they also note that “when students chose a college based on its prestige or selectivity, the college tended to have a higher mean SAT score. . . . Students with higher SAT scores and grades tended to choose colleges with higher mean SAT scores.”¹⁷² Overall, these studies show that there are links between student academic achievements, which should be a reflection of the relative academic rigor of a student's secondary school experience, especially when examining the median SAT scores reported by the school. However, in examining admission to top-ranked colleges and universities, it is important to note that highly achieving students still choose to attend selective colleges closer to home. Because CESA schools are widely geographically dispersed, including schools' student admission percentages—rather than matriculation rates—at fifty top ranked universities allowed for an accounting of this “closer to home” trend. Having looked at the SAT in relationship to AP courses and college admissions generally, this review will now examine the specific use of the SAT as an example of a high school's academic rigor.

SAT. The College Board has collected annual SAT score data and has reported their findings across a variety of demographic measurements.¹⁷³ Between 2004 and 2014, their data

¹⁷⁰Hope E. Wilson and Jill L. Adelson, “College Choices of Academically Talented Secondary Students,” *Journal of Advanced Academics* 23, no. 1 (February 1, 2012): 32-52.

¹⁷¹Ibid., 48.

¹⁷²Ibid.

¹⁷³“College Bound Seniors: A Profile of SAT Test-Takers,” *The College Board Summary Reporting Service, 2004*, accessed April 18, 2016, http://media.collegeboard.com/digitalServices/pdf/research/cb-seniors-2004-CBSNR_total_group.pdf; “College Bound Seniors: A Profile of SAT Test-Takers,” *The College Board*

showed a strong correlation between family income and median SAT score. As a result, any study examining the SAT should control for this mediating variable. Rebecca Zwick and Jennifer Greif Green studied the relationship between socioeconomic (SES) factors and SAT scores.¹⁷⁴ They find that the higher the score, the higher the students' SES is likely to be, which corresponds to the College Board's own self-reported data. Their independent finding highlighted the need for private, independent schools (including private Christian schools) to acknowledge the way that variation in tuition and family income levels are reflected in student average SAT data contained in schools' academic profiles. They note that comparing student data from school to school can sometimes be meaningless when comparing high school GPA, but could be more easily understood when comparing schools against their potential, based on an expected performance considering demographic data. They argue, "In the case of SAT scores, the between-school effect tends to be substantial—that is, schools with high average SES also tend to have high average SAT scores. When this effect is discounted, the resulting (student-level) correlation is smaller."¹⁷⁵ This quote underlines the need for a comparable measurement when applying the term "academically rigorous," as does another of Zwick and Greif Green's

Summary Reporting Service, 2005, accessed April 18, 2016, <http://media.collegeboard.com/digitalServices/pdf/research/cb-seniors-2005-total-group-report.pdf>; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, <http://media.collegeboard.com/digitalServices/pdf/research/cb-seniors-2006-national-report.pdf>; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, <http://media.collegeboard.com/digitalServices/pdf/research/cb-seniors-2007-national-report.pdf>; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, https://professionals.collegeboard.com/profdownload/Total_Group_Report.pdf; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, <https://professionals.collegeboard.com/profdownload/cbs-2009-national-TOTAL-GROUP.pdf>; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, <https://professionals.collegeboard.com/profdownload/2010-total-group-profile-report-cbs.pdf>; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, http://media.collegeboard.com/digitalServices/pdf/research/cbs2011_total_group_report.pdf; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, <http://media.collegeboard.com/digitalServices/pdf/research/TotalGroup-2012.pdf>; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, <http://media.collegeboard.com/digitalServices/pdf/research/2013/TotalGroup-2013.pdf>; "College-Bound Seniors: Total Group Profile Report," *The College Board*, accessed April 18, 2016, <https://secure-media.collegeboard.org/digitalServices/pdf/sat/TotalGroup-2014.pdf>.

¹⁷⁴Rebecca Zwick and Jennifer Greif Green, "New Perspectives on the Correlation of SAT Scores, High School Grades, and Socioeconomic Factors," *Journal of Educational Measurement* 44, no. 1 (March 2007): 23-45.

¹⁷⁵*Ibid.*, 39. The relationship of this finding to the study by Hart and Risley lies outside the bounds of the present study. Cf. Betty Hart and Todd R. Risley, "The Early Catastrophe," *Education Review* 17, no. 1 (October 2003): 100-18.

assertions: “It is indisputable that SAT scores and SES are positively correlated.”¹⁷⁶ Ezekiel J. Dixon-Román, Howard T. Everson, and John J. McArdle carried this analysis forward in their article examining the relationship between race, poverty, and SAT scores.¹⁷⁷ Their 2013 article seeks to understand the effect of SES on SAT performance, continuing and extending the research so convincingly produced by Zwick and Greif Green in 2007. They assert that there is a non-linear relationship between SES and SAT scores.¹⁷⁸ Their study concludes that there are likely institutional factors perpetuating the persistent difference in white and black student SAT scores. It confirms the great difference in racial groups when it comes to SAT score data, showing that income disparities compound this difference. Their work provided further rationale for controlling for family income when studying SAT score achievement among Christian schools. As noted by Margarita Mooney, William H. Jeynes’ 2007 study found that a religious education provides academic benefits, especially for minority students from intact families.¹⁷⁹ His study demonstrates that religious education made a difference in overall test scores across a variety of subjects, but that family situations made an even more significant difference in educational attainment. Jeynes reports that standardized test results are 5.7 percent higher among lowest quartile SES students at Christian schools than compared to their public school counterparts.¹⁸⁰ Jeynes also posits that the greatest advantage for lowest SES students in Christian schools compared to their public school counterparts is the opportunity to take harder coursework, thus substantiating this study’s examination of academic rigor.

¹⁷⁶Zwick and Greif Green, “New Perspectives on the Correlation of SAT Scores,” 42.

¹⁷⁷Ezekiel J. Dixon-Román et al., “Race, Poverty and SAT Scores: Modeling the Influences of Family Income on Black and White High School Students’ SAT Performance,” *Teachers College Record* 115, no. 4 (April 2013): 1-33.

¹⁷⁸*Ibid.*, 3.

¹⁷⁹William H. Jeynes, “Religion, Intact Families, and the Achievement Gap,” *Interdisciplinary Journal of Research on Religion* 3 (January 2007): 1-24.

¹⁸⁰*Ibid.*, 9.

Similarly, Derek J. Keenan, Vice President of Academic Affairs at ACSI, argues that National Merit Scholarship Semifinalist status (from the PSAT, a preliminary administration of the SAT) is a noteworthy measurement of the academic quality of ACSI schools.¹⁸¹ However, he does not address how ACSI schools compare to non-ACSI schools in the same markets or of equivalent socioeconomic profiles. Though he mentioned it, he also does not adequately account for the role of higher income and its relationship with higher test scores. His brief article further reveals a need for a standard of comparison between different kinds of schools in various geographical areas that controls for the confounding presence of socioeconomic variability. Howard Everson and Roger Millsap's study in 2004 sought to explore the effect of attendance at different schools on SAT scores.¹⁸² They note,

At the individual student level, [the oft-cited relationship between family wealth and socioeconomic background and SAT scores] appears to be moderated by both student achievement levels and exposure to extracurricular activities. This is not to say that family background – particularly parental education levels, does not matter . . . these models suggest that the relation is complex and moderate [*sic*] by school resources, as well as family assets.¹⁸³

Consequently, their research substantiates the need for a study that examines academic achievement in a more holistic capacity than simply comparing SAT scores.

Studies Combining the Qualitative and the Quantitative Variables

The final portion of this literature review examined several studies that have investigated both the qualitative and quantitative components of this research study. Leslie Siskin's 2004 work examines the effect of accountability standards on areas not measured by those standards.¹⁸⁴ While Siskin wrote about music, her overall work on subjects that fall

¹⁸¹Derek J. Keenan, "Measuring Up: Measuring High School Academic Quality," *Christian School Education 2008-2009* (January 1, 2008): 1.

¹⁸²Howard T. Everson and Roger E. Millsap, "Beyond Individual Differences: Exploring School Effects on SAT Scores," *Educational Psychologist* 39, no. 3 (Summer 2004): 157-72.

¹⁸³*Ibid.*, 171.

¹⁸⁴Leslie Santee Siskin, "Outside the Core: Accountability in Tested and Untested Subjects," in *The Curriculum Studies Reader*, ed. David J. Flinders and Stephen J. Thornton (New York: Routledge/Falmer, 2004):

“outside the core” explains why questions about Christian curricular emphases should differentiate between schools that integrate Christianity into their curriculum and those that do not. Siskin discusses the power of the testing factor, which applies especially to Bible curriculum, which is not measured by any national test or standards. Additionally, no national standards measured the integration of faith and learning. Therefore faith-integration posed an interesting dilemma for measurement. She asks, “In transforming subjects into something all students need to be able to demonstrate on a test, do we inadvertently lower performance standards . . . or lose knowledge outside the core altogether?”¹⁸⁵ Of interest to this present research project is Siskin’s assertion that what schools believe to be as measurable is what they measure. Therefore, this research study seeks to measure curricular expressions of Christian belief through examining the course descriptions for secondary students. Her concern for the measurement of untested curricula provides a clear need to examine the integration of faith and learning in academically rigorous secondary schools, due to the potential for its under-emphasis in pursuit of more quantifiable goals.

In 2011, Kristen Campbell Wilcox and Janet Ives Angelis provided a helpful definition of academic rigor and related that definition in terms of measurable data through comparing different cases.¹⁸⁶ They clarified a framework for examining academic achievement in terms of both higher graduation rates and test scores, using a metric to discuss academic rigor that is rooted in “publicly available performance data.”¹⁸⁷ They examine higher performing schools’ blend of success, asserting that rigor with support equals success, rather than blind rigor. Campbell Wilcox and Ives Angelis define rigor as “an intense, focused ethic of striving to do the

269-77.

¹⁸⁵Leslie Santee Siskin, “Outside the Core,” 277.

¹⁸⁶Kristen Campbell Wilcox and Janet Ives Angelis, “High School Best Practices: Results from Cross-Case Comparisons,” *High School Journal* 94, no. 4 (Summer 2011): 138-53.

¹⁸⁷*Ibid.*, 140.

very best one can do.”¹⁸⁸ Their explanation reflects a realization similar to the ideas of Charles Justins, suggesting the merit of balancing rigor with Christian emphases results in a less stressed, more collegiately prepared student. Now having reviewed the necessary precedent studies, this chapter turns to the establishment of its research hypotheses.

Research Hypothesis

Chapter 1 presented the need for this research topic. Measuring academic rigor in private Christian schools assesses the work that students and teachers are doing in classrooms in comparison to schools that have no such Christian foundation, whether public or private. This literature review has shown that a great deal of interest exists in most components of this project, but that none addresses all these areas in one study. Several recent studies have examined practices of the integration of faith and learning, but none of them have examined official statements of the curricular intentionality of integrating faith and learning. Most curriculum studies and Christian school studies have not examined written course descriptions, preferring to survey teacher perceptions rather than published, or official, statements. However, without such statements, teacher enactment of curriculum can only be operational, not official, and therefore not a more easily measurable emphasis. Mark Pike’s study revealed, as examined above, a need for some sort of translation of the value added by a Christian school education. That value could be expressed both using commonly understood standardized test scores such as the SAT and also college acceptance at highly ranked colleges and universities in order to accomplish a comparison of like schools.

The literature review reveals no study of Christian schools’ official curricula, or of integration statements that might be expected of a self-identified Christian school. Existing dissertations mostly examine teacher practices, administrator perceptions, but do not examine official curricular statements, primarily focusing on the operational curricula. Additionally, due

¹⁸⁸Wilcox and Ives Angelis, “High School Best Practices,” 143.

to the fact that most Christian schools charge tuition, measuring a school's academic rigor and Christian curricular emphases while controlling for income band should reveal some new information not examined in Christian school studies to date.

Now having shown that there is a significant literature gap for examining the relationship of academic rigor to Christian curricular emphases, the following research hypothesis is proposed: Christian schools who emphasize the integration of faith and learning in their course descriptions for core subjects are more likely to report higher levels of academic rigor as measured by median SAT scores, AP courses, and college acceptances at highly ranked colleges and universities. Additionally, Christian schools that have a separate Bible curriculum are more likely to report higher levels of academic rigor, when measured by median SAT scores, AP courses, and college acceptances at highly ranked colleges and universities.

CHAPTER 3

METHODOLOGICAL DESIGN

Christian schools emerged in strength in the United States during the 1970s and 1980s. Primarily, these schools were founded by both fundamentalist and evangelical Christians, who were concerned about preserving the teachings of their faith within an educational context.¹ As they have labored to educate students and to foster their Christian faith, Christian schools have also struggled to define themselves in terms of both the nature of their Christianity and in terms of their level of academic rigor. Beginning in 2012, a new group of schools collectively calling themselves the Council on Educational Standards and Accountability (CESA) emerged, stating their dedication to both academic rigor and explicit Christian faith. As of February 10, 2016, there were 39 total CESA schools, 36 with upper school programs. They were located in 15 geographically widespread states, from Washington to Florida, California to Virginia (see figure 1 in chapter 3).

This chapter describes the methodological approach and classification procedures to be used in this research study. The study was designed to examine the relationship between Christian curricular emphases (the independent variables) and academic rigor (the dependent variables). It used both content analysis of the official publications and a quantitative measurement of schools' self-reported academic

¹For further reading on the designation “evangelical,” see Robert Woodberry et al., “The Measure of American Religious Traditions: Theoretical and Measurement Considerations,” *Social Forces* 91, no. 1 (September 2012): 65–73; also see Adam Laats, “Forging a Fundamentalist ‘One Best System’: Struggles over Curriculum and Educational Philosophy for Christian Day Schools, 1970–1989,” *History of Education Quarterly* 50, no. 1 (February 2010): 55–83.

measurements. Content analysis occurs in several different forms, as outlined by Hsieh and Shannon in an article published in 2005.² They describe three types of qualitative content analysis: conventional, directed, and summative. This research study used a directed content analysis. Hsieh and Shannon wrote, “The goal of a directed approach to content analysis is to validate or extend conceptually a theoretical framework or theory. Existing theory or research can help focus the research question.”³ This content analysis applied Badley’s paradigms of integration of faith and learning (IFL) through examining the course descriptions for language drawn from Badley’s 1994 articulation of his paradigms, and using his language describing those paradigms to identify the presence of IFL language in CESA school course descriptions.⁴ The analysis measured academic rigor in terms of school median SAT scores, percentage of Advanced Placement (AP) courses offered at the school in four core areas, and the percentage of acceptances to top fifty universities and colleges.

Purpose Statement

The purpose of this mixed methods study was to determine and to describe the relationship between academic rigor and Christian curricular emphases among select private, Christian secondary schools.

Research Question Synopsis

1. What is the nature of Christian curricular emphases at CESA schools as reflected by the presence of Bible/Christian studies curricula and the integration of faith and learning language in core curricula?

²Hsiu-Fang Hsieh and Sarah E. Shannon, “Three Approaches to Qualitative Content Analysis,” *Qualitative Health Research* 15, no. 9 (November 2005): 1277-88.

³This type of content analysis is the second type described by Hsieh and Shannon, “Three Approaches to Qualitative Content Analysis,” 1281.

⁴Badley added two new paradigms to his scheme in 2009: appliqué and incarnational. However, those two paradigms refer to examples of IFL that are either extremely simple forms of Christian emphasis (appliqué) or not expressing in course descriptions (incarnational), and therefore both are excluded from the directed content analysis.

2. How academically rigorous are CESA school curricula as reflected by median SAT scores, AP courses, and selective college and university acceptances?
3. What is the relationship between the presence of Christian curricular emphases and overall academic rigor?

Research Design Overview

Mixed methods research brought together the strengths of qualitative and quantitative research processes. With regard to convergent data transformation mixed methods, Creswell wrote,

The data-transformation variant occurs when researchers implement the convergent design using an unequal priority, placing greater emphasis on the quantitative strand, and use a merging process of data transformation. That is, after the initial analysis of the two data sets, the researcher uses procedures to quantify the qualitative findings (e.g., creating a new variable based on qualitative themes). The transformation allows the results from the qualitative data set to be combined with the quantitative data and results through direct comparison, interrelation, and further analyses.⁵

Therefore, the order in which the qualitative and quantitative data were collected did not bear on the analysis, since the content analysis data was quantitized into nominal (Yes/No) data prior to analysis.⁶ The process has been explicitly addressed later in this chapter, but in basic form, I followed a version of the research process practiced by Anthony Foster in his dissertation and that of Rowell and This.⁷ Thus, I did the following:

1. Identified all CESA schools' websites
2. Collected all relevant data from those websites

⁵John W. Creswell, "Choosing a Mixed Methods Design," in *Designing and Conducting Mixed Methods Research*, 2nd ed. (Thousand Oaks, CA: Sage Publications, 2010), 81, accessed October 23, 2015, https://us.sagepub.com/sites/default/files/upm-binaries/35066_Chapter3.pdf.

⁶Margarete Sandelowski, Corrine I. Voils, and George Knafl, "On Quantitizing," *Journal of Mixed Methods Research* 3, no. 3 (January 1, 2009): 208-22.

⁷Anthony Wayne Foster, "A Study of Post-Baccalaureate Leadership Curricula at Select Christian Institutions of Higher Education" (PhD diss., The Southern Baptist Theological Seminary, 2010); Katherine Rowell and Craig This, "Exploring the Sociology Curriculum at Community Colleges in the United States," *American Sociologist* 44, no. 4 (December 2013): 329-40.

3. Divided relevant data into related segments
4. Recorded quantitative data
5. Examined course descriptions for IFL language
6. Categorized the course descriptions
7. Analyzed the data
8. Evaluated the results
9. Wrote the research report

Coding Criteria

The qualitative portion of this study consisted of a directed content analysis of the course descriptions of secondary grade English, math, social studies, and science. Using the *NVivo 11* software package from QSR International to search for Badley's paradigm vocabulary, the qualitative portion of the study classified each course according to the presence criterion in order to detect the percentage of courses in a given academic discipline (English, math, science, and social studies) at each CESA school that possessed IFL language as a measure of Christian curricular emphases. Additionally, the qualitative portion of this study examined all published graduation requirements for the presence of required Bible or Christian studies courses, classifying them on a Yes/No scale according to the presence criterion. Those two analyses constituted the independent variables of the study.

The quantitative portion of this study recorded the median SAT score, the percentage of AP courses in a given discipline available at that school versus the number of AP courses offered by the college board in a discipline, and the percentage of colleges to which a school's students were accepted that were ranked in the top 50 by an aggregate of college rankings.

Population

The research population for this study was all course descriptions and academic profiles (or college profiles) of CESA member schools (“Members of Council,” “Provisional Members,” and “Candidate Members”) who had a school with secondary grades. Because these descriptions and profiles were designed to be viewed by people outside of the school, they were presumed to be accurate reflections of how the school wanted to portray itself.

Sample and Delimitations

This study constituted a census of all CESA schools with secondary grades (also known as upper school); therefore the content is exhaustively sampled. All published content meeting the delimitations was analyzed.

Member institutions were defined as every institution of CESA with a secondary grade program (upper school). Only constituent schools’ courses in English, math, social studies, and science, were part of the directed content analysis phase. The school’s academic profile (also known as a college profile), which is annually distributed to colleges, was part of the quantitative data collection phase and the school’s list of recent college acceptances was the other part of the data collection phase (if separate from the college profile).

Limitations of Generalization

This study constituted a census since it analyzed the official course descriptions of all member institutions of CESA with secondary grades programs. The findings of this study may not generalize to institutions dedicated to vocational training at the secondary level, nor populations that do not seek to integrate faith and learning. Since it was a census, it does generalize to all CESA member schools, but may not generalize to institutions beyond CESA member schools in the study.

Research Method and Instrumentation

The study pursued a correlational descriptive mixed methods research design. The qualitative portion of the research used a directed content analysis to detect the presence or non-presence of IFL language in course descriptions for secondary grade courses in English, math, social studies, and science. Additionally, the qualitative portion of the research detected the presence or non-presence of a separate Bible or Christian studies curriculum. The qualitative portion of the study was accomplished using the *NVivo 11* software package, produced by QSR International. This software enabled an accurate, fast analysis of dozens of course descriptions. The quantitative portion of the research detected median SAT scores, the percentage of AP course offerings available, and the percentage of top colleges and universities to which students were admitted. The data transformation of the qualitative into quantitative data allowed for a multivariate analysis of variance with covariates (MANCOVA) using the *SPSS Standard Grad Pack 22 for Students* for statistical analysis.

Ethics Committee Process

Since this study consisted of content analysis of published documents, the research process required no interaction with human subjects. Therefore, no ethics committee approvals were needed to proceed with this study, since all texts in this population were located primarily through institutional websites.

Research Procedures

Given the mixed methods nature of this particular project, several preliminary steps were required in order to prepare for the establishment of the research procedures. First, an extensive literature review revealed an enormous lack of information on the relationship between academic rigor and Christian curricular emphases. Second, this study recognized a disparity in the perception of the academic ability of evangelical Christians reflected in two studies: Mooney's study in *Sociology of Religion* and the

study of Lewis et al. in *Intelligence*. Mooney found that evangelical students at highly selective universities tended to have stronger academic performances, while Lewis et al. found that strong religiosity (which encompasses evangelical religious beliefs) correlated negatively with overall intelligence. Due to the contrasting pictures provided by these studies, the present research project sought to examine the correlation between academic rigor and Christian curricular emphases as a way of providing further clarity in the discrepancy between the work of Mooney and that of Lewis et al. Third in order to find a sufficiently narrow project, this study settled on the schools of CESA as a study population that claims to be both academic and Christian. Due to the relatively recent emergence of CESA, its status as a new alignment of schools made it ideal for study. Finally, in order to have a standard of comparison that would provide relatively common data among this widely geographically distributed population, this study compared them to one another based on nationally administered tests and acceptance at national universities (in contrast to regional universities).

Qualitative Procedures

The qualitative portion of the study involved the collecting, sorting, and analyzing of the course descriptions of English, math, social studies, and science courses from the websites of all CESA schools with secondary grade programs. Thus, I did the following:

1. Visited the websites of every CESA school within the delimitations of the study.
2. Collected every course description of every English, math, social studies, and science course taught in grades 9-12.
3. Rendered every course description into a file format readable by the *NVivo 11* software.
4. Performed a word count of all of the course descriptions of all the schools in each discipline by grade and school.
5. Used Badley's categories and language to detect the presence of IFL language in

each course description and to exhaustively record coding processes and protocols.

6. Scrutinized each school for the presence of a required Bible or Christian studies curriculum separate from the rest of the Core Four curriculum.
7. Categorized the course descriptions in a Yes/No (1 or 0) for the presence or non-presence of IFL language in every Core Four course description.
8. Categorized the presence or non-presence of Bible or Christian studies in a Yes/No coding (1 or 0).
9. Analyzed the courses within each Core Four academic discipline to ascertain the percentage of courses that display IFL.

Quantitative Procedures

The quantitative portion of the study recorded and analyzed the SAT, AP, and college acceptance data reported in the College Profile information all CESA schools with secondary grade programs. Thus, I did the following:

1. Visited the website of every CESA school within the delimitations of the study.
2. Downloaded the academic profile (or college profile) of every CESA school.
3. Recorded all SAT median scores (converting published ACT scores to SAT equivalents using the published accepted concordance from both the ACT and the College Board).
4. Recorded the secondary grades tuition of each school.
5. Recorded the median family income for families with children ages 18 and under for the ZIP code in which the school is located.
6. Recorded the median family income for families with children under the age of 18 in all the ZIP codes bordering that ZIP code as a measurement of the relative affluence of the school's potential population.
7. Recorded the percentage of AP courses offered at a CESA school out of the possible AP courses available in a given discipline according to the College Board's list of possible AP courses.
8. Recorded the five year median ranking of the top fifty national universities according to the US News and World Report: the five year median ranking of the top fifty world universities in the United States according to the Times Higher Education ranking, the top fifty world universities in the United States according to the Shanghai rankings, and the five year median ranking of the top fifty world universities in the United States according to the QS Rankings.

Data Transformation and Mixing

After I collected the qualitative data, I quantitized it in order to enable statistical analysis using the *SPSS* software package, specifically a general multivariate model in the form of MANCOVA. First, the information about the IFL was converted to a percentage of courses which display IFL in each delimited academic discipline. Second, the information about the schools' tuition data relative to the median family income in their ZIP codes was converted into a percentage of the school's tuition. Third, the dependent variables (quantitative data) and the independent variables (qualitative data) were analyzed through a multivariate analysis of variance with covariates using the *SPSS* software package. Once the data had been analyzed, post hoc studies were sought to further explain the relationship between the dependent variables and the independent variables. However, the dichotomous nature of the independent variables obviated the ability of the *SPSS* software package to perform the standard post hoc tests used in a MANCOVA. Therefore, I used the other reporting mechanisms to ascertain the strongest relationships between the dependent and independent variables, as is seen in chapter 4.

CHAPTER 4

ANALYSIS OF FINDINGS

The purpose of this research was to determine and describe the relationship between academic rigor and Christian curricular emphases among select private, Christian secondary schools. To complete this study and answer the research questions, I completed a content analysis of the official school publications describing their academic profile and the core curriculum courses that met the population delimitation criteria. This study constituted a census, as every school's published documents in the population were analyzed. The resulting data is analyzed and summarized in this chapter.

Compilation Protocols

Before beginning the study, I undertook several e-training modules from the QSR Corporation that provided him with the requisite skills needed to use of the *NVivo 11* software package, facilitated by QSR's employees. The first training session occurred on February 19, 2016 and the second training session occurred on February 21, 2016. In addition, the QSR YouTube channel provides numerous guides to facilitate the further use of the *NVivo 11* product. I also used the numerous available websites and published guides regarding specific statistical applications of the *SPSS* program. The guides available from Statistical Associates have substantially aided the performance of the statistical analysis and reporting of this project. Due to this mixed methods analysis being a convergent data transformation model, the compilation protocols are listed according to their quantitative and qualitative nature.

Quantitative Data

There were two sets of quantitative data needed for the MANCOVA: the dependent and covariates (or mediating variables). The dependent variables were median SAT scores, percentage of possible AP courses offered per core subject area, and percentage of top-ranked US universities to which students have been admitted. The mediating variables were the school's tuition and the percentage of the school's tuition relative to the median family income for the ZIP code in which the school is located and bordering ZIP codes.

Phase 1 – Population data for quantitative data. An initial listing of all member institutions of CESA was compiled from the official website of the Council of Educational Standards and Accountability. The list of CESA schools included in this study is found in table A2 in appendix 2. From this listing, a spreadsheet was designed to allow for the recording of all pertinent compilation data in order to enable the reproduction of this study. The data included the school's name and website, their ZIP code, and all quantitative and qualitative data required to conduct this study. In addition, I created a bookmark file of every school's website within a Google Chrome browser to facilitate the consistent collection of the necessary demographic data for each school to conduct the research. Every effort was made to use the most recent available published data from each CESA school as of the research window of February 10, 2016 to March 4, 2016.

Phase 2 – Demographic criteria established for quantitative data. I began by navigating each school's website to collect the expected tuition and fees of a high school senior at each school. All deposits, book fees, recreation fees, participation fees, lab fees, and other fees were added to the base tuition, if not ordinarily done so at the school, in order to compare schools who itemized their fees to schools that combined their fees. The next phase included collecting the ZIP code of the main campus of the

school (for schools that have multiple campuses, the situs ZIP code of the Upper School was used).

After establishing the ZIP code of each school, I used a ZIP code look up service to ascertain all the ZIP codes bordering the ZIP code of the school.¹ All relevant bordering ZIP codes, including those across rivers and in adjacent states were included in the list, were compiled in an Excel spreadsheet which is reproduced in table A5 in appendix 2.

Once all the schools' ZIP codes and those of the bordering ZIP codes were recorded, I then sought to collect the median family income for all collected ZIP codes. I used the United States Census website's research tools to locate the Median Family Income for the last twelve months in 2014 Inflation-Adjusted Dollars 5 Year Estimates (US Census ID S1903).² I then entered in every collected ZIP code into the Census "Add Geographies tool." I then recorded the median income for families with own children under age 18 into the Excel spreadsheet containing the ZIP code.

Having compiled all the median family income for every collected ZIP code, I entered the median family income for the ZIP Code of the school into a column labeled MFIZ, see table A3 in appendix 2. I also used *Microsoft Excel's* spreadsheet functionality to determine the median income of the aggregated ZIP codes inclusive of the school's ZIP code and entered that information into a column labeled MFIA, see table A4 in appendix 2. The second phase of collecting the necessary quantitative data required approximately 80 hours of work.

¹"Free USPS Lookup and Boundary Map," accessed March 15, 2016, <http://www.usnaviguide.com/>.

²"American Fact Finder," United States Census Bureau, accessed March 15, 2016, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S1903&prodType=table.

Dependent variables. Every CESA school had a website containing their physical address and tuition rates, and other information necessary for the research including AP courses taught, either the mean of middle 50 percent SAT and ACT scores or the median SAT (whichever was reported), and college and university acceptances. In order to establish a list of AP courses available for students to take in each of the Core Four subjects, I used the course listings available on the College Board’s website, placing them into the categories English, math, social studies, and science (which included computer science).³ Once scores and admittances were collected, academic profiles and school websites were scoured for lists of AP courses taught in each CESA school. Once I determined the number of courses offered by the College Board’s AP program, they were recorded in the research spreadsheet for each the core categories, compiling a total percentage of AP courses offered at each CESA school based on the number of total AP courses available.⁴ A list of AP courses used in this study can be found in table A14 in appendix 5. While this further division of the information was not necessary to conduct the present study, it does allow for further regression and factor analysis to be conducted on my data set.

I recorded the reported middle 50 percent scores of either the SAT data or the ACT data, whichever the school reported. If the school reported both, I converted the ACT scores to SAT scores using the concordance tables jointly provided by both the College Board and the ACT company. Once I determined which reporting constituted the highest mean score of the middle 50 percent, that number was recorded as the school’s SAT score. Due to some variation in whether or not schools reported SAT 2400 or SAT 1600 scores, I restricted the data to the SAT 1600 scores (CR + M). I recorded the scores

³“Exam Information,” AP Central, accessed March 15, 2016, http://apcentral.collegeboard.com/apc/public/exam/exam_information/index.html.

⁴For a list of AP courses used in this study, see table A14 in appendix 5.

from every school that reported them. I compiled seven years of data from the College Board's archives to determine SAT scores broken into median family income bands. To provide substantiation for the variance of scores due to income, see table 13 in this chapter.

Every CESA school's website contained information about college admissions. I then created a spreadsheet that contained the five most recently available years of top 50 colleges and universities from the US News and World Report's annual college rankings. After collecting that list, I sought to compare that list with other international college rankings of US colleges and universities. I collected five years of data from the "Times Higher Education World University Rankings," the "QS World University Rankings," and the "Academic Ranking of World Universities."⁵ Once those ranked lists were finalized, I then compiled a list of the mode of 50 most listed US universities from each ranking system. Those lists were then condensed into one final representative list. The lists of Top Universities, are found from table A7 through table A13 in appendix 4.

Against this list, all CESA school college acceptances were scored, one point for each college acceptance from the composite top 50 colleges. Each CESA school was then given a score representing the percentage of recent college acceptances from top 50 US colleges and universities. The spreadsheet containing all Top University data is reproduced in appendix 4. This data formed the basis by which I determined both universities and colleges as top-ranking and therefore was subjected to the inherent weaknesses of those ranking systems. There was strong agreement about the universities at the top of the rankings, but the rankings diverged markedly from one another as the lists continued. Nevertheless, these data sets allowed a systematic measure against which

⁵"Times Higher Education World University Rankings," accessed March 15, 2016, <https://www.timeshighereducation.com/world-university-rankings>; "QS World University Rankings," QS Top Universities, accessed March 15, 2016, <http://www.topuniversities.com/qs-world-university-rankings>; "Academic Ranking of World Universities," Academic Ranking of World Universities, accessed March 15, 2016, <http://www.shanghairanking.com/>.

student admissions to top universities could be weighed. This first phase of collecting the necessary documents for the study from the school's websites took approximately 150 hours of work.

Mediating variables. CESA tuition data was compiled by visiting the admissions and tuition sections of each school's website. I used the highest listed tuition for high school students and included all additional fees to build the most realistic cost of schooling for a single high school student in his or her final year of secondary schooling. Some schools separated out costs for books, sports fees, and other additional costs into separate categories, but I believed that all costs associated with attending a school should be represented in the evaluation of the school and therefore added all fees to the base tuition to attain a true cost of schooling at a given school.

The school's tuition was first analyzed as a percentage of the median family income for the ZIP code in which the school is located. Median family income data was compiled through the US Census office's American FactFinder tool.⁶ After acquiring this data, I then recorded the median family income from all the ZIP codes bordering the school's ZIP code. The ZIP codes bordering each school's ZIP code were determined using a "ZIP code look up guide" from USNaviguide.com.⁷ Any errors in data compilation were due to any errors possessed within those publically available databases.

Qualitative Data

There was one set of independent variables broken into five sub-categories: presence of Bible curricula, percentage of IFL language present in English course descriptions, percentage of IFL language present in social studies course descriptions,

⁶"American FactFinder," United States Census Bureau, accessed December 30, 2015, <http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>.

⁷"Free US ZIP code Lookup and Boundary Map," accessed December 30, 2015, <http://www.usnaviguide.com/>.

percentage of IFL language present in mathematics course descriptions, percentage of IFL language present in science course descriptions.⁸

Independent variables. CESA schools' academic and curricular data were collected in a systematic format. First, I visited each school's website. Second, I scoured the website for academic/college profiles and 9-12 grade course descriptions. Third, I printed the data into PDF or *Microsoft Word* documents for ease of scanning into files useable by *NVivo 11*. Fourth, I performed a directed content analysis of the files for IFL terminology according to the findings from Badley's paradigms. Fifth, I used *SPSS* to conduct the MANCOVA and potential post-hoc analyses of the data. All variable abbreviations used in this analysis were recorded into table 1, which includes dependent variables, independent variables, and covariates.

Phase 3 – Qualitative data, the *NVivo 11* phase for independent variables.

Beginning February 19, 2016, the primary documents published by the 36 member schools of CESA in the research study were analyzed to determine which programs met the delimitation criteria. All available academic profiles and course descriptions were collected and uploaded into the *NVivo 11* program. After uploading all the documents, I used the program to code all the available course descriptions to the four major areas: English, math, science, and social studies. I followed each school's grouping of courses, allowing them to dictate what was coded within each node. During the coding process, I observed that every CESA school had a separate Bible curriculum, which meant that one of the sub-questions was answered for Research Question 1. Every publically available school course description was coded into one of the categories, constituting a census of all academic course descriptions.

⁸Some CESA schools used the category "history courses" as an alternate title for social studies courses.

I then uploaded the three PDFs containing Ken Badley's paradigms of the integration of faith and learning. I performed a word frequency count of the sections of Badley's work in each document specifically describing the paradigms of integration of faith and learning.⁹ Using that word frequency count, I then used those most frequently occurring terms as a guide to text query searches within the *NVivo 11* programs' database of CESA school course descriptions. Those terms most frequently appearing in the Badley paradigms appear in table A6 in appendix 3. I then systematically used those words to perform a stemmed text query within the coded course descriptions, then reviewed those queries, uncoding uses of the words that were irrelevant for the purposes of Badley's paradigms. I also gave weight to Badley's definitions themselves when performing word frequency counts. For example, "integration" and its stemmed variants showed a high frequency in the Math node, but further review revealed that those uses were within description of course goals within the discipline of calculus and did not describe the integration of faith or a biblical worldview. After coding each high frequency word on its own individual node, I then reviewed the results and performed a comparison diagram within the *NVivo 11* program that allowed review of the overlap between each node and the possible merging of nodes within one another. The result of that review was to reveal four IFL-related terms that were prominent in course descriptions among CESA schools: "Biblical," "Christian," "perspective," and "worldview."

Quantitizing qualitative data. I then reviewed all instances of those words in relationship to one another and where they appeared in the course descriptions according

⁹These paradigm descriptions appeared in Kenneth R. Badley, "'Intergration' and 'The Integration of Faith and Learning'" (PhD diss., The University of British Columbia, 1986), 64-77; Kenneth R. Badley, "The Faith/Learning Integration Movement in Christian Higher Education: Slogan or Substance?" *Journal of Research on Christian Education* 3, no. 1 (Spring 1994): 24-25; Kenneth R. Badley, "Clarifying 'Faith-Learning Integration': Essentially Contested Concepts and the Concept-Conception Distinction," *Journal of Education & Christian Belief* 13, no. 1 (Spring 2009): 7-17.

to major academic discipline. I performed a manual count of each instance of those words' appearance within each discipline according to each IFL-related term. If one or more of the IFL-related terms appeared in a course description, I counted that as one appearance of IFL language in the CESA schools' course descriptions. Thus, I subsequently coded all of those appearances within a spreadsheet containing all other relevant research data. I used the arithmetic mean of all the results of the qualitative research as a dividing point, rather than the median, because the mean was a more precise number, providing a better break between the numbers. After I established that mean established for each major academic area—English, math, science, and social studies—I then used the organizing capabilities of the *Excel* program to separate the data into schools whose presence of IFL-language was above the CESA schools' mean and those who were below the mean; converting each result into a dichotomous variable. Once all variables were recorded into the *Excel* document, they were uploaded into the *SPSS* program for further statistical examination. This third phase involving the collection and coding of all CESA school course documentation took approximately 60 hours of work.

Phase 4 – The *SPSS* phase. Beginning March 10, the collected data from the preceding three phases was finalized and uploaded into *SPSS*. I then followed the *SPSS* data analysis guidance of David Garson in his book from Statistical Associates, *GLM Multivariate, MANOVA, and Canonical Correlation*.¹⁰ I determined that because the model sought to determine the relationship between academic rigor (using three dependent variables) and the integration of faith and learning (using five independent variables) while controlling for income (using three covariates), that the appropriate statistical analysis was a multivariate analysis of variance with covariates (MANCOVA).

¹⁰David Garson, *GLM Multivariate, MANOVA, & Canonical Correlation: Blue Book Series 11* (Raleigh, NC: Statistical Associates Publishers, 2015), loc. 1, Kindle.

I then determined whether the research data met the assumptions of MANCOVA before performing the study. I followed the guidance of Garson and also the guidance of Andrew Mayers in verifying whether the data met the assumptions necessary to perform MANCOVA.¹¹ This process required approximately 100 hours of work. The entire research process was systematically recorded in an Excel spreadsheet and reproduced in table A1 in appendix 1. The next section contains the findings from the research study, and Table 1 provides the list of abbreviations used in this study for each variable.

Table 1. List of abbreviations for each variable

<i>Variable</i>	<i>Abbreviation</i>	<i>Type of Variable</i>
Median Family Income (Area) as percentage of Tuition	MFIA	Covariate
Median Family Income (ZIP code) as percentage of Tuition	MFIZ	Covariate
Tuition of the School	Tuition	Covariate
Mean of middle 50 percent or Median SAT score	SAT	Dependent
Percentage of AP courses offered at the School	AP	Dependent
Percentage of students admitted to Top 50 Universities	TopUniv	Dependent
English IFL	EngIFL	Independent
Math IFL	MathIFL	Independent
Science IFL	SciIFL	Independent
Social Studies IFL	SSIFL	Independent

Demographic and Sample Data

This section includes basic demographic data, specifically median family income and profiles of schools. The CESA schools were geographically dispersed. There are 8 each in Texas and Georgia, 4 in California, 3 in Illinois, 2 each in Tennessee, Missouri, and North Carolina, and 1 each in Arkansas, Colorado, Florida, Montana, Ohio, Virginia, and Washington. Their geographic spread is represented below in figure 1

¹¹ Andrew Mayers, *Introduction to Statistics and SPSS in Psychology* (London: Pearson Education, 2013), chap. 15, pp. 362-96, accessed March 16, 2016, http://www.pearsonhighered.com/assets/hip/gb/uploads/Mayers_Intro_Stats_SPSS_Chapter_15.pdf.

which shows a pin in the home ZIP code for each CESA school.



Figure 1. CESA schools by ZIP code

As stated in chapter 3, the examination of CESA schools constituted a census meaning that the data would have been comprehensive for all CESA schools that fit the delimitations of the sample. Because the study examined all schools that are either CESA Members of Council, CESA Provisional Schools, or CESA Candidate Schools, it constituted a census of all the schools that fit the delimitations of the study, this fact had ramifications for the analysis of the MANCOVA. The implications of the analysis of a census MANCOVA appear below in the section “MANOVA Results.”

The data collected during Phase 1 provided the basis for the dependent variable. The data categories were labeled “AP_{avail}” – for the percentage of AP courses available at a given school; “SAT_{med}” – for the median or median of middle 50% of SAT

or ACT score; and “TopUniv” – for the percentage of admissions to top fifty colleges and universities reported by schools. The examination of the list of CESA schools revealed that 36 CESA schools met the delimitations of the study. Five schools reported no SAT data of any sort that met the study delimitations, and consequently were not recorded and delimited from the study when the *SPSS* software analyzed that variable in the MANCOVA. The mean percentage of AP_{avail} courses offered at CESA schools was 40% with a median of 45%. The percentage of AP courses offered at CESA schools ranged from a low of 0% to a high of 77%, for a range of 77% and a standard deviation of 20.2%. The SAT_{med} mean score was 1150, with a low of 1010 and a high of 1279, for a range of 261 points and a standard deviation of 55. The mean percentage of Top Universities to which CESA school students were admitted was 35% with a median of 30%. The percentage of TopUniv ranged from 0% to 90% for a range of 90 percentage points and a standard deviation of 26.5%. The basic statistics appear in table 2.

Table 2. Case summaries for dependent variables

		<i>AP (%)</i>	<i>SAT</i>	<i>TopUniv (%)</i>
Total	N	36	31	36
	Mean	40.151	1150.520	35.388
	Median	45.454	1150.000	30.000
	Minimum	0.000	1018	0.000
	Maximum	77.270	1279	90.000
	Range	77.270	261	90.000
	Std. Deviation	20.255	55.047	26.549

Covariate Data

The covariate data were collected along three related variables. The tuition of the school was collected for 35 of the 36 schools meeting the delimitations of the study.

One school reported no fixed tuition and was not included in the calculations by the *SPSS* program. The median family income of the ZIP code in which the school is situated was used to calculate the covariate MFIZ, using the formula: (MFIZ % = Tuition / Median Family Income of ZIP Code). The median family income of the ZIP code of the school plus all bordering ZIP codes was calculated from the median of all bordering ZIP codes inclusive of the school’s ZIP code and used to calculate the covariate MFIA, using the formula: (MFIA% =Tuition/Median Family Income of all Bordering ZIP Codes). These variables are summarized in table 3.

Table 3. Case summaries for covariates

		<i>Tuition (\$)</i>	<i>MFIZ (%)</i>	<i>MFIA(%)</i>
Total	N	35	35	35
	Mean	15803.69	28	25
	Median	15925.00	23	21
	Minimum	7755.00	7	9
	Maximum	22350.00	103	60
	Range	14595.00	96	51
	Std. Deviation	4300.11	21	13

The covariate “Tuition”, expressed in dollars, reveals a mean of \$15,803.69 and a median of \$15,925. The minimum was \$7,755 and the maximum was \$22,350, with a range of \$14,595 and a standard deviation of \$4,300.10. The covariate “MFIZ,” expressed in percent, reveals a mean of 28% and a median of 23%. The minimum was 7% and the maximum was 103% for a range of 96% and a standard deviation of 20.6%. The covariate “MFIA” expressed in percent, reveals a mean of 25% and a median of 21%. The minimum was 9% and the maximum was 60% with a range of 51% and a standard deviation of 12.9%. The case summaries are presented in table 3.

Independent Variable Data

The independent variable data was coded as dichotomous, with N=0 and Y=1 based on whether or not the school’s percentage of IFL language (as determined by instances of IFL language detected for each course description according to the protocol listed above) in each academic discipline was above or below the CESA mean for that subject. The case summaries appear in table 4. The mean was used instead of the median because it provided a more precise break between the numbers than the median. The recorded mean of Bible courses at CESA schools was 3.25 years of Bible required. The recorded mean of English course descriptions containing IFL language was 18%. The recorded mean of Math course descriptions containing IFL language was 0% because no CESA school used IFL language in their course descriptions for that subject. The recorded mean of science course descriptions containing IFL language was 21%. The recorded mean of social studies course descriptions containing IFL language was 36%. Therefore, the variable “Bible” represents the Y/N dichotomization of whether the schools’ years of Bible required were above or below the mean of 3.25 years.

Table 4. Case summaries of the independent variables

		<i>Bible</i>	<i>EngIFL</i>	<i>MathIFL</i>	<i>SciIFL</i>	<i>SSIFL</i>
Total	N	36	36	36	36	36
	Mean	0.639	0.333	0.000	0.250	0.361
	Median	1.000	0.000	0.000	0.000	0.000
	Minimum	0.000	0.000	0.000	0.000	0.000
	Maximum	1.000	1.000	1.000	1.000	1.000
	Range	1.000	1.000	0.000	1.000	1.000
	Std. Deviation	0.487	0.478	0.000	0.439	0.487

The variable “EngIFL” represents the Y/N dichotomization of whether the schools’ English courses were above or below the mean of 18%. The variable “MathIFL”

contained no instances of IFL language. The variable “SciIFL” represents the Y/N dichotomization of whether the schools’ science courses were above or below the mean of 21%. The variable “SSIFL” represents the Y/N (where Y=1; N=0) dichotomization of whether the schools’ social studies courses were above or below the mean of 36%. I recorded the IFL presence from all 36 CESA schools meeting the delimitations of the study for course descriptions. For the “Bible” variable, the mean of the Y/N responses was 0.639, with a median of 1. The standard deviation was 0.487. For the “EngIFL” variable, the mean of the Y/N responses was 0.333, with a median of 0. The standard deviation was 0.4781. For the “MathIFL” variable, there were no recorded instances of IFL language. For the “SciIFL” variable, the mean of the Y/N responses was 0.25, with a median of 0. The standard deviation was 0.4392. For the “SSIFL” variable, the mean of the Y/N responses was 0.361, with a median of 0. The standard deviation was 0.4871.

Table 5. Overview of statistical analysis

<i>Research Question</i>	<i>Statistical Tools</i>	<i>Data set</i>
Description of Sample	Descriptive Statistics	Geographical location, tuition, information from websites
Research Question 1	Descriptive statistics, means, standard deviations	<i>Independent variables:</i> Bible, EngIFL, MathIFL, SciIFL, SSIFL
Research Question 2	Descriptive statistics, means, standard deviations	<i>Dependent variables:</i> AP _{avail} , SAT _{med} , TopUniv <i>Covariates:</i> Tuition, MFIZ, MFIA
Research Question 3	MANOVA, MANCOVA, ANOVA; tests of assumptions for MANOVA (Pearson correlations, tests for homoscedasticity, normality, multicollinearity, equality of covariance)	<i>Independent variables:</i> Bible, EngIFL, MathIFL, SciIFL, SSIFL <i>Dependent variables:</i> AP _{avail} , SAT _{med} , TopUniv <i>Covariates:</i> Tuition, MFIZ, MFIA

Findings and Displays

The research study sought to understand the relationship, if any, between academic rigor and Christian curricular emphases in CESA schools with secondary programs (grades 9-12). The first research question sought to know how Christian curricular emphases are expressed at CESA schools with regard to Bible courses and the presence of integration of faith and learning language. The second research question sought to examine how academically rigorous CESA schools are with regard to their median SAT scores, AP courses offerings, and top-ranked college admissions. The third research question sought to examine the relationship between the presence of Christian curricular emphases and overall academic rigor at CESA schools. The overview of statistical analysis performed during this study is presented in table 5.

Research Question 1

The first research question asked, “How are Christian curricular emphases at CESA schools expressed, as reflected in the presence of Bible courses and integration of faith and learning language in core curricula (English/language arts, history/social studies, mathematics, and science)?”

To answer Research Question 1, I examined the data collected during Phase 1 and Phase 3 of the study. In collecting the data, I found that all CESA schools provided information via their website that helped to answer this research question in the form of course descriptions either collected into one large manual or in individual descriptions for each course in a specific place on the website. I then downloaded all manuals and course descriptions as either Microsoft Word ® files or as print digital files (PDF) for the purpose of entering those files into the *NVivo 11* software package for further analysis. A descriptive statistical summary from the SPSS program’s analysis of the findings with regard to the first research question appears in table 6 with explanations following.

Table 6. Descriptive statistics: Christian curricular emphases above or below the mean

	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Mean</i>		<i>Std. Dev.</i>	<i>Skewness</i>		<i>Kurtosis</i>	
	<i>Stat.</i>	<i>Stat.</i>	<i>Stat.</i>	<i>Stat.</i>	<i>Std. Err.</i>	<i>Stat.</i>	<i>Statistic</i>	<i>Std. Err.</i>	<i>Statistic</i>	<i>Std. Err.</i>
Bible	36	0.0	1.0	0.639	0.081	0.487	-0.604	0.393	-1.735	0.768
EngIFL	36	0.0	1.0	0.333	0.079	0.478	0.738	0.393	-1.544	0.768
MathIFL	36	0.0	0.0	0.000	0.000	0.000	--	--	--	--
SciIFL	36	0.0	1.0	0.250	0.073	0.439	1.206	0.393	-0.582	0.768
SSIFL	36	0.0	1.0	0.361	0.081	0.487	0.604	0.393	-1.735	0.768
Valid N (listwise)	36	--	--	--	--	--	--	--	--	--

Note: Data was autorecoded using rounding, entered as an integer, data below 0.5 coded 0 in the program and data 0.5 and above is coded 1; Stat. = Statistic

I exhaustively examined every CESA school’s course descriptions for the presence of IFL language derived from a word count content analysis of each of Ken Badley’s paradigms. I then used that list to form the foundation for a directed content analysis, refined by Badley’s specified paradigm lists published in 1994 and 2009. After performing a directed content analysis of the documentation from the CESA schools, I coded the IFL language found into four parent nodes, “Biblical,” “Christian,” “Perspective,” and “Worldview.” After examining each node for improper coding (e.g., removing art classes from the node “perspective”), I performed a comparison diagram to analyze the overlap between each created node, moving some original nodes into child nodes. The parent node “Biblical” included the child node “Integration.” The parent node “Perspective” included the child node “Lens.” The parent node “worldview” included the child node “Faith.” After recording each school’s data, I then quantitized the qualitative data from the content analysis by coding the presence of any IFL language in a course description as a “1” and the non-presence of IFL language in a course as a “0.” The result of this coding process was that several course descriptions displayed coding in multiple

nodes, but still were counted as one single course with IFL language. The number of courses showing IFL language was then divided by the total number of courses offered in that academic area by the course descriptions displaying IFL language to achieve a percentage of courses expressing IFL language. I then used the calculated percentages to determine the overall mean percentage of CESA schools in that particular discipline. Schools demonstrating a percentage of courses displaying IFL language above the mean were coded as “1” (Y) and those demonstrating a percentage below the mean were coded as “0” (N). In that way, CESA school IFL language presence in English, math, science, and social studies were collected and recorded into comprehensive tables presented below in table 7 through table 9. No CESA school reported Math IFL language; therefore, a table has not been presented with that data.

The Bible course descriptions were handled differently from the IFL language in core curriculum, since Bible courses are specifically about faith and learning. Consequently, I initially sought to determine the presence or non-presence of Bible curricula in CESA schools. After determining that every current CESA school required Bible coursework of every student, I sought to convey the impact of that information in a way that would be meaningful for this study. Therefore, I collected the number of years of required Bible courses and recorded them into the master data sheet. The findings from that collection have been displayed in table 10.

Table 7. EngIFL mean data

<i>Mean N of English Courses</i>	8.82
<i>Mean N of English Courses w/ IFL language</i>	1.33
<i>Mean Percentage of English Courses w/ IFL Language (%)</i>	18
<i>N of EngIFL Language Cases Above Mean Percentage</i>	12

English. Every CESA school required their students to follow an English curriculum during their time at the school. After exhaustively examining the schools’ English course descriptions for IFL language, I found that the mean of English courses descriptions containing IFL language was 18% of courses displaying that language. After examining all CESA schools in this study, 33% of schools were above that mean of English courses containing IFL language. This data appears in table 7.

Math. Every CESA school required that their students follow a math curriculum during their time at the school. After exhaustively examining the schools’ math course descriptions for IFL language, I found that no CESA schools had any IFL language in any math course. Those findings notably resulted in no cases of IFL language emergent in the course descriptions of any of the CESA schools. This absence of information led me to survey math departmental vision or philosophy statements for the presence of IFL language. I found that 13 CESA schools did have a mathematics departmental vision or philosophy statement that included IFL language, but since that information fell outside of the study’s delimitations, it was not included in the analysis.

Table 8. SciIFL mean data

<i>Mean number of Science Courses</i>	11.24
<i>Mean number of Science Courses w/ IFL language</i>	0.72
<i>Mean percentage of Science Courses w/ IFL language (%)</i>	7
<i>N of SciIFL Language Cases Above Mean Percentage</i>	9

Science. Every CESA school required that their students follow a science

curriculum during their time at the school. After exhaustively examining the schools' science course descriptions for IFL language, I found that the mean of science course descriptions containing IFL language was 7%. After examining all CESA schools in this study, 25% of schools were above that mean of science courses containing IFL language. This data appears in table 8.

Table 9. SSIFL mean data

<i>Mean number of Social Studies Courses</i>	9.70
<i>Mean number of Social Studies Courses w/ IFL language</i>	1.92
<i>Mean percentage of Social Studies Courses w/ IFL language (%)</i>	21
<i>N of SSIFL Language Cases Above Mean Percentage</i>	13

Social studies. Every CESA school required that their students follow a social studies curriculum during their time at the school. After exhaustively examining the schools' social studies course descriptions for IFL language, I found that the mean of social studies course descriptions containing IFL language was 21%. After examining all CESA schools in this study, 36% of schools were above that mean of social studies courses containing IFL language. This data appears in table 9.

Table 10. Bible mean data

<i>Mean Years Required Bible</i>	3.25
<i>Percentage of Bible Courses Required Above the Mean (%)</i>	63.90
<i>N of Bible Courses Required Above Mean</i>	23

Bible. Every CESA school required their students to follow a Bible (or Christian studies) curriculum during their time at the school. Schools varied in the amount of years that students were required to study Bible. The length of time required ranged from a low of half of a year (one semester) to a high of 4 years. The median number of years required was 3 and the mean was 3.25 years. Since every school required the course, I realized that a more meaningful measurement would be the required amount of time for a student to study a Bible curriculum, rather than its presence. I found that 63.9 % of CESA schools were above the mean for required years of Bible. This data is summarized in table 10.

Research Question 2

Research Question 2 asked, “How academically rigorous are CESA school curricula as reflected by median SAT scores, AP courses, and top-ranked college and university acceptances at Top 50 World University Rankings universities?” To answer Research Question 2, I examined the data collected through Phases 1 and 2. The research revealed that while the overwhelming majority of CESA schools (31 out of 36) divulged all three measures of academic data, five did not provide academic data with regard specifically to median SATs. Additionally, one CESA school did not provide any tuition data on its website, in an apparent effort to keep themselves affordable to parents from low income situations. I decided that including the rest of that schools’ data would enhance the findings and therefore proceeded with the comparison of those data, knowing that the *SPSS* software package would exclude cases with missing data from a Type III model when conducting the multivariate analyses. Table 11 is a descriptive statistical analysis of the findings regarding the quantitative data which includes the dependent variables and covariates.

Table 11. Descriptive statistics for dependent variables and covariates

	<i>N</i>	<i>Min.</i>	<i>Max.</i>	<i>Mean</i>		<i>Std. Dev.</i>	<i>Skewness</i>		<i>Kurtosis</i>	
	<i>Stat.</i>	<i>Stat.</i>	<i>Stat.</i>	<i>Stat.</i>	<i>Std. Err.</i>	<i>Stat.</i>	<i>Stat.</i>	<i>Std. Error</i>	<i>Stat.</i>	<i>Std. Error.</i>
AP _{avail} (%)	36	0	77	40.15	3.376	20.26	-0.22	0.393	-0.95	0.768
SAT _{med}	31	1018	1279	1150.52	9.887	55.05	-0.09	0.421	0.66	0.821
TopUniv (%)	36	0	90	35.39	4.425	26.55	0.42	0.393	-1.02	0.768
Tuition (\$)	35	7755	22350	15803.69	726.851	4300.11	-0.23	0.398	-1.01	0.778
MFIZ (%)	35	0	1	28.00	0.035	0.21	2.21	0.398	5.43	0.778
MFIA (%)	35	0	1	25.00	0.022	0.13	1.20	0.398	0.90	0.778
Valid N (listwise)	31	--	--	--	--	--	--	--	--	--

Note: Data was autorecoded using rounding, entered as an integer, data below 0.5 coded 0 in the program and data 0.5 and above is coded 1; “Stat.” = Statistic

CESA schools have a mean SAT_{med} of 1151 (Std. Dev. of 55 pts), mean percentage 40% of AP_{avail} courses (Std. Dev. of 20 pts), and also admission to 35% of the TopUniv (Std. Dev. of 26.5 pts) in the United States. While national statistics do not record two of these measures used in this study, SAT_{med} data provides a simple comparison. Table 12 provides a measure of national SAT scores at comparable levels to those of CESA Schools. National scores are reported means, where CESA scores are the group mean of median scores. This table shows that CESA schools are substantially above national comparison groups based on both income range and school groupings, and are also well above the national mean SAT score.¹²

¹²Standard deviation data is reported for the SAT by each component of the test (Critical

Table 12. Comparison of CESA schools alongside recent SAT data

<i>Grouping</i>	<i>Mean SAT (CR +M)</i>	<i>Difference from CESA Schools</i>
National Mean	1006	-145
Family Income \$60k-\$80k	1013	-138
Family Income \$80K-\$100k	10403	-108
Family Income \$100k-\$120k	1073	-78
Independent Schools	1111	-40
Religious Schools	1069	-82
CESA Schools	1151	--

Note: All data are for 2015 or most recently available and rounded to the nearest whole number

Consequently, I found that, at least in measurements of SAT, the CESA schools are academically rigorous. However, due to the relationship between income and SAT scores presented in table A15 in appendix 6, it was important to control for the effect that family income has on SAT scores and other correlated measures of academic rigor (AP_{avail} and TopUniv).

Research Question 3

This question asked, “What is the relationship between the presence of Christian curricular emphases and overall academic rigor at CESA schools?”

In order to answer this question, I performed a multivariate analysis of the information gathered in the first two portions of this study. This question’s answers emerged during Phase 4 of the research and constituted the most complex portion of the study. This decision emerged because I intended to perform a multivariate analysis of

Reading, Math, and Writing) and therefore does not as easily compare with the data as reported in this study.

variance with covariates (MANCOVA) in order to control for the effect of family income on the academic rigor data. I found, both through the literature review and through conducting a preliminary analysis of variance (ANOVA) that income and SAT scores are significantly related. I compiled a database of all reported SAT results by income band (presented in table A15 in appendix 6) and performed an ANOVA on that data. The results of this ANOVA are presented in table 13. There was a statistically significant difference between group means as shown by a one-way ANOVA ($F(9, 60) = 1207.356$, $p = 2.49 \times 10^{-64}$). This level of statistical significance led me to perform a MANCOVA as the most appropriate way to control for this finding, while avoiding Type I errors in the analysis.

Table 13. ANOVA of SAT (CR+M) scores by income band, 2008-14

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	368416.100	9	40935.12	1207.356	2.49e-64*	2.040098
Within Groups	2034.286	60	33.90	--	--	--
Total	370450.300	69	--	--	--	--

Note: * $p < 0.001$

Summary of testing of assumptions. In order to perform a MANCOVA, several assumptions had to be met by the data. The assumptions are described in appendix 7 with accompanying tables and text to demonstrate how the data met these assumptions. All research data were tested to ensure that it met all assumptions required for a MANCOVA. After testing the data, I determined that the MANCOVA was the appropriate test to perform and that the covariates collected in the data collection phase would help to strengthen the model proposed by Research Question 3. Due to the

findings reported in appendix 7, I have excluded the covariate MFIZ from the model due to its high degree of kurtosis and skewness and its failure of the test of normality.

Therefore, the model was a 3x5x2 MANCOVA with three dependent variables (AP_{avail} , SAT_{med} , and Top Universities), five independent variables (Bible, EngIFL, MathIFL, SciIFL, and SSIFL), and two covariates (Tuition and MFIA).

MANOVA Results

Initially, I ran a 3x5 Multivariate Analysis of Variance (MANOVA), omitting the covariates, in order to assess the additional strength of the model provided by the covariates once they were added in the MANCOVA. The results of the MANOVA are presented in the table below with discussion following of every interaction displaying strong effects in terms of partial eta squared (η_p^2).¹³ In order for statistical analysis to generalize beyond the sampled population, it must be random and achieve significance at a level of $p < 0.05$. However, Garson noted, “If data are an enumeration (census) of all observations, then significance is moot. All findings, however weak, are ‘real’ and have a true significance level of $p = 0.000$, contrary to the computed asymptotic estimate of significance. [Random] sampling is not required if data are an enumeration. Though reporting significance for enumeration data is common, significance estimates confound effect size and sample size. For enumeration data it is better simply to report effect size.”¹⁴ Since this study represents a census of all CESA schools within the delimitations of the study, the reporting of this study concentrated on effect size, measured by partial eta squared (η_p^2), rather than statistical significance, measured by p values.

Table 14 showed that the CESA schools have a mean AP_{avail} courses offered

¹³“Computed significance levels are reported in order to follow social science convention. However, as the data are an enumeration of all cases, the actual significance level for all findings is $p = 0.000$, not the computed level, which assumes the data are a random sample of the size of the enumeration,” Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, loc. 1776, Kindle.

¹⁴Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, locs. 1772-74, Kindle.

of 46.2%, with a standard error of 4.05%, a mean SAT_{med} score of 1158.34, with a standard error of 12.45 points, and a mean percentage of TopUniv of 38.85%, with a standard error of 5.825 %. Table 15 presented a side-by-side comparison of the means of the three dependent variables according to the descriptive statistics, the MANOVA, and the MANCOVA.

Table 14. MANOVA grand mean

<i>Dependent Variable</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
			<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail} (%)	46.200 ^a	4.051	37.690	54.711
SAT _{med}	1158.342 ^a	12.447	1132.191	1184.493
TopUniv (%)	38.848 ^a	5.825	26.610	51.086

Note: a. Based on modified population marginal mean.

Table 15. Comparison of means from descriptive statistics, MANOVA estimated marginal means, and MANCOVA estimated marginal means

	<i>AP_{avail} (%)</i>		<i>SAT_{med}</i>		<i>TopUniv (%)</i>	
	<i>Mean</i>	<i>Std. Error</i>	<i>Mean</i>	<i>Std. Error</i>	<i>Mean</i>	<i>Std. Error</i>
Descriptive	40.151	3.375	1150.52	9.887	35.388	4.424
MANOVA	46.200	4.051	1158.34	12.447	38.848	5.825
MANCOVA	47.155	3.638	1163.66	11.216	39.964	5.973

These means, based on modified population marginal mean, demonstrated an increase for each dependent variable in the MANOVA compared to that reported in the descriptive statistics. Table A30 in appendix 8 shows all interactions between the independent variables with strong and medium effect sizes on the dependent variables.

Table 16. Multivariate tests (MANOVA)

<i>Effect</i>		<i>Value</i>	<i>F</i>	<i>Hypothesis df</i>	<i>Error df</i>	<i>Sig.</i>	<i>Partial Eta Squared (η_p^2)</i>
Bible * EngIFL	Pillai's Trace	0.176	1.136	3.000	16.000	0.364	0.176
	Wilks's λ	0.824	1.136	3.000	16.000	0.364	0.176
	Hotelling's Trace	0.213	1.136	3.000	16.000	0.364	0.176
	Roy's Largest Root	0.213	1.136	3.000	16.000	0.364	0.176
EngIFL * SciIFL	Pillai's Trace	0.267	1.948	3.000	16.000	0.163	0.267
	Wilks's λ	0.733	1.948	3.000	16.000	0.163	0.267
	Hotelling's Trace	0.365	1.948	3.000	16.000	0.163	0.267
	Roy's Largest Root	0.365	1.948	3.000	16.000	0.163	0.267
EngIFL * SciIFL * SSIFL	Pillai's Trace	0.140	0.870	3.000	16.000	0.477	0.140
	Wilks's λ	0.860	0.870	3.000	16.000	0.477	0.140
	Hotelling's Trace	0.163	0.870	3.000	16.000	0.477	0.140
	Roy's Largest Root	0.163	0.870	3.000	16.000	0.477	0.140

Note: Design: Intercept + Bible + EngIFL + MathIFL + SciIFL + SSIFL + Bible * EngIFL + Bible * MathIFL + Bible * SciIFL + Bible * SSIFL + EngIFL * MathIFL + EngIFL * SciIFL + EngIFL * SSIFL + MathIFL * SciIFL + MathIFL * SSIFL + SciIFL * SSIFL + Bible * EngIFL * MathIFL + Bible * EngIFL * SciIFL + Bible * EngIFL * SSIFL + Bible * MathIFL * SciIFL + Bible * MathIFL * SSIFL + Bible * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL + EngIFL * MathIFL * SSIFL + EngIFL * SciIFL * SSIFL + MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL + Bible * EngIFL * MathIFL * SSIFL + Bible * EngIFL * SciIFL * SSIFL + Bible * MathIFL * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL * SSIFL; Computed using alpha = 0.05

Table 16 has been edited from the original *SPSS* output to display only those interactions between variables that showed a strong effect, measured by partial eta squared (η_p^2). The rules of thumb for effect size measured by partial eta squared are $\eta_p^2 =$

0.01, weak; $\eta_p^2 = 0.06$, medium; and $\eta_p^2 = 0.14$, strong.¹⁵ Therefore, according to the stated rules of thumb, the interactions effects (in order of strength) are EngIFL*SciIFL (Wilks $\lambda = 0.733$, $F(3, 16) = 1.946$, $\eta_p^2 = 0.267$), Bible*EngIFL (Wilk's $\lambda = 0.834$, $F(3, 16) = 1.136$, $\eta_p^2 = 0.176$), and EngIFL*SciIFL*SSIFL (Wilks's $\lambda = 0.860$, $F(3, 16) = 0.870$, $\eta_p^2 = 0.140$). These three interactions show that CESA schools experience strong effects with regard to the presence of IFL language in their English, science, and social studies curriculum. Table A30 in appendix 8 expands the interactions by dependent variables.

Table 17. EngIFL*SciIFL

<i>Dependent Variable</i>	<i>EngIFL</i>	<i>SciIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail} (%)	0.0	0.0	38.030	6.559	24.251	51.810
		1.0	59.091 ^a	9.964	38.158	80.024
	1.0	0.0	48.864	7.877	32.315	65.413
		1.0	44.949 ^a	8.787	26.488	63.411
SAT _{med}	0.0	0.0	1157.111	20.155	1114.768	1199.454
		1.0	1231.167 ^a	30.617	1166.843	1295.491
	1.0	0.0	1146.250	24.205	1095.398	1197.102
		1.0	1127.556 ^a	27.002	1070.827	1184.284
TopUniv (%)	0.0	0.0	38.589	9.432	18.773	58.404
		1.0	47.000 ^a	14.328	16.898	77.102
	1.0	0.0	34.167	11.327	10.369	57.964
		1.0	40.000 ^a	12.636	13.453	66.547

Note: a. Based on modified population marginal mean.

¹⁵“The general rules of thumb given by Cohen and Miles & Shevlin (2001) are for eta-squared (η^2), which uses the total sum of squares in the denominator, but these would arguably apply more to partial eta-squared than to eta-squared. This is because partial eta-squared in factorial ANOVA arguably more closely approximates what eta-squared would have been for the factor had it been a one-way ANOVA and it is presumably a one-way ANOVA which gave rise to Cohen's rules of thumb,” “Rules of Thumb on Magnitudes of Effect Sizes,” *Cognition and Brain Sciences Unit*, Cambridge University, accessed March 18, 2016, <http://imaging.mrc-cbu.cam.ac.uk/statswiki/FAQ/effectSize>.

The estimated marginal means for this model and their relationship to the model have been produced in table 17 through table 19 along with further discussion about the individual interactions. The EngIFL*SciIFL partial eta squared from table A30 found in appendix 8 suggested an interaction on the variable AP_{avail}. When EngIFL courses were below the CESA schools' mean and SciIFL courses were also below the mean, the average percentage of AP_{avail} was 38.03%. When the EngIFL courses were above the CESA schools' mean and SciIFL courses were above the CESA schools' mean, the average percentage of AP_{avail} was 48.86%. However, when EngIFL courses were below the CESA schools mean and SciIFL courses were above the mean, the average percentage of AP_{avail} was 59.09%.

Table 18. Bible*EngIFL Mean

<i>Dependent Variable</i>	<i>Bible</i>	<i>EngIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail} (%)	0.0	0.0	49.545 ^a	9.452	29.687	69.404
		1.0	40.404 ^a	8.787	21.943	58.865
	1.0	0.0	42.803	6.745	28.631	56.975
		1.0	52.273	7.877	35.724	68.822
SAT _{med}	0.0	0.0	1177.000 ^a	29.046	1115.977	1238.023
		1.0	1170.556 ^a	27.002	1113.827	1227.284
	1.0	0.0	1184.194	20.728	1140.647	1227.742
		1.0	1114.000	24.205	1063.148	1164.852
TopUniv (%)	0.0	0.0	50.400 ^a	13.593	21.843	78.957
		1.0	38.000 ^a	12.636	11.453	64.547
	1.0	0.0	36.889	9.700	16.510	57.268
		1.0	35.667	11.327	11.869	59.464

Note: a. Based on modified population marginal mean.

When the EngIFL courses were above the CESA schools mean and the SciIFL

courses were also above the mean, the percentage of AP courses overall in the curriculum was 44.94%. This showed a negative relationship between the AP_{avail} and the presence of IFL language when both were above the CESA schools' mean for English and science courses.

The Bible*EngIFL mean suggested an interaction on AP_{avail} . When Bible courses were below the CESA schools' mean and EngIFL courses were also below the mean, the average percentage of AP_{avail} was 49.55%. When both the Bible courses were above the CESA schools' mean and EngIFL courses were above the CESA schools' mean, the average percentage of AP_{avail} was 52.27%. However, when the Bible courses were below the CESA schools mean and EngIFL courses were above the mean, the average percentage of AP_{avail} was 40.40%. When the Bible courses and EngIFL were above the CESA school mean, the percentage of AP_{avail} was 42.80%. This finding showed a negative relationship between the dependent variable AP_{avail} and the interaction between Bible and EngIFL.

The EngIFL*SciIFL*SSIFL mean suggested an interaction on the independent variable AP_{avail} . When science courses alone showed the presence of IFL language, then academic measures were higher than every other interaction: $AP_{avail} = 63.6\%$, $SAT_{med} = 1279$, $TopUniv = 72\%$. When the EngIFL and SSIFL course are both above the CESA schools' mean and SciIFL remains below, that generally means lower academic measures ($AP_{avail} = 38.6\%$; $SAT_{med} = 1152$; and $TopUniv = 14.3\%$) than the CESA school MANOVA mean ($AP_{avail} = 46.2\%$; $SAT_{med} = 1158$; and $TopUniv = 38.8\%$). When EngIFL courses alone were above the CESA schools mean, academic rigor measures substantially increased ($AP_{avail} = 59.1\%$; $SAT_{med} = 1140$; $TopUniv = 54\%$). When the EngIFL, SciIFL, and SSIFL courses are all above the mean, then measures of academic rigor showed more weakly ($AP_{avail} = 46.9\%$; $SAT_{med} = 1138$; and $TopUniv = 49\%$). These findings showed noteworthy interactions between three of the independent

variables and all three dependent variables.

Table 19. EngIFL*SciIFL*SSIFL

<i>Dependent Variable</i>	<i>EngIFL</i>	<i>SciIFL</i>	<i>SSIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
						<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail} (%)	0.0	0.0	0.0	39.697	4.813	29.585	49.809
			1.0	36.364	12.203	10.726	62.001
		1.0	0.0	63.636 ^a	17.258	27.379	99.893
			1.0	54.545 ^a	9.964	33.612	75.478
	1.0	0.0	0.0	59.091	12.203	33.453	84.728
			1.0	38.636	9.964	17.703	59.569
		1.0	0.0	40.909 ^a	17.258	4.652	77.166
			1.0	46.970	9.964	26.037	67.903
SAT _{med}	0.0	0.0	0.0	1138.722	14.789	1107.651	1169.794
			1.0	1175.500	37.498	1096.720	1254.280
		1.0	0.0	1279.000 ^a	53.030	1167.588	1390.412
			1.0	1183.333 ^a	30.617	1119.009	1247.657
	1.0	0.0	0.0	1140.000	37.498	1061.220	1218.780
			1.0	1152.500	30.617	1088.176	1216.824
		1.0	0.0	1106.000 ^a	53.030	994.588	1217.412
			1.0	1138.333	30.617	1074.009	1202.657
TopUniv (%)	0.0	0.0	0.0	48.178	6.921	33.637	62.718
			1.0	29.000	17.548	-7.867	65.867
		1.0	0.0	72.000 ^a	24.817	19.862	124.138
			1.0	22.000 ^a	14.328	-8.102	52.102
	1.0	0.0	0.0	54.000	17.548	17.133	90.867
			1.0	14.333	14.328	-15.769	44.435
		1.0	0.0	22.000 ^a	24.817	-30.138	74.138
			1.0	49.000	14.328	18.898	79.102

Note: a. Based on modified population marginal mean.

MANCOVA (MANOVA with Covariates)

The baseline established by the initial MANOVA was examined once covariates were

added to the model. After the findings have been presented below, comments follow on the overall effect of the individual interactions. Again, only interactions with strong effects ($\eta_p^2 \geq 0.14$) between the independent variables and dependent variables when controlling for the covariates have been reported in table 21, presented below. When the covariates MFIA (Wilks's $\lambda = 0.600$, $F(3, 14) = 3.115$, $\eta_p^2 = 0.424$,) and Tuition (Wilks's $\lambda = 0.576$, $F(3, 14) = 3.444$, $\eta_p^2 = 0.400$) were added, the effects of the interactions between the independent variables strengthened. The interactions identified earlier in the MANOVA are compared with those from the MANCOVA and presented in table 20.

Table 20. Partial eta squared of MANOVA compared with partial eta squared of MANCOVA

<i>Interaction</i>	<i>MANOVA η_p^2</i>	<i>MANCOVA η_p^2</i>
EngIFL*SciIFL	0.267	0.337
Bible*EngIFL	0.176	0.196
EngIFL*SciIFL*SSIFL	0.140	0.211
Bible*EngIFL*SSIFL	--	0.283
Bible*SSIFL	--	0.259
Bible*SciIFL	--	0.162
EngIFL*SSIFL	--	0.140

The three identified interactions from the MANOVA are all strengthened, two of them substantially, by the inclusion of the covariates in the analysis. Notably, four additional interactions showed strong effects with the inclusion of the covariates: Bible*SSIFL (Wilks's $\lambda = 0.741$, $F(3, 14) = 1.631$, $\eta_p^2 = 0.259$); Bible*SciIFL (Wilks's $\lambda = 0.838$, $F(3, 14) = 0.901$, $\eta_p^2 = 0.162$); Bible*EngIFL (Wilks's $\lambda = 0.804$, $F(3, 14) = 1.138$, $\eta_p^2 = 0.196$); EngIFL*SSIFL (Wilks's $\lambda = 0.860$, $F(3, 14) = 0.760$, $\eta_p^2 = 0.140$); and Bible*EngIFL*SSIFL (Wilks's $\lambda = 0.717$, $F(3, 14) = 1.841$, $\eta_p^2 = 0.283$).

Table 21. Multivariate tests (MANCOVA)

<i>Effect</i>		<i>Value</i>	<i>F</i>	<i>Hypothesis df</i>	<i>Error df</i>	<i>Sig.</i>	<i>Partial Eta Squared(η_p^2)</i>
Intercept	Pillai's Trace	0.960	111.627	3.000	14.000	0.000	0.960
	Wilks's λ	0.040	111.627	3.000	14.000	0.000	0.960
	Hotelling's Trace	23.920	111.627	3.000	14.000	0.000	0.960
	Roy's Largest Root	23.920	111.627	3.000	14.000	0.000	0.960
Tuition	Pillai's Trace	0.400	3.115	3.000	14.000	0.060	0.400
	Wilks's λ	0.600	3.115	3.000	14.000	0.060	0.400
	Hotelling's Trace	0.668	3.115	3.000	14.000	0.060	0.400
	Roy's Largest Root	0.668	3.115	3.000	14.000	0.060	0.400
MFIA	Pillai's Trace	0.424	3.441	3.000	14.000	0.046	0.424
	Wilks's λ	0.576	3.441	3.000	14.000	0.046	0.424
	Hotelling's Trace	0.737	3.441	3.000	14.000	0.046	0.424
	Roy's Largest Root	0.737	3.441	3.000	14.000	0.046	0.424
Bible * EngIFL	Pillai's Trace	0.196	1.138	3.000	14.000	0.368	0.196
	Wilks's λ	0.804	1.138	3.000	14.000	0.368	0.196
	Hotelling's Trace	0.244	1.138	3.000	14.000	0.368	0.196
	Roy's Largest Root	0.244	1.138	3.000	14.000	0.368	0.196
Bible * SciIFL	Pillai's Trace	0.162	0.901	3.000	14.000	0.465	0.162
	Wilks's λ	0.838	0.901	3.000	14.000	0.465	0.162
	Hotelling's Trace	0.193	0.901	3.000	14.000	0.465	0.162
	Roy's Largest Root	0.193	0.901	3.000	14.000	0.465	0.162
Bible * SSIFL	Pillai's Trace	0.259	1.631	3.000	14.000	0.227	0.259
	Wilks's λ	0.741	1.631	3.000	14.000	0.227	0.259
	Hotelling's Trace	0.349	1.631	3.000	14.000	0.227	0.259
	Roy's Largest Root	0.349	1.631	3.000	14.000	0.227	0.259

Table 21 continued

EngIFL * SciIFL	Pillai's Trace	0.337	2.369	3.000	14.000	0.115	0.337
	Wilks's λ	0.663	2.369	3.000	14.000	0.115	0.337
	Hotelling's Trace	0.508	2.369	3.000	14.000	0.115	0.337
	Roy's Largest Root	0.508	2.369	3.000	14.000	0.115	0.337
EngIFL * SSIFL	Pillai's Trace	0.140	0.760	3.000	14.000	0.535	0.140
	Wilks's λ	0.860	0.760	3.000	14.000	0.535	0.140
	Hotelling's Trace	0.163	0.760	3.000	14.000	0.535	0.140
	Roy's Largest Root	0.163	0.760	3.000	14.000	0.535	0.140
SciIFL * SSIFL	Pillai's Trace	0.130	0.696	3.000	14.000	0.570	0.130
	Wilks's λ	0.870	0.696	3.000	14.000	0.570	0.130
	Hotelling's Trace	0.149	0.696	3.000	14.000	0.570	0.130
	Roy's Largest Root	0.149	0.696	3.000	14.000	0.570	0.130
Bible * EngIFL * SSIFL	Pillai's Trace	0.283	1.841	3.000	14.000	0.186	0.283
	Wilks's λ	0.717	1.841	3.000	14.000	0.186	0.283
	Hotelling's Trace	0.394	1.841	3.000	14.000	0.186	0.283
	Roy's Largest Root	0.394	1.841	3.000	14.000	0.186	0.283
EngIFL * SciIFL * SSIFL	Pillai's Trace	0.211	1.250	3.000	14.000	0.329	0.211
	Wilks's λ	0.789	1.250	3.000	14.000	0.329	0.211
	Hotelling's Trace	0.268	1.250	3.000	14.000	0.329	0.211
	Roy's Largest Root	0.268	1.250	3.000	14.000	0.329	0.211

Note: a. Design: Intercept + Tuition + MFIA + Bible + EngIFL + MathIFL + SciIFL + SSIFL + Bible * EngIFL + Bible * MathIFL + Bible * SciIFL + Bible * SSIFL + EngIFL * MathIFL + EngIFL * SciIFL + EngIFL * SSIFL + MathIFL * SciIFL + MathIFL * SSIFL + SciIFL * SSIFL + Bible * EngIFL * MathIFL + Bible * EngIFL * SciIFL + Bible * EngIFL * SSIFL + Bible * MathIFL * SciIFL + Bible * MathIFL * SSIFL + Bible * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL + EngIFL * MathIFL * SSIFL + EngIFL * SciIFL * SSIFL + MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL + Bible * EngIFL * MathIFL * SSIFL + Bible * EngIFL * SciIFL * SSIFL + Bible * MathIFL * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL * SSIFL; Computed using alpha = .05

Table 22. Tests of between-subjects effects (MANCOVA)

<i>Source</i>	<i>Dependent Variable</i>	<i>Type III Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>	<i>Partial Eta Squared (η_p^2)</i>
Corrected Model	AP _{avail}	6688.082 ^a	14	477.720	2.056	0.084	0.643
	SAT _{med}	55560.102 ^b	14	3968.579	1.797	0.130	0.611
	TopUniv	9372.963 ^c	14	669.497	1.069	0.445	0.483
Intercept	AP _{avail}	1019.060	1	1019.060	4.385	0.053	0.215
	SAT _{med}	796716.507	1	796716.507	360.672	0.000	0.958
	TopUniv	44.076	1	44.076	0.070	0.794	0.004
Tuition	AP _{avail}	12.673	1	12.673	0.055	0.818	0.003
	SAT _{med}	9965.701	1	9965.701	4.511	0.050	0.220
	TopUniv	1062.590	1	1062.590	1.696	0.211	0.096
MFIA	AP _{avail}	1152.513	1	1152.513	4.959	0.041	0.237
	SAT _{med}	18.874	1	18.874	0.009	0.928	0.001
	TopUniv	391.632	1	391.632	0.625	0.441	0.038
Bible * EngIFL	AP _{avail}	485.272	1	485.272	2.088	0.168	0.115
	SAT _{med}	2307.985	1	2307.985	1.045	0.322	0.061
	TopUniv	178.019	1	178.019	0.284	0.601	0.017
Bible * SciIFL	AP _{avail}	240.879	1	240.879	1.036	0.324	0.061
	SAT _{med}	1282.012	1	1282.012	0.580	0.457	0.035
	TopUniv	14.030	1	14.030	0.022	0.883	0.001
Bible * SSIFL	AP _{avail}	324.913	1	324.913	1.398	0.254	0.080
	SAT _{med}	3630.420	1	3630.420	1.643	0.218	0.093
	TopUniv	27.061	1	27.061	0.043	0.838	0.003
EngIFL * SciIFL	AP _{avail}	1329.940	1	1329.940	5.723	0.029	0.263
	SAT _{med}	1650.843	1	1650.843	0.747	0.400	0.045
	TopUniv	0.207	1	0.207	0.000	0.986	0.000
SciIFL * SSIFL	AP _{avail}	1.838	1	1.838	0.008	0.930	0.000
	SAT _{med}	5195.506	1	5195.506	2.352	0.145	0.128
	TopUniv	21.401	1	21.401	0.034	0.856	0.002
Bible * EngIFL * SSIFL	AP _{avail}	460.461	1	460.461	1.981	0.178	0.110
	SAT _{med}	2399.737	1	2399.737	1.086	0.313	0.064
	TopUniv	61.894	1	61.894	0.099	0.757	0.006
EngIFL * SciIFL * SSIFL	AP _{avail}	16.812	1	16.812	0.072	0.791	0.005
	SAT _{med}	2023.645	1	2023.645	0.916	0.353	0.054
	TopUniv	1194.341	1	1194.341	1.907	0.186	0.106

Table 22 continued

Error	AP _{avail}	3718.476	16	232.405	--	--	--
	SAT _{med}	35343.640	16	2208.978	--	--	--
	TopUniv	10022.908	16	626.432	--	--	--
Total	AP _{avail}	68801.653	31	--	--	--	--
	SAT _{med}	41125212.000	31	--	--	--	--
	TopUniv	68836.000	31	--	--	--	--
Corrected Total	AP _{avail}	10406.558	30	--	--	--	--
	SAT _{med}	90903.742	30	--	--	--	--
	TopUniv	19395.871	30	--	--	--	--

Note: Design: Intercept + Tuition + MFIA + Bible + EngIFL + MathIFL + SciIFL + SSIFL + Bible * EngIFL + Bible * MathIFL + Bible * SciIFL + Bible * SSIFL + EngIFL * MathIFL + EngIFL * SciIFL + EngIFL * SSIFL + MathIFL * SciIFL + MathIFL * SSIFL + SciIFL * SSIFL + Bible * EngIFL * MathIFL + Bible * EngIFL * SciIFL + Bible * EngIFL * SSIFL + Bible * MathIFL * SciIFL + Bible * MathIFL * SSIFL + Bible * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL + EngIFL * MathIFL * SSIFL + EngIFL * SciIFL * SSIFL + MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL + Bible * EngIFL * MathIFL * SSIFL + Bible * EngIFL * SciIFL * SSIFL + Bible * MathIFL * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL * SSIFL; Computed using alpha = .05

In the MANCOVA, two of the strongest interactions (Bible*EngIFL*SSIFL and Bible*SSIFL) emerged only when the covariates were included. These results showed the importance of including controls for the covariates in model due to their strengthening effect and the revelation of new interactions unseen in the MANOVA. Table 21 shows the results of the 3x5x2 MANCOVA in terms of the effect size for the strong interactions between each independent variable.

When examining the effect of specific interactions with each of the dependent variables, the study became even clearer. Table 22 contains the full list of the interactions between two or more independent variables and individual dependent variables while controlling for covariates. The effect was strong at the $\eta_p^2 > 0.14$ level for one dependent variable in one interaction. The effect was medium at the $0.14 > \eta_p^2 > 0.06$ level for nine

dependent variables across six independent variable interactions. Table 22 presented only the effects that were medium or strong, while omitting any interactions that showed only weak effects. It shows that the strong interaction effects were not found equally on every dependent variable. Instead, most individual variable interactions showed medium effects ($0.14 > \eta_p^2 > 0.06$) that cumulatively raised the effect score for the interaction. The only interaction that displayed a strong effect on a specific dependent variable was the interaction EngIFL*SciIFL on the dependent variable APavail ($\eta_p^2 = 0.263$). The figures and discussions following illustrate the interaction between specific variables.

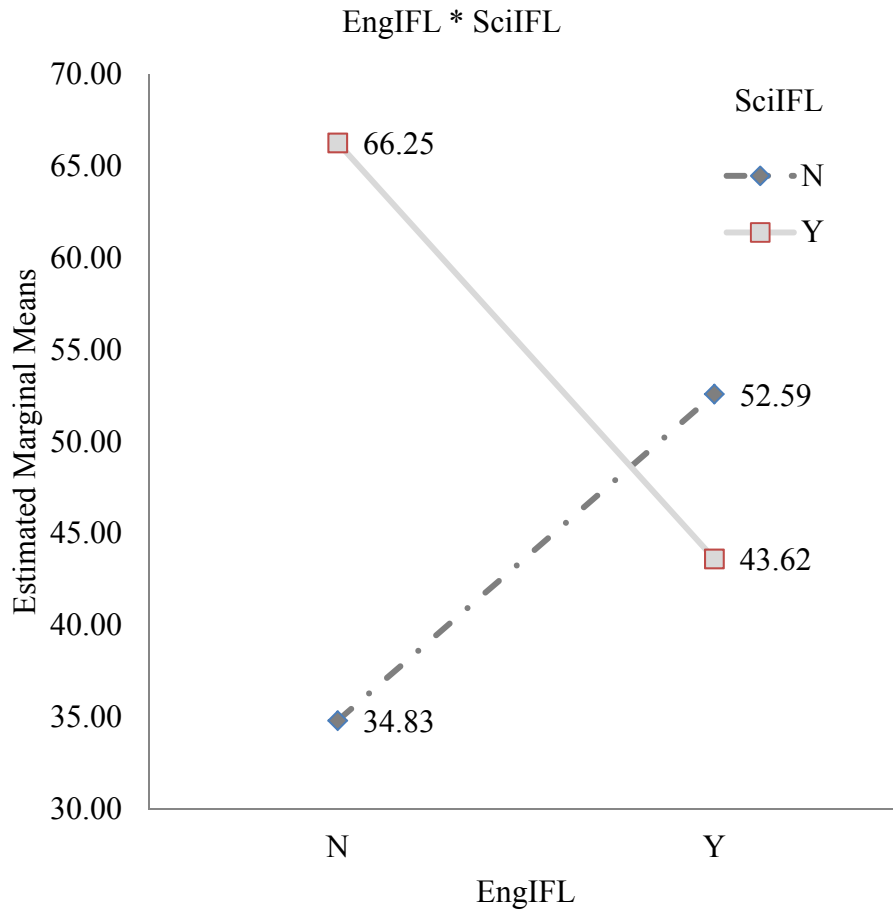


Figure 2. Estimated marginal means of AP_{avail} for EngIFL*SciIFL

Figure 2 showed the effect size of the interaction between the independent variables EngIFL and SciIFL on the dependent variable AP_{avail}, showing that AP percentages were highest (nearly 65%) when EngIFL = N and SciIFL = Y, but declined when EngIFL = Y and SciIFL = Y (to approximately 45%). Notably, when EngIFL = N, and SciIFL = N, then AP_{avail} was low (approximately 35%), but increased when EngIFL = Y and SciIFL = N (to approximately 52%). The effect of the EngIFL = Y variable on the means was such that the SciIFL = Y meant declines by nearly 30 percentage points. Thus, this line graph displayed the strong effect size on the mean percentage of AP courses offered when both EngIFL and SciIFL = Y. The data containing the estimated marginal means for this interaction are presented in table A36 in appendix 8.

The six interactions that displayed a medium effect size were Bible*EngIFL both for the dependent variable AP_{avail} ($\eta_p^2 = 0.115$) and for the dependent variable SAT_{med} ($\eta_p^2 = 0.061$); Bible*SciIFL for the dependent variable AP_{avail} ($\eta_p^2 = 0.061$); Bible*SSIFL for the dependent variable AP_{avail} ($\eta_p^2 = 0.080$) and for the dependent variable SAT_{med} ($\eta_p^2 = 0.093$); SciIFL*SSIFL, for the dependent variable SAT_{med} ($\eta_p^2 = 0.128$); Bible*EngIFL*SSIFL, for the dependent variable AP_{avail} ($\eta_p^2 = 0.110$) and for the dependent variable SAT_{med} ($\eta_p^2 = 0.064$); and EngIFL*SciIFL*SSIFL, for the dependent variable TopUniv ($\eta_p^2 = 0.106$). Therefore, all dependent variables show a medium strength effect size when controlling for the effects of family income. The most complex interactions found in this analysis involved three different independent variables. No interaction involving four or more variables showed a strong, medium or weak interaction effect even when controlling for family income or tuition. figure 3 through figure 14 all have visually illustrated the interaction effects of the independent variables on the dependent variables.

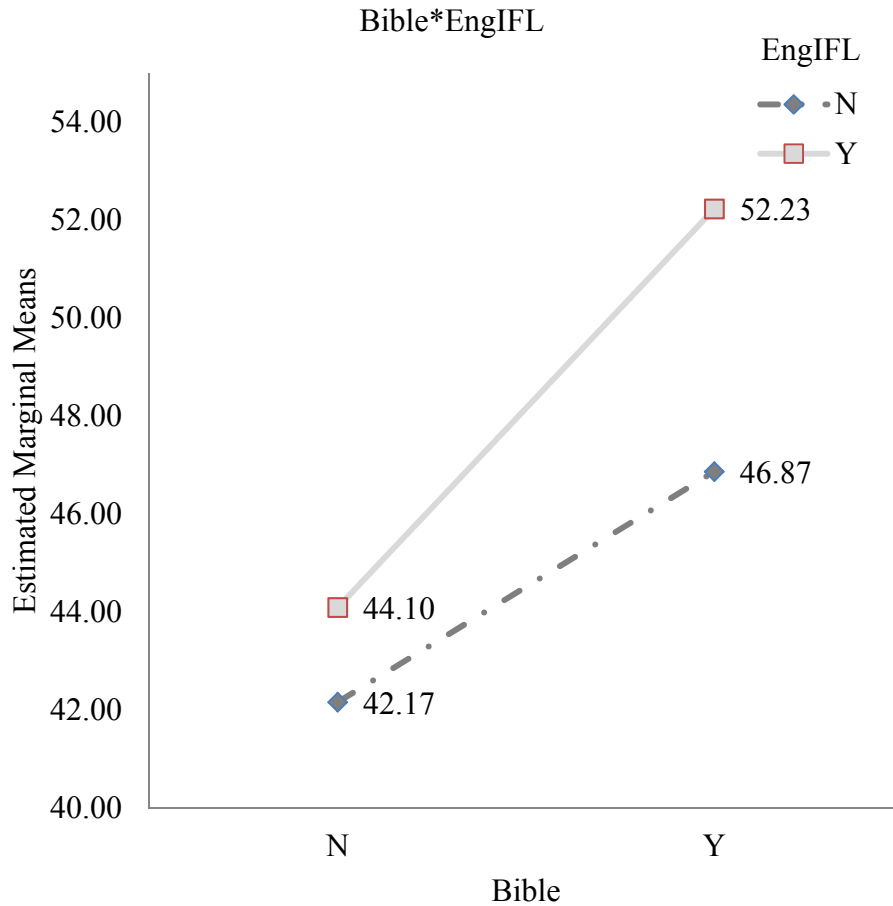


Figure 3. Estimated marginal means of AP_{avail} for Bible*EngIFL

Figure 3 showed the effect size of the interaction between the independent variables Bible and EngIFL on the dependent variable AP. The graph showed that while there was a difference in the dependent variable AP_{avail} for EngIFL = N (42.5%) and EngIFL = Y (44%) when Bible = N, the difference increased between EngIFL = N (46%) and EngIFL = Y (52.5%) when Bible = Y. Therefore, the mean percentage of AP_{avail} , showed a medium effect size on EngIFL due to the interaction of the independent variable Bible. The data table containing the estimated marginal means for this interaction is found in table A33 in appendix 8.

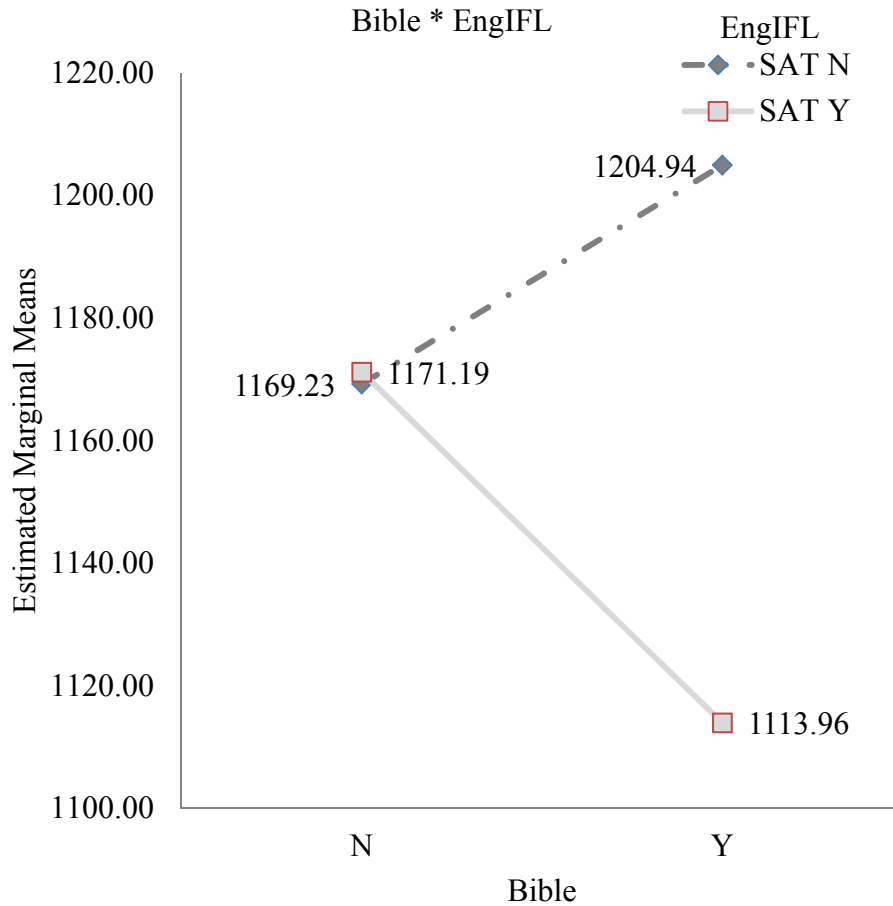


Figure 4 Estimated marginal means of SAT_{med} for Bible*EngIFL

Figure 4 showed the effect size of the interaction between the independent variables Bible and EngIFL on the dependent variable SAT_{med} . While the means for the SAT_{med} scores were nearly the same if EngIFL = N and EngIFL = Y (1170) when Bible = N, they diverged markedly between EngIFL = N (1200) and EngIFL = Y (1115) when Bible = Y. EngIFL = N was approximately 85 points higher than EngIFL = Y when Bible = Y. Therefore, this line graph showed the medium effect size of the interaction between Bible and EngIFL. The data table containing the estimated marginal means for this interaction is found in table 33 in appendix 8.

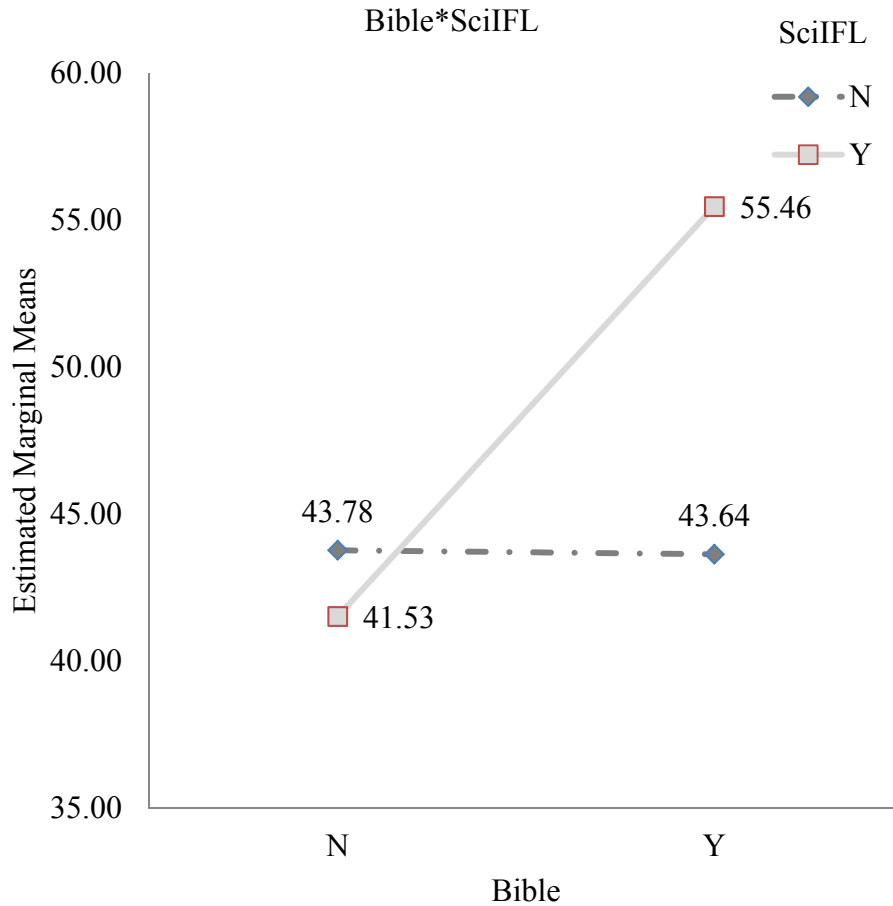


Figure 5. Estimated marginal means of AP_{avail} for Bible*SciIFL

Figure 5 showed the effect of the interaction the independent variables Bible and SciIFL on the dependent variable AP. While mean percentage of AP for the independent variable SciIFL = N (43%) showed negligible change regardless of whether Bible = N or Bible = Y, the mean percentage of AP for the independent variable SciIFL increased by more than 10 percentage points when SciIFL = Y (55%) and Bible = Y. Therefore, the line graph showed the medium effect on percentage of AP when both Bible = Y and SciIFL = Y versus when Bible = N and SciIFL = Y. The data containing the estimated marginal means for this interaction is presented in table A34 in appendix 8.

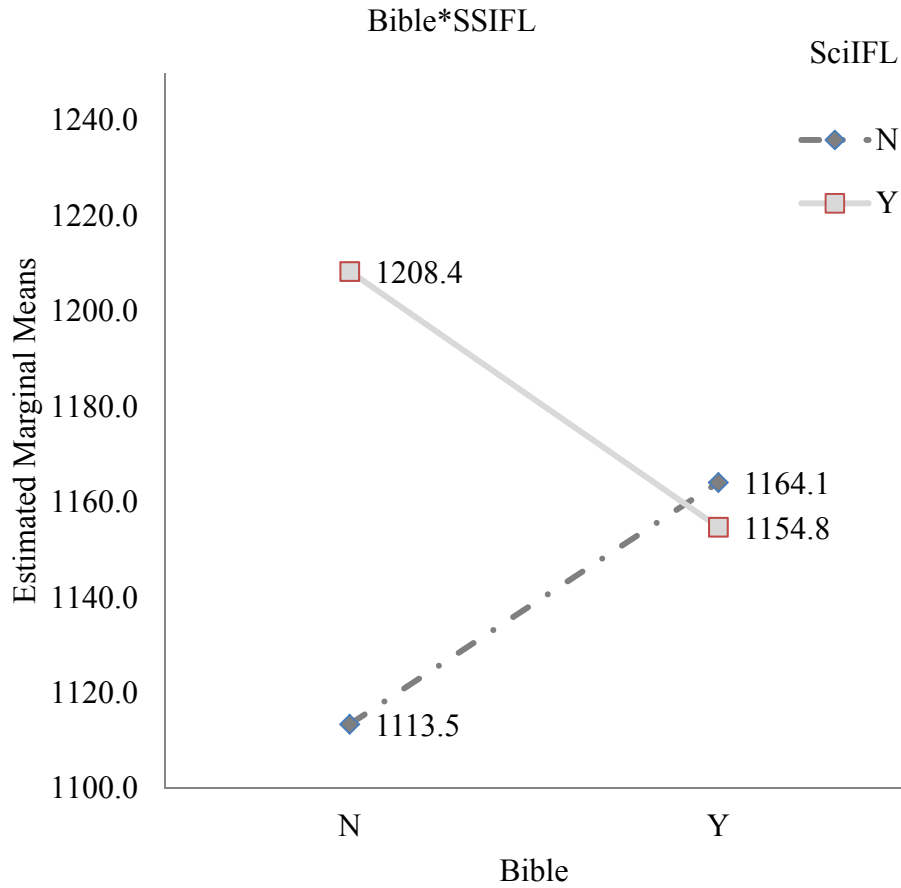


Figure 6. Estimated marginal means of SAT_{med} for Bible*SSIFL

Figure 6 showed the effect of the interaction of the independent variables Bible and SSIFL on the dependent variable SAT_{med}. The mean SAT_{med} of the independent variable SSIFL = Y (1208) was nearly 95 points higher than the SAT mean of SSIFL = N (1113) when Bible = N. However, the SAT mean of SSIFL = Y (1155) was lower than SSIFL = N (1164) when Bible = Y. Therefore, this graph illustrated a medium positive effect that the interaction between SSIFL and Bible had on the dependent variable SAT_{med}. The data containing the estimated marginal means of this interaction is presented in table A35 in appendix 8.

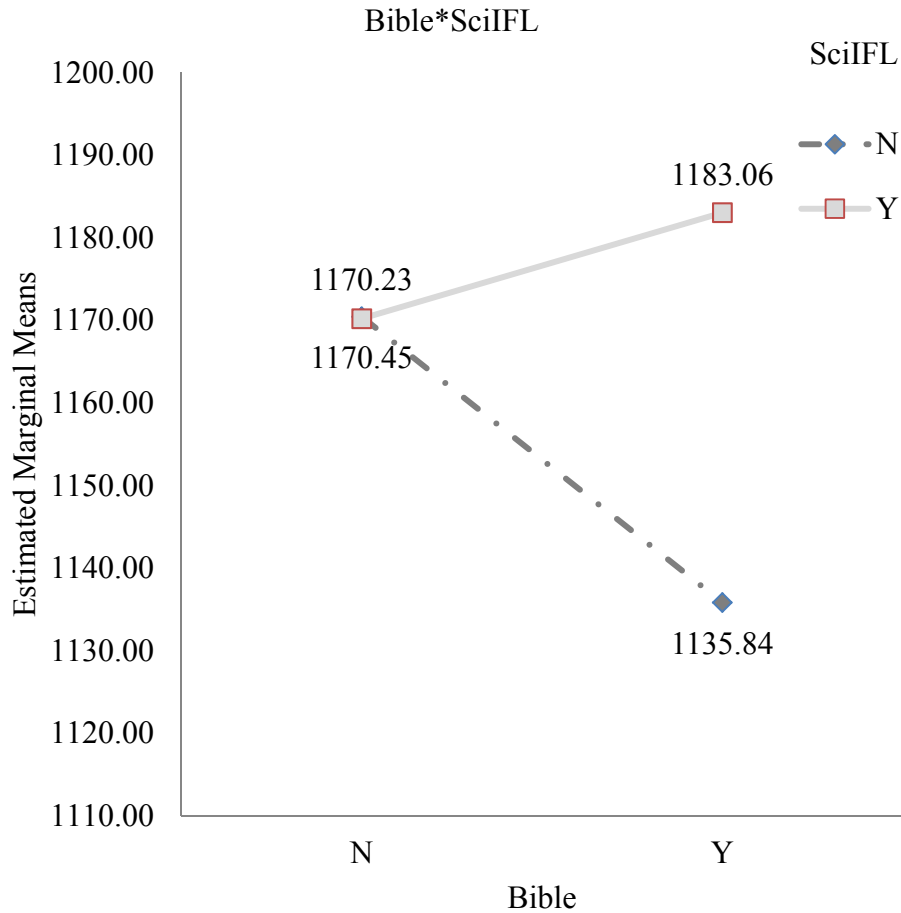


Figure 7. Estimated marginal means of SAT for Bible*SciIFL

Figure 7 showed the effect of the interaction of the independent variables Bible and SciIFL on the dependent variable SAT_{med}. When Bible = N, SciIFL = Y and SciIFL = N resulted in the same score—1170, but when Bible = Y, SciIFL = Yes rose to 1183, while SciIFL = N declined to 1136. Therefore, the negative effect of Bible = Y on SciIFL = N was contrasted by a positive effect when Bible = Y on SciIFL = Y. This finding parallels the finding that SciIFL is correlated positively with academic rigor scores in AP_{avail}. The data containing the estimated marginal means of this interaction is found in table A34 in appendix 8.

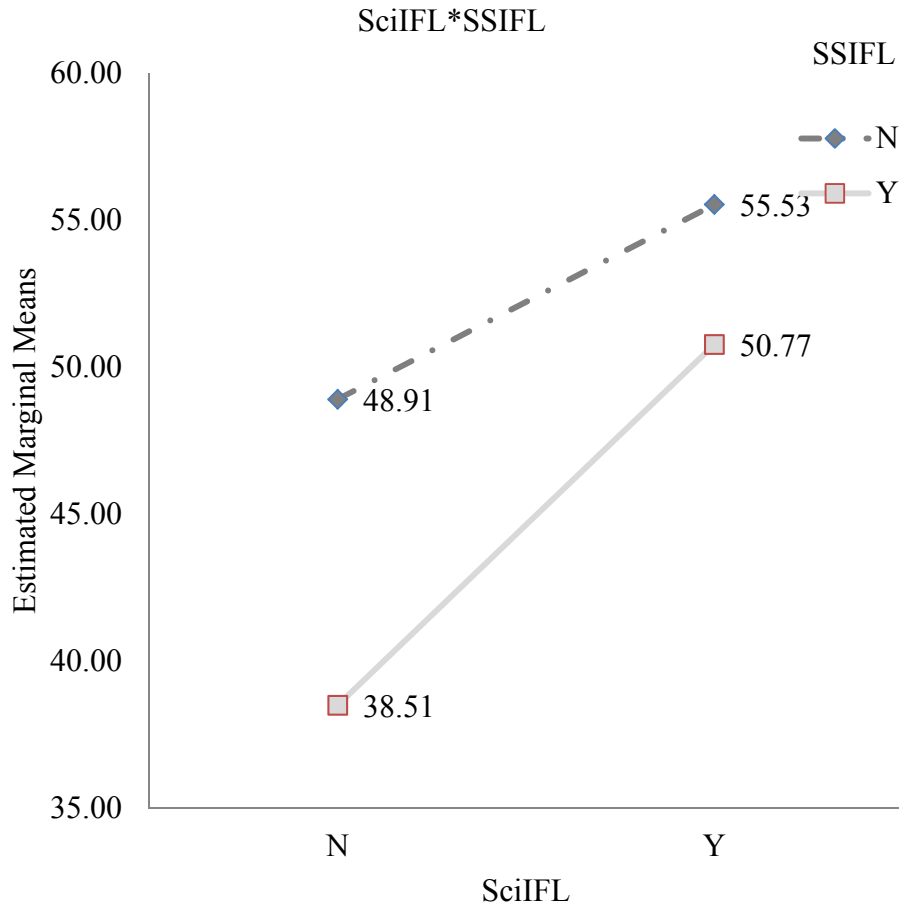


Figure 8. Estimated marginal means of AP for SciIFL*SSIFL

Figure 8 showed the effect of the interaction between the independent variables SciIFL and SSIFL on the dependent variable AP_{avail} . The two line graphs were non-parallel and non-intersecting, demonstrating the medium effect that the independent variables had on AP_{avail} . When SciIFL = N, SSIFL = N, the AP score (49%) was 10 percentage points higher than when SciIFL = N, SSIFL = Y (39%). However when SciIFL = Y and SSIFL = N, AP_{avail} was only five percentage points higher than SSIFL = Y (51%), though higher (56%) than under SciIFL = N. This showed that the gap between the AP score narrowed when both SciIFL and SSIFL both were above the CESA mean. This graph illustrated the positive interaction effect between SciIFL and SSIFL on AP_{avail} .

The data containing the estimated marginal means of this interaction is found in table A38 in appendix 8.

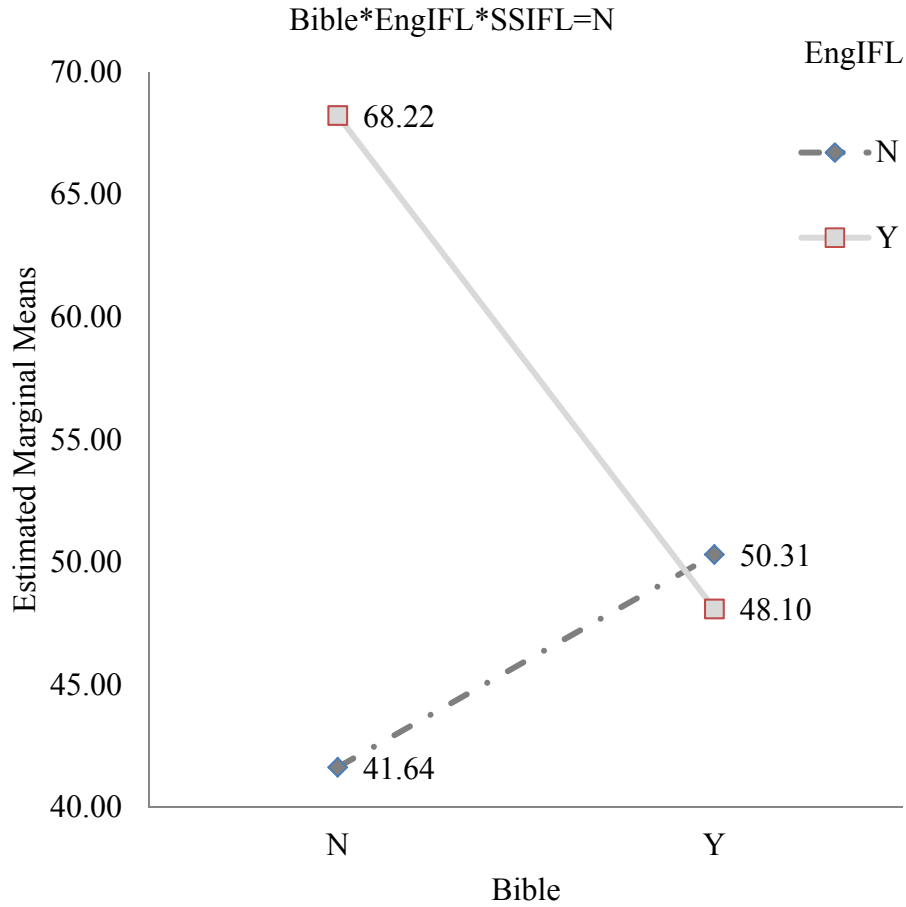


Figure 9. Estimated marginal means of AP for Bible*EngIFLwith SSIFL = N

The next three interactions displayed have explored the interaction between three different independent variables. Therefore, the graphs must be viewed in pairs to grasp fully the contrast between the interactions: Figure 9 and Figure 10 should be viewed together; Figure 11 and Figure 12 should be viewed together; and Figure 13 and Figure 14 should be viewed together. The data for all interactions is found in table A39 in appendix 8.

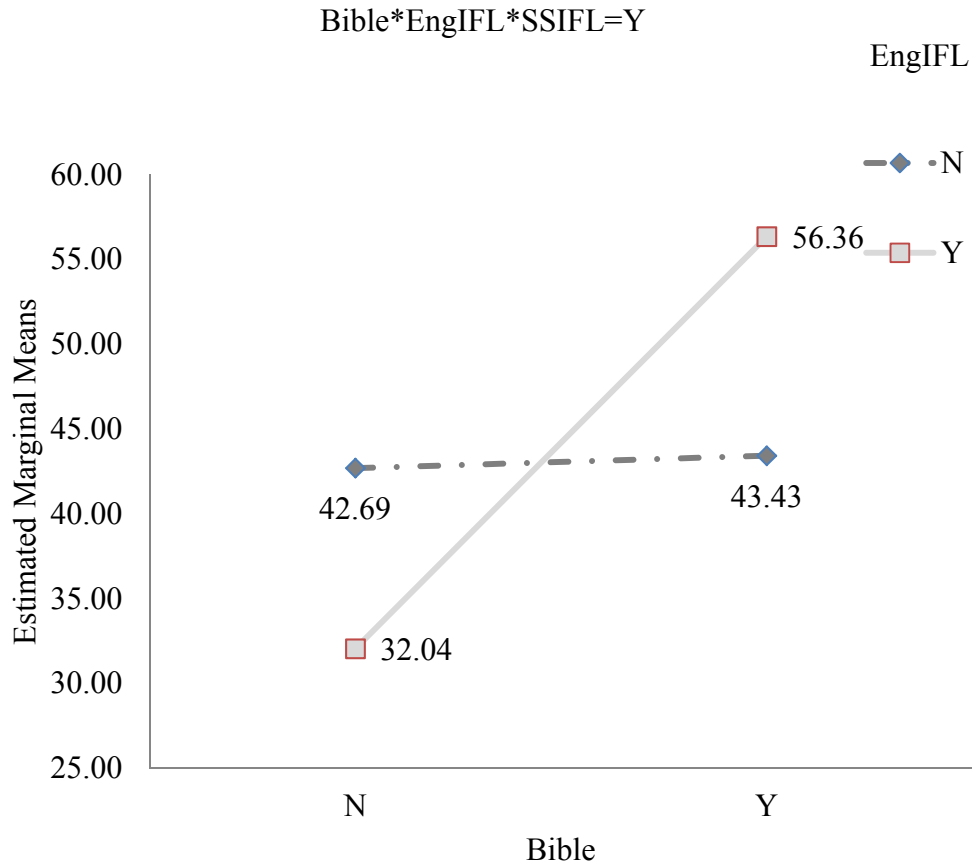


Figure 10. Estimated marginal means of AP for Bible*EngIFL with SSIFL = Y

Figure 9 and Figure 10 showed the effect of the interaction between the independent variables Bible, EngIFL, and SSIFL on the dependent variable AP. Figure 9 shows the data for the interaction between Bible and EngIFL when SSIFL = N and Figure 10 shows the data for the interaction between Bible and EngIFL when SSIFL = Y. Both graphs had to be read together to examine the interaction, which showed that when SSIFL = N, Bible = N, and EngIFL = Y, the mean percentage of AP scores was at its highest (68%). The interaction between all three variables was at its lowest (32%) when SSIFL = Y, Bible = N, and EngIFL = Y. When SSIFL = N, Bible = Y, and EngIFL = Y,

the mean percentage of AP courses declined (48%), yet when SSIFL = Y, Bible = Y, and EngIFL = Y, the mean percentage of AP courses rose to 56%, 24 points higher than when Bible = N. This comparison demonstrates that adding SSIFL to the previously examined interaction between Bible and EngIFL contributed to further positive interaction effects on the mean percentage of AP_{avail} scores. When all three variables were above the mean, the estimated marginal mean of the scores was higher than when both Bible and EngIFL were above the mean and SSIFL was below the mean. However, the highest overall score (68%) occurred when only EngIFL was above the mean, and the second highest overall score (56%) occurred when all three variables were above the mean.

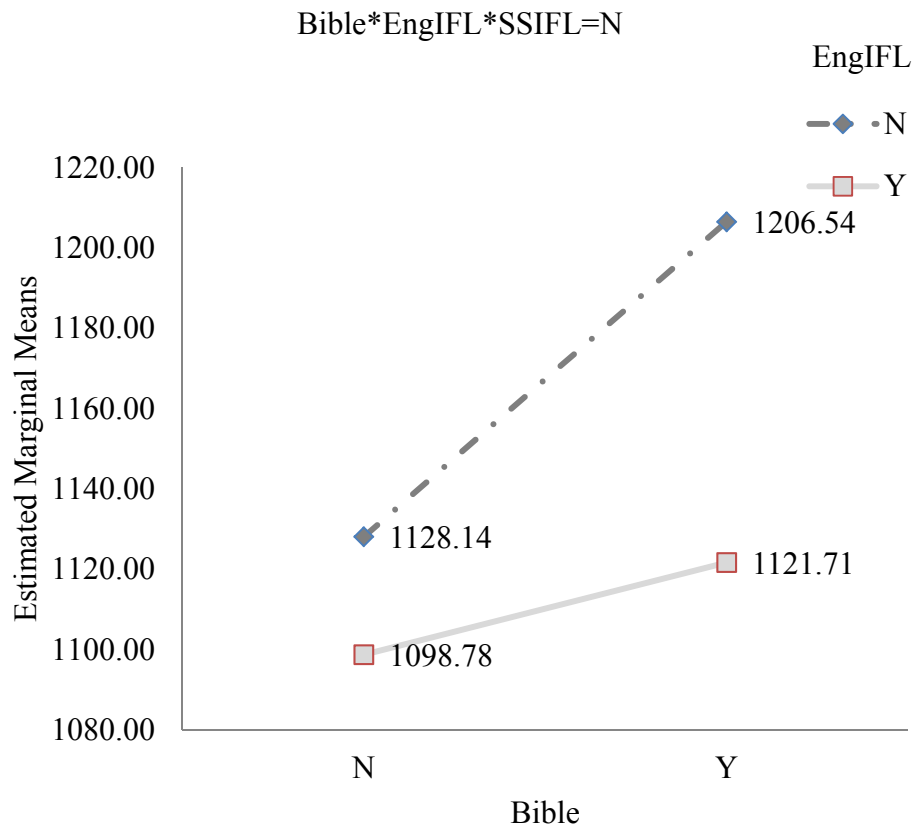


Figure 11. Estimated marginal means of SAT for Bible*EngIFL with SSIFL = N

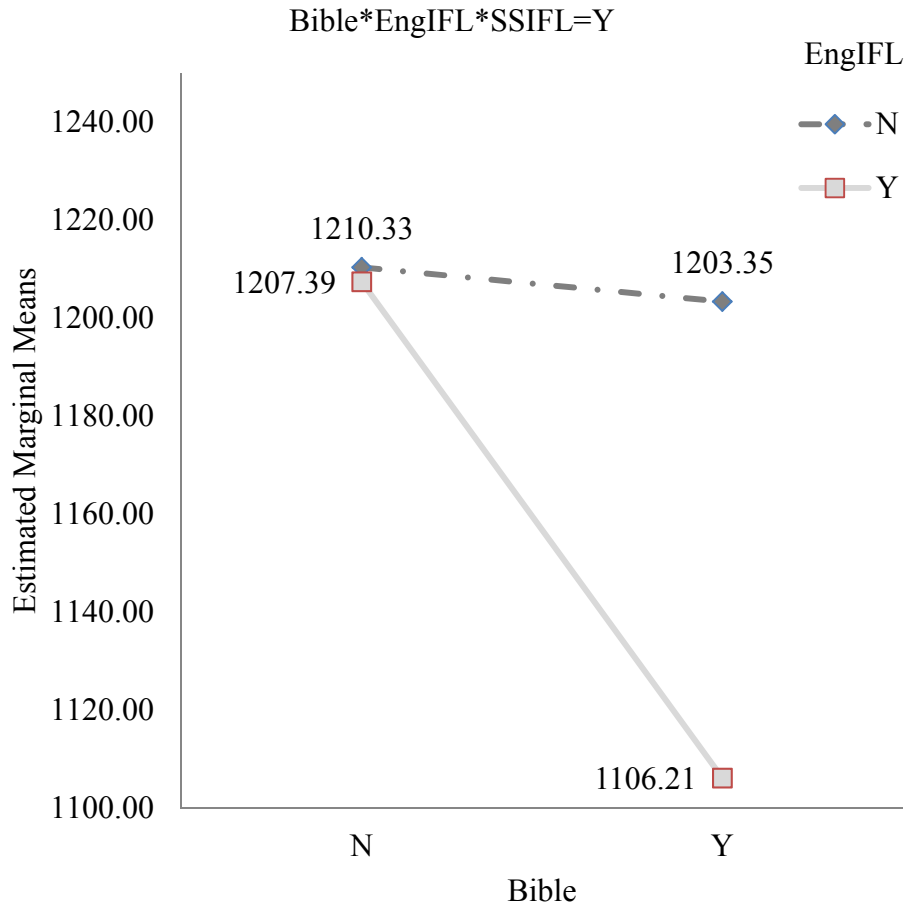


Figure 12. Estimated marginal means of SAT for Bible*EngIFL with SSIFL = Y

Figure 11 and Figure 12 showed the effect size of the interaction between the independent variables Bible, EngIFL, and SSIFL on the dependent variable SAT_{med}. When SSIFL = N, Bible = N, and EngIFL = N, the mean SAT score is 1128, but when SSIFL = N, Bible = N, and EngIFL = Y, the mean SAT score was 1098, resulting in a gap of 30 points. When SSIFL = N, Bible = Y, and EngIFL = N, the mean SAT_{med} score is 1207, but when SSIFL = N, Bible = Y, and EngIFL = Y, the mean SAT score is 1122, resulting in a gap of 85 points. This shows one part of the effect size of the interaction between these three variables. When SSIFL = Y, Bible = N, and EngIFL = N, the average SAT_{med} score was 1210, a score that was nearly identical to the SAT_{med} score of 1207

where SSIFL = Y, Bible = N, and EngIFL = Y. However, when SSIFL = Y, Bible = Y, and EngIFL = N, the mean SAT_{med} score declined to 1203, but when SSIFL = Y, Bible = Y and EngIFL = Y, the mean SAT_{med} score declined to 1106, opening a gap of approximately 100 points. The similarity of the point difference whether SSIFL = Y or SSIFL = N, but dissimilarity for the beginning point values, indicated that there was a medium effect size for the interaction between SSIFL, Bible, and EngIFL, with EngIFL showing a noteworthy negative effect on SAT. This effect showed that when all three variables are above the mean, the net increase over all three variables being below the mean is only an 8 point increase.

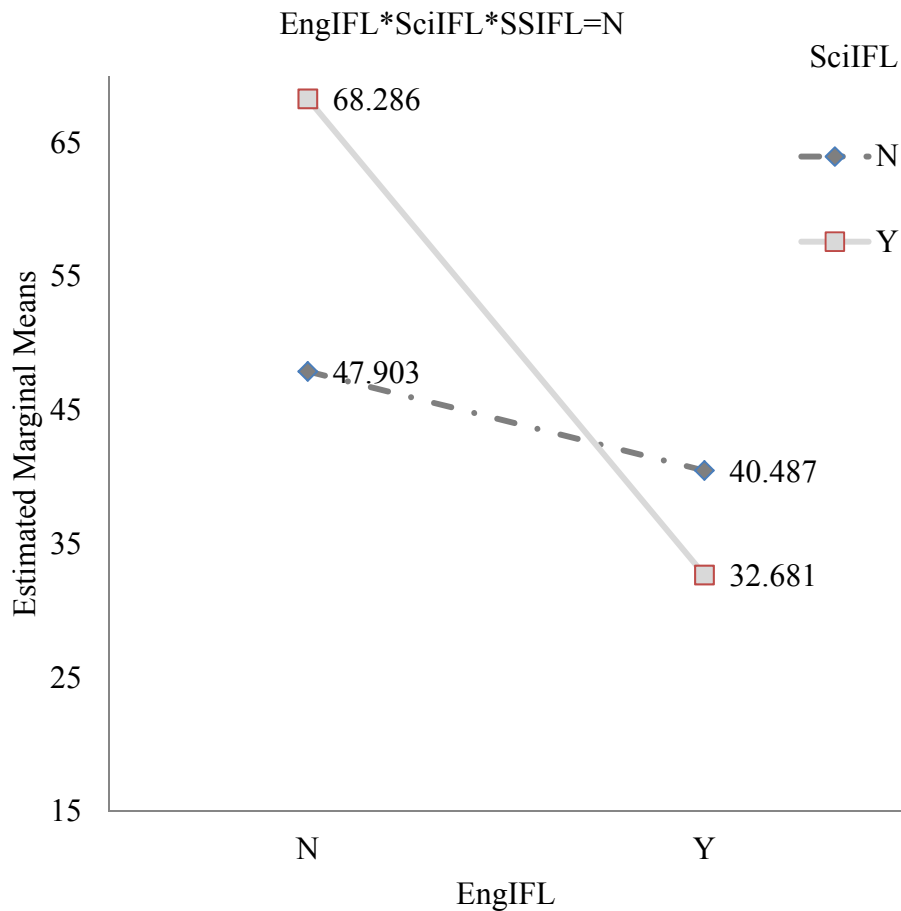


Figure 13. Estimated marginal means of TopUniv for EngIFL*SciIFL with SSIFL = N

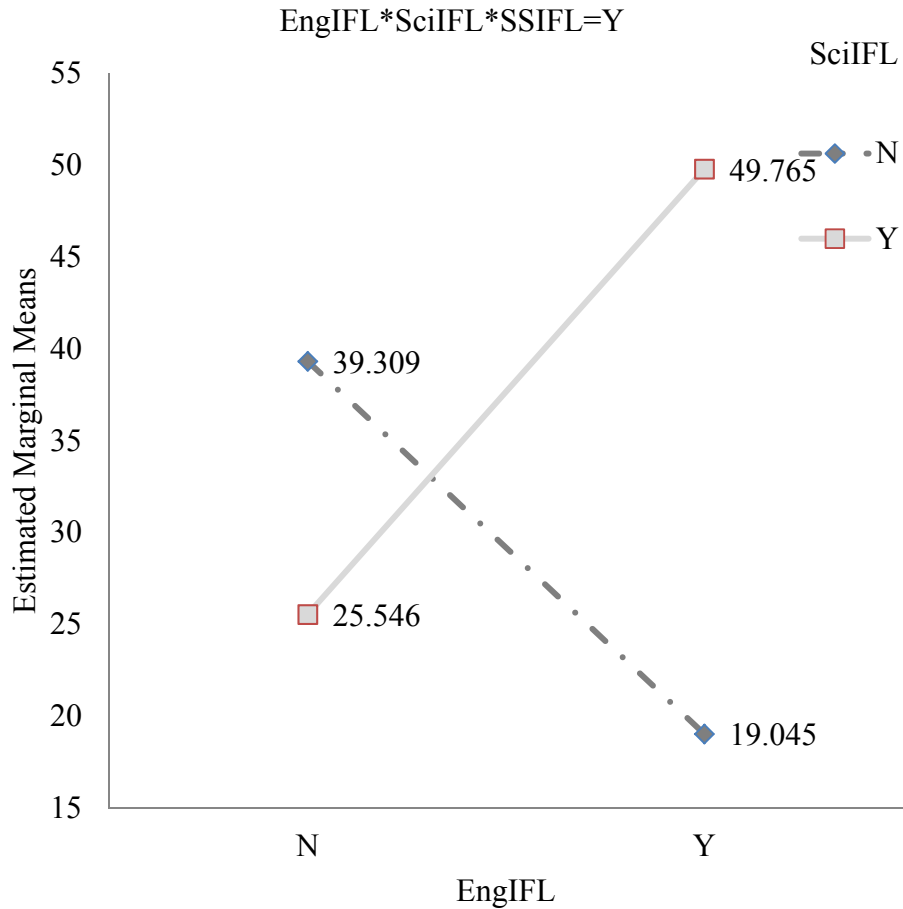


Figure 14. Estimated marginal means of TopUniv for EngIFL*SciIFL with SSIFL = Y

Figure 13 and Figure 14 showed the effect size of the interaction between the independent variables EngIFL, SciIFL, and SSIFL on the dependent variable Top Universities. When SSIFL = N, EngIFL = N, and SciIFL = Y, the mean percentage of top universities was 68%. When SSIFL = Y, EngIFL = N, and SciIFL = Y, the mean percentage of top universities was 26%, a difference of nearly 42 percentage points. When SSIFL = N, EngIFL = Y, and SciIFL = Y, the mean percentage of TopUniv is 32%. When SSIFL = Y, EngIFL = Y, and SciIFL = Y, the mean percentage of TopUniv is 50%, a difference of 18 percentage points. The lowest TopUniv score is when EngIFL = Y, SciIFL = N, and SSIFL = Y, at 19%. Table A36 in appendix 8 contains the

interaction effect between EngIFL = Y and SciIFL = N without SSIFL in the evaluation, and the mean is 46%.

Including SSIFL = Y in the interaction resulted in a 25 percentage point decrease. This comparison demonstrated medium effect size from the addition of SSIFL to the interaction between EngIFL and SciIFL on the heretofore weak effect size of the dependent variable TopUniv. The data table containing the results of this interaction is found in table A40 in appendix 8.

These data showed the effect sizes of each notable interaction between the independent variables on each of the three dependent variables. Table 23 below showed the variables most commonly demonstrating the interaction effects. When the effect size of the interactions was broken into the frequency of occurrence on the dependent variables, a strong or medium effect occurring five times on the dependent variable AP_{avail}, followed in frequency by a medium effect occurring four times on SAT_{med}, and with a single medium effect occurring on TopUniv.

Table 23. Frequency of medium effect size and strongest overall effect in MANCOVA

<i>Dependent Variable Showing Effect $\eta_p^2 > .06$</i>	<i>Frequency of Effect $\eta_p^2 > .06$</i>	<i>Strongest Effect Shown in terms of η_p^2</i>
AP _{avail}	5	0.263
SAT _{med}	4	0.128
TopUniv	1	0.106

Comparison of Estimated Marginal Means

After performing the MANCOVA, the SPSS program produced another estimated marginal means, presented below in table 25. The addition of the covariates Tuition and MFIA resulted in a smaller standard error for the dependent variables AP_{avail}

and SAT_{med}, but resulted in a larger standard error for the dependent variable TopUniv.

Table 24. Estimated marginal means of MANOVA

<i>Dependent Variable</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
			<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	46.200 ^a	4.051	37.690	54.711
SAT _{med}	1158.342 ^a	12.447	1132.191	1184.493
TopUniv	38.848 ^a	5.825	26.610	51.086

Note: a. Based on modified population marginal mean.

The addition of the covariates also resulted in a higher mean percentage of AP_{avail} scores (46.2% in MANOVA < 47.2% in MANCOVA) reported by CESA schools, a higher SAT_{med} reported for CESA schools (1158 in MANOVA < 1164 in MANCOVA), and a higher percentage of TopUniv (38.8% in MANOVA < 40.0% in MANCOVA) admitting students from CESA schools. By controlling for the covariate, I found that there was a significant multivariate effect size on all three dependent variables due to various interactions among the independent variables.

Table 25. Estimated marginal means of MANCOVA

<i>Dependent Variable</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
			<i>Lower Bound</i>	<i>Upper Bound</i>
AP	47.155 ^{a,b}	3.638	39.442	54.867
SAT	1163.664 ^{a,b}	11.216	1139.887	1187.442
Top Universities	39.964 ^{a,b}	5.973	27.302	52.626

Note: a. Covariates appearing in the model are evaluated at the following values: Tuition = \$16,229.55, MFIA = 25%; b. Based on modified population marginal mean.

Evaluation of the Research Design

This section presents an evaluation of the strengths and weaknesses of this research design. This evaluation permitted my candid engagement of the strengths and weaknesses emergent through the research project. Generally, I was pleased with the design of the research, the process of research gathering, and the process of data analysis, with a few caveats for future replications of this study.

Strengths of the Research Design

The great strength of the research design was the relative ease of gathering the necessary data from publically available internet resources. Many schools had published academic profiles, tuition and fees, and curriculum guides for internal and external consumption. Tying those pieces of data to easily accessible census data created a useful matrix for examining the many variables in this study. Additionally, using widely reviewed software programs with numerous independently produced user guides such as *NVivo II* and *SPSS* enabled me to access quickly all the tools needed for collating, analyzing, and constructing meaningful data tables, charts, and graphs. Completing this project in a timely manner required the use of these powerful software tools in conjunction with internet resources. Bringing together all these tools to analyze previously unexamined data from CESA schools proved one of the great strengths of this research design. An unexpected benefit of this design was the fact that it constituted a census of all the schools of CESA, and therefore obviated the need to be concerned about statistical significance for data on a sample size of under forty schools. A final strength was the use of complex statistical data analysis to prevent Type I statistical errors when examining the relationships, leading to a more robust set of conclusions about the interactions between the independent variables and the dependent variables.

Weaknesses of the Research Design

The greatest weaknesses of the design emerged along three strains: the relative

difficulty of learning how to interpret the complex statistical analyses used in this study and converting them into meaningful prose, the now understood complexity involved in turning all IFL data into dichotomous variables which made the use of customary post hoc tests unaccomplishable, and the transitory nature of this analysis. First, the complexity of the statistical analysis led to hours of unplanned reading in the midst of the analysis process as I sought to ensure the meaningful and accurate communication of complex ideas. Second, had I an opportunity to convene the study with a deeper understanding of the needs of statistical analysis programs, the data would have been configured in a more easily digestible form for the analysis software. For example, I would not have sought to code the IFL data solely into dichotomous categories but would have allowed for a greater sense of nuance to emerge from those data than was possible from a purely dichotomous differentiation, perhaps three or more variations would have produced even clearer results. Additionally, I would have chosen a population with a larger number of cases which could form more widely generalizable conclusions than those reached based on the present number of cases. One further question I did not consider was how to handle the complete absence of data for a particular variable, as manifested in the absence of data regarding IFL language in math courses. This finding took me by surprise, but did not negatively impact the effect size of the other variables, due to the analytical power of the *SPSS* program. I might have been better served with allowing for one or more variables discussing the vision or philosophy statements of the Core Four academic disciplines to permit discussion of IFL language in places other than course descriptions. It may have been useful to expand the study perhaps expanding to include chapel services and service through mission trips or student discipleship groups. Third, the transitory nature of this study comes from the fact that schools update their academic profiles regularly—often annually—rendering the data accurate for the research window but possibly fluctuating should the study be replicated. The ranking of top

colleges and universities also fluctuates from year to year and there may be additional rankings for private Christian colleges and universities that could be used to establish composite rankings for them. Additionally, schools may be able to add or omit AP courses offered versus those courses which students actually take, thereby also changing their respective rankings of academic rigor along that dependent variable. With respect to the independent variables that reflect the use of IFL language in their course descriptions for core academic classes, schools may make future changes regarding their use of IFL language, resulting in a change in the future results for replications of this study, either among CESA schools or other Christian school organizations.

Summary of Analysis

With respect to Research Question 1, the research revealed that all CESA schools required a mean of 3.25 years of Bible from students attending at the secondary level, that no CESA schools had IFL language in their math course descriptions, that English course descriptions showed an average of 18% of their courses with IFL language, that science courses showed an average of 7% of their courses with IFL language, and that social studies courses showed an average of 22% of their courses with IFL language.

With respect to Research Question 2, the research revealed that CESA schools were academically rigorous with a mean SAT score of 1151, an average of 40% of all AP core courses offered, and admission to an average of 35% of the top universities in the United States. The research also revealed that CESA schools had a mean tuition rate of \$15,803.69, representing 28% of the median family income for their ZIP code, and 25% of the median family income for the ZIP code of their area.

With respect to Research Question 3, the research revealed a number of strong or medium effect sizes on the academic rigor variables for interactions between the IFL language variables. The strongest effect size was that of the effect on percentage of AP courses from the interaction between EngIFL and SciIFL. As seen in table 29, controlling

for the effect of Tuition and MFIA enhanced the overall strength of CESA schools' academic rigor. CESA schools' estimated marginal mean for the AP dependent variable increased from 40% in the simple descriptive statistics to 47% when the covariates were added in the MANCOVA. CESA schools' estimated marginal mean for the SAT dependent variable increased from 1151 in the simple descriptive statistics to 1164 when the covariates were added in the MANCOVA. CESA schools' estimated marginal mean for the TopUniv dependent variable increased from 35% in the simple descriptive statistics to 40% when the covariates were added in the MANCOVA. In all three cases, the increase shown in the MANCOVA was more than one standard deviation above the descriptive statistics' mean because of controlling for the covariates.

I also found that the incorporation of covariates to control for the effects of income greatly increased the strength of the interactions and enhanced the findings beyond the basic descriptive statistics of academic rigor, descriptive statistics of the presence of integration of faith and learning language, and the relationship between Christian curricular emphases and academic rigor at CESA schools in 2016. This finding revealed that academic rigor measurements show a complex relationship with IFL language among CESA schools.

CHAPTER 5

CONCLUSIONS

This research study was intended to bring greater understanding to conversations about the relationship between academic rigor and Christian curricular emphases in secondary education. It constituted an innovative descriptive study that filled a void in the research base in terms of descriptive analysis of the academic rigor and presence of IFL language among a selective group of private Christian schools and provided the basis for future research in the area of private Christian secondary schooling.

Research Purpose

Private Christian schools strive to differentiate themselves from competing schools in both the public and private sectors. However, Christian schools have curricula largely derived from public school categories outlined in the governmental report, *A Nation at Risk*. Since the early twenty-first century, a self-selected group of private, Christian schools began distinguishing themselves as different from other private, Christian schools by emphasizing academic rigor and a “framework of the Christian faith” as reflected in the Nicene Creed. This group of schools, known as the Council for Educational Standards and Accountability (hereafter CESA), has established a set of standards by which other schools can attain membership and a distinguished brand of Christian education. By comparing these schools’ academic rigor while controlling for the influence of income factors, this study has sought to identify the correlation of educating along an explicitly Christian framework and academic rigor, as per CESA guidelines. The official course descriptions of the secondary grades of members of

CESA should therefore reflect both academic curricular priorities and philosophical priorities consonant with a Christian framework of faith.

Research Questions

This research study sought to examine the intersection of the areas of academic rigor and Christian curricular emphases. Its research purpose was guided by the following three questions:

1. What is the nature of Christian curricular emphases at CESA schools as reflected by the presence of Bible/Christian studies curricula and the integration of faith and learning language in core curricula?
2. How academically rigorous are CESA school curricula as reflected by median SAT scores, AP courses, and selective college and university acceptances?
3. What is the relationship between the presence of Christian curricular emphases and overall academic rigor?

Research Implications

This section enumerates and then explains implications from the findings of this research study, grouping the implications according to the research question.

1. All CESA schools share a requirement that students take coursework in Bible.
2. CESA schools have a limited amount of Christian curricular emphases in terms of IFL language present in their curricular course descriptions.
3. CESA schools are academically rigorous when comparing their mean SAT scores to all other comparable groups.
4. CESA schools' academic rigor in terms of percentage of AP courses offered and admission to top universities is not comparable to other groups of schools due to the lack of records being kept on those measurements of academic rigor.
5. The relationship between the presence of Christian curricular emphases, the form of IFL, and overall academic rigor is complex. Both positive and negative relationships exist depending on the type of interaction created by the independent variables.
6. The presence of Bible courses above the CESA mean correlate positively with higher SAT measurements when interacting with EngIFL, but negatively with SAT measurements and TopUniv when interacting with SciIFL.
7. The presence of EngIFL courses above the CESA mean tends to correlate negatively with SATmed measurements across every interaction with medium or strong effect

size.

8. The presence of SciIFL courses above the CESA mean correlates positively with AP_{avail}, SAT_{med}, and TopUniv measurements when interacting with every independent variable, except for Bible, which negatively correlates with AP_{avail}. SciIFL presents with either medium or strong effect size in all interactions.
9. The presence of SSIFL courses above the CESA mean tends to correlate positively with SAT_{med}, and negatively with AP_{avail}. SSIFL presents with either medium or strong effect size in all interactions.

Christian Curricular Emphases Among CESA Schools

Research Implication 1: All CESA schools share a requirement that students take coursework in Bible. The mean number of years required for Bible was more than three years. This finding was somewhat unexpected, since I expected that at least one school out of the thirty-six would not have a required Bible curriculum, instead perhaps relying on a strong program of integration of faith and learning to implement biblical teaching to their students. This may be due to the fact that schools are responding to expectations that they provide biblical instruction in order to be a “truly Christian” school. Further research may investigate felt need to include Bible instruction in secondary grades coursework.

Research Implication 2: CESA schools have a limited amount of Christian curricular emphases in terms of IFL language present in their curricular course descriptions. The average amount of course descriptions containing IFL language was regularly fewer than half of the courses offered, ranging from a low of 0% (math) to a high of 21% (social studies). This finding was somewhat unexpected, since I expected that at least one school out of the thirty-six would have some sort of IFL language in their math curriculum. Upon discovering the paucity of IFL language in CESA schools’ math curriculum, I conducted a follow-up scan of departmental philosophies or vision statements and uncovered 13 of 36 CESA schools with IFL language in those documents. However, since the departmental philosophies were not included in the study

delimitations, they were excluded from the analysis. In terms of the stronger presence of IFL language among social studies courses, this may indicate greater comfort with connecting IFL to the language of the social sciences, rather than the language of mathematics.

Academic Rigor among CESA Schools

Research Implication 3: CESA schools are academically rigorous when comparing their mean SAT scores to all other comparable groups. CESA schools demonstrated high SAT_{med} scores (1151) compared to national averages of Christian schools, other independent schools, the expected scores from national averages for the income bands (derived from the average CESA school tuition divided by the percentage of median family income for the area), see table 12 in chapter 4. After performing the initial MANOVA on the combination of the dependent and independent variables, it produced an estimated mean SAT_{med} score of 1158. Once I added covariates to the analysis, controlling for the effects of varying tuition and MFIA rates, the CESA schools demonstrated even higher estimated mean SAT_{med} scores: 1164. Therefore, mean SAT_{med} scores suggested that CESA schools are academically rigorous institutions, taken together after controlling for income-related factors.

Research Implication 4: CESA schools' academic rigor in terms of percentage of AP courses offered and admission to top universities is not comparable to other groups of schools due to the lack of data records being kept on those measurements of academic rigor. CESA schools demonstrated a sizeable percentage of AP course offerings when looking at the descriptive statistics, with a mean score of 40% of possible AP courses offered. After performing the initial MANOVA, I found an estimated mean of 46% of possible AP courses offered. Once I added covariates to the analysis, controlling for the effects of varying Tuition and MFIA covariates, the CESA schools demonstrated a still higher estimated marginal mean percentage of AP courses offered (47%). Therefore

when considering the precedent literature findings that taking AP courses enhances student preparation for college, I concluded that CESA schools provide academically rigorous course offerings, given the percentage of possible AP courses they offer.

CESA schools demonstrated a sizeable percentage of TopUniv admissions when looking at the descriptive statistics, with a mean score of 36.3% of top universities admitting CESA schools' students. After performing the initial MANOVA, the research found an estimated mean of 38.8% of top universities admitting CESA schools' students. Once I added covariates to the analysis, controlling for the effects of varying tuition and MFIA rates, the CESA schools demonstrated a still higher estimated marginal mean percentage of top universities to which CESA schools' students were admitted (39.9%). Therefore, I concluded that CESA schools are academically rigorous based on the percentage of top universities to which their students have been admitted. Additionally, the category of top universities did not include well-regarded Christian colleges and universities, which are often not classed as national universities or included in international rankings. The inclusion of these schools may change the percentages of admittances from a number of CESA schools. Finally, many schools may have students who choose not to apply to top universities for a variety of financial or faith reasons.

The Relationship between Christian Curricular Emphases and Academic Rigor

Research Implication 5: The relationship between the presence of Christian curricular emphases and overall academic rigor is complex. Certain combinations of IFL language and course descriptions yield higher academic rigor scores than the CESA mean, while other combinations yield lower academic rigor scores than the CESA mean. The MANCOVA analysis provided me with a wealth of data to process. Due to the fact that the math course descriptions were all registered as "No" in the data recording process, the results of the MANCOVA were exactly the same both with and without the

variable MathIFL. The fact that the study performed a census study on the CESA schools rather than sampled them as a subset of a larger population allowed me to concentrate on effect size, rather than focus on the statistical significance. One of the more noteworthy aspects of the study was the way that certain combinations of independent variables demonstrated strong effect sizes, but those effect sizes were weakened in the presence of an additional variable in some cases and strengthened by an additional variable in other cases. For example, the strongest effect sizes shown among the interactions was that of EngIFL*SciIFL ($\eta_p^2 = 0.337$), but the inclusion of SSIFL, a third variable, yielding the interaction EngIFL*SciIFL*SSIFL, markedly decreased the effect size ($\eta_p^2 = 0.211$). On the other hand, the addition of an additional variable, Bible, to an already strong effect size, EngIFL*SSIFL ($\eta_p^2 = 0.140$), greatly strengthened that effect size (Bible*EngIFL*SSIFL, $\eta_p^2 = 0.283$). Therefore, the research suggested that the independent variables' effect size on the dependent variables reflects a complex relationship between the two chief components of the study: Christian curricular emphases and academic rigor.

Additionally, there were several interactions with strong effect sizes whose relationship to individual dependent variables were merely medium effect sizes. This suggested that the strong effect sizes shown in the multivariate tests for the seven identified interactions were due to the cumulative effect size on all three dependent variables, rather than any one single outstandingly strong effect size on a single dependent variable. The lone exception to this seems to be for the strongest effect size of all the interactions: EngIFL*SciIFL. Its strong effect size ($\eta_p^2 = 0.337$) was mirrored in the strong effect size that it had on the dependent variable AP ($\eta_p^2 = 0.263$), with weak effect size on SAT ($\eta_p^2 = 0.045$), and no effect size on TopUniv ($\eta_p^2 = 0.000$). Still, the strong overall partial eta squared value was greater than the individual value of the interaction with the dependent variable AP. This substantiated the earlier assertion that

the cumulative effect of the interaction with all three dependent variables contributed strongly to the overall value more than any single contribution.

Research Implication 6: The presence of Bible courses above the mean tends to correlate positively with SAT_{med} when interacting with EngIFL, but negatively with SAT_{med} and TopUniv when interacting with SciIFL. Of the seven independent variable interactions with strong effect size, four of them included the variable Bible. In examining the estimated marginal means of those four interactions, I noted that when considering the impact of the variable Bible when occurring by itself, it was neither the highest, nor lowest value for two of the four interactions. Bible had a mixed relationship with SAT_{med} scores, correlating with the highest estimated mean for SAT_{med} (1205) when interacting with EngIFL, but correlating with the lowest estimated mean for SAT_{med} (1135) when interacting with SciIFL. It also correlated with the lowest TopUniv percentage (32.7%) when interacting with SciIFL. These lower estimated marginal means were both below the CESA school mean. This led me to conclude that the requirement to have more than three years of Bible could negatively impact SAT scores when science courses do not also have IFL language, but could positively impact them when science courses do have IFL language. One implication of this finding was that Bible courses taken in isolation from a program-wide emphasis on IFL did not enhance the overall academic rigor of the school.

Research Implication 7: The presence of English courses above the mean IFL course tends to correlate negatively with SAT measurements across every interaction with medium or strong effect size. Of the seven interactions with strong effect size, five of them included the variable EngIFL. In examining the estimated marginal means of those five interactions, the research showed that the presence of IFL language in English course descriptions correlates negatively with admission to top universities (when interacting with both SciIFL and SSIFL (19%)) and SAT_{med} (when interacting with SciIFL (1138)),

and SSIFL (1114), both individually or in combination (1102)). However, EngIFL did correlate positively with a higher AP_{avail} (62%) when interacting with SciIFL and SSIFL.

One implication of this finding was that the presence of IFL language in English courses reflected a possible reduced emphasis on vocabulary or critical reading skills, which are important components of SAT scores. A brief follow-up study of this phenomenon should reveal the prevalence of vocabulary emphases between courses that contain IFL language and those that do not. Another implication was that schools that sought to incorporate a more thoroughgoing IFL to the point of including it in core English classes were producing students who are not as focused on admission into top-ranked universities, but rather were seeking schools better suited to their faith, and therefore resulting in lower TopUniv scores. One implication to be drawn from the positive correlation between the presence of higher percentages of AP courses being offered was that schools may offer more AP courses in order to bolster their academic program, recognizing that being intentionally Christian might cause their academic program to be considered of lesser quality by top universities.

Research Implication 8: The presence of SciIFL above the mean tends to correlate positively with AP_{avail} , SAT_{med} , and TopUniv measurements across every interaction with medium or strong effect size except for Bible, where SciIFL is negatively correlated with AP_{avail} percentages. Of the seven interactions with strong effect size, the independent variable SciIFL was part of three of them. In the estimated marginal means of three interactions, SciIFL correlated positively with the highest SAT_{med} score of that interaction (EngIFL*SciIFL (1244), EngIFL*SciIFL*SSIFL (1281), and Bible*SciIFL (1183, when SciIFL is above the CESA school mean)). In the estimated marginal means of all three interactions, science correlated positively with the highest TopUniv scores of that interaction (EngIFL*SciIFL (46.9%) and Bible*SciIFL (49.8%) and EngIFL*SciIFL*SSIFL (68.3%)). In the estimated marginal means of two interactions,

science correlated positively with AP_{avail} (EngIFL*SciIFL (66.2%) and EngIFL*SciIFL*SSIFL (71.3%)). However in the estimated marginal means of one interaction, SciIFL correlated negatively with AP_{avail} when Bible courses below the CESA mean (41.5%), but positively with AP_{avail} when both SciIFL and Bible were above the mean (55.5%).

One implication of this finding was that CESA schools that were careful to include integration of faith and learning language with their science course descriptions were more likely to have a considered academic approach to the entirety of their instructional program. The strong correlation between SciIFL and all measures of academic rigor in this study bears further consideration for future research. Another implication of this finding was that when Bible and SciIFL are both above the CESA mean, TopUniv rates were lower, indicating that fewer students either applied to or were accepted by highly rated US universities. A third implication could be that despite the fact that colleges saw the additional academic rigor as expressed in AP_{avail} and higher SAT_{med} scores, they were not admitting students coming from CESA schools.

Research Implication 9. The presence of social studies courses above the mean tends to correlate positively with SAT_{med} measurements, and negatively with AP_{avail} measurements across every interaction with medium or strong effect size. Of the seven interactions with strong effect size, the independent variable SSIFL was part of four of them. In the estimated marginal means of three interactions, social studies correlated positively with the highest SAT_{med} score of that interaction (EngIFL*SSIFL (1206), Bible*SSIFL (1208), and Bible*EngIFL*SSIFL (1210)). However in examining the estimated marginal means of all four interactions that include SSIFL, it correlated negatively with AP_{avail} (EngIFL*SSIFL (43%), Bible*SSIFL (36%), EngIFL*SciIFL*SSIFL (34%), and Bible*EngIFL*SSIFL (32%, when both Bible and SSIFL are above the mean)).

One implication of this finding was that CESA schools with IFL language in their social studies course descriptions did not offer as many AP courses, possibly because they did not find it necessary to seek validation for their academic program by using those classes. Another possibility is that, instead of offering AP courses under guidance by the College Board, they offered dual enrollment classes in conjunction with a local college or university, therefore achieving a similar effect to having AP courses available. Another implication, from looking at the SAT scores, was that CESA schools whose social studies course descriptions included IFL language had strong training for their students in terms of what the SAT measures. These schools might also have a stronger intentionality in their entire academic program, which was reflected in their higher estimated marginal mean SAT scores. A final implication could be that CESA schools chose not to offer certain AP courses at the time of this research study due to the controversy surrounding a recent course redesign.¹

Research Applications

The purpose of this study was to examine the presence of Christian curricular emphases, academic rigor, and their relationship among CESA schools. Guided by the research design, I was able to compile and analyze the data emergent from the CESA schools, and to describe the trends and themes that emerged from the data. This next section has described five applications from the findings in this study.

First, CESA schools themselves will be able to use this study as a reflection of

¹In 2014, the College Board released new guidelines for their AP US history course. There was significant pushback from conservative voices over this new course, resulting in an adjustment to this redesign's course curriculum in the summer of 2015. See Peter Jacobs, "Here's How AP US History Became One of the Most Controversial Classes in America," BusinessInsider.com, February 20, 2015, accessed May 1, 2016, <http://www.businessinsider.com/heres-how-ap-us-history-became-controversial-2015-2>; Pema Levy, "What's Driving Conservatives Mad about the New AP History Course," Newsweek.com, August 14, 2014, accessed May 1, 2016, <http://www.newsweek.com/whats-driving-conservatives-mad-about-new-history-course-264592>; Anya Kamentez, "The New, New Framework for AP US History," NPR.org, August 5, 2015, accessed May 1, 2016, <http://www.npr.org/sections/ed/2015/08/05/429361628/the-new-new-framework-for-ap-u-s-history>.

the current state of their organization, which appears to rate comparably well in measures of academic rigor, but displays less evident IFL in terms of their course descriptions. They will have a number of measurements to examine when seeking to improve and some confirmation of their efforts to be both distinctively Christian and rigorously academic. One area that CESA schools might find of significant interest is the lack of IFL language as defined by Badley's work in any of their mathematics course descriptions. Another area that CESA schools might find interesting is the apparently strong correlation between the presence of IFL language in social studies and science course descriptions and all three measures of academic rigor used in this study. Those may be leverage points for infusing a deeper connection between Christianity and academic coursework without sacrificing academic rigor.

Second, Christian school administrators and teachers whose schools are not members of CESA but who are seeking higher academic rigor may find that examining the findings of this study could yield improved academic measurements for their own institutions. Additionally, the research data shows that schools that require more than three years of Bible from their students face an increasingly complex task in achieving high ratings for these three external measurements of academic rigor. This may lead to a reconsideration of the number of years required for students to take Bible coursework, especially as Christian curricular emphases are more fully integrated into the traditional academic courses, therefore demonstrating continued emphasis on the importance of integrating faith with the learning.

Third, Christian textbook writers may find that CESA schools prove to be a profitable target audience for course curricula that are well-written, academic, and that integrate faith into their media offerings. Other studies have examined the curricula under use in Christian schools, and this study could serve as a window into the types of courses

that would be well-served by excellent textbooks.²

Fourth, those interested in developing a profile of academically-trained Christian secondary students will find this study helpful. Christian colleges seeking students with experience integrating their faith into rigorous academic work may find that schools with IFL language in their course descriptions could serve as a pool of top quality undergraduate student candidates. Researchers interested in developing a profile of Christian secondary school students who find academic success at various types of institutions might examine the relationship between their experiences at schools similar in profile to CESA schools.

Fifth, researchers looking for the relationship between academic rigor and other non-faith variables may find aspects of this study scalable to their specific research interests. This process could be used for a study as narrow as the correlation between one element of course descriptions, or even course descriptions within a specific academic field, and the dependent variables. The expense of the two software programs used in this study is not prohibitive and they are amply supported by official company guides as well as guides designed for use by researchers. However, the dependent variables and covariates should hold as helpful markers of academic rigor, regardless of the independent variables.

Research Limitations

In addition to the limitations enumerated in chapter 3, this study contains the following additional limitations. First, the research's lack of emphasis on statistical significance in favor of emphasizing effect size came from the fact that this study was a census of all CESA schools. Therefore, there is highly limited generalization to non-

²See William F. Cox, Jr., Nancy J. Hameloth, and Daniel P. Talbot, "Biblical Fidelity of Christian School Textbooks," *Journal of Research on Christian Education* 16, no. 2 (September 2007): 181-210; and Janice Guthrie, "Christian-Published Textbooks and the Preparation of Teens for the Rigors of College Science Courses," *Journal of Research on Christian Education* 20, no. 1 (January 2011): 46-72.

CESA schools. However, further research on additional groupings of schools may show similar correlations for Christian schools across the United States and other countries, and therefore bear further research. Second, due to the emphasis on IFL language in the course descriptions, this research does not seek to make statements about what actually occurs in classrooms on a daily basis (the operational curriculum), but instead has examined only official course descriptions (the official curriculum). Third, this study also did not comment on other aspects of Christian curricular emphases that fall within the hidden or extra curriculum at CESA schools. It did not examine the presence and number of school-based mission trips, the nature and frequency of chapel programs, student Bible studies, or discipleship programs as measures of Christian curricular emphases. It did not examine the presence of IFL language in non-core academic curriculum, foreign language classes, art classes, or additional leadership or other programs offered at the school. Therefore, the findings of this study are restricted to Bible, English, math, science, and social studies courses at CESA schools, and should not be generalized beyond those areas. Fourth, the findings of this study are predicated on a dichotomization of the presence of IFL language based on the mean of the reported IFL language in the course descriptions. If the research design had allowed for more levels of IFL language, the analysis could have produced a more nuanced discussion of the interaction between the factors. Therefore, generalizations of this study are limited by the dichotomous nature of the independent variables, which provide little nuance.

Contribution of Research to the Precedent Literature

This research filled a void in the existing literature by analyzing the intersection of several well-studied subjects: curriculum, IFL, and measures of academic rigor. Prior to this study, no discovered empirical studies had assessed the correlation between academic rigor and the presence of IFL language in course descriptions at any grouping of schools, Christian or non-Christian. Therefore, it constituted a

groundbreaking descriptive analysis of Christian schools and the relationship of Christian curricular emphases to commonly recognized measures of academic rigor.

Recommendations for Practice

Christian schools with secondary school programs who are interested in an academically rigorous program that also expresses integration of faith and learning should review their course descriptions for IFL language. This research indicates that including a more explicit expression of IFL in their core courses, especially in the science and social studies courses, indicates a purposeful approach to Christian curricular emphases, with correlative higher academic rigor measurements. Additionally, Christian secondary schools should evaluate their academic programs to determine whether they are adding academic value above what would be expected for the median family income of the area relative to their tuition rates. Finally, CESA schools and others similar in priority and profile should evaluate the number of years of Bible they require of their students because this appears to be an indicator for some measures of academic rigor.

Further Research

This section contains recommendations for other research that could be done in the field of Christian curricular emphases and academic rigor in Christian schools. This initial descriptive study will provide a scalable model for future researchers to examine the correlation between Christian curricular emphases and academic rigor, or even the relationship between entirely different curricular emphases and academic rigor. This section proposes several additional studies that could extend, develop, or deepen the findings of this study. Following the model set forth in John David Trentham's PhD dissertation, this list of further research studies will italicize variables distinguishing each study.³

³John David Trentham, "Epistemological Development in Pre-ministry Undergraduates: A
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1. Using a similar design and method, three separate studies could examine Christian curricular emphases apparent in the *operational*, *hidden*, and *extracurricular* offerings among CESA schools
2. Using a similar design and method as found in this research, three separate studies could explore several variables at CESA schools including the relationship between *SES* factors, *gender*, or *racial* factors and students' academic rigor at CESA schools (extending Jeynes's 2007 and 2009 studies)
3. Using a similar design and method as found in this research, eight separate studies could explore Christian curricular emphases and academic rigor at *ACSI* schools, *ACCS* schools, *Lutheran* schools, *Catholic* schools, *Seventh Day Adventist* schools, *University Model* schools, *National Association of Episcopal Schools* (NAES), *Southern Baptist Convention Association of Schools* (SBCAS), and *Christian Schools International* (CSI) by *state*, by *regional groupings*, or by *international groupings*.
4. Using a similar design and method, thirty-six separate studies could explore *CTP4*, *ERB*, *SAT-10*, *Iowa* and other primary and middle grades standardized testing modules to examine the relationship between Christian curricular emphases and academic rigor in *ACSI* schools, *ACCS* schools, *Lutheran* schools, *Catholic* schools, *Seventh Day Adventist* schools, *University Model* schools, *National Association of Episcopal Schools* (NAES), *Southern Baptist Convention Association of Schools* (SBCAS), and *Christian Schools International* (CSI) by *state*, by *regional groupings*, or by *international groupings*.
5. Using the findings from each of the different school groupings, five separate studies could follow up with qualitative studies, such as phenomenologies, of the experiences of *heads of school*, *administrators*, *students*, *teachers*, and *parents* with IFL language or their understanding of IFL language in course descriptions or other expressions of curricula.
6. Using a similar design and method, three separate studies could explore the relationship between schools that primarily use Christian textbook and media publishers such as *A Beka* and *Bob Jones University Press* and academic rigor measurements.
7. Using a similar design and method, eight separate studies could replicate of this mixed methods study to examine academic rigor while controlling for income-related variables among *National Association of Independent Schools* (NAIS), *Southern Association of Independent Schools* (SAIS), *Southern Association of Colleges and Schools* (SACS), *Western Association of Schools and Colleges* (WASC), etc.
8. Using a similar design and method, two separate studies could connect the findings of the studies related to IFL language and academic rigor with John David Trentham's work in epistemological development among Christian pre-ministry secondary students.

Cross-Institutional Application of the Perry Scheme" (PhD diss., The Southern Baptist Theological Seminary, 2012), 220.

9. A longitudinal mixed methods study of graduates from schools with IFL language, tracking academic rigor in collegiate experiences and post-graduate education, as well as Christian maturity and growth.
10. Once the above studies have been completed, a meta-analysis of the IFL-related studies could be completed toward the development of a taxonomy of integration of faith and learning according to academic rigor.
11. Over one hundred separate qualitative or content analysis studies could be completed of IFL language according to each of Badley's 1994 paradigms in the published curricula, mission statements, visions, and educational philosophies of *ACSI* schools, *ACCS* schools, *Lutheran* schools, *Catholic* schools, *Seventh Day Adventist* schools, *University Model* schools, *National Association of Episcopal Schools* (NAES), *Southern Baptist Convention Association of Schools* (SBCAS), and *Christian Schools International* (CSI) by *state*, by *regional groupings*, or by *international* groupings.
12. A phenomenological study of the academic and IFL experiences of students who have graduated from schools displaying each type of Badley's paradigms based on the findings of the studies outlined immediately above and schools discovered to display these paradigms, possibly leading to the development of a profile of schools displaying each of Badley's paradigms.
13. A factorial analysis of the studies of Christian schools enumerated above could lead to the the development of an IFL identification instrument for use by future researchers.
14. The mixed methods development of a robust taxonomy of the academic rigor of *independent Christian*, *church-affiliated*, *Christian home-school*, and *denominationally-affiliated* schools.

APPENDIX 1
RESEARCH PROCEDURES WORKSHEET

Table A1. Research procedures chart

<i>Step</i>	1	2	3	4
<i>Action</i>	Establish CESA school names from website	Record School ZIP code	Navigate to “Tuition and Fees” section of website	Navigate to academic profile (college profile)
<i>Website Required?</i>	Yes	Yes	Yes	Yes
<i>Program Required</i>	Internet browser	Internet browser	Internet browser	Internet browser
<i>Web Address</i>	CESA Schools	To Determine: ZIP Codes / To Determine: Median Family Income by ZIP Code	Will Vary	Will Vary
<i>Follow-Up Action</i>	Create folder for each CESA school	Using School Zip Code, navigate to ZIP Code Lookup to determine all bordering zip codes for the school, inclusive of those across rivers. Record all ZIP codes in data sheet	Record school maximum tuition for 12th grade student inclusive of all likely costs and fees	Download latest academic profile as PDF

Table A1 continued

<i>Follow-Up Action</i>	Copy web addresses for each school into browser folder	Using School ZIP code, navigate to Fact Finder on US Census Website for Median Family Income for Families with Children under 18 in all bordering ZIP codes to calculate MFIA, recording these in spreadsheet	--	Create spreadsheet of median SAT for each CESA school in delimited population
<i>Follow-Up Action</i>	Create row in spreadsheet for each CESA school	Using all ZIP codes data, determine the median family income of all the ZIP codes inclusive of the school's home ZIP code and those bordering the schools. (Include all campuses for multisite campuses).	--	Convert ACT scores to SAT scores using Concordance tables
<i>Follow-Up Action</i>	Create major category section for each variable	Record labeled generated median family incomes as MFIA	--	For schools reporting both ACT and SAT scores, take the higher once converted to SAT form
<i>Follow-Up Action</i>	Create additional spreadsheet data as needed	--	--	If no academic profile is available, use whatever latest published standardized test scores available

Table A1 continued

Step	5	6	7	8
<i>Action</i>	Navigate to course descriptions for 9-12 grade courses	Navigate to AP Central for Latest AP Course offering listing	Calculate percentage of AP Course offerings per major subject area per school	Navigate to College Rankings
<i>Website Required?</i>	Yes	Yes	No	Yes
<i>Program Required</i>	Internet browser	Internet browser	Spreadsheet	Internet browser
<i>Web Address</i>	Will Vary	AP Central Course Index	No	See individual cells
<i>Follow-Up Action</i>	Download course descriptions for English courses	Determine AP English Course offerings: English Language, English Literature	Determine percentage of AP English course offerings per CESA School	Collect five most recent years of data for top US 50 universities US News and World Report: Historic US News and World Report: Current
<i>Follow-Up Action</i>	Download course descriptions for Math courses	Determine AP Math Course offerings: Statistics, Calculus AB, Calculus BC	Determine percentage of AP Math course offerings per CESA School	Collect five most recent years of data for top US 50 universities Times Higher Education World University Rankings: Current

Table A1 continued

<p><i>Follow-Up Action</i></p>	<p>Download course descriptions for Science courses</p>	<p>Determine AP Science Course offerings: Biology, Chemistry, Computer Science A, Environmental Science, Physics 1, Physics 2, Physics C (Electricity and Magnetism), Physics C (Mechanics)</p>	<p>Determine percent-age of AP Science course offerings per CESA School</p>	<p>Collect five most recent years of data for top US 50 universities QS Rankings: Current</p>
<p><i>Follow-Up Action</i></p>	<p>Download course descriptions for Social Studies courses</p>	<p>Determine AP Social Studies Course offerings: Comparative Government, European History, Human Geography, Macroeconomics, Microeconomics, Psychology, US Government and Politics, US History, World History</p>	<p>Determine percentage of AP Social Studies course offerings per CESA School</p>	<p>Collect five most recent years of data for top US 50 universities Academic Rankings of World Universities (Shanghai Rankings): Current</p>

Table A1 continued

<i>Step</i>	9	10	11	12
<i>Action</i>	Calculate median rankings of top 50 universities	Calculate overall median rankings of top 50 universities	Calculate percentage of Top 50 Colleges and Universities present in each CESA School's Academic Profile	Establish criteria words for IFL presence and non-presence in course descriptions
<i>Website Required?</i>	No	No	No	No
<i>Program Required</i>	Spreadsheet	Spreadsheet	Spreadsheet or Content Analysis software	Content Analysis software
<i>Web Address</i>	No	No	No	No
<i>Follow-Up Action</i>	Calculate median rankings of USNWR top 50 universities	Include most commonly ranked colleges and universities across all rankings, even those lower than 50 for continuity between polls	Record percentage of Top 50 Colleges and Universities represented in each CESA schools academic profile	Include IFL language from Badley's three works regarding integration of faith and learning
<i>Follow-Up Action</i>	Calculate median rankings of QSR top 50 universities	Choose one poll to serve as top 50 ranking of US colleges and universities	--	--
<i>Follow-Up Action</i>	Calculate median rankings of ARWU top 50 universities	--	--	--

Table A1 continued

<i>Step</i>	13	14	15	16
<i>Action</i>	Determine the presence of Bible or Christian Studies curriculum in CESA Schools	Determine the presence of IFL language in all core subject courses	Calculate IFL presence score	Run MANCOVA on all variables
<i>Website Required?</i>	Yes	No	No	No
<i>Program Required</i>	Internet browser	Content Analysis software	Spreadsheet	Advanced Statistical Software
<i>Web Address</i>	Will Vary	No - use downloaded course descriptions	No	No
<i>Follow-Up Action</i>	Record Yes/No; Yes = 1; No = 0	Record IFL language presence or non-presence in all 9-12 CESA School Eng courses	Record whether each core curriculum's IFL language presence is above or below the CESA mean	Examine MANCOVA output for relationships between variables
<i>Follow-Up Action</i>	Determine mean of CESA School IFL presence	Record IFL language presence or non-presence in all 9-12 CESA School Math courses	Record Yes/No; Yes = 1; No = 0	--

Table A1 continued

<p><i>Follow-Up Action</i></p>	<p>Record whether each school's Bible curriculum is above or below the CESA mean</p>	<p>Record IFL language presence or non-presence in all 9-12 CESA School science courses</p>	<p>--</p>	<p>--</p>
<p><i>Follow-Up Action</i></p>	<p>Record Yes/No; Y = 1; N = 0</p>	<p>Record IFL language presence or non-presence in all 9-12 CESA School social studies courses</p>	<p>--</p>	<p>--</p>

APPENDIX 2
CESA SCHOOL DATA

Table A2. List of CESA schools included in study

<i>Full Members</i>
<u>Brentwood Academy</u>
<u>Charlotte Christian School</u>
<u>Cincinnati Hills Christian Academy</u>
<u>First Presbyterian Day School</u>
<u>Grace Community School</u>
<u>Hill Country Christian School</u>
<u>Legacy Christian School</u>
<u>Life Christian Academy</u>
<u>Little Rock Christian Academy</u>
<u>Mount Paran Christian School</u>
<u>Norfolk Christian Schools</u>
<u>The First Academy</u>
<u>Valor Christian School</u>
<u>Westminster Schools of Augusta</u>
<u>Wheaton Academy</u>
<i>Provisional Members</i>
<u>Christian Academy of Knoxville</u>
<u>Cornerstone Academy</u>
<u>Cornerstone Christian Academy - IL</u>
<u>Houston Christian High School</u>
<u>Kansas City Christian School</u>
<u>Prestonwood Christian Academy</u>
<u>Stillwater Christian Academy</u>
<u>The Brook Hill School</u>
<u>Village Christian Schools</u>
<u>Westminster Christian Academy</u>
<u>Whittier Christian High School</u>

Table 2 continued

<i>Candidate Members</i>
<u>Greater Atlanta Christian School</u>
<u>Mount Pisgah Christian School</u>
<u>Northside Christian Academy</u>
<u>Providence: A Santa Barbara Christian School</u>
<u>Santa Fe Christian Schools</u>
<u>Wesleyan School</u>
<u>Whitefield Academy</u>

Table A3. CESA school tuition as percentage of median family income of school ZIP code

<i>CESA Schools</i>	<i>Tuition (\$)</i>	<i>Median Family Income of School ZIP (\$)</i>	<i>Tuition as % of MFIZ</i>
<i>Full Members</i>			
Brentwood Academy	21,150	144,492	15
Charlotte Christian School	18,580	60,313	31
Cincinnati Hills Christian Academy	15,075	106,667	14
First Presbyterian Day School	12,850	13,826	93
Grace Community School	9,899	49,895	20
Hill Country Christian School	11,060	121,250	9
Legacy Christian School	15,460	125,165	12
Life Christian Academy	10,857	48,850	22
Little Rock Christian Academy	10,317	120,568	9
Mount Paran Christian School	16,095	91,970	18
Norfolk Christian Schools	12,000	47,833	25
The First Academy	16,700	22,384	75
Valor Christian School	16,580	124,346	13
Westminster Schools of Augusta	13,900	41,720	33
Wheaton Academy	15,250	61,746	25
<i>Provisional Members</i>			
Christian Academy of Knoxville	12,336	60,807	20
Cornerstone Academy	--	62,625	--
Cornerstone Christian Academy – IL	7,975	101,875	8
Houston Christian High School	21,650	40,813	53
Kansas City Christian School	10,265	108,798	9
Prestonwood Christian Academy	20,050	125,942	16
Stillwater Christian Academy	7,755	51,040	15
The Brook Hill School	10,760	73,722	15
Village Christian Schools	12,856	45,000	29
Westminster Christian Academy	15,350	118,450	13
Whittier Christian High School	13,775	61,964	22

Table A3 continued

<i>Candidate Members</i>			
Greater Atlanta Christian School	18,795	29,109	65
Mount Pisgah Christian School	18,980	126,250	15
Northside Christian Academy	8,945	52,141	17
Providence: A Santa Barbara Christian School	15,800	45,071	35
Santa Fe Christian Schools	18,440	115,558	16
Wesleyan School	21,770	80,461	27
Whitefield Academy	21,000	80,923	26

Table A4. CESA school tuition as percentage of median family income of school and surrounding ZIP codes

<i>CESA Schools</i>	<i>Tuition (\$)</i>	<i>Median Family Income ZIP Aggregate (\$)</i>	<i>Tuition as % of MFIA</i>
<i>Full Members</i>			
Boston Trinity Academy	16,950	87,612	19
Brentwood Academy	21,150	106,596	20
Charlotte Christian School	18,580	82,199	23
Cincinnati Hills Christian Academy	15,075	114,770	13
First Presbyterian Day School	12,850	46,129*	28
Grace Community School	9,899	55,833	18
Hill Country Christian School	11,060	107,484	10
Legacy Christian School	15,460	116,382	13
Life Christian Academy	10,857	47,862	23
Little Rock Christian Academy	10,317	86,964	12
Mount Paran Christian School	16,095	80,553	20
Norfolk Christian Schools	12,000	49,375	24
St. David's School	18,650	78,778	24
The Dunham School	15,875	86,753	18
The First Academy	16,700	31,209	54
Valor Christian School	16,580	122,297	14
Westminster Schools of Augusta	13,900	43,750	32
Wheaton Academy	15,250	107,434	14
<i>Provisional Members</i>			
Christian Academy of Knoxville	12,336	84,286	15
Cornerstone Academy	--	130,417	--
Cornerstone Christian Academy - IL	7,975	85,714	9
Delaware County Christian School	16,175	137,031	12
Houston Christian High School	21,650	54,751	40
Kansas City Christian School	10,265	108,798	9
Prestonwood Christian Academy	20,050	87,869	23
Stillwater Christian Academy	7,755	51,172	15
The Brook Hill School	10,760	64,801	17
The Stony Brook School	27,800	138,000	20
Village Christian Schools	12,856	65,161	20

Table A4 continued

Westminster Christian Academy	15,350	118,073	13
Whittier Christian High School	13,775	71,756	19
<i>Candidate Members</i>			
Greater Atlanta Christian School	18,795	43,827	43
Mount Pisgah Christian School	18,980	94,867	20
Northside Christian Academy	8,945	71,404	13
Providence: A Santa Barbara Christian School	15,800	78,511	20
Santa Fe Christian Schools	18,440	119,559	15
Wesleyan School	21,770	54,851	40
Whitefield Academy	21,000	36,754	57

* indicates used city median family income instead of ZIP

Table A5. CESA school ZIP codes and bordering ZIP codes

<i>School ZIP</i>	23505	<i>MFIZ</i>	28262	<i>MFIZ</i>	28270	<i>MFIZ</i>
<i>Bordering 1</i>	23504	\$ 20,481.00	28027	\$ 76,803.00	28212	\$ 27,288.00
<i>Bordering 2</i>	23505	\$ 47,833.00	28075	\$ 88,111.00	28105	\$ 82,199.00
<i>Bordering 3</i>	23508	\$ 87,390.00	28213	\$ 43,300.00	28270	\$ 60,313.00
<i>Bordering 4</i>	23509	\$ 49,375.00	28262	\$ 52,141.00	28211	\$ 113,250.00
<i>Bordering 5</i>	23511	\$ 86,250.00	28269	\$ 71,404.00	28226	\$ 87,897.00
<i>Bordering 6</i>	23513	\$ 38,894.00	--	--	28227	\$ 50,676.00
<i>Bordering 7</i>	23518	\$ 50,536.00	--	--	28277	\$ 112,289.00
Mean	--	\$ 54,394.14	--	\$ 66,351.80	--	\$ 76,273.14
Median	--	\$ 49,375.00	--	\$ 71,404.00	--	\$ 82,199.00
<i>School ZIP</i>	30022	<i>MFIZ</i>	30092	<i>MFIZ</i>	30093	<i>MFIZ</i>
<i>Bordering 1</i>	30005	\$ 128,375.00	30022	\$ 129,253.00	30044	\$ 49,550.00
<i>Bordering 2</i>	30009	\$ 94,867.00	30071	\$ 34,710.00	30047	\$ 68,914.00
<i>Bordering 3</i>	30022	\$ 126,250.00	30092	\$ 80,461.00	30071	\$ 34,710.00
<i>Bordering 4</i>	30076	\$ 75,841.00	30096	\$ 43,827.00	30084	\$ 51,396.00
<i>Bordering 5</i>	30092	\$ 76,908.00	30097	\$ 111,463.00	30093	\$ 29,109.00
<i>Bordering 6</i>	30097	\$ 106,343.00	30350	\$ 54,851.00	30096	\$ 43,827.00
<i>Bordering 7</i>	30350	\$ 56,769.00	30360	\$ 43,569.00	30340	\$ 31,921.00
Mean	--	\$ 95,050.43	--	\$ 71,162.00	--	\$ 44,203.86
Median	--	\$ 94,867.00	--	\$ 54,851.00	--	\$ 43,827.00
<i>School ZIP</i>	30126	<i>MFIZ</i>	30152	<i>MFIZ</i>	30909	<i>MFIZ</i>
<i>Bordering 1</i>	30082	\$ 66,283.00	30060	\$ 31,730.00	30905	\$ 43,750.00
<i>Bordering 2</i>	30106	\$ 42,431.00	30064	\$ 93,894.00	30813	\$ 65,522.00
<i>Bordering 3</i>	30126	\$ 80,923.00	30101	\$ 83,009.00	29841	\$ 56,344.00
<i>Bordering 4</i>	30168	\$ 33,977.00	30127	\$ 78,098.00	30904	\$ 27,519.00
<i>Bordering 5</i>	30318	\$ 36,754.00	30144	\$ 72,731.00	30906	\$ 27,611.00
<i>Bordering 6</i>	30331	\$ 33,542.00	30152	\$ 91,970.00	30907	\$ 66,088.00
<i>Bordering 7</i>	30336	\$ 28,750.00	--	--	30909	\$ 41,720.00
Mean	--	\$ 46,094.29	--	\$ 75,238.67	--	\$ 46,936.29
Median	--	\$ 36,754.00	--	\$ 80,553.50	--	\$ 43,750.00
<i>School ZIP</i>	31201	<i>MFIZ</i>	31408	<i>MFIZ</i>	32805	<i>MFIZ</i>
<i>Bordering 1</i>	31201	\$ 13,826.00	29927	\$ 45,841.00	32801	\$ 63,276.00

Table A5 continued

<i>Bordering 2</i>	31204	\$ 29,490.00	31322	\$ 74,157.00	32804	\$ 92,727.00
<i>Bordering 3</i>	31206	\$ 19,978.00	31404	\$ 28,702.00	32805	\$ 22,384.00
<i>Bordering 4</i>	31211	\$ 44,643.00	31405	\$ 41,533.00	32806	\$ 68,285.00
<i>Bordering 5</i>	31217	\$ 32,178.00	31406	\$ 43,727.00	32808	\$ 31,209.00
<i>Bordering 6</i>	--	--	31407	\$ 50,455.00	32811	\$ 28,598.00
<i>Bordering 7</i>	--	--	31408	\$ 29,211.00	32839	\$ 24,355.00
<i>Bordering 8</i>	--	--	31410	\$ 79,713.00	--	--
<i>Bordering 9</i>	--	--	31411	\$ 119,455.00	--	--
<i>Bordering 10</i>	--	--	31415	\$ 18,995.00	--	--
<i>Bordering 11</i>	--	--	31419	\$ 46,640.00	--	--
Mean	--	\$ 28,023.00	--	\$ 52,584.45	--	\$ 47,262.00
Median	--	\$ 29,490.00	--	\$ 45,841.00	--	\$ 31,209.00
<i>School ZIP</i>	<i>37027</i>	<i>MFIZ</i>	<i>37923</i>	<i>MFIZ</i>	<i>45429</i>	<i>MFIZ</i>
<i>Bordering 1</i>	37013	\$ 51,341.00	37909	\$ 40,026.00	45429	\$ 106,667.00
<i>Bordering 2</i>	37027	\$ 133,139.00	37919	\$ 87,681.00	45040	\$ 114,780.00
<i>Bordering 3</i>	37067	\$ 110,129.00	37921	\$ 43,256.00	45241	\$ 103,125.00
<i>Bordering 4</i>	37069	\$ 5,502.00	37922	\$ 114,435.00	45140	\$ 115,248.00
<i>Bordering 5</i>	37135	\$ 106,596.00	37923	\$ 60,807.00	45242	\$ 114,760.00
<i>Bordering 6</i>	37211	\$ 34,592.00	37931	\$ 84,286.00	--	--
<i>Bordering 7</i>	37215	\$ 163,269.00	37932	\$ 98,314.00	--	--
<i>Bordering 8</i>	37220	\$ 126,344.00	--	--	--	--
<i>Bordering 9</i>	37221	\$ 98,766.00	--	--	--	--
Mean	--	\$ 92,186.44	--	\$ 75,543.57	--	\$ 110,916.00
Median	--	\$ 106,596.00	--	\$ 84,286.00	--	\$ 114,760.00
<i>School ZIP</i>	<i>59901</i>	<i>MFIZ</i>	<i>60610</i>	<i>MFIZ</i>	<i>60185</i>	<i>MFIZ</i>
<i>Bordering 1</i>	59901	\$ 51,040.00	60610	\$ 62,625.00	60103	\$ 106,659.00
<i>Bordering 2</i>	59911	\$ 58,250.00	60611	\$ 146,288.00	60134	\$ 122,561.00
<i>Bordering 3</i>	59912	\$ 60,154.00	60614	\$ 186,895.00	60174	\$ 98,786.00
<i>Bordering 4</i>	59916	--	60642	\$ 91,023.00	60184	\$ 182,500.00
<i>Bordering 5</i>	59920	\$ 51,563.00	60654	\$ 130,417.00	60185	\$ 61,746.00
<i>Bordering 6</i>	59922	\$ 51,172.00	--	--	60188	\$ 91,455.00
<i>Bordering 7</i>	59925	\$ 40,893.00	--	--	60189	\$ 140,024.00
<i>Bordering 8</i>	59937	\$ 50,075.00	--	--	60190	\$ 128,598.00
<i>Bordering 9</i>	--	--	--	--	60510	\$ 108,209.00

Table A5 continued

<i>Bordering 10</i>	--	--	--	--	60555	\$ 82,402.00
Mean	--	\$ 51,878.14	--	\$ 123,449.60	--	\$ 112,294.00
Median	--	\$ 51,172.00	--	\$ 130,417.00	--	\$ 107,434.00
<i>School ZIP</i>	<i>61736</i>	<i>MFIZ</i>	<i>63017</i>	<i>MFIZ</i>	<i>66208</i>	<i>MFIZ</i>
<i>Bordering 1</i>	61705	\$ 109,077.00	63005	\$ 193,594.00	64112	\$ 138,750.00
<i>Bordering 2</i>	61736	\$ 101,875.00	63011	\$ 117,696.00	64113	\$ 158,542.00
<i>Bordering 3</i>	61737	\$ 54,083.00	63017	\$ 118,450.00	64114	\$ 74,172.00
<i>Bordering 4</i>	61745	\$ 82,083.00	63131	\$ 173,203.00	66202	\$ 52,628.00
<i>Bordering 5</i>	61752	\$ 85,714.00	63141	\$ 134,737.00	66204	\$ 54,216.00
<i>Bordering 6</i>	--	--	63146	\$ 91,463.00	66205	\$ 102,644.00
<i>Bordering 7</i>	--	--	63303	\$ 87,232.00	66206	\$ 159,013.00
<i>Bordering 8</i>	--	--	63304	\$ 96,911.00	66207	\$ 120,625.00
<i>Bordering 9</i>	--	--	--	--	66208	\$ 108,798.00
Mean	--	\$ 86,566.40	--	\$ 126,660.75	--	\$ 107,709.78
Median	--	\$ 85,714.00	--	\$ 118,073.00	--	\$ 108,798.00
<i>School ZIP</i>	<i>72223</i>	<i>MFIZ</i>	<i>75701</i>	<i>MFIZ</i>	<i>75034</i>	<i>MFIZ</i>
<i>Bordering 1</i>	72113	\$ 81,278.00	75701	\$ 49,895.00	75024	\$ 126,237.00
<i>Bordering 2</i>	72122	\$ 99,896.00	75702	\$ 29,650.00	75034	\$ 125,165.00
<i>Bordering 3</i>	72135	\$ 86,964.00	75703	\$ 70,514.00	75035	\$ 112,044.00
<i>Bordering 4</i>	72210	\$ 60,250.00	75707	\$ 80,391.00	75056	\$ 101,691.00
<i>Bordering 5</i>	72211	\$ 82,826.00	75709	\$ 55,833.00	75068	\$ 71,065.00
<i>Bordering 6</i>	72212	\$ 105,556.00	--	--	75078	\$ 120,721.00
<i>Bordering 7</i>	72223	\$ 120,568.00	--	--	--	--
Mean	--	\$ 91,048.29	--	\$ 57,256.60	--	\$ 109,487.17
Median	--	\$ 86,964.00	--	\$ 55,833.00	--	\$ 116,382.50
<i>School ZIP</i>	<i>75093</i>	<i>MFIZ</i>	<i>75150</i>	<i>MFIZ</i>	<i>75757</i>	<i>MFIZ</i>
<i>Bordering 1</i>	75007	\$ 76,455.00	75043	\$ 52,328.00	75703	\$ 72,935.00
<i>Bordering 2</i>	75010	\$ 87,869.00	75149	\$ 43,518.00	75757	\$ 73,722.00
<i>Bordering 3</i>	75023	\$ 77,668.00	75150	\$ 42,399.00	75759	\$ 23,906.00
<i>Bordering 4</i>	75024	\$ 120,026.00	75182	\$ 126,750.00	75762	\$ 86,625.00
<i>Bordering 5</i>	75056	\$ 99,239.00	75228	\$ 32,242.00	75763	\$ 47,813.00
<i>Bordering 6</i>	75075	\$ 89,896.00	--	--	75766	\$ 30,392.00
<i>Bordering 7</i>	75093	\$ 125,942.00	--	--	75789	\$ 56,667.00

Table A5 continued

<i>Bordering 8</i>	75252	\$ 75,799.00	--	--	75791	\$ 79,556.00
<i>Bordering 9</i>	75287	\$ 44,519.00	--	--	--	--
Mean	--	\$ 88,601.44	--	\$ 59,447.40	--	\$ 58,952.00
Median	--	\$ 87,869.00	--	\$ 43,518.00	--	\$ 64,801.00
<i>School ZIP</i>	77043	<i>MFIZ</i>	77057	<i>MFIZ</i>	78750	<i>MFIZ</i>
<i>Bordering 1</i>	77055	\$ 37,342.00	77024	\$ 194,750.00	78729	\$ 69,176.00
<i>Bordering 2</i>	77041	\$ 65,382.00	77036	\$ 24,382.00	78717	\$ 107,484.00
<i>Bordering 3</i>	77024	\$ 185,463.00	77056	\$ 133,088.00	78613	\$ 90,936.00
<i>Bordering 4</i>	77043	\$ 40,813.00	77057	\$ 42,434.00	78726	\$ 110,956.00
<i>Bordering 5</i>	77079	\$ 124,028.00	77063	\$ 44,091.00	78730	\$ 182,344.00
<i>Bordering 6</i>	77080	\$ 29,321.00	77074	\$ 28,610.00	78759	\$ 105,357.00
<i>Bordering 7</i>	77084	\$ 54,751.00	77081	\$ 22,047.00	78750	\$ 121,250.00
Mean	--	\$ 76,728.57	--	\$ 69,914.57	--	\$ 112,500.43
Median	--	\$ 54,751.00	--	\$ 42,434.00	--	\$ 107,484.00
<i>School ZIP</i>	80126	<i>MFIZ</i>	90631	<i>MFIZ</i>	91352	<i>MFIZ</i>
<i>Bordering 1</i>	80112	\$ 92,768.00	90603	\$ 110,720.00	91040	\$ 78,844.00
<i>Bordering 2</i>	80122	\$ 106,063.00	90604	\$ 64,410.00	91042	\$ 61,733.00
<i>Bordering 3</i>	80124	\$ 125,688.00	90605	\$ 62,300.00	91208	\$ 108,665.00
<i>Bordering 4</i>	80125	\$ 115,814.00	90631	\$ 61,964.00	91214	\$ 102,944.00
<i>Bordering 5</i>	80126	\$ 124,346.00	90638	\$ 92,629.00	91331	\$ 46,594.00
<i>Bordering 6</i>	80129	\$ 122,297.00	91745	\$ 78,736.00	91342	\$ 55,816.00
<i>Bordering 7</i>	80130	\$ 125,100.00	91748	\$ 64,025.00	91352	\$ 45,000.00
<i>Bordering 8</i>	--	--	92821	\$ 94,592.00	91402	\$ 33,920.00
<i>Bordering 9</i>	--	--	92833	\$ 64,777.00	91501	\$ 68,589.00
<i>Bordering 10</i>	--	--	92835	\$ 119,006.00	91504	\$ 87,109.00
<i>Bordering 11</i>	--	--	--	--	91505	\$ 100,918.00
<i>Bordering 12</i>	--	--	--	--	91605	\$ 36,868.00
Mean	--	\$ 116,010.86	--	\$ 81,315.90	--	\$ 68,916.67
Median	--	\$ 122,297.00	--	\$ 71,756.50	--	\$ 65,161.00
<i>School ZIP</i>	92075	<i>MFIZ</i>	93103	<i>MFIZ</i>	98405	<i>MFIZ</i>
<i>Bordering 1</i>	92007	\$ 113,409.00	93101	\$ 48,661.00	98402	\$ 32,045.00
<i>Bordering 2</i>	92014	\$ 199,384.00	93103	\$ 45,071.00	98403	\$ 75,647.00
<i>Bordering 3</i>	92024	\$ 120,786.00	93105	\$ 108,361.00	98405	\$ 48,850.00

Table A5 continued

<i>Bordering 4</i>	92067	\$ 154,118.00	93108	\$ 133,359.00	98406	\$ 73,295.00
<i>Bordering 5</i>	92075	\$ 109,464.00	--	--	98409	\$ 38,962.00
<i>Bordering 6</i>	--	--	--	--	98465	\$ 46,875.00
<i>Bordering 7</i>	--	--	--	--	98466	\$ 58,980.00
Mean	--	\$ 139,432.20	--	\$ 83,863.00	--	\$ 53,522.00
Median	--	\$ 120,786.00	--	\$ 78,511.00	--	\$ 48,850.00

APPENDIX 3

IFL DATA USING BADLEY'S PARADIGMS

Table A6. Word frequency count of Badley's IFL paradigm publications

<i>Word</i>	<i>Length</i>	<i>Count</i>	<i>Weighted Percentage (%)</i>	<i>Similar Words</i>
integrative	11	93	1.94	integral, integrate, integrated, integrating, integration, integrative
christians	10	34	0.71	christian, christianity, christians
creation	8	30	0.63	creation, creational, creations
learning	8	30	0.63	learning
faith	5	29	0.61	faith
integratio	10	29	0.61	integratio
proposal	8	27	0.56	proposal, proposals, propose, proposed
element	7	22	0.46	element, elements
scholarship	11	22	0.46	scholarship
fusion	6	19	0.40	fusion
incorporation	13	18	0.38	incorporate, incorporated, incorporation
educators	9	17	0.36	education, educational, educators, educators'
language	8	17	0.36	language, languages
redemption	10	17	0.36	redemption
scholar	7	15	0.31	scholar, scholarly, scholars
usuall	6	15	0.31	usuall, usually
curriculu	9	14	0.29	curriculu
fusio	5	14	0.29	fusio
examples	8	13	0.27	example, examples
might	5	13	0.27	might
points	6	13	0.27	point, pointing, points
correlation	11	12	0.25	correlation, correlations, correlative
creating	8	12	0.25	create, created, creates, creating
curriculum	10	12	0.25	curriculum

Table A6 continued

model	5	12	0.25	model, models
condition	9	11	0.23	condition, conditions
denta	5	11	0.23	denta
science	7	11	0.23	scienc, science
involves	8	10	0.21	involv, involve, involved, involves
correlatio	10	9	0.19	correlatio
healt	5	9	0.19	healt
illustrate	10	9	0.19	illustrate, illustrates
incorporatio	12	9	0.19	incorporatio
logica	6	9	0.19	logica
second	6	9	0.19	second
student	7	9	0.19	student, students
teacher	7	9	0.19	teacher, teachers
relate	6	8	0.17	relat, relate
appendix	8	8	0.17	appendix
dialogical	10	8	0.17	dialogical
follow	6	8	0.17	follow, following, follows
means	5	8	0.17	meaning, means
number	6	8	0.17	number
paradigm	8	8	0.17	paradigm, paradigms
purpose	7	8	0.17	purpose, purposes
simila	6	8	0.17	simila
another	7	7	0.15	another
correlativ	10	7	0.15	correlativ
course	6	7	0.15	course, courses
differen	8	7	0.15	differen
includ	6	7	0.15	includ, includes, including
important	9	7	0.15	importance, important
academic	8	6	0.13	academic, academics
activity	8	6	0.13	activities, activity
attempt	7	6	0.13	attempt, attempts
become	6	6	0.13	become, becomes, becoming
cours	5	6	0.13	cours
degree	6	6	0.13	degree, degrees
dialogica	9	6	0.13	dialogica
entir	5	6	0.13	entir, entire, entirely
joined	6	6	0.13	joine, joined, joining

Table A6 continued

knowledge	9	6	0.13	knowledge
possible	8	6	0.13	possibilities, possibl, possible, possibly
questio	7	6	0.13	questio
whether	7	6	0.13	whether
actions	7	5	0.10	actions
areas	5	5	0.10	areas
biolog	6	5	0.10	biolog, biological, biology
characteristics	15	5	0.10	characteristic, characteristics
colleges	8	5	0.10	college, colleges
discipline	10	5	0.10	disciplin, discipline
discusse	8	5	0.10	discusse, discusses, discussion
educatio	8	5	0.10	educatio
ethic	5	5	0.10	ethic, ethical, ethics
fallen	6	5	0.10	fallen, fallenness
first	5	5	0.10	first
followin	8	5	0.10	followin
forms	5	5	0.10	forms
histor	6	5	0.10	histor, historical
implied	6	5	0.10	implied, imply
interes	7	5	0.10	interes
literature	10	5	0.10	literatur, literature
noted	5	5	0.10	noted, notes, noting
original	8	5	0.10	original
rearticulating	14	5	0.10	rearticulating
redeem	6	5	0.10	redeem, redeemed, redeeming
remain	6	5	0.10	remain, remains
restoration	11	5	0.10	restoration, restored, restores, restoring
schools	7	5	0.10	school, schools
suggest	7	5	0.10	suggest, suggeste, suggesting, suggestion
tasks	5	5	0.10	tasks
theological	11	5	0.10	theological, theologically
believe	7	4	0.08	believe
biblical	8	4	0.08	biblical, biblically
chapte	6	4	0.08	chapte
christ	6	4	0.08	christ
claim	5	4	0.08	claim, claime, claims
common	6	4	0.08	common

Table A6 continued

conditio	8	4	0.08	conditio
critique	8	4	0.08	critique, critiques, critiquing

APPENDIX 4
COLLEGE RANKING DATA

Table A7. *US News and World Report* college rankings 2010-11 to 2014-2015

<i>2015</i>	<i>2014</i>	<i>2013</i>	<i>2012</i>	<i>2011</i>	<i>Mean</i>	<i>Median</i>	<i>Name</i>
1	1	1	1	2	1.2	1	Princeton University
2	2	1	1	1	1.4	1	Harvard University
3	3	3	3	3	3.0	3	Yale University
4	4	4	4	4	4.0	4	Columbia University
4	5	6	5	5	5.0	5	Stanford University
4	5	4	5	9	5.4	5	University of Chicago
7	7	6	5	7	6.4	7	Massachusetts Institute of Technology
8	7	8	5	5	6.6	7	University of Pennsylvania
8	7	8	10	9	8.4	8	Duke University
10	10	10	5	7	8.4	10	California Institute of Technology
11	10	10	11	9	10.2	10	Dartmouth College
13	12	12	12	12	12.2	12	Northwestern University
12	12	13	13	13	12.6	13	Johns Hopkins University
14	14	14	14	13	13.8	14	Washington University in St. Louis

Table A7 continued

16	14	15	15	15	15.0	15	Brown University
15	16	15	15	15	15.2	15	Cornell University
16	17	17	17	17	16.8	17	Vanderbilt University
19	18	17	17	17	17.6	17	Rice University
16	18	17	19	19	17.8	18	University of Notre Dame
21	20	20	20	20	20.2	20	Emory University
20	20	21	21	22	20.8	21	University of California-Berkeley
21	20	21	22	21	21.0	21	Georgetown University
25	23	23	23	23	23.4	23	Carnegie Mellon University
25	23	24	23	23	23.6	23	University of Southern California
23	23	24	25	25	24.0	24	University of California-Los Angeles
23	23	24	25	25	24.0	24	University of Virginia
27	23	27	25	25	25.4	25	Wake Forest University
27	28	28	29	28	28.0	28	Tufts University
29	28	29	28	29	28.6	29	University of Michigan-Ann Arbor
30	30	30	29	30	29.8	30	University of North Carolina-Chapel Hill

Table A7 continued

31	31	31	31	31	31.0	31	Boston College
32	32	32	33	33	32.4	32	New York University
33	32	33	33	31	32.4	33	College of William and Mary
35	32	33	31	34	33.0	33	Brandeis University
33	32	33	35	37	34.0	33	University of Rochester
35	36	36	36	35	35.6	36	Georgia Institute of Technology
37	39	38	37	35	37.2	37	University of California-San Diego
38	37	37	38	41	38.2	38	Case Western Reserve University
38	39	38	38	39	38.4	38	University of California-Davis
40	41	38	38	37	38.8	38	Lehigh University
40	41	41	42	39	40.6	41	University of California-Santa Barbara
42	41	41	50	41	43.0	41	Rensselaer Polytechnic Institute
47	41	41	42	45	43.2	42	University of Wisconsin-Madison
42	49	44	45	41	44.2	44	University of California-Irvine
42	41	46	45	47	44.2	45	University of Illinois-Urbana Champaign
48	37	46	45	47	44.6	46	Pennsylvania State University
48	52	46	42	41	45.8	46	University of Washington
48	47	44	38	47	44.8	47	University of Miami

Table A7 continued

48	47	46	45	50	47.2	47	Yeshiva University
42	41	51	53	56	48.6	51	Boston University

Table A8. *Times Higher Education* world university rankings, 2011-2015

<i>2015</i>	<i>2014</i>	<i>2013</i>	<i>2012</i>	<i>2011</i>	<i>Mean</i>	<i>Median</i>	<i>Name</i>
1	1	1	1	2	1.2	1.0	California Institute of Technology
2	2	3	2	1	2.0	2.0	Harvard University
3	3	2	3	4	3.0	3.0	Stanford University
4	4	4	5	3	4.0	4.0	Massachusetts Institute of Technology
5	5	5	4	5	4.8	5.0	Princeton University
6	6	6	7	6	6.2	6.0	University of California, Berkeley
8	7	7	6	9	7.4	7.0	University of Chicago
7	8	8	8	7	7.6	8.0	Yale University
9	9	9	10	8	9.0	9.0	University of California, Los Angeles
10	10	10	9	13	10.4	10.0	Columbia University
11	11	12	11	10	11.0	11.0	Johns Hopkins University
12	12	11	12	14	12.2	12.0	University of Pennsylvania
13	14	15	13	12	13.4	13.0	University of Michigan
15	15	13	14	11	13.6	14.0	Cornell University
14	13	17	16	17	15.4	16.0	Duke University
17	17	16	15	15	16.0	16.0	Carnegie Mellon University
16	16	14	19	18	16.6	16.0	Northwestern University
18	18	18	18	16	17.6	18.0	University of Washington
19	20	19	17	19	18.8	19.0	Georgia Institute of Technology
20	19	20	21	--	20.0	20.0	University of Texas at Austin

Table A8 continued

21	21	22	22	23	21.8	22.0	University of Illinois at Urbana-Champaign
22	22	21	20	25	22.0	22.0	University of Wisconsin-Madison
23	23	23	24	20	22.6	23.0	University of California, Santa Barbara
25	25	24	23	22	23.8	24.0	University of California, San Diego
24	24	25	29	35	27.4	25.0	New York University
26	26	28	26	24	26.0	26.0	Washington University in St Louis
27	27	29	27	29	27.8	27.0	University of Minnesota
28	28	26	28	21	26.2	28.0	University of North Carolina at Chapel Hill
29	31	30	30	32	30.4	30.0	Brown University
30	32	27	25	31	29.0	30.0	University of California, Davis
31	30	32	32	34	31.8	32.0	Boston University
32	29	34	31	56	36.4	32.0	Pennsylvania State University
33	33	31	34	40	34.2	33.0	Ohio State University
34	35	37	38	26	34.0	35.0	Rice University
35	36	33	33	45	36.4	35.0	University of Southern California
41	54	36	36	33	40.0	36.0	University of Massachusetts
42	37	38	35	38	38.0	38.0	University of Pittsburgh
39	39	40	40	30	37.6	39.0	Tufts University
43	38	39	39	36	39.0	39.0	Emory University

Table A8 continued

45	46	41	41	41	42.8	41.0	University of Colorado Boulder
44	42	50	37	28	40.2	42.0	Vanderbilt University
36	40	42	49	59	45.2	42.0	Michigan State University
38	43	43	45	37	41.2	43.0	University of Notre Dame
40	44	44	44	27	39.8	44.0	University of California, Irvine
46	34	35	51	55	44.2	46.0	Purdue University
49	45	48	43	--	46.3	46.5	University of Rochester
48	41	49	47	39	44.8	47.0	Case Western Reserve University
56	47	47	42	54	49.2	47.0	Rutgers, the State University of New Jersey
37	48	46	50	50	46.2	48.0	University of Arizona
53	49	45	48	51	49.2	49.0	University of Maryland, College Park
50	51	50	52	51	50.8	51.0	Georgetown University

Table A9. QS Rankings, 2011-2015

<i>2015</i>	<i>2014</i>	<i>2013</i>	<i>2012</i>	<i>2011</i>	<i>Average</i>	<i>Median</i>	<i>Name</i>
1	1	1	1	2	1.2	1	Massachusetts Institute of Technology (MIT)
2	2	2	2	1	1.8	2	Harvard University
3	3	3	10	7	5.2	3	Stanford University
7	6	4	3	3	4.6	4	Yale University
5	7	5	4	4	5.0	5	University of Chicago
4	4	6	6	8	5.6	6	California Institute of Technology (Caltech)
6	5	7	5	9	6.4	6	Princeton University
10	8	8	8	5	7.8	8	University of Pennsylvania
11	9	9	7	6	8.4	9	Columbia University
9	11	10	9	11	10.0	10	Cornell University
8	10	11	11	12	10.4	11	Johns Hopkins University
15	12	12	12	10	12.2	12	University of Michigan
14	13	13	13	13	13.2	13	Duke University
12	14	14	14	14	13.6	14	University of California, Berkeley (UCB)
16	15	15	15	15	15.2	15	Northwestern University

Table A9 continued

13	16	17	16	16	15.6	16	University of California, Los Angeles (UCLA)
20	18	16	17	18	17.8	18	University of Wisconsin-Madison
18	19	19	18	17	18.2	18	Brown University
19	17	18	19	20	18.6	19	New York University (NYU)
21	22	21	21	22	21.4	21	University of Illinois at Urbana-Champaign
25	21	20	22	21	21.8	21	University of North Carolina, Chapel Hill
22	24	22	20	19	21.4	22	Carnegie Mellon University
23	23	23	23	22	22.8	23	University of Washington
17	20	24	26	25	22.4	24	University of California, San Diego (UCSD)
24	26	25	25	24	24.8	25	University of Texas at Austin
29	25	26	24	23	25.4	25	Boston University
27	27	27	31	31	28.6	27	University of California, Davis
26	30	29	28	27	28.0	28	Georgia Institute of Technology

Table A9 continued

33	28	28	27	26	28.4	28	Washington University in St. Louis
28	29	30	29	28	28.8	29	Purdue University
31	33	33	32	29	31.6	32	Pennsylvania State University
38	32	32	30	37	33.8	32	University of Pittsburgh
34	34	31	33	32	32.8	33	University of Minnesota
30	31	34	34	34	32.6	34	The Ohio State University
35	35	35	36	35	35.2	35	University of Maryland, College Park
39	39	36	35	30	35.8	36	Dartmouth College
37	37	37	41	33	37.0	37	University of Southern California
32	36	40	38	38	36.8	38	Rice University
36	38	38	37	39	37.6	38	University of California, Santa Barbara (UCSB)
44	40	39	40	40	40.6	40	University of Virginia
43	42	41	39	36	40.2	41	Emory University
41	41	42	43	45	42.4	42	University of California, Irvine
48	43	43	42	41	43.4	43	University of Rochester
40	44	44	46	46	44.0	44	Texas A & M University

Table A9 continued

45	45	45	44	43	44.4	45	University of Colorado - Boulder
51	48	47	45	44	47.0	47	Case Western Reserve University
52	46	49	47	42	47.2	47	Vanderbilt University
47	47	51	50	48	48.6	48	University of Illinois - Chicago
46	49	48	48	47	47.6	48	University of Florida
42	50	46	49	50	47.4	49	Michigan State University
52	50	51	59	44	51.2	51	University of Virginia

Table A10. *Academic Rankings of World Universities, 2011-15*

<i>2015</i>	<i>2014</i>	<i>2013</i>	<i>2012</i>	<i>2011</i>	<i>Median</i>	<i>Mean</i>	<i>School</i>
1	1	1	1	1	1	1.0	Harvard University
2	2	2	2	2	2	2.0	Stanford University
3	3	4	3	3	3	3.2	Massachusetts Institute of Technology (MIT)
4	4	3	4	4	4	3.8	University of California-Berkeley
6	6	5	5	5	5	5.4	California Institute of Technology
5	5	6	6	6	6	5.6	Princeton University
7	7	7	7	7	7	7.0	Columbia University
8	8	8	8	8	8	8.0	University of Chicago
9	9	9	9	9	9	9.0	Yale University
10	10	10	10	10	10	10.0	University of California, Los Angeles
11	11	11	11	11	11	11.0	Cornell University
12	12	12	13	13	12	12.4	University of California, San Diego
15	14	13	12	12	13	13.2	University of Pennsylvania
13	13	14	14	14	14	13.6	University of Washington
14	15	15	15	16	15	15.0	Johns Hopkins University
16	16	16	16	15	16	15.8	University of California, San Francisco
18	18	17	17	17	17	17.4	University of Wisconsin
17	17	18	18	18	18	18.0	University of Michigan

Table A10 continued

21	20	19	19	19	19	19.6	University of Illinois, Urbana-Champaign
19	19	20	20	21	20	19.8	New York University
22	22	21	21	20	21	21.2	University of Minnesota
19	20	22	22	22	22	21.0	Northwestern University
23	23	23	28	27	23	24.8	Duke University
24	24	24	23	23	24	23.6	Washington University, St. Louis
25	25	26	24	25	25	25.0	Rockefeller University
26	26	25	25	24	25	25.2	University of Colorado, Boulder
28	29	27	26	25	27	27.0	University of California, Santa Barbara
27	28	28	27	27	27	27.4	The University of Texas
30	30	29	29	29	29	29.4	University of Maryland
29	27	30	30	30	30	29.2	University of North Carolina at Chapel Hill
31	31	32	34	35	32	32.6	The University of Texas Southwestern Medical Center at Dallas
33	32	31	31	33	32	32.0	University of California, Irvine
32	33	33	32	32	32	32.4	University of Southern California
35	36	33	33	33	33	34.0	University of California, Davis
36	37	37	35	31	36	35.2	Pennsylvania State University
34	35	35	36	36	35	35.2	Vanderbilt University

Table A10 continued

39	34	39	40	39	39	38.2	Rutgers, The State University of New Jersey
37	36	36	37	37	37	36.6	Carnegie Mellon University
37	38	38	38	40	38	38.2	Purdue University
41	41	39	39	38	39	39.6	University of Pittsburgh
40	40	41	42	41	41	40.8	The Ohio State University
43	43	42	41	42	42	42.2	Brown University
42	42	44	43	44	43	43.0	Boston University
44	44	43	44	43	44	43.6	University of Florida
46	46	45	45	47	46	45.8	University of Arizona
47	48	46	46	45	46	46.4	Arizona State University
47	47	47	47	46	47	46.8	University of Utah
45	45	50	50	51	50	48.2	Rice University
57	55	47	48	48	48	51.0	Indiana University
47	50	63	61	62	61	56.6	University of California, Santa Cruz

Table A11. Aggregated average rankings, US weighted

<i>USNWR 5YA</i>	<i>THEWUR 5YA</i>	<i>QSR 5YA</i>	<i>ARWU 5YA</i>	<i>University</i>	<i>GRAND AVERAGE (Triple US)</i>
1	2	2	1	Harvard University	1.33
1	5	6	6	Princeton University	3.33
5	3	3	2	Stanford University	3.83
7	4	1	3	Massachusetts Institute of Technology (MIT)	4.83
3	8	4	9	Yale University	5.00
5	7	5	8	University of Chicago	5.83
4	10	9	7	Columbia University	6.33
10	1	6	5	California Institute of Technology	7.00
7	12	8	13	University of Pennsylvania	9.00
13	11	11	15	Johns Hopkins University	12.67
8	16	13	23	Duke University	12.67
15	14	10	11	Cornell University	13.33
21	6	14	4	University of California, Berkeley	14.50
12	16	15	22	Northwestern University	14.83
24	9	16	10	University of California, Los Angeles (UCLA)	17.83
14	26	28	24	Washington University in St. Louis	20.00
15	30	18	42	Brown University	22.50
23	16	22	37	Carnegie Mellon University	24.00
29	42	12	18	University of Michigan	26.50
32	25	19	20	New York University (NYU)	26.67
30	28	21	30	University of North Carolina, Chapel Hill	28.17

Table A11 continued

37	24	24	12	University of California, San Diego (UCSD)	28.50
23	35	37	32	University of Southern California	28.83
17	34	38	50	Rice University	28.83
17	42	46.5	35	Vanderbilt University	29.08
42	22	18	17	University of Wisconsin-Madison	30.50
10	52	36	70	Dartmouth College	31.33
46	18	23	14	University of Washington	32.17
20	39	41	54	Emory University	32.33
45	22	21	19	University of Illinois at Urbana-Champaign	32.83
38	29	27	33	University of California, Davis	33.83
46	20	25	27	University of Texas at Austin	35.00
36	19	28	55	Georgia Institute of Technology	35.00
41	23	38	27	University of California, Santa Barbara (UCSB)	35.17
24	47	40	67	University of Virginia	37.67
28	39	52	60	Tufts University	39.17
46	32	32	36	Pennsylvania State University	39.67
34	46.5	44	49	University of Rochester	40.25
44	44	42	32	University of California, Irvine	41.67
51	32	25	43	Boston University	42.17
18	43	54	104	University of Notre Dame	42.50
38	47	47	53	Case Western Reserve University	43.50
55	33	34	41	The Ohio State University	45.50
21	51	51	112	Georgetown University	46.17

Table A11 continued

68	27	33	21	University of Minnesota	47.50
58	49	35	29	University of Maryland, College Park	47.83
62	38	32	39	University of Pittsburgh	49.17
62	46	29	38	Purdue University	49.83
68	47	60	36	Rutgers	57.83
73	42	49	50	Michigan State University	60.00

Table A12. Aggregated average rankings, US unweighted

<i>USNWR 5YA</i>	<i>THEWUR 5YA</i>	<i>QSR 5YA</i>	<i>ARWU 5YA</i>	<i>University</i>	<i>Grand Average (World dominant)</i>
1	2	2	1	Harvard University	1.50
1	5	6	6	Princeton University	4.50
5	3	3	2	Stanford University	3.25
7	4	1	3	Massachusetts Institute of Technology (MIT)	3.75
3	8	4	9	Yale University	6.00
5	7	5	8	University of Chicago	6.25
4	10	9	7	Columbia University	7.50
10	1	6	5	California Institute of Technology	5.50
7	12	8	13	University of Pennsylvania	10.00
13	11	11	15	Johns Hopkins University	12.50
8	16	13	23	Duke University	15.00
15	14	10	11	Cornell University	12.50
21	6	14	4	University of California, Berkeley	11.25
12	16	15	22	Northwestern University	16.25
24	9	16	10	University of California, Los Angeles (UCLA)	14.75
14	26	28	24	Washington University in St. Louis	23.00
15	30	18	42	Brown University	26.25
23	16	22	37	Carnegie Mellon University	24.50
29	42	12	18	University of Michigan	25.25
32	25	19	20	New York University (NYU)	24.00
30	28	21	30	University of North Carolina, Chapel Hill	27.25

Table A12 continued

37	24	24	12	University of California, San Diego (UCSD)	24.25
23	35	37	32	University of Southern California	31.75
17	34	38	50	Rice University	34.75
17	42	46.5	35	Vanderbilt University	35.13
42	22	18	17	University of Wisconsin-Madison	24.75
10	52	36	70	Dartmouth College	42.00
46	18	23	14	University of Washington	25.25
20	39	41	54	Emory University	38.50
45	22	21	19	University of Illinois at Urbana-Champaign	26.75
38	29	27	33	University of California, Davis	31.75
46	20	25	27	University of Texas at Austin	29.50
36	19	28	55	Georgia Institute of Technology	34.50
41	23	38	27	University of California, Santa Barbara (UCSB)	32.25
24	47	40	67	University of Virginia	44.50
28	39	52	60	Tufts University	44.75
46	32	32	36	Pennsylvania State University	36.50
34	46.5	44	49	University of Rochester	43.38
44	44	42	32	University of California, Irvine	40.50
51	32	25	43	Boston University	37.75
18	43	54	104	University of Notre Dame	54.75
38	47	47	53	Case Western Reserve University	46.25
55	33	34	41	The Ohio State University	40.75
21	51	51	112	Georgetown University	58.75

Table A12 continued

68	27	33	21	University of Minnesota	37.25
58	49	35	29	University of Maryland, College Park	42.75
62	38	32	39	University of Pittsburgh	42.75
62	46	29	38	Purdue University	43.75
68	47	60	36	Rutgers	52.75
73	42	49	50	Michigan State	53.50

Table A13. Alphabetical list of top universities

Boston University
Brown University
California Institute of Technology
Carnegie Mellon University
Case Western Reserve University
Columbia University
Cornell University
Dartmouth College
Duke University
Emory University
Georgetown University
Georgia Institute of Technology
Harvard University
Johns Hopkins University
Massachusetts Institute of Technology (MIT)
Michigan State
New York University (NYU)
Northwestern University
Pennsylvania State University
Princeton University
Purdue University
Rice University
Rutgers
Stanford University
The Ohio State University
Tufts University
University of California, Berkeley
University of California, Davis
University of California, Irvine
University of California, Los Angeles (UCLA)
University of California, San Diego (UCSD)
University of California, Santa Barbara (UCSB)
University of Chicago
University of Illinois at Urbana-Champaign
University of Maryland, College Park
University of Michigan
University of Minnesota
University of North Carolina, Chapel Hill
University of Notre Dame
University of Pennsylvania
University of Pittsburgh
University of Rochester
University of Southern California
University of Texas at Austin
University of Virginia
University of Washington
University of Wisconsin-Madison
Vanderbilt University
Washington University in St. Louis
Yale University

APPENDIX 5

COLLEGE BOARD LIST OF AP COURSES

Table A14. Core area AP course offerings

<i>English</i>	<i>History & Social Sciences</i>	<i>Mathematics</i>	<i>Science</i>
<u>AP English Language & Composition</u>	<u>AP Comparative Government & Politics</u>	<u>AP Calculus AB</u>	<u>AP Biology</u>
<u>AP English Literature & Composition</u>	<u>AP European History</u>	<u>AP Calculus BC</u>	<u>AP Chemistry</u>
	<u>AP Human Geography</u>	<u>AP Statistics</u>	<u>AP Computer Science A</u>
	<u>AP Macroeconomics</u>		<u>AP Environmental Science</u>
	<u>AP Microeconomics</u>		<u>AP Physics 1</u>
	<u>AP Psychology</u>		<u>AP Physics 2</u>
	<u>AP United States Government & Politics</u>		<u>AP Physics C: Electricity and Magnetism</u>
	<u>AP United States History</u>		<u>AP Physics C: Mechanics</u>
	<u>AP World History</u>		

Note: “AP Courses,” AP Central, accessed December 30, 2015,
http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/index.html

APPENDIX 6

SAT DATA FROM PUBLISHED REPORTS

Table A15. SAT Scores 2008-2014 (CR+M)

<i>Family Income (\$)</i>	<i>2008 Mean</i>	<i>2009 Mean</i>	<i>2010 Mean</i>	<i>2011 Mean</i>	<i>2012 Mean</i>	<i>2013 Mean</i>	<i>2014 Mean</i>
0k-20k	890	891	897	894	894	897	895
20k-40k	935	937	944	944	944	947	948
40k-60k	984	985	990	986	985	987	989
60k-80k	1012	1015	1018	1014	1011	1011	1016
80k-100k	1039	1045	1047	1042	1036	1036	1042
100k-120k	1056	1063	1069	1065	1062	1058	1066
120k-140k	1063	1071	1079	1074	1070	1066	1073
140k-160k	1079	1086	1094	1090	1085	1081	1091
160k-200k	1083	1096	1108	1100	1097	1094	1102
200k>	1124	1142	1154	1154	1156	1151	1157

Note: "Income" column is measured in thousands of dollars

Table A16. Difference between independent schools and religious schools by mean SAT score (CR + M)

	<i>08 Mean</i>	<i>09 Mean</i>	<i>10 Mean</i>	<i>11 Mean</i>	<i>12 Mean</i>	<i>13 Mean</i>	<i>14 Mean</i>	<i>Overall Mean</i>
Independent Schools	1124	1128	1140	1130	1119	1117	1115	1124.71
Religious Schools	1063	1066	1067	1064	1065	1067	1070	1066.00
Difference	61	62	73	66	54	50	45	58.71

APPENDIX 7

ASSUMPTIONS OF MANCOVA

This appendix explains the assumptions that need to be met in order to perform a multivariate analysis of variance with covariates (MANCOVA). The assumptions are explained in conjunction with tables showing the data outputs from the *SPSS* software, demonstrating how this research project met the assumptions of a MANCOVA.

Assumption of Level and Measurement of the Variables

In order to perform a MANCOVA, the dependent variables and covariates must be continuous and the independent variables must be categorical. The data conformed to this assumption since the independent variables have been quantitized into dichotomous variables according to the procedures outlined in Phase 3. The dependent variables were measured in percentages or intervals. The independent variables were categorical, dichotomous variables, entered numerically as $Y = 1$ and $N = 0$. The covariates for this study were measured in either dollar amounts or percentages, but recorded in *SPSS* as integers, thus causing them to appear dichotomous though they are not.

In addition, there was an assumption that for a MANCOVA the group is of adequate size to allow for statistical significance. Garson wrote:

Small samples may have lower power. At a minimum, every cell must have more cases than there are dependent variables. With multiple factors and multiple levels of each factor, group sizes may fall below minimum levels. When sample size is large (ex, when all group sizes are greater than 30), MANOVA is relatively robust against violation of normality and homogeneity of error variance.¹

¹David Garson, *GLM Multivariate, MANOVA, & Canonical Correlation: Blue Book Series 11* (Raleigh, NC: Statistical Associates Publishers, 2015), loc. 2040, Kindle.

The 36 schools of CESA meeting the delimitations of this study allowed for a MANCOVA study of statistical power due to this study exceeding the Garson's minimum set for an adequate sample size.

Assumption of Random Sampling

In order for statistical analysis to generalize beyond the sampled population, it must have been random and achieve significance at a level of $p < 0.05$. However, Garson noted:

If data are an enumeration (census) of all observations, then significance is moot. All findings, however weak, are 'real' and have a true significance level of $p = 0.000$, contrary to the computed asymptotic estimate of significance. [Random] sampling is not required if data are an enumeration. Though reporting significance for enumeration data is common, significance estimates confound effect size and sample size. For enumeration data it is better simply to report effect size.²

Since this study represented a census of all CESA schools within the delimitations of the study, the reporting of this study concentrated on effect size, measured by partial eta squared (η_p^2), rather than statistical significance, measured by p values. However, in testing the assumptions of the MANCOVA, it was necessary to examine and report p values in order to meet the criteria for each test of assumptions. In several additional places, in conformity with social scientific convention, this study reports p values, but concentrated its examination of interaction effects between the independent variables solely on the reported partial eta squared values (η_p^2).

Assumption of Correlation between the Dependent Variates and the Covariates

This assumption was measured by a correlation matrix performed in *SPSS*. The results of the correlation matrix are presented in table A17, with discussion preceding the table.³ The correlation matrix revealed that Tuition is significantly correlated to MFIA

²Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, loc. 1772-74, Kindle.

³Andrew Mayers, *Introduction to Statistics and SPSS in Psychology* (London, Pearson Education Ltd., 2013), chap. 15, p. 382, accessed March 16, 2016, <http://www.pearsonhighered.com/>

(0.534), AP (0.447), and Top Universities (0.524), at a $p < 0.01$ level. The matrix revealed that MFIZ was significantly correlated to MFIA (0.673), at a $p < 0.01$ level. The matrix revealed that AP was significantly related to Top Universities (0.459) at a $p < 0.01$ level.

Table A17. Correlations between dependent variates and covariates

		<i>Tuition</i>	<i>MFIZ</i>	<i>MFIA</i>	<i>AP_{avail}</i>	<i>SAT_{med}</i>	<i>TopUniv</i>
<i>Tuition</i>	Pearson Correlation	1	0.242	0.534**	0.447**	0.265	0.524**
	Sig. (2-tailed)	--	0.161	0.001	0.007	0.150	0.001
<i>MFIZ</i>	Pearson Correlation	0.242	1	0.673**	0.292	-0.156	0.103
	Sig. (2-tailed)	0.161	--	0.000	0.089	0.403	0.555
<i>MFIA</i>	Pearson Correlation	0.534**	0.673**	1	0.288	0.085	0.235
	Sig. (2-tailed)	0.001	0.000	--	0.094	0.650	0.175
<i>AP_{avail}</i>	Pearson Correlation	0.447**	0.292	0.288	1	0.261	0.459**
	Sig. (2-tailed)	0.007	0.089	0.094	--	0.156	0.005
<i>SAT_{med}</i>	Pearson Correlation	0.265	-0.156	0.085	0.261	1	0.131
	Sig. (2-tailed)	0.150	0.403	0.650	0.156	--	0.483
<i>TopUniv</i>	Pearson Correlation	0.524**	0.103	0.235	0.459**	0.131	1
	Sig. (2-tailed)	0.001	0.555	0.175	0.005	0.483	--

Note: ** = Correlation is significant at the 0.01 level (2-tailed).

Assumption of the Independence of the Covariate

The independence of the covariate was tested through an ANOVA of the covariates with the independent variables.⁴ Tests with a significance of $p > 0.05$ failed to reject the null hypothesis that there is no significant effect of the independent variables on the covariates. The desired result was that the ANOVA would show a $p > 0.05$ for each covariate measured against every independent variable. The following tables (table A18

[assets/hip/gb/uploads/ Mayers_Intro_Stats_SPSS_Chapter_15.pdf](#).

⁴Mayers, *Introduction to Statistics and SPSS*, 383.

through table A21) displayed a one-way ANOVA conducted for each of the independent variables, labeled as such. For every independent variable, there was no measure of the covariates that was statistically significant at $p < 0.05$. Therefore, the findings failed to reject the null hypothesis, and the “covariates may help reduce error variance.”⁵

Table A18. ANOVA for Bible by covariates

		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
<i>Tuition</i>	Between Groups	36337792.007	1	36337792.007	2.024	0.164
	Within Groups	592353249.536	33	17950098.471	--	--
	Total	628691041.543	34	--	--	--
<i>MFIZ</i>	Between Groups	0.007	1	0.007	0.159	0.692
	Within Groups	1.437	33	0.044	--	--
	Total	1.444	34	--	--	--
<i>MFIA</i>	Between Groups	0.031	1	0.031	1.893	0.178
	Within Groups	0.536	33	0.016	--	--
	Total	0.567	34	--	--	--

Table A19. ANOVA for EngIFL by covariates

		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
<i>Tuition</i>	Between Groups	26192657.572	1	26192657.572	1.435	0.240
	Within Groups	602498383.971	33	18257526.787	--	--
	Total	628691041.543	34	--	--	--
<i>MFIZ</i>	Between Groups	0.000	1	0.000	0.001	0.979
	Within Groups	1.444	33	0.044	--	--
	Total	1.444	34	--	--	--
<i>MFIA</i>	Between Groups	0.011	1	0.011	0.651	0.425
	Within Groups	0.556	33	0.017	--	--
	Total	0.567	34	--	--	--

⁵Mayers, *Introduction to Statistics and SPSS*, 383.

Table A20. ANOVA for SciIFL by covariates

		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
<i>Tuition</i>	Between Groups	4033829.197	1	4033829.197	0.213	0.647
	Within Groups	624657212.346	33	18929006.435	--	--
	Total	628691041.543	34	--	--	--
<i>MFIZ</i>	Between Groups	0.000	1	0.000	0.007	0.935
	Within Groups	1.443	33	0.044	--	--
	Total	1.444	34	--	--	--
<i>MFIA</i>	Between Groups	0.024	1	0.024	1.483	0.232
	Within Groups	0.543	33	0.016	--	--
	Total	0.567	34	--	--	--

Table A21. ANOVA for SSIFL by covariates

		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
<i>Tuition</i>	Between Groups	4872467.274	1	4872467.274	0.258	0.615
	Within Groups	623818574.269	33	18903593.160	--	--
	Total	628691041.543	34	--	--	--
<i>MFIZ</i>	Between Groups	0.008	1	0.008	0.184	0.670
	Within Groups	1.436	33	0.044	--	--
	Total	1.444	34	--	--	--
<i>MFIA</i>	Between Groups	0.028	1	0.028	1.740	0.196
	Within Groups	0.539	33	0.016	--	--
	Total	0.567	34	--	--	--

Assumption of Normal Distribution of the Covariates

This tested the null hypothesis that the covariates and dependent variables were normally distributed.⁶ Due to the fact that “there are fewer than 50 people in each group,” this study examined the covariates for a normal distribution using Shapiro-Wilks test of normality as a measure.⁷ If a Shapiro-Wilks test of normality revealed a statistically

⁶Mayers, *Introduction to Statistics and SPSS*, 384.

⁷*Ibid.*, 375.

significant result for a covariate, that result was judged to be non-normal. The tables (table A15 through table A18) below showed the results of the Shapiro-Wilk test of normality for every independent variate against all dependent variates and covariates. For non-normal results, the results were noted. In all tables, N = 0 and Y = 1.

Table A22. Tests of normality Bible by dependent variables and covariates

	<i>Bible</i>	<i>Shapiro-Wilk</i>		
		<i>Statistic</i>	<i>Df</i>	<i>Sig.</i>
<i>AP_{avail}</i>	N	0.959	11	0.755
	Y	0.935	20	0.195
<i>SAT_{med}</i>	N	0.924	11	0.352
	Y	0.954	20	0.431
<i>TopUniv</i>	N	0.977	11	0.950
	Y	0.887	20	0.024
<i>Tuition</i>	N	0.861	11	0.059
	Y	0.962	20	0.581
<i>MFIZ</i>	N	0.691	11	0.000
	Y	0.751	20	0.000
<i>MFIA</i>	N	0.870	11	0.077
	Y	0.884	20	0.021

For the independent variable “Bible,” the covariate MFIZ was not normal, with a $p = 0.000$ for both the “N” and the “Y” responses and the covariate MFIA was potentially not normal for the response “Y” with a $p = 0.021$, but for the response “N” a $p = 0.077$. The dependent variable “TopUniv” was potentially not normal for the response “Y,” with a $p = 0.024$, but for the response “N,” a $p = 0.950$. Therefore, these results needed to be compared against the results of the other independent variables. For the independent variable “English,” the covariate MFIZ was not normal with a $p = 0.003$ for the response “N” and a $p = 0.000$ for the response “Y.” Also, the covariate MFIA was potentially not normal with a $p = 0.007$ for the response “N,” but a $p = 0.599$ for the

response “Y.” Also the dependent variable “TopUniv” was potentially not normal for the response “N” with a $p = 0.027$, but was normal for the response “Y” with a $p = 0.479$.

Table A23. Tests of normality EngIFL by dependent variables with covariate

	<i>English IFL</i>	<i>Shapiro-Wilk</i>		
		<i>Statistic</i>	<i>df</i>	<i>Sig.</i>
<i>AP_{avail}</i>	N	0.955	20	0.454
	Y	0.918	11	0.302
<i>SAT_{med}</i>	N	0.939	20	0.225
	Y	0.936	11	0.479
<i>TopUniv</i>	N	0.890	20	0.027
	Y	0.931	11	0.423
<i>Tuition</i>	N	0.950	20	0.361
	Y	0.914	11	0.273
<i>MFIZ</i>	N	0.835	20	0.003
	Y	0.572	11	0.000
<i>MFIA</i>	N	0.856	20	0.007
	Y	0.946	11	0.599

Table A24. Tests of normality SciIFL by dependent variables and covariates

	<i>Science IFL</i>	<i>Shapiro-Wilk</i>		
		<i>Statistic</i>	<i>df</i>	<i>Sig.</i>
<i>AP_{avail}</i>	N	0.942	22	0.217
	Y	0.915	9	0.354
<i>SAT_{med}</i>	N	0.914	22	0.057
	Y	0.938	9	0.558
<i>TopUniv</i>	N	0.919	22	0.072
	Y	0.935	9	0.530
<i>Tuition</i>	N	0.925	22	0.095
	Y	0.892	9	0.210
<i>MFIZ</i>	N	0.805	22	0.001
	Y	0.611	9	0.000
<i>MFIA</i>	N	0.877	22	0.011
	Y	0.835	9	0.050

For the independent variable “SciIFL,” the covariate MFIZ was not normal, with a $p = 0.001$ and $p = 0.000$ in the two groups. The covariate MFIA was potentially not normal, with a $p = 0.011$ for the “N” response and a $p = 0.05$ for the “Y” response.

Table A25. Tests of normality SSIFL by dependent variables and covariates

	<i>SSIFL</i>	<i>Shapiro-Wilk</i>		
		<i>Statistic</i>	<i>df</i>	<i>Sig.</i>
<i>AP_{avail}</i>	N	0.957	18	0.540
	Y	0.894	13	0.112
<i>SAT_{med}</i>	N	0.967	18	0.737
	Y	0.918	13	0.238
<i>TopUniv</i>	N	0.891	18	0.040
	Y	0.889	13	0.096
<i>Tuition</i>	N	0.939	18	0.276
	Y	0.965	13	0.833
<i>MFIZ</i>	N	0.826	18	0.004
	Y	0.589	13	0.000
<i>MFIA</i>	N	0.887	18	0.034
	Y	0.862	13	0.041

For the independent variable “SSIFL,” the covariate MFIZ was not normal, with a $p = 0.004$ for the response “N” and a $p = 0.000$ for the response “Y.” The covariate MFIA was not normal for the response “N” with a $p = 0.034$ and for the response “Y” with a $p = 0.041$. The dependent variable “TopUniv” was potentially not normal for the response “N” with a $p = 0.040$, but was normal for the response “Y” with a $p = 0.096$.

In conclusion, it appears that there were several instances of potential non-normality against specific independent variables, but overall the data collectively failed to reject the null hypothesis for the dependent variables AP, SAT, and Top Universities. However, the covariate MFIZ consistently demonstrates non-normality with statistically significant values at the level of $p < 0.01$. Therefore, the null hypothesis was rejected for

the covariate MFIZ and it was not included in further statistical analyses. The covariates Tuition and MFIA failed to reject the null hypothesis and therefore were included in further statistical analyses.

Assumption of Homogeneity of Regressions

A MANCOVA assumed homogeneity of regression slopes of the interaction between the independent variables and the covariates.⁸ The null hypothesis stated that the regression slopes of the interaction between the independent variables and the covariates were non-significant. The null hypothesis for the homogeneity of regressions was that all regressions were homogenous at a level of $p < 0.05$. The desired result for this analysis was that regression analyses, done through the “General Linear Model (GLM), Multivariate – Custom” interface in the *SPSS* program would result in a $p > 0.05$, failing to reject the null hypothesis. The results of the regression analyses are presented below in table A26. The custom MANOVA suggested that there were no significant interactions ($p > 0.05$ for all interactions) between the independent variables and the covariates. The only interaction approaching a significance of $p > 0.05$ is Bible*MFIA, which had was significant at a value of $p = 0.164$. This was much greater than the minimally acceptable level. Therefore, the findings failed to reject the null hypothesis and the MANCOVA could proceed as intended.

⁸Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, loc. 1857, Kindle.

Table A26. MANOVA of Independent Variables and Covariates

<i>Effect</i>		<i>Value</i>	<i>F</i>	<i>Hypothesis df</i>	<i>Error df</i>	<i>Sig.</i>
Bible * Tuition	Pillai's Trace	0.145	0.736 ^b	3.000	13.000	0.549
	Wilks's λ	0.855	0.736 ^b	3.000	13.000	0.549
	Hotelling's Trace	0.170	0.736 ^b	3.000	13.000	0.549
	Roy's Largest Root	0.170	0.736 ^b	3.000	13.000	0.549
EngIFL * Tuition	Pillai's Trace	0.048	0.220 ^b	3.000	13.000	0.880
	Wilks's λ	0.952	0.220 ^b	3.000	13.000	0.880
	Hotelling's Trace	0.051	0.220 ^b	3.000	13.000	0.880
	Roy's Largest Root	0.051	0.220 ^b	3.000	13.000	0.880
SciIFL * Tuition	Pillai's Trace	0.173	0.909 ^b	3.000	13.000	0.464
	Wilks's λ	0.827	0.909 ^b	3.000	13.000	0.464
	Hotelling's Trace	0.210	0.909 ^b	3.000	13.000	0.464
	Roy's Largest Root	0.210	0.909 ^b	3.000	13.000	0.464
SSIFL * Tuition	Pillai's Trace	0.208	1.140 ^b	3.000	13.000	0.369
	Wilks's λ	0.792	1.140 ^b	3.000	13.000	0.369
	Hotelling's Trace	0.263	1.140 ^b	3.000	13.000	0.369
	Roy's Largest Root	0.263	1.140 ^b	3.000	13.000	0.369
Bible * MFIA	Pillai's Trace	0.317	2.008 ^b	3.000	13.000	0.163
	Wilks's λ	0.683	2.008 ^b	3.000	13.000	0.163
	Hotelling's Trace	0.463	2.008 ^b	3.000	13.000	0.163
	Roy's Largest Root	0.463	2.008 ^b	3.000	13.000	0.163
EngIFL * MFIA	Pillai's Trace	0.166	0.864 ^b	3.000	13.000	0.484
	Wilks's λ	0.834	0.864 ^b	3.000	13.000	0.484
	Hotelling's Trace	0.199	0.864 ^b	3.000	13.000	0.484
	Roy's Largest Root	0.199	0.864 ^b	3.000	13.000	0.484
SciIFL * MFIA	Pillai's Trace	0.120	0.593 ^b	3.000	13.000	0.631
	Wilks's λ	0.880	0.593 ^b	3.000	13.000	0.631
	Hotelling's Trace	0.137	0.593 ^b	3.000	13.000	0.631
	Roy's Largest Root	0.137	0.593 ^b	3.000	13.000	0.631

Table A26 continued

SSIFL *	Pillai's Trace	0.272	1.615 ^b	3.000	13.000	0.234
MFIA	Wilks's λ	0.728	1.615 ^b	3.000	13.000	0.234
	Hotelling's Trace	0.373	1.615 ^b	3.000	13.000	0.234
	Roy's Largest Root	0.373	1.615 ^b	3.000	13.000	0.234

Note: Design: Intercept + Bible * Tuition + EngIFL * Tuition + SciIFL * Tuition + SSIFL * Tuition + Bible * MFIA + EngIFL * MFIA + SciIFL * MFIA + SSIFL * MFIA; b. Exact statistic; c. Computed using alpha = 0.05

Assumption of Homogeneity of Error Variance

The “GLM, Multivariate” function in the *SPSS* program provided Levene's test to analyze this assumption.⁹ The null hypothesis states that the error variance of the dependent variable is equal across groups, with a $p < 0.05$. The desired result for this study was that the results would fail to reject the null hypothesis across all three dependent variables, with $p > 0.05$. The results of the table are presented below in table A27. Levene's Test revealed that all three dependent variables fail to reject the null hypothesis, with $p > 0.05$, suggesting that the MANCOVA could use all three dependent variables in its analysis.

Assumption of Homogeneity of Covariances

The “GLM, Multivariate” function in the *SPSS* program provided Box's M test to analyze this assumption.¹⁰ The test was considered highly sensitive and therefore was measured at a significance level of $p = 0.001$. Test results that failed to reject the null hypothesis ($p > 0.001$) were desirable for the confirmation of the assumption of homogeneity of covariances. The results of Box's M test are presented in table A28 below. The results of Box's M test suggested that the covariance matrices of the

⁹Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, loc. 1778, Kindle.

¹⁰Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, loc. 1897, Kindle.

dependent variables failed to reject the null hypothesis and therefore the assumption of homogeneity of variances was met and that the MANCOVA could proceed.

Table A27. Levene's test of equality of error variances

	<i>F</i>	<i>df1</i>	<i>df2</i>	<i>Sig.</i>
AP _{avail}	1.010	12	18	0.479
SAT _{med}	1.413	12	18	0.246
TopUniv	2.278	12	18	0.056

Note: Tests the null hypothesis that the error variance of the dependent variable is equal across groups; Design: Intercept + Tuition + MFIA + Bible + EngIFL + MathIFL + SciIFL + SSIFL + Bible * EngIFL + Bible * MathIFL + Bible * SciIFL + Bible * SSIFL + EngIFL * MathIFL + EngIFL * SciIFL + EngIFL * SSIFL + MathIFL * SciIFL + MathIFL * SSIFL + SciIFL * SSIFL + Bible * EngIFL * MathIFL + Bible * EngIFL * SciIFL + Bible * EngIFL * SSIFL + Bible * MathIFL * SciIFL + Bible * MathIFL * SSIFL + Bible * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL + EngIFL * MathIFL * SSIFL + EngIFL * SciIFL * SSIFL + MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL + Bible * EngIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SSIFL + Bible * EngIFL * SciIFL * SSIFL + Bible * MathIFL * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL * SSIFL

Table A28. Box's test of equality of covariance matrices

<i>Box's M</i>	8.524
<i>F</i>	0.952
<i>df1</i>	6.000
<i>df2</i>	425.627
<i>Significance</i>	0.458

Note: Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups; Design: Intercept + Tuition + MFIA + Bible + EngIFL + MathIFL + SciIFL + SSIFL + Bible * EngIFL + Bible * MathIFL + Bible * SciIFL + Bible * SSIFL + EngIFL * MathIFL + EngIFL * SciIFL + EngIFL * SSIFL + MathIFL * SciIFL + MathIFL * SSIFL + SciIFL * SSIFL + Bible * EngIFL * MathIFL + Bible * EngIFL * SciIFL + Bible * EngIFL * SSIFL + Bible * MathIFL * SciIFL + Bible * MathIFL * SSIFL + Bible * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL + EngIFL * MathIFL * SSIFL + EngIFL * SciIFL * SSIFL + MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL + Bible * EngIFL * MathIFL * SSIFL + Bible * EngIFL * SciIFL * SSIFL + Bible * MathIFL * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL * SSIFL

Assumption of Sphericity

The MANCOVA assumed the sphericity of data and used Bartlett’s test of sphericity to determine whether proceeding with the MANCOVA was warranted.¹¹ For Bartlett’s Test of Sphericity, “the null hypothesis is that correlations of dependent variables are all zero,”¹² with a significance of $p < 0.05$. The desired results for this study were that the data would reject the null hypothesis with a $p < 0.05$, showing “sufficient variability in the correlation matrix to proceed with [MANCOVA].”¹³ The results of Bartlett’s Test of Sphericity was a choice in the reported data from the “GLM, Multivariate” interface in the *SPSS* program and the results are reported in table A29 below with analysis following the table.

Table A29. Bartlett's test of sphericity

<i>Likelihood Ratio</i>	0.000
<i>Approx. Chi-Square</i>	24.350
<i>Df</i>	5.000
<i>Significance</i>	0.000

Note: Tests the null hypothesis that the residual covariance matrix is proportional to an identity matrix; Design: Intercept + Tuition + MFIA + Bible + EngIFL + MathIFL + SciIFL + SSIFL + Bible * EngIFL + Bible * MathIFL + Bible * SciIFL + Bible * SSIFL + EngIFL * MathIFL + EngIFL * SciIFL + EngIFL * SSIFL + MathIFL * SciIFL + MathIFL * SSIFL + SciIFL * SSIFL + Bible * EngIFL * MathIFL + Bible * EngIFL * SciIFL + Bible * EngIFL * SSIFL + Bible * MathIFL * SciIFL + Bible * MathIFL * SSIFL + Bible * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL + EngIFL * MathIFL * SSIFL + EngIFL * SciIFL * SSIFL + MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL + Bible * EngIFL * MathIFL * SSIFL + Bible * EngIFL * SciIFL * SSIFL + Bible * MathIFL * SciIFL * SSIFL + EngIFL * MathIFL * SciIFL * SSIFL + Bible * EngIFL * MathIFL * SciIFL * SSIFL

¹¹Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, loc. 1973, Kindle.

¹²Ibid.

¹³Ibid.

Bartlett's Test of Sphericity revealed that the data were significant at $p = 0.000$ and meet the assumption of sphericity. Therefore, the MANCOVA could properly proceed.

Summary of Testing of Assumptions

Testing the assumptions of MANCOVA showed that it could be performed and that the covariates collected in the data collection phase would help to strengthen the model proposed by Research Question 3. The covariate MFIZ was excluded from the model due to its high degree of kurtosis and skewness and its failure of the test of normality. Therefore, the model was a $3 \times 5 \times 2$ MANCOVA with three dependent variables (AP_{avail} , SAT_{med} , and $TopUniv$), five independent variables (Bible, EngIFL, MathIFL, SciIFL, and SSIFL), and two covariates (Tuition and MFIA).

APPENDIX 8

EVALUATIVE TABLES FOR MANCOVA ANALYSIS

Table A30. Tests of Between-Subjects Effects (MANOVA)

<i>Source</i>		<i>Type III Sum of Squares</i>	<i>df</i>	<i>F</i>	<i>Sig.</i>	<i>Partial Eta Squared</i>
Corrected Model	AP _{avail}	5045.677	12	1.412	0.247	0.485
	SAT _{med}	40284.186	12	1.194	0.357	0.443
	TopUniv	8310.182	12	1.124	0.399	0.428
Intercept	AP _{avail}	41122.792	1	138.076	0.000	0.885
	SAT _{med}	23684989.455	1	8422.235	0.000	0.998
	TopUniv	31506.134	1	51.157	0.000	0.740
Bible * EngIFL	AP _{avail}	1074.527	1	3.608	0.074	0.167
	SAT _{med}	37.535	1	.013	0.909	0.001
	TopUniv	817.072	1	1.327	0.264	0.069
EngIFL * SciIFL	AP _{avail}	1201.923	1	4.036	0.060	0.183
	SAT _{med}	10981.387	1	3.905	0.064	0.178
	TopUniv	525.675	1	.854	0.368	0.045
EngIFL * SciIFL * SSIFL	AP _{avail}	19.469	1	.065	0.801	0.004
	SAT _{med}	1916.259	1	.681	0.420	0.036
	TopUniv	1157.470	1	1.879	0.187	0.095
Error	AP _{avail}	5360.882	18	--	--	--
	SAT _{med}	50619.556	18	--	--	--
	TopUniv	11085.689	18	--	--	--
Total	AP _{avail}	68801.653	31	--	--	--
	SAT _{med}	41125212.000	31	--	--	--
	TopUniv	68836.000	31	--	--	--

Table A31. Tests of Between-Subjects Effects (MANCOVA)

<i>Source</i>		<i>Type III Sum of Squares</i>	<i>df</i>	<i>F</i>	<i>Sig.</i>	<i>Partial Eta Squared</i>
Bible * EngIFL	AP _{avail}	485.272	1	2.088	0.168	0.115
	SAT _{med}	2307.985	1	1.045	0.322	0.061
	TopUniv	178.019	1	0.284	0.601	0.017
Bible * SciIFL	AP _{avail}	240.879	1	1.036	0.324	0.061
	SAT _{med}	1282.012	1	0.580	0.457	0.035
	TopUniv	14.030	1	0.022	0.883	0.001
Bible * SSIFL	AP _{avail}	324.913	1	1.398	0.254	0.080
	SAT _{med}	3630.420	1	1.643	0.218	0.093
	TopUniv	27.061	1	0.043	0.838	0.003
EngIFL * SciIFL	AP _{avail}	1329.940	1	5.723	0.029	0.263
	SAT _{med}	1650.843	1	0.747	0.400	0.045
	TopUniv	0.207	1	0.000	0.986	0.000
SciIFL * SSIFL	AP _{avail}	1.838	1	0.008	0.930	0.000
	SAT _{med}	5195.506	1	2.352	0.145	0.128
	TopUniv	21.401	1	0.034	0.856	0.002
Bible * EngIFL * SSIFL	AP _{avail}	460.461	1	1.981	0.178	0.110
	SAT _{med}	2399.737	1	1.086	0.313	0.064
	TopUniv	61.894	1	0.099	0.757	0.006
EngIFL * SciIFL * SSIFL	AP _{avail}	16.812	1	0.072	0.791	0.005
	SAT _{med}	2023.645	1	0.916	0.353	0.054
	TopUniv	1194.341	1	1.907	0.186	0.106
Error	AP _{avail}	3718.476	16	--	--	--
	SAT _{med}	35343.640	16	--	--	--
	TopUniv	10022.908	16	--	--	--
Total	AP _{avail}	68801.653	31	--	--	--
	SAT _{med}	41125212.000	31	--	--	--
	TopUniv	68836.000	31	--	--	--

Table A32. Estimated grand mean of MANCOVA

<i>Dependent Variable</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
			<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	47.155	3.638	39.442	54.867
SAT _{med}	1163.664	11.216	1139.887	1187.442
TopUniv	39.964	5.973	27.302	52.626

Table A33. Estimated marginal means for Bible * EngIFL

<i>Dependent Variable</i>	<i>Bible</i>	<i>EngIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	42.166	8.817	23.475	60.857
		Y	44.099	7.921	27.307	60.891
	Y	N	46.869	6.490	33.112	60.627
		Y	52.226	6.958	37.475	66.977
SAT _{med}	N	N	1169.233	27.182	1111.609	1226.856
		Y	1171.187	24.421	1119.417	1222.956
	Y	N	1204.942	20.007	1162.529	1247.356
		Y	1113.960	21.452	1068.483	1159.437
TopUniv	N	N	52.026	14.475	21.340	82.712
		Y	36.185	13.005	8.617	63.754
	Y	N	41.05	10.654	18.465	63.637
		Y	35.680	11.424	11.462	59.898

Table A34. Estimated marginal means for Bible * SciIFL

<i>Dependent Variable</i>	<i>Bible</i>	<i>SciIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	43.776	6.853	29.248	58.304
		Y	41.525	9.286	21.838	61.211
	Y	N	43.638	6.006	30.906	56.370
		Y	55.458	7.337	39.903	71.013
SAT _{med}	N	N	1170.449	21.128	1125.660	1215.238
		Y	1170.229	28.630	1109.536	1230.922
	Y	N	1135.839	18.516	1096.585	1175.092
		Y	1183.064	22.621	1135.109	1231.019
TopUniv	N	N	40.704	11.251	16.852	64.555
		Y	49.793	15.246	17.472	82.114
	Y	N	32.668	9.861	11.765	53.572
		Y	44.062	12.047	18.525	69.600

Table A35. Estimated marginal means for Bible * SSIFL

<i>Dependent Variable</i>	<i>Bible</i>	<i>SSIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	54.930	9.828	34.096	75.763
		Y	35.590	8.344	17.901	53.278
	Y	N	49.205	6.761	34.871	63.538
		Y	49.891	6.552	36.002	63.780
SAT _{med}	N	N	1113.456	30.298	1049.226	1177.685
		Y	1208.371	25.724	1153.838	1262.905
	Y	N	1164.125	20.845	1119.936	1208.314
		Y	1154.778	20.198	1111.959	1197.596
TopUniv	N	N	46.494	16.135	12.290	80.698
		Y	39.873	13.699	10.833	68.913
	Y	N	46.189	11.100	22.658	69.721
		Y	30.541	10.756	7.739	53.343

Table A36. Estimated marginal means for EngIFL * SciIFL

<i>Dependent Variable</i>	<i>EngIFL</i>	<i>SciIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	34.829	6.336	21.398	48.259
		Y	66.248	9.206	46.733	85.763
	Y	N	52.585	7.363	36.976	68.194
		Y	43.620	8.000	26.660	60.580
SAT _{med}	N	N	1167.778	19.533	1126.371	1209.186
		Y	1243.561	28.381	1183.396	1303.725
	Y	N	1138.509	22.700	1090.387	1186.632
		Y	1138.455	24.665	1086.167	1190.742
TopUniv	N	N	43.606	10.402	21.555	65.656
		Y	46.916	15.114	14.877	78.955
	Y	N	29.766	12.089	4.139	55.393
		Y	44.070	13.135	16.226	71.915

Table A37. Estimated marginal means for EngIFL * SSIFL

<i>Dependent Variable</i>	<i>EngIFL</i>	<i>SSIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	47.422	5.858	35.003	59.841
		Y	43.182	8.646	24.852	61.511
	Y	N	54.804	9.175	35.353	74.255
		Y	44.197	6.384	30.663	57.731
SAT _{med}	N	N	1180.403	18.061	1142.115	1218.691
		Y	1205.676	26.657	1149.165	1262.186
	Y	N	1114.067	28.288	1054.100	1174.035
		Y	1156.800	19.683	1115.074	1198.526
TopUniv	N	N	54.697	9.618	34.308	75.087
		Y	34.721	14.196	4.628	64.815
	Y	N	37.885	15.064	5.950	69.819
		Y	34.405	10.482	12.185	56.625

Table A38. Estimated marginal means for SciIFL * SSIFL

<i>Dependent Variable</i>	<i>SciIFL</i>	<i>SSIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	48.906	6.644	34.822	62.991
		Y	38.507	7.821	21.928	55.087
	Y	N	55.526	10.985	32.238	78.814
		Y	50.768	6.630	36.714	64.823
SAT _{med}	N	N	1116.053	20.484	1072.630	1159.476
		Y	1190.235	24.112	1139.121	1241.349
	Y	N	1209.599	33.867	1137.804	1281.395
		Y	1161.096	20.440	1117.765	1204.426
TopUniv	N	N	44.195	10.908	21.071	67.319
		Y	29.177	12.840	1.957	56.397
	Y	N	50.483	18.035	12.250	88.717
		Y	41.692	10.885	18.617	64.767

Table A39. Estimated marginal means for Bible * EngIFL * SSIFL

<i>Dependent Variable</i>	<i>Bible</i>	<i>EngIFL</i>	<i>SSIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
						<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	N	41.640	7.610	25.507	57.772
			Y	42.692	15.779	9.243	76.142
		Y	N	68.220	17.500	31.122	105.317
			Y	32.039	9.407	12.096	51.981
	Y	N	N	50.313	8.133	33.072	67.553
			Y	43.426	9.916	22.405	64.448
		Y	N	48.097	10.790	25.223	70.970
			Y	56.356	8.814	37.670	75.041
SAT _{med}	N	N	N	1128.136	23.462	1078.399	1177.873
			Y	1210.329	48.646	1107.205	1313.454
		Y	N	1098.775	53.951	984.404	1213.146
			Y	1207.393	29.003	1145.909	1268.876
	Y	N	N	1206.536	25.073	1153.383	1259.689
			Y	1203.349	30.571	1138.540	1268.157
		Y	N	1121.714	33.266	1051.193	1192.234
			Y	1106.207	27.175	1048.599	1163.815
TopUniv	N	N	N	57.214	12.494	30.727	83.700
			Y	46.838	25.905	-8.078	101.755
		Y	N	35.775	28.730	-25.131	96.680
			Y	36.390	15.445	3.649	69.132
	Y	N	N	53.439	13.352	25.134	81.745
			Y	28.663	16.280	-5.849	63.175
		Y	N	38.940	17.715	1.386	76.494
			Y	32.420	14.471	1.742	63.097

Table A40. Estimated marginal means for EngIFL * SciIFL * SSIFL

<i>Dependent Variable</i>	<i>EngIFL</i>	<i>SciIFL</i>	<i>SSIFL</i>	<i>Mean</i>	<i>Std. Error</i>	<i>95% Confidence Interval</i>	
						<i>Lower Bound</i>	<i>Upper Bound</i>
AP _{avail}	N	N	N	35.465	4.547	25.827	45.104
			Y	34.192	11.818	9.140	59.244
		Y	N	71.334	15.592	38.281	104.388
			Y	61.161	9.332	41.379	80.944
	Y	N	N	62.348	12.518	35.810	88.885
			Y	42.823	9.239	23.236	62.409
		Y	N	39.717	16.042	5.709	73.726
			Y	45.572	8.823	26.868	64.276
SAT _{med}	N	N	N	1130.337	14.017	1100.622	1160.052
			Y	1205.220	36.433	1127.985	1282.455
		Y	N	1280.535	48.071	1178.629	1382.440
			Y	1206.587	28.769	1145.598	1267.575
	Y	N	N	1101.769	38.594	1019.954	1183.584
			Y	1175.249	28.485	1114.865	1235.634
		Y	N	1138.664	49.458	1033.817	1243.511
			Y	1138.350	27.202	1080.685	1196.015
TopUniv	N	N	N	47.903	7.464	32.079	63.727
			Y	39.309	19.402	-1.821	80.439
		Y	N	68.286	25.599	14.019	122.554
			Y	25.546	15.320	-6.932	58.024
	Y	N	N	40.487	20.552	-3.082	84.055
			Y	19.045	15.169	-13.111	51.201
		Y	N	32.681	26.338	-23.153	88.514
			Y	49.765	14.486	19.057	80.473

The SPSS program evaluated all covariates in the estimated marginal means tables for the MANCOVA at the following values: Tuition = \$16,229.55 and MFIA = 25%.

APPENDIX 9

CANONICAL CORRELATION ANALYSIS

This appendix contains the results of a canonical correlation analysis (CCA) performed on the data used for the research project. The canonical correlation analysis allowed for the creation of synthetic variables containing all the continuous variables in the study, showing the presence of relationships between variables in new ways and confirming the study's findings of strong effects within the data. The results of the CCA are interpreted below.

Confirmation of Findings through Canonical Correlation Analysis (CCA)

The *SPSS* GLM interface allows users to conduct a number of post-hoc tests for variables that have more than two levels, Bonferroni being the most customary. However, due to the fact that all independent variables were dichotomous (Y/N), the normal post-hoc tests would not be run by the *SPSS* program. Consequently after reading Garson's manual, I chose to perform a canonical correlation analysis to confirm the correlations between the variables indicated by the MANCOVA.¹

The assumptions of canonical correlation analysis (CCA) were the same as for MANOVA, so the tests offered in the earlier section sufficed to confirm that I could continue with the CCA.² I used the *SPSS* program's "Syntax" command box to specify

¹Garson writes, "Statistically, a canonical correlation is the correlation of two canonical variables. Each set may be considered a latent variable based on measured indicator variables in its set. The canonical correlation is optimized such that the linear correlation between the two latent variables is maximized," David Garson, *GLM Multivariate, MANOVA, & Canonical Correlation: Blue Book Series 11* (Raleigh, NC: Statistical Associates Publishers, 2015), loc. 2927, Kindle.

²"Canonical correlation is a member of the multiple general linear hypothesis (MLGH) family and shares many of the assumptions of multiple regression and multiple analysis of variance, such as

the test of canonical correlation. The command set is reproduced in table A49. Canonical correlation uses statistical analysis to

Find the linear combination of variables that produces the largest correlation with the second set of variables. This linear combination, or ‘root’, is extracted and the process is repeated for the residual data, with the constraint that the second combination of variables must not correlate with the first one. The process is repeated until a successive linear combination is no longer significant.³

The following analysis freely adopts the suggested wording from Robin K. Henson in the appendix to her article with Alyssa Sherry.⁴ I conducted a canonical correlation analysis using the two income variables as predictors of the three academic rigor variables to evaluate the multivariate shared relationship between the two variable sets (i.e., income and academic rigor). The analysis yielded two functions with squared canonical correlations (R_c^2) of 0.425 and 0.371 for each successive function. Collectively, the full model across all functions was statistically significant using the Wilks’s $\lambda = 0.361$ criterion, $F(6, 28) = 3.09988$, $p = 0.019$. Because Wilks’s λ represents the variance unexplained by the model, $1 - \lambda$ yields the full model effect size in an r^2 metric. Thus, for the set of four canonical functions, the r^2 type effect size was 0.639, which indicates that the full model explained a substantial portion, about 64%, of the variance shared between the variable sets. The dimension reduction analysis allowed me to test the hierarchal arrangement of functions for statistical significance. As noted, the full model (Functions 1 to 2) was statistically significant. Function 2 to 2 was also statistically significant, $F(2, 15) = 4.43876$, $p = 0.031$. Given the effects for each

linearity of relationships, homoscedasticity (same level of relationship for the full range of the data), interval or near-interval data, untruncated variables, proper specification of the model, lack of high multicollinearity, and multivariate normality for purposes of hypothesis testing,” Garson, *GLM Multivariate, MANOVA, & Canonical Correlation*, loc. 2951, Kindle.

³Ibid., loc. 2936, Kindle.

⁴The text of this canonical correlation analysis wholly follows the suggested “Sample Write-Up of the Results” from appendix B in the article by Sherry and Henson. I substituted my own data for the findings of Sherry and Henson, while preserving their suggested language. Alyssa Sherry and Robin K. Henson, “Conducting and Interpreting Canonical Correlation Analysis in Personality Research: A User-Friendly Primer,” *Journal of Personality Assessment* 84, no. 1 (June 2004): 37-48.

function, both of the first two functions were considered noteworthy in the context of this study (42.5% and 37.1% of shared variance, respectively). Table A41 presents the standardized canonical function coefficients and structure coefficients for Functions 1 and 2. The squared structure coefficients were also given as well as the communalities (h^2) across the two functions for each variable. Looking at the Function 1 coefficients, the relevant criterion variable was primarily AP_{avail}, with TopUniv making secondary contributions to the synthetic criterion variable. This conclusion was supported by the squared structure coefficients. These aspects of academic rigor also tended to have the larger canonical function coefficients. Furthermore, all of these variables' structure coefficients had the same sign, indicating that they were all positively related. AP_{avail} was inversely related to the other aspects of academic rigor. Regarding the predictor variable set in Function 1, the MFIA variable was the primary contributor to the predictor synthetic variable. These results were generally supportive of the theoretically expected relationships between academic rigor as expressed through more AP course offerings and higher levels of median family income, and I labeled Function 1 as "AP and Median Family Income." This confirmed the finding in the MANCOVA "Tests of Between-Subjects Effects," that MFIA had a strong effect size ($\eta_p^2 = 0.237$) on percentage of AP course offerings. Moving to Function 2, the coefficients in table A41 suggested that the criterion variables of relevance were both AP_{avail} and SAT_{med}, markedly so for the latter. As for income variables, Tuition was now the dominant predictor, along with MFIA again. Looking at the structure coefficients for the entire function, both Tuition and MFIA were positively related to AP_{avail} and SAT_{med}. Given the nature of these variables, I labeled this function as "Standardized Tests and Tuition." This largely echoed the finding in the MANCOVA "Tests of Between-Subjects Effects" that Tuition has a strong effect on SAT_{med} scores ($\eta_p^2 = 0.220$) and the findings from the one-way ANOVA performed on

mean SAT_{med} scores by income brackets seen in table 13 in chapter 4.⁵

Therefore, I found that there are two canonical roots that account for the variance in the model constructed by the original research study's dependent variables and covariates. Those two canonical roots, "Standardized Tests and Tuition" and "AP Offerings and Median Family Income" explained 64% of the variance in the model, and the research suggested that those two roots are correlated to one another, possibly through the presence of the IFL language variables used in the MANCOVA. Those variables were not included in the model due to the fact that they were dichotomous and not the continuous variables needed for CCA.

Table A41. Canonical solution for income predicting academic rigor for functions 1 and 2

<i>Variable</i>	<i>Function 1</i>			<i>Function 2</i>			<i>h²</i>
	<i>Coef.</i>	<i>r_s</i>	<i>r_s²</i> (%)	<i>Coef.</i>	<i>r_s</i>	<i>r_s²</i> (%)	
AP _{avail}	1.06009	0.64450	41.5	0.30461	0.59066	34.9	76.4
SAT _{med}	-0.38666	-0.13910	1.9	0.82414	0.88857	78.9	80.8
TopUniv	-0.78517	-0.33494	11.2	0.24389	0.35991	12.9	24.1
<i>R_c</i>	--	--	42.5	--	--	37.1	--
Tuition	-0.90895	-0.13035	1.7	0.88910	0.99147	98.3	100
MFIA	1.26064	0.69926	48.9	0.16574	0.71487	51.1	100

Note: Structure coefficients (*r_s*) greater than $|.45|$ are bolded. Community coefficients (*h²*) greater than 45% are bold. Coef = standardized canonical function coefficient; *r_s* = structure coefficient; *r_s²* = squared structure coefficient; *h²* = communality coefficient

⁵Sherry and Henson, "Conducting and Interpreting Canonical Correlation Analysis in Personality Research," 48.

Table A42. Effect and within cells regression

<i>Multivariate Tests of Significance (S = 2, M = 0, N = 6) $\alpha = .05$</i>					
<i>Test Name</i>	<i>Value</i>	<i>Approx. F</i>	<i>Hypoth. DF</i>	<i>Error DF</i>	<i>Sig. of F</i>
Pillai's	0.79707	3.31307	6.00	30.00	0.013
Hotelling's	1.33181	2.88559	6.00	26.00	0.027
Wilks's	0.36104	3.09988	6.00	28.00	0.019
Roy's	0.42528	--	--	--	--

Note: F statistic for Wilks's λ is exact; $p < .05$

Table A43. Eigenvalues and canonical correlations

<i>Root No.</i>	<i>Eigenvalue</i>	<i>%</i>	<i>Cum.%</i>	<i>Canon Cor. (R_c)</i>	<i>Sq. Cor (R_c^2)</i>
1	0.73998	55.56176	55.56176	0.65214	0.42528
2	0.59183	44.43824	100.00000	0.60975	0.37179

Table A44. Dimension reduction analysis

<i>Roots</i>	<i>Wilks λ</i>	<i>F</i>	<i>Hypoth. DF</i>	<i>Error DF</i>	<i>Sig. of F</i>
1 TO 2	0.36104	3.09988	6.00	28.00	0.019
2 TO 2	0.62821	4.43876	2.00	15.00	0.031

Note: ($p < 0.05$) = Sig. of F

Table A45. Standardized canonical coefficients for DEPENDENT variables

<i>Variable</i>	<i>Function No.</i>	
	<i>1</i>	<i>2</i>
AP _{avail}	1.06009	0.30461
SAT _{med}	-0.38666	0.82414
TopUniv	-0.78517	0.24389

Table A46. Correlations between DEPENDENT and canonical variables

<i>Variable</i>	<i>Function No.</i>	
	<i>1</i>	<i>2</i>
AP _{avail}	0.64450	0.59066
SAT _{med}	-0.13910	0.88857
TopUniv	-0.33494	0.35991

Note: these values = r_s (structure coefficient)

Table A47. Standardized canonical coefficients for COVARIATES

<i>Variable</i>	<i>Canonical Variable</i>	
	<i>1</i>	<i>2</i>
Tuition	-0.90895	0.88910
MFIA	1.26064	0.16574

Table A48. Correlations between COVARIATES and canonical variables

<i>Variable</i>	<i>Canonical Variable</i>	
	<i>1</i>	<i>2</i>
Tuition	-0.13035	0.99147
MFIA	0.69926	0.71487

Note: these values = r_s (structure coefficient)

Table A49. Syntax Command for Canonical Correlation in SPSS

MANOVA AP SAT TopUniversity BY Bible (0,1) EngIFL (0,1) SciIFL (0,1) SSIFL (0,1) WITH Tuition MFIA
/DISCRIM=ALL ALPHA(1)
/PRINT SIGNIF(MULTIV UNIV EIGEN DIM).

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ABSTRACT

CHRISTIAN CURRICULAR EMPHASES AND ACADEMIC RIGOR: A MIXED METHODS STUDY

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This study explored the relationship between Christian curricular emphases and academic rigor among Christian secondary schools. It used convergent data transformation methods to analyze published curriculum descriptions in relationship to published academic data. This study correlated the two sets of variables while controlling for the influence of family income on these academic performance metrics.

A review of the precedent literature first presented foundations for Christian education. It then examined studies of both Christian curriculum and academic rigor. It reviewed studies of curriculum, both theoretical and practical, and introduced the term “Christian curricular emphases” for discussing intentional assertions of Christian principles. It also reviewed studies examining selected criteria (AP courses, SAT scores, and acceptance into top universities) as measures of academic rigor. Few published studies examined both strands together.

The convergent data transformation research design consisted of both qualitative and quantitative analyses consisting of four phases. The study required a population which could demonstrate both Christian curricular emphases and academic rigor, hence the selection of CESA schools. The first phase collected published qualitative curricular data and quantitative academic rigor data. The second phase gathered both tuition and family income data to control for possible confounding

variables. The third phase coded schools' course descriptions for integration of faith and learning (IFL) language, which was then transformed into quantitative data for analysis. The fourth phase performed a multivariate analysis of variance with covariates (MANCOVA) on all collected data.

Overall, this study found that CESA schools provided rigorous academics when compared to other categories of schools. Controlling for family income levels strengthened all academic rigor measurements. Increasing years of required Bible courses correlated with lower measures of academic rigor. Higher frequency of IFL language in science course descriptions correlated with higher academic rigor measures, while higher frequency of IFL language in English or social studies courses did not. No school used IFL language in math course descriptions.

Evaluating CESA schools' Christian curricular and academic rigor data confirmed the added clarity of controlling for income data. Additionally, this study provided a new methodology for correlating Christian curricular emphases and academic rigor in Christian secondary schools.

KEYWORDS: academic rigor, AP, Badley paradigms, Bible courses, CESA, census study, Christian curriculum, Christian school, convergent data transformation, correlation, course descriptions, directed content analysis, faith integration, integration of faith and learning, Ken Badley, MANCOVA, median family income, mixed methods, SAT, secondary schools, top-ranked universities, tuition

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